6222B-UUC

Wi-Fi Dual-band 2x2 11ac + Bluetooth 5.0

Combo Module Datasheet

6222B-UUC Module Datasheet

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Customer Approval :

_____	Company
_____	Title
_____	Signature
_____	Date
_____	Fn-Link

Revision History

Version	Date	Revision Content	Draft	Approved
1.0	2020/10/14	Initial Release	fc	Stone

CONTENTS

1 Overview

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 and Bluetooth functionalities. The highly integrated module makes the possibilities of web browsing, VoIP, Bluetooth headsets applications. With seamless roaming capabilities and advanced security, also could interact with different vendors' 802.11a/b/g/n/ac 2x2 Access Points in the wireless LAN.
The wireless module complies with IEEE 802.11 a/b/g/n/ac 2x2 MIMO standard and it can achieve up to a speed of 867Mbps with dual stream in 802.11ac to connect the wireless LAN. The integrated module provides USB2.0 interface for Wi-Fi and Bluetooth. This compact module is a total solution for a combination of Wi-Fi + BT technologies. The module is specifically developed for Smart TV and OTT Box application

1.2 Features

- Highly integrated wireless local area network (WLAN) system-on-chip (SOC) for 5 GHZ 802.11ac, or 2.4G/5G 802.11n WLAN applications
- Dual-stream spatial multiplexing up to 867 Mbps data rate.
- Supports 20/40MHz at 2.4GHz and supports 20/40/80MHz at 5GHz
- Supports USB interface for WLAN and Bluetooth.
- Complies with USB2.0 for WLAN and BT controller.
- Supports Bluetooth V5.0+HS, BLE and be backwards compatible with Bluetooth 1.2, 2.X+ enhance data rate.
- Supports Bluetooth for class1 , class2 and class3 power level transmissions.

1.3 Block Diagram
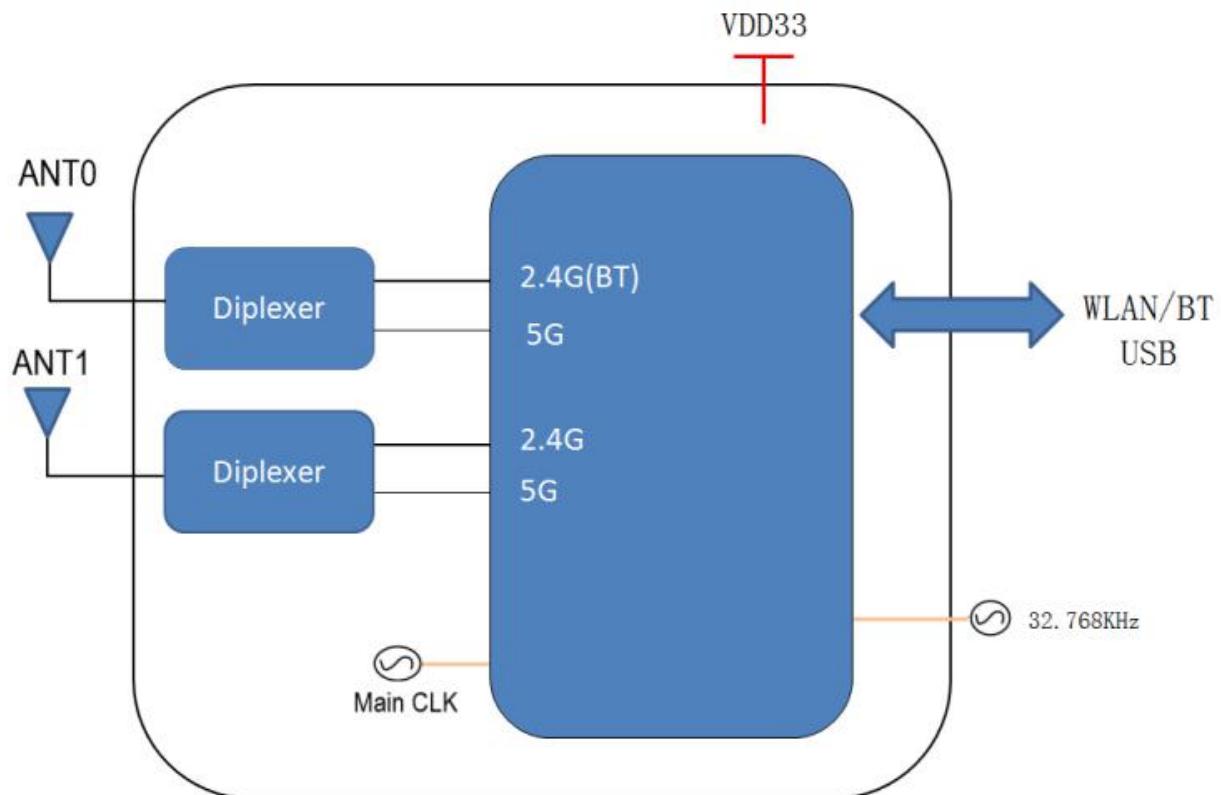
Figure 1-1 Block Diagram

1.4 General Specification

Model Name	6222B-UUC
Product Description	Support Wi-Fi/Bluetooth functionalities
Dimension	L x W x H: 13.0 x 15.0 x 2.5 mm
Wi-Fi Interface	USB 2.0
BT Interface	USB 2.0
Operating temperature	0°C to 70°C
Storage temperature	-40°C to 85°C
RoHS	All hardware components are fully compliant with EU RoHS directive

1.5 Recommended Operating Rating

	Min.	Typ.	Max.	Unit
Operating Temperature	0	25	70	deg.C
VCC33	3.15	3.3	3.45	V
VDDIO	-	3.3	-	V
Power Consumption	VCC33 = 3.3V(Unit: mA)			
	Wi-Fi on Mode	180		
	TX (2.4G 11n HT40 MCS15 @14dBm)	650		
	RX (2.4G 11n HT40 MCS8)	220		
	TX (5G 11ac vHT80 MCS9@13dBm)	750		
	RX (5G 11ac vHT80 MCS0)	250		
	BT on	32		

※1.6 EEPROM Information

Wi-Fi

Vendor ID	0BDAh
Product ID	C82Ch

2 Wi-Fi RF Specification

2.1 Wi-Fi 2.4GHz RF Specification

Feature	Description
WLAN Standard	IEEE 802.11b/g/n, Wi-Fi compliant
Frequency Range	2.400 GHz ~ 2.497 GHz (2.4 GHz ISM Band)
Channels	2.4GHz : Ch1 ~ Ch14
Output Power	802.11b /11M : 16 ± 1.5 dBm @ EVM ≤ -9dB
	802.11g /54M : 15 ± 1.5 dBm @ EVM ≤ -26dB

	802.11n /MCS7 : 14 ± 1.5 dBm @ EVM $\leq$ -28dB
	Other data rate TX power control by 'power by rate'
Spectrum Mask	IEEE compliant
Freq. Tolerance	$\pm$20 ppm
Receive Sensitivity (11b) @8% PER	- 1Mbps: $\leq$ -92 dBm
	- 11Mbps: $\leq$ -85 dBm
Receive Sensitivity (11g) @10% PER	- 6Mbps: $\leq$ -89 dBm
	- 54Mbps: $\leq$ -71 dBm
Receive Sensitivity (11n,20MHz) @10% PER	- MCS=0: $\leq$ -89 dBm
	- MCS=7: $\leq$ -69 dBm
Receive Sensitivity (11n,40MHz) @10% PER	- MCS=0: $\leq$ -87 dBm
	- MCS=7: $\leq$ -67 dBm

2.2 Wi-Fi 5GHz RF Specification

Feature	Description	
WLAN Standard	IEEE 802.11a/n/ac 2x2, Wi-Fi compliant	
Frequency Range	4.900 GHz ~ 5.845 GHz (5.0 GHz ISM Band)	
Number of Channels	5.0GHz：Please see the table[1]	
Output Power	802.11a /54Mbps : 15 dBm ± 1.5 dB @ EVM $\leq$ -25dB	
	802.11n /MCS7 : 14 dBm ± 1.5 dB @ EVM $\leq$ -28dB	
	802.11ac /MCS9 : 13 dBm ± 1.5 dB @ EVM $\leq$ -32dB	
Test Items	**Test Value**	**Standard Value**
SISO Receive Sensitivity (11a,20MHz) @10% PER	- 6Mbps PER @ -89 dBm	≤-85
	- 54Mbps PER @ -71 dBm	≤-68
SISO Receive Sensitivity (11n,20MHz) @10% PER	- MCS=0 PER @ -89 dBm	≤-85
	- MCS=7 PER @ -69 dBm	≤-67
MIMO Receive Sensitivity (11n,20MHz) @10% PER	- MCS=0 PER @ -89 dBm	≤-82
	- MCS=15 PER @ -69 dBm	≤-63
SISO Receive Sensitivity (11n,40MHz) @10% PER	- MCS=0 PER @ -87 dBm	≤-82
	- MCS=7 PER @ -67 dBm	≤-64
MIMO Receive Sensitivity (11n,40MHz) @10% PER	- MCS=0 PER @ -87 dBm	≤-79
	- MCS=15 PER @ -67 dBm	≤-61
SISO Receive Sensitivity (11ac,20MHz) @10% PER	- MCS=0, NSS1 PER @ -86 dBm	≤-82
	- MCS=8, NSS1 PER @ -64 dBm	≤-60

MIMO Receive Sensitivity (11ac,20MHz) @10% PER	- MCS=0, NSS1 PER @ -88 dBm	≤-79
	- MCS=8, NSS1 PER @ -67 dBm	≤-57
SISO Receive Sensitivity (11ac,40MHz) @10% PER	- MCS=0, NSS1 PER @ -84 dBm	≤-79
	- MCS=9, NSS1 PER @ -60 dBm	≤-55
MIMO Receive Sensitivity (11ac,40MHz)@10% PER	- MCS=0, NSS1 PER @ -86 dBm	≤-79
	- MCS=9, NSS1 PER @ -63 dBm	≤-54
SISO Receive Sensitivity (11ac,80MHz) @10% PER	- MCS=0, NSS1 PER @ -81 dBm	≤-79
	- MCS=9, NSS1 PER @ -56 dBm	≤-54
MIMO Receive Sensitivity (11ac,80MHz) @10% PER	- MCS=0, NSS1 PER @ -82 dBm	≤-76
	- MCS=9, NSS1 PER @ -60 dBm	≤-51
Maximum Input Level	802.11a/n : -30 dBm	
Antenna Reference	Small antennas with 0~2 dBi peak gain	

[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

3 Bluetooth Specification

3.1 Bluetooth Specification

Feature	Description		
General Specification			
Bluetooth Standard	Bluetooth V5.0 of 1, 2 and 3 Mbps.		
Host Interface	USB2.0		
Antenna Reference	Small antenna with 0~2 dBi peak gain		
Frequency Band	2402 MHz ~ 2480 MHz		
Number of Channels	79 channels		
Modulation	GFSK, π/4-DQPSK, 8DPSK		
RF Specification			
	Min.	**Typical.**	**Max.**
Output Power (Class 1.5)	4 dBm	5dBm	10 dBm
Sensitivity @ BER=0.1% for GFSK (1Mbps)	-92 dBm	-82 dBm	-70 dBm
Sensitivity @ BER=0.01% for π/4-DQPSK (2Mbps)	-92 dBm	-80 dBm	-70 dBm
Sensitivity @ BER=0.01% for 8DPSK (3Mbps)	-92 dBm	-80 dBm	-70 dBm
Maximum Input Level	GFSK (1Mbps):-20dBm		
	π/4-DQPSK (2Mbps) :-20dBm		
	8DPSK (3Mbps) :-20dBm		

4 Pin Assignments

4.1 Pin Outline

< TOP VIEW >
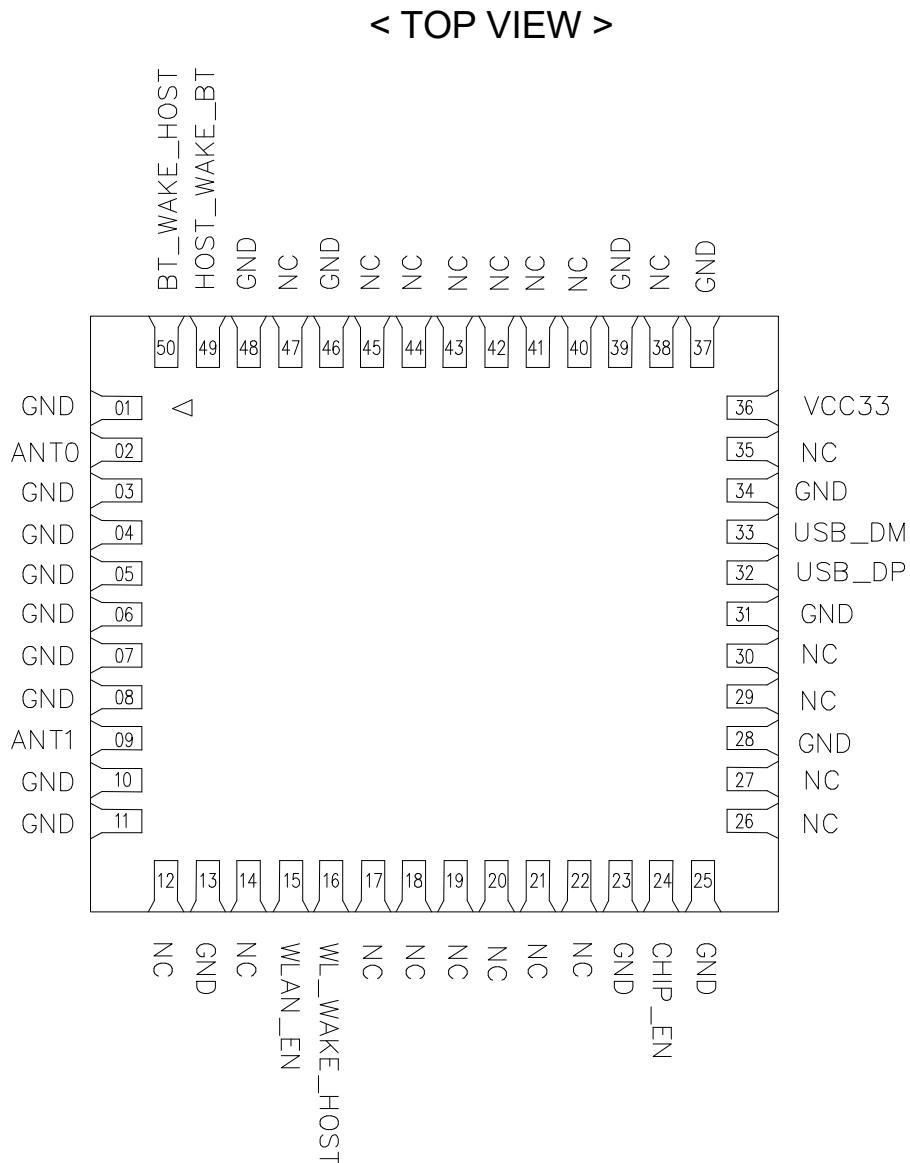
Figure 4-1 Module pin outline

4.2 Pin Definition

PIN	Name	Type	Description	Voltage
1	GND	—	Ground connections	
2	ANT0	I/O	RF I/O chain0, dual band Wi-Fi and BT	
3~8	GND	—	Ground connections	
9	ANT1	I/O	RF I/O chain1, dual band Wi-Fi	
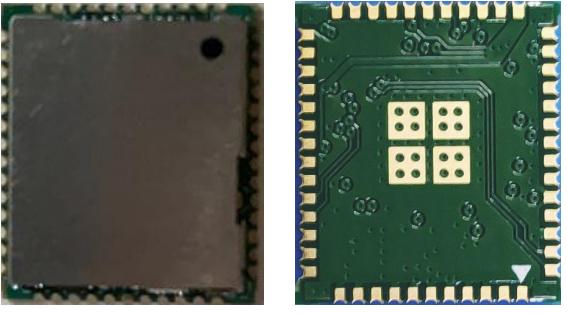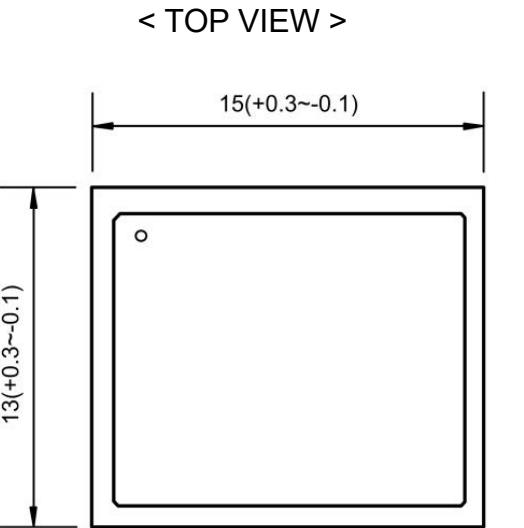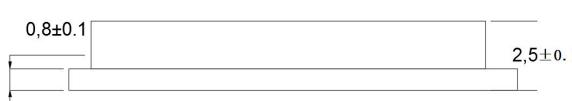
10~11	GND	—	Ground connections	
12	NC	—	Not connected	
13	GND	—	Ground connections	
14	NC	—	Not connected	
15	WLAN_EN	I	Enable pin for WLAN device ON: pull high ; OFF: pull low	3.3V
16	WL_WAKE_HOST	O	WLAN to wake-up HOST	3.3V
17~22	NC	—	Not connected	
23	GND	—	Ground connections	
24	CHIP_EN	I/O	Enable pin for chipset. Pull low to shut down RTL8821CU. (Internal 47Kohm pull-high to 3.3V)	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	
40~45	NC	—	Not connected	
46	GND	—	Ground connections	
47	NC	—	Not connected	
48	GND	—	Ground connections	
49	HOST_WAKE_BT	I	HOST to wake-up Bluetooth device	3.3V
50	BT_WAKE_HOST	O	Bluetooth device to wake-up HOST	3.3V

P: POWER   I: INPUT   O: OUTPUT

5 Dimensions

5.1 Physical Dimensions and Module Photo

(Unit: mm)

	< TOP VIEW >
L x W : 13 x 15 mm	15(+0.3~-0.1) 13(+0.3~-0.1)
H: 2.5 mm	< Side View > 0,8±0.1 2,5±0.1
Weight	0.85±0.1g

5.2 Marking Description

< TOP VIEW >

Fn-Link ------- Brand name

6222B-UUC -·-·- Model name

XXXXXX -·-·- Lot code

XXXX 00 -·-·- XXXX: Date Code
00: Internal control code
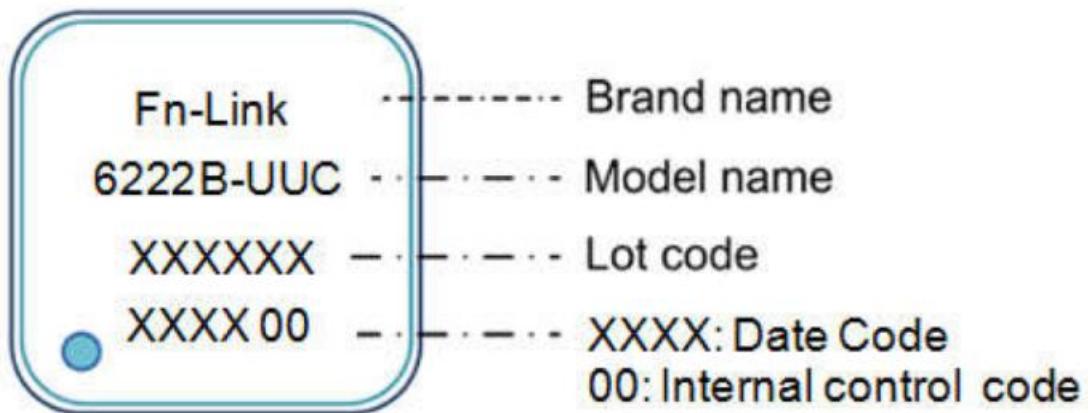
Figure 5-1 Marking Description

5.3 Module Physical Dimensions

(Unit: mm)

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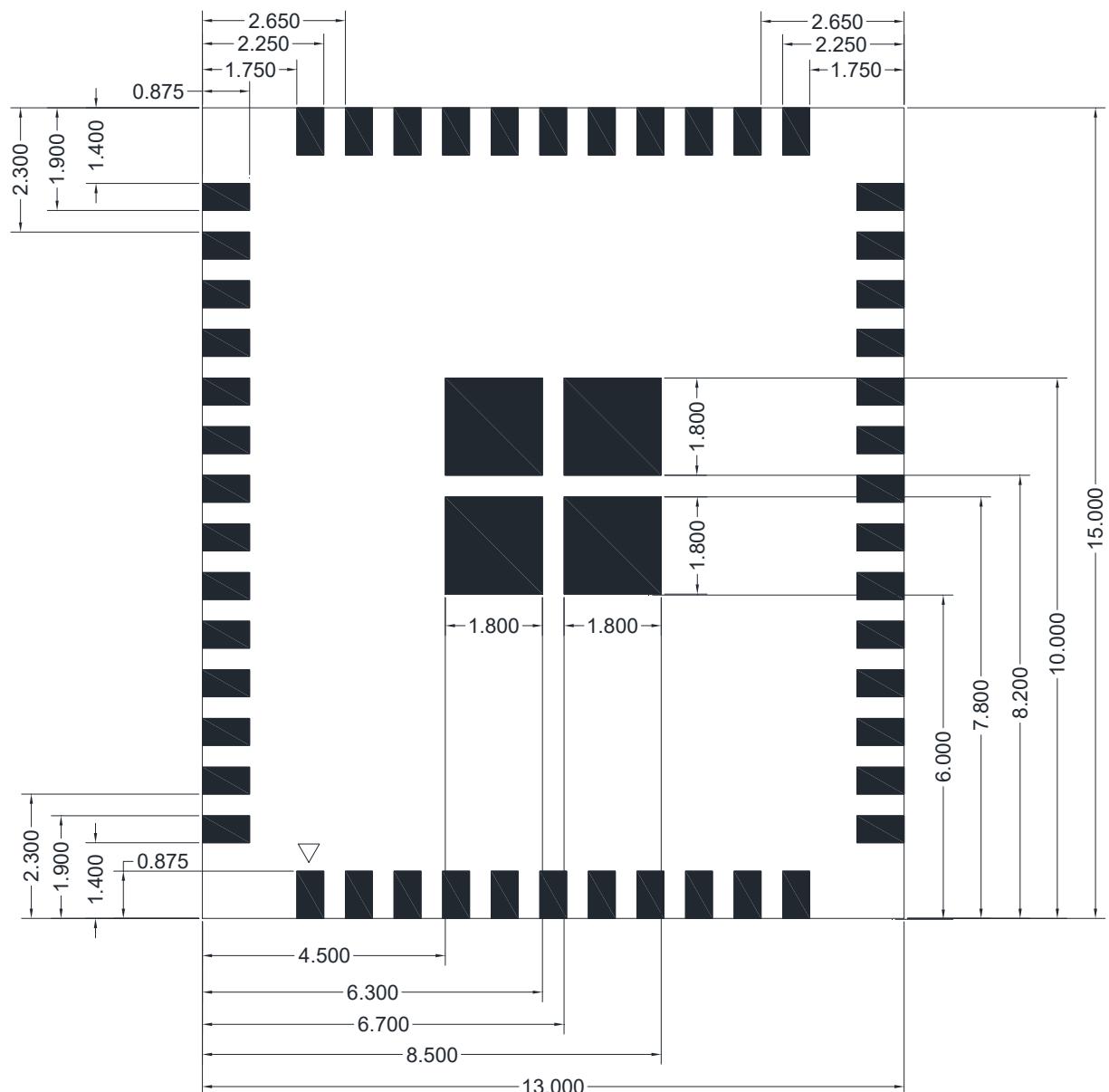
Figure 5-2 Module physical dimensions

5.4 Layout Recommendation

(Unit: mm)

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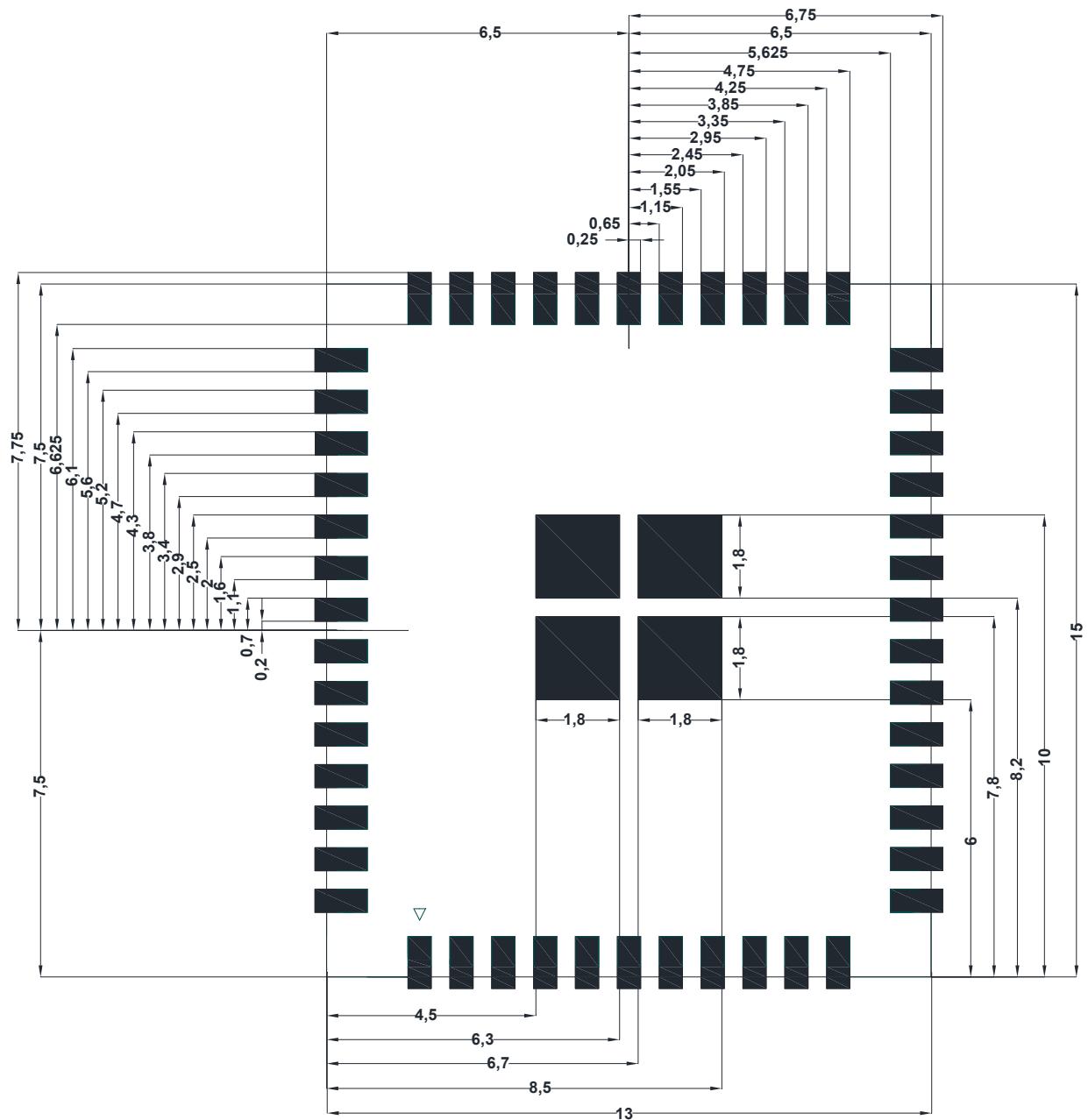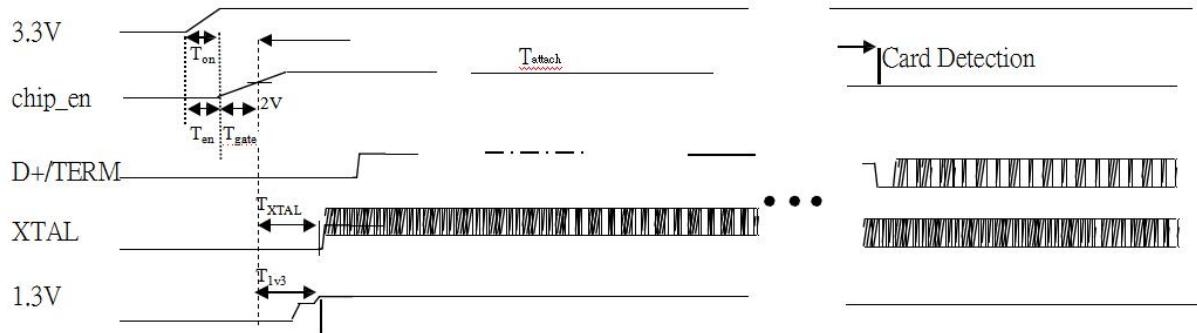
Figure 5-3 Layout footprint recommendation

6 Interface Timing Specification

6.1 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:

After the main 3.3V ramp up, the internal power on reset is released by the power ready detection circuit and the power management unit is 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	-	1.5	5
T_{en}	ms	0	0	5
T_{gate}	ms	0	1.5	8
T_{attach}	ms	100	250	-
T_{xtal}	ms	-	1.5	8
T_{1v3}	ms	-	3	11

7 Reference Design
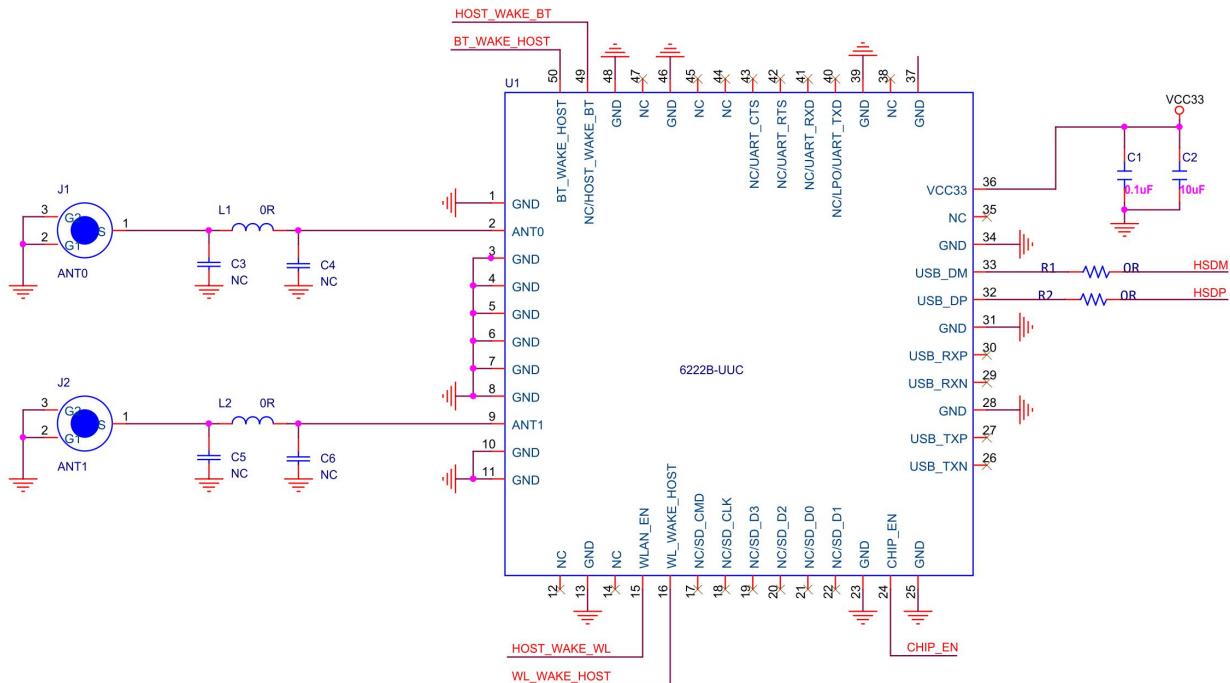
Figure 7-1 Reference schematic

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

8 Ordering Information

Part No.	Description
FG6222BUUC-00	RTL8822CU, 802.11a/b/g/n/ac, Wi-Fi 2T2R, BT V5.0, USB2.0, 15x13mm, dual antenna (external)

9 The Key Material List

Item	Part Name	Description	Manufacturer
1	Inductor	2016 2.2uH,±20%	Cenker, Sunlord, Ceaiya
2	Diplexer	1608 Dual-band, dual-mode 2.4GHz/5GHz WLAN	ACX, Walsin, GIEAD, MAG.LAYERS, Murata
3	Crystal	2016 40MHz ±10ppm -10~85℃	ECEC, Hosonic, TKD, JWT
4	Chipset	RTL8822CU-CG	Realtek

10 Recommended Reflow Profile

Referred to IPC/JEDEC standard.

Peak Temperature : <250°C

Number of Times : ≦2 times
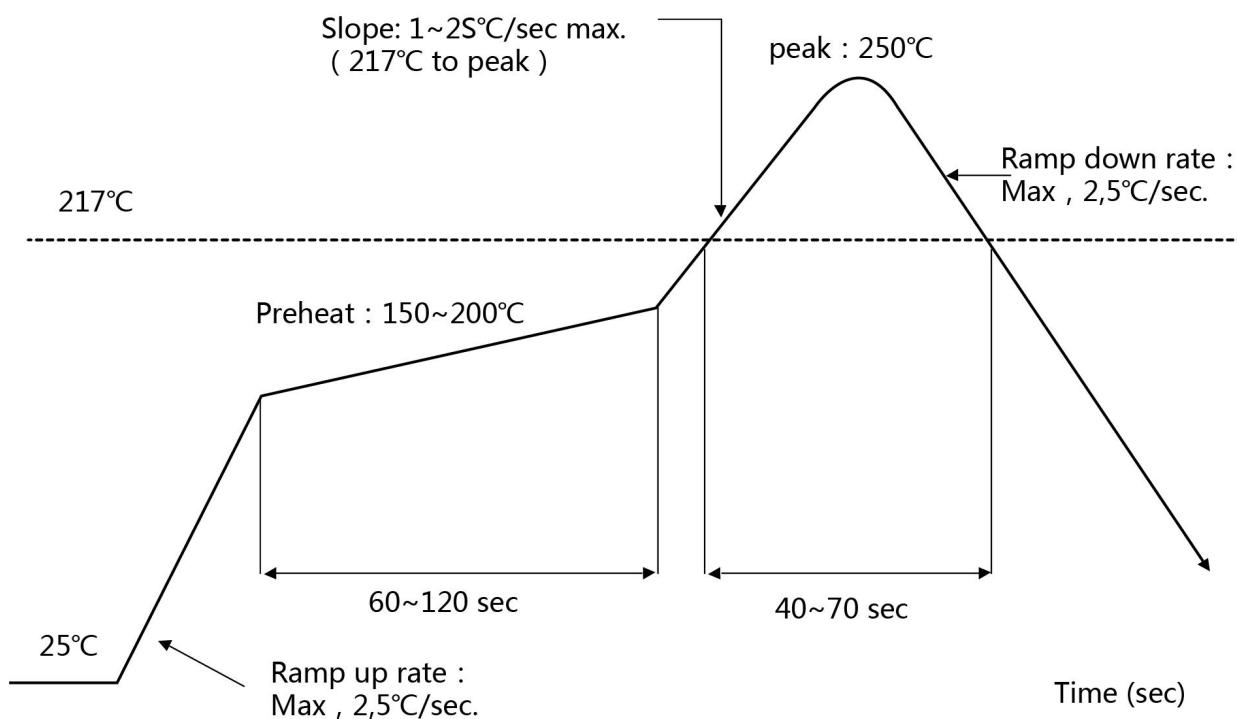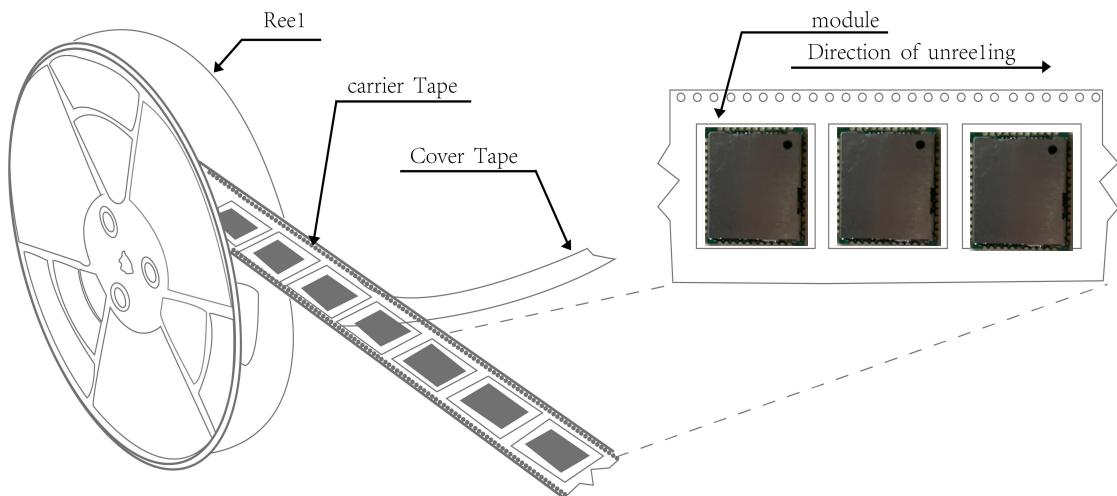
Figure 10-1 Recommended reflow profile

11 Package Information

11.1 Reel

11.2 Packaging Details

The take-up package:

Using self-adhesive tape
Color of plastic disc: blue

NY bag size: TBD

Internal box size: TBD

Carton size: TBD

11.3 Moisture Sensitivity

The modules is a Moisture Sensitive Level 3 device, in according with standard IPC/JEDEC J-STD-020, take care of all the requirements for this kind of components. Moreover, please pay attention to following conditions:

a) Calculated shelf life in sealed bag: 12 months at <40°C and <90% 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 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