

PRODUCT SPECIFICATION

6252C-PUB

Wi-Fi Dual-band 2T2R 11ax + Bluetooth 5.2

Combo Module

Version:v1.0



6252C-PUB Module Datasheet

Ordering Information	Part NO.	Description
	FG6252CPUB-00	RTL8852BE-CG/wifi6/2T2R+BT,802.11a/b/g/n/ac/ax+BLE5.2,2T2R,PCIE+USB,12*16,PCIE port

Customer: _____

Customer P/N: _____

Signature: _____

Date: _____

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Revision History

[illegible]

1. General Description

1.1 Introduction

The fn-link6252C-PUB is a highly integrated single-chip that support 2-stream 802. 11ax solutions with Multi-user MIMO (Multiple-Input, Multiple-Output)with Wireless LAN (WLAN) PCI Express network interface controller with integrated Bluetooth 5 USB interface controller.It combines a WLAN MAC, a2T2R capable WLAN baseband, and RF in a single chip. The RTL8852BE provides a complete solution for a high-performance integrated wireless and Bluetooth device

電波法により5.2/5.3 GHz帯は屋内使用に限ります。
5.2/5.3 GHz band is restricted to indoor use due to the Radio Law”

1.2 Description

Model Name	6252C-PUB
Product Description	Support Wi-Fi/Bluetooth functionalities
Dimension	L x W x H: 16x 12x 1.7 (typical) mm
Wi-Fi Interface	Support PCIe
BT Interface	USB
OS supported	Android /Linux/ Win CE /iOS /XP/WIN7/WIN10
Operating temperature	0°C to 70°C
Storage temperature	-55°C to 85°C

2. Features

General

- IEEE 802.11a/b/g/n/ac/ax compatible WLAN
- Supports 20/40MHz at 2.4GHz and supports 20/40/80MHz at 5GHz
- Supports 802.11ac 2x2, Wave-2 compliant with RX MU-MIMO
- Complete 802.11n MIMO solution for 2.4GHz and 5GHz band
- Enhanced BT/Wi-Fi Coexistence Control to improve transmission quality in different profiles
- Integrated 32K oscillator for power management

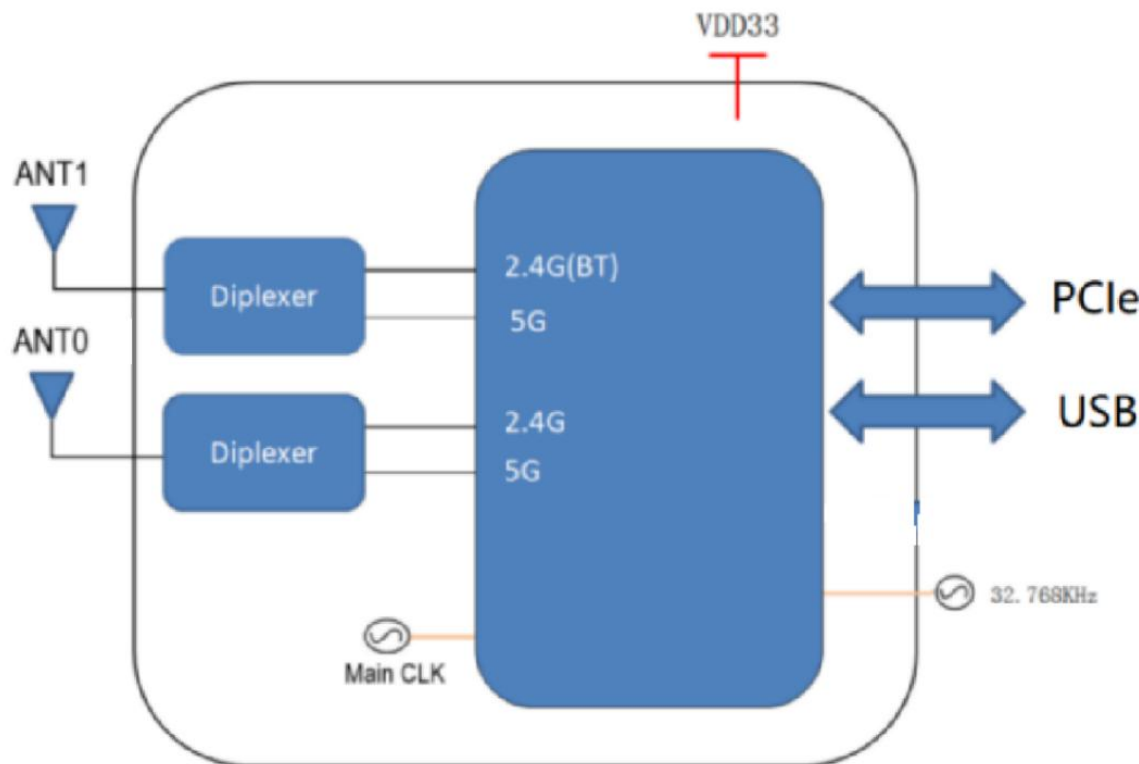
Host Interface

- Supports low power PCIe(Base Specification Revision 1.1) interface for WLAN and USB(2.0FS-mode)

Bluetooth Features

- Supports Bluetooth 5.2 system
- Compatible with Bluetooth v2.1+EDR
- Dual Mode support: Simultaneous LE and BR/EDR
- Supports Bluetooth for class1, class2 and class3 power level transmissions without requiring an external PA

3. Block Diagram



4. General Specification

4.1 2.4GHz RF Specification

Feature	Description	
WLAN Standard	IEEE 802.11 b/g/n/ac/ax Wi-Fi compliant	
Frequency Range	2.412 GHz ~ 2.472 GHz (2.4 GHz ISM Band)	
Number of Channels	2.4GHz: Ch1 ~ Ch13	
Test Items	Typical Value	EVM
Output Power	802.11b /11Mbps: 19dBm ± 2 dB	EVM ≤ -9dB
	802.11g /54Mbps: 18dBm ± 2 dB	EVM ≤ -25dB
	802.11n /MCS7: 17dBm ± 2 dB	EVM ≤ -28dB
	802.11ac VHT20 MCS8: 16dBm ± 2 dB	EVM ≤ -30dB
	802.11ac VHT40 MCS9: 15dBm ± 2 dB	EVM ≤ -32dB
	802.11ax HE20 MCS11: 13dBm ± 2 dB	EVM ≤ -35dB
	802.11ax HE40 MCS11: 13dBm ± 2 dB	EVM ≤ -35dB
Spectrum Mask	Meet with IEEE standard	

Freq. Tolerance	$\pm 20\text{ppm}$		
SISO Receive Sensitivity (11b,20MHz) @8% PER	- 1Mbps	@ -94 dBm	$\leq -83\text{ dBm}$
	- 11Mbps	@ -85 dBm	$\leq -76\text{ dBm}$
Receive Sensitivity (11g,20MHz) @10% PER	- 6Mbps	@ -90 dBm	$\leq -85\text{ dBm}$
	- 54Mbps	@ -71 dBm	$\leq -68\text{ dBm}$
Receive Sensitivity (11n,20MHz) @10% PER	- MCS=0	@ -90 dBm	$\leq -85\text{ dBm}$
	- MCS=7	@ -69 dBm	$\leq -67\text{ dBm}$
Receive Sensitivity (11n,40MHz) @10% PER	- MCS=0	@ -87 dBm	$\leq -82\text{ dBm}$
	- MCS=7	@ -66 dBm	$\leq -64\text{ dBm}$
Receive Sensitivity (11ac,20MHz) @10% PER	- MCS=0	@ -90 dBm	$\leq -82\text{ dBm}$
	- MCS=8	@ -64 dBm	$\leq -60\text{ dBm}$
Receive Sensitivity (11ac ,40MHz) @10% PER	- MCS=0	@ -87 dBm	$\leq -79\text{ dBm}$
	- MCS=9	@ -59 dBm	$\leq -55\text{ dBm}$
Receive Sensitivity (11ax,20MHz) @10% PER	- MCS=0	@ -90 dBm	$\leq -74\text{ dBm}$
	- MCS=11	@ -60 dBm	$\leq -52\text{ dBm}$
Receive Sensitivity (11ax ,40MHz) @10% PER	- MCS=0	@ -87 dBm	$\leq -71\text{ dBm}$
	- MCS=11	@ -57 dBm	$\leq -49\text{ dBm}$
Maximum Input Level	802.11b : -10 dBm		
	802.11g/n : -20 dBm		
Antenna Reference	Rob Antenna 1, max gain 3.35dBi, Rob Antenna 2, max gain 3.35dBi. The antenna MIMO combining gain is 6.35dBi.		

4.2 5GHz RF Specification

Conditions : VBAT=3.3V ; VDDIO=3.3V ; Temp:25°C

Feature	Description	
WLAN Standard	IEEE 802.11a/n/ac/ax 2x2, Wi-Fi compliant	
Frequency Range	5180-5240, 5260-5320, 5500-5700, 5745-5825MHz(5.0 GHz ISM Band)	
Number of Channels	5.0GHz: Please see the table1	
Test Items	Typical Value	EVM
Output Power	802.11a /54Mbps: 18 dBm $\pm 2\text{ dB}$	EVM $\leq -25\text{dB}$
	802.11n /MCS7: 17 dBm $\pm 2\text{ dB}$	EVM $\leq -28\text{dB}$
	802.11ac VHT20 MCS8: 16 dBm $\pm 2\text{ dB}$	EVM $\leq -30\text{dB}$
	802.11ac VHT40 MCS9: 15 dBm $\pm 2\text{ dB}$	EVM $\leq -32\text{dB}$
	802.11ac VHT80 MCS9: 15 dBm $\pm 2\text{ dB}$	EVM $\leq -32\text{dB}$
	802.11ax HE20 MCS11: 13 dBm $\pm 2\text{ dB}$	EVM $\leq -35\text{dB}$
	802.11ax HE40 MCS11: 13 dBm $\pm 2\text{ dB}$	EVM $\leq -35\text{dB}$
	802.11ax HE80 MCS11: 13 dBm $\pm 2\text{ dB}$	EVM $\leq -35\text{dB}$

Test Items	Test Value	Standard Value
Receive Sensitivity (11a,20MHz) @10% PER	- 6Mbps @ -90 dBm	≤-85
	- 54Mbps @ -71 dBm	≤-68
Receive Sensitivity (11n,20MHz) @10% PER	- MCS=0 @ -90 dBm	≤-85
	- MCS=7 @ -69 dBm	≤-67
Receive Sensitivity (11n,40MHz) @10% PER	- MCS=0 @ -87 dBm	≤-82
	- MCS=7 @ -66 dBm	≤-64
Receive Sensitivity (11ac,20MHz)@10% PER	- MCS=0, NSS1 @ 90 dBm	≤-82
	- MCS=8, NSS1 @ -64 dBm	≤-60
Receive Sensitivity (11ac,40MHz) @10% PER	- MCS=0, NSS1 @ -87 dBm	≤-79
	- MCS=9, NSS1 @ -59 dBm	≤-55
Receive Sensitivity (11ac,80MHz) @10% PER	- MCS=0, NSS1 @ -84 dBm	≤-79
	- MCS=9, NSS1 @ -56 dBm	≤-54
Receive Sensitivity (11ax,20MHz) @10% PER	- MCS=0 @ -90 dBm	≤-74
	- MCS=11 @ -60 dBm	≤-52
Receive Sensitivity (11ax,40MHz) @10% PER	- MCS=0 @ -87 dBm	≤-71
	- MCS=11 @ -57 dBm	≤-49
Receive Sensitivity (11ax,80MHz) @10% PER	- MCS=0 @ -84 dBm	≤-68
	- MCS=11 @ -54 dBm	≤-46
Maximum Input Level	802.11a/n: -30 dBm	
Antenna Reference	Rob Antenna 1, max gain 4.56dBi, Rob Antenna 2, max gain 4.56dBi. The antenna MIMO combining gain is 7.56dBi.	

15GHz(20MHz) Channel table

Band range	Operating Channel Numbers	Channel center frequencies(MHz)
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

5745MHz~5825MHz	136	5680
	140	5700
	149	5745
	153	5765
	157	5785
	161	5805
	165	5825

4.3 Bluetooth Specification

Feature	Description		
General Specification			
Bluetooth Standard	Bluetooth V5.2 of 1, 2 and 3 Mbps.		
Host Interface	USB		
Antenna Reference	Rob Antenna, max gain 3.35dBi		
Frequency Band	2402 MHz ~ 2480 MHz		
Number of Channels	79 channels		
Modulation	GFSK, $\pi/4$ -DQPSK, 8-DPSK		
RF Specification			
	Min(dBm)	Typical(dBm)	Max(dBm)
Output Power (Class 1)	2	5	8
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		

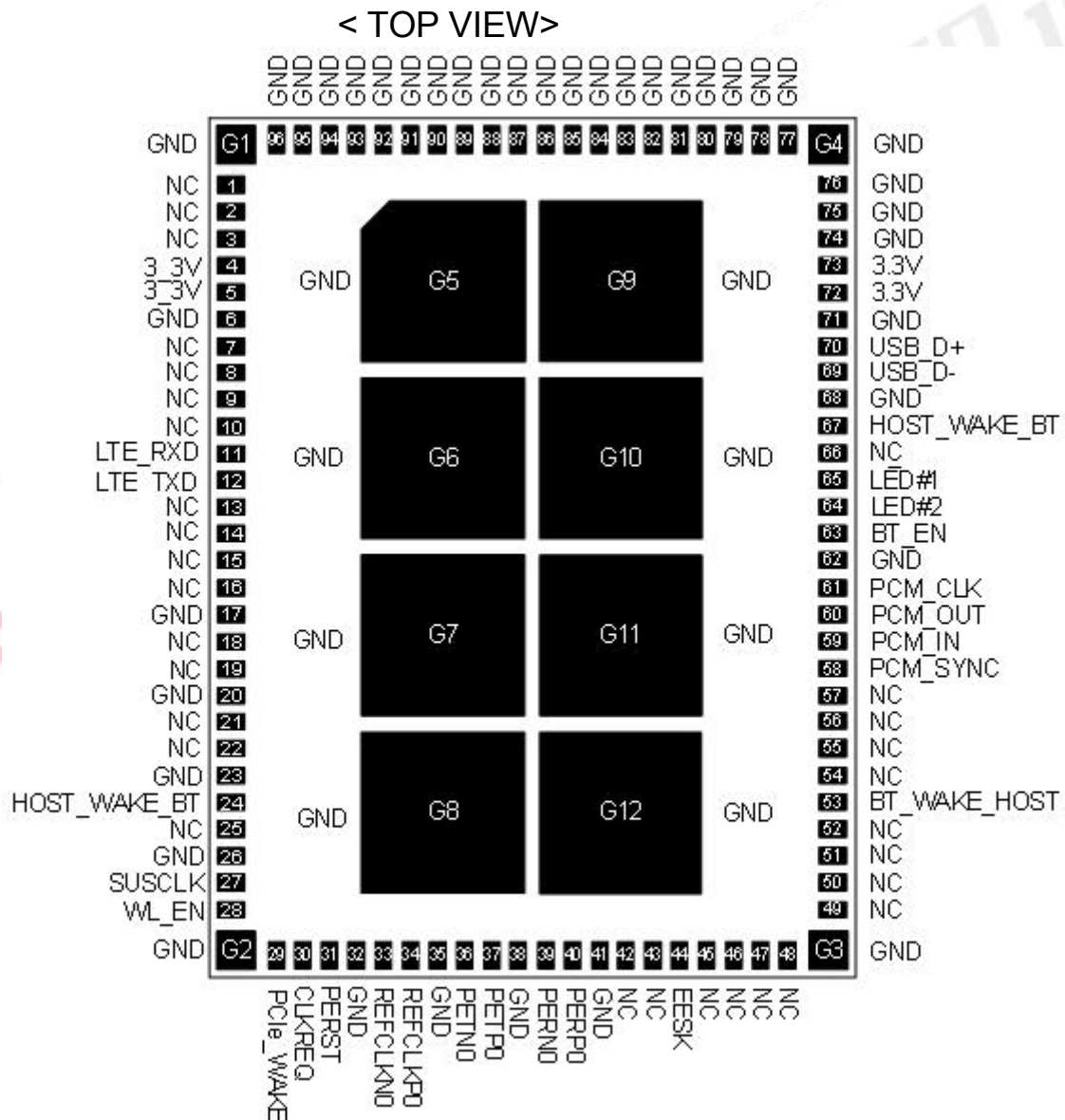
5. ID setting information

WI-FI

Vendor ID	TBD
Product ID	TBD

6. Pin Definition

6.1 Pin Outline



6.2 Pin Definition details

NO.	Name	Type	Description	Voltage
1	NC	—	No connect	
2	NC	—	No connect	
3	NC	—	No connect	
4	3_3V	P	Main power voltage source input 3.3V	3.3V
5	3_3V	P	Main power voltage source input 3.3V	3.3V
6	GND	—	Ground connections	
7	NC	—	No connect	
8	NC	—	No connect	
9	NC	—	No connect	
10	NC	—	No connect	
11	LTE_RXD	I	LTE coexist signal	3.3V
12	LTE_TXD	O	LTE coexist signal	3.3V
13	NC	—	No connect	
14	NC	—	No connect	
15	NC	—	No connect	
16	NC	—	No connect	
17	GND	—	Ground connections	
18	NC	—	No connect	
19	NC	—	No connect	
20	GND	—	Ground connections	
21	NC	—	No connect	
22	NC	—	No connect	
23	GND	—	Ground connections	
24	HOST_WAKE_BT	I	Host wake up BT	3.3V
25	NC	—	No connect	
26	GND	—	Ground connections	
27	SUSCLK	I	External sleep clock input(32.768KHz)	3.3V
28	WL_EN	—	WLAN enable pin, High: enable,Low:disable	3.3V
29	PCIe_WAKE	OD	PCIe wake up host	3.3V
30	CLKREQ	OD	PCIe reference clock request signal	3.3V
31	PERST	PD	PCIe reset module	3.3V
32	GND	—	Ground connections	
33	REFCLKN0	I	PCIe CLK Difference -	
34	REFCLKP0	I	PCIe CLK Difference +	
35	GND	—	Ground connections	

36	PETN0	O	PCIe Data Out Difference -	
37	PETP0	O	PCIe Data Out Difference +	
38	GND	—	Ground connections	
39	PERN0	I	PCIe Data IN Difference -	
40	PERP0	I	PCIe Data IN Difference +	
41	GND	—	Ground connections	
42	NC	—	No connect	
43	NC	—	No connect	
44	EESK/NC	—	EESK or No connect, NC if not use, do not connect to GND	
45	NC	—	No connect	
46	NC	—	No connect	
47	NC	—	No connect	
48	NC	—	No connect	
49	NC	—	No connect	
50	NC	—	No connect	
51	NC	—	No connect	
52	NC	—	No connect	
53	BT_WAKE_HOST	O	Bluetooth wake up host	3.3V
54	NC	—	No connect	
55	NC	—	No connect	
56	NC	—	No connect	
57	NC	—	No connect	
58	PCM_SYNC	I/O	PCM sync signal	3.3V
59	PCM_IN	I	PCM data input	3.3V
60	PCM_OUT	O	PCM Data output	3.3V
61	PCM_CLK	I/O	PCM clock	3.3V
62	GND	—	Ground connections	
63	BT_EN	I	This pin can externally shut down the module BT function when BT_EN is pulled Low. When this pin is pulled low, USB interface will be also disabled.	3.3V
64	LED#2	O	BT link LED, active low.	3.3V
65	LED#1	O	WLAN link LED, active low.	3.3V
66	NC	—	No connect	
67	HOST_WAKE_BT	I	Host wake up BT, active high	3.3V
68	GND	—	Ground connections	
69	USB_D-	I/O	USB difference line for BT	

70	USB_D+	I/O	USB difference line for BT	
71	GND	—	Ground connections	
72	3.3V	P	Main power voltage source input 3.3V	3.3V
73	3.3V	P	Main power voltage source input 3.3V	3.3V
74-96	GND	—	Ground connections	
G1-G12	GND	—	Ground connections	

P:POWER I:INPUT O:OUTPUT

7. Electrical Specifications

7.1 Power Supply DC Characteristics

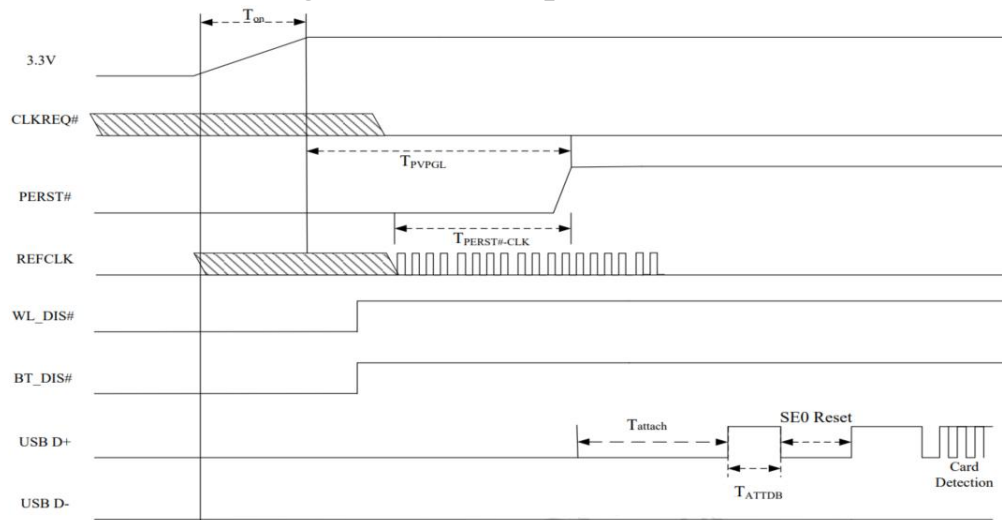
The digital IO supports VDD33 or VDD18 application.

	MIN	TYP	MAX	Unit
Operating Temperature	0	25	70	deg.C
VDD33	3.0	3.3	3.6	V

7.2 Power Consumption

Power Consumption		VDD33 = 3.3V(Unit:mA)
	Wi-Fi on Mode	
	TX (2.4G 1M)	
	TX (2.4G HT40)	
	RX (2.4G HT40)	
	TX (5G 6M)	
	TX (5G vHT80)	
	RX (5G vHT80)	
	BT on	
	BT Hopping	
	BT TX	
	BT RX	

7.3 PCIe Bus during Power On Sequence



T_{on}: The main power ramp up duration

T_{PVPGL}: Power valid to PERST# input inactive

T_{PERST#-CLK}: Reference clock stable before PERST# inactive

T_{attach}: The interval to turn on BT after PERST# de-asserted

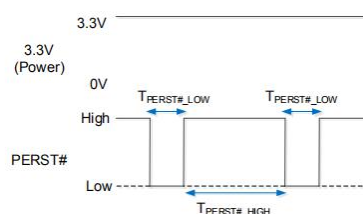
T_{ATTDB}: the debounce interval with a minimal duration of 100ms that provided by the USB system Software

T_{SE0 Reset}: USB host send SE0 Reset duration

Symbol	Unit	Min	Typical	Max
T_{on}	ms	0.5	1.5	5
T_{PVPGL}	ms	Implementation specific; recommended 50ms		
T_{PERST#-CLK}	us	100	—	—
T_{attach}	ms	0.5	2	5
T_{ATTDB}	ms	100	—	—
T_{SE0 Reset}	ms	10	—	—

7.4 Interface Circuit time series

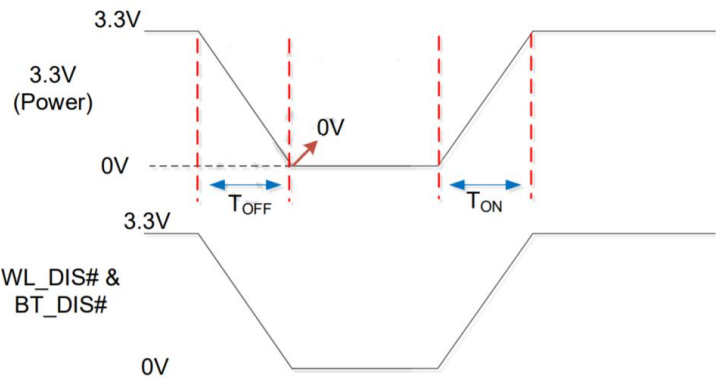
7.4.1 PCIe PERST# Timing Sequence



RTL8821CE-CG PCIe PERST# Timing Parameters

	Min	Typical	Max	Unit	Description
T _{PERST# LOW}	6	10	X	ms	PERST# low duration
T _{PERST# HIGH}	400	500	X	ms	PERST# high duration

7.4.2 Power Off Sequence

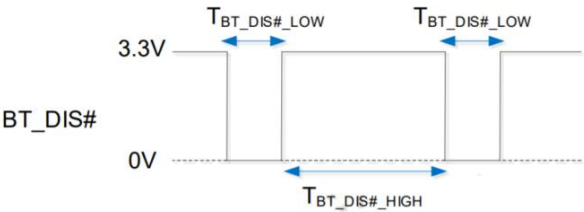


RTL8822CE-CG Power Off Timing Parameters

Symbol	Min	Typical	Max	Unit	Description
T_{OFF}	1.5ms	--	--	ms	Measure point start on 100% Measure point end on 0% (must be 0V)
T_{ON}	0.5	1.5	5	ms	Measure point start on 0% (must be 0V) Measure point end on 100%

Note: If BT_DIS# can't connect to the same power source with 3.3V, it need to be de-asserted before PERST# with 100ms in power on sequence.

7.4.3 BT_DIS Timing Sequence



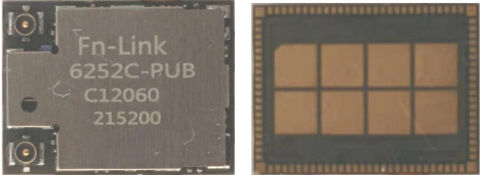
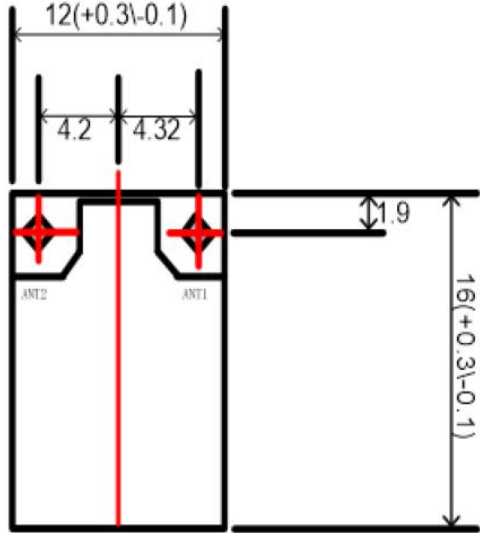
	Min	Typical	Max	Unit	Description
BT_DIS#_LOW	200	--	--	ms	BT_DIS# low duration
BT_DIS#_HIGH	500	--	--	ms	BT_DIS# high duration

7.4.4 Platform state transitions

3.3V Power range	3.3V Ripple	3.3V Noise	Rise time	
			Min	Max
+/-0.165V	300mVpp @ switching frequency > 100KHz		0.5ms	5ms

8. Size reference

8.1 Module Picture

L x W : 16 x 12 (+0.3/-0.1) mm 	
H: 1.7 (±0.2) mm	
Weight	0.75(±0.1)g

8.2 Marking Description

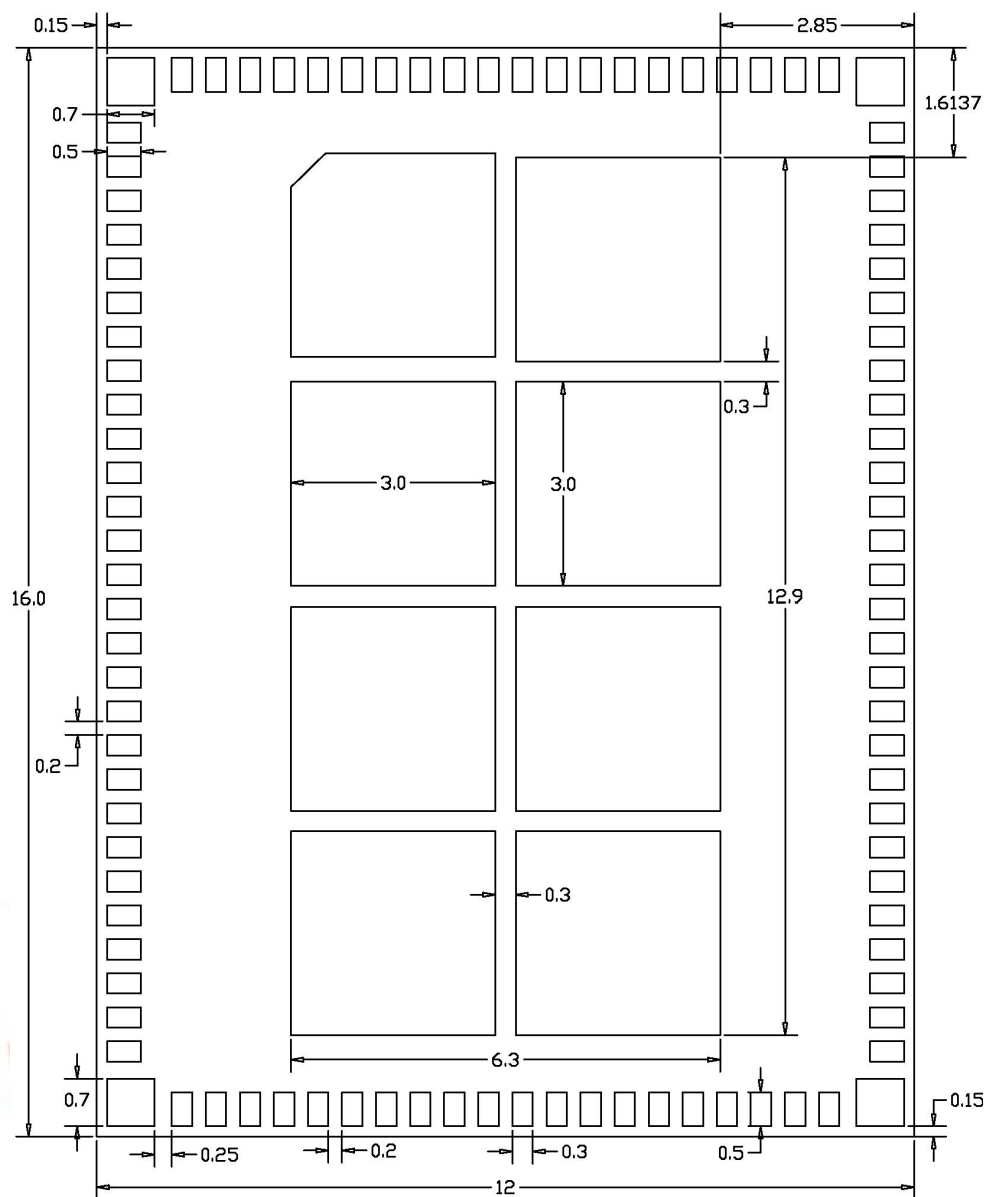
< TOP VIEW >

Brand name -----
Model name -----
Lot code -----
Date code -----

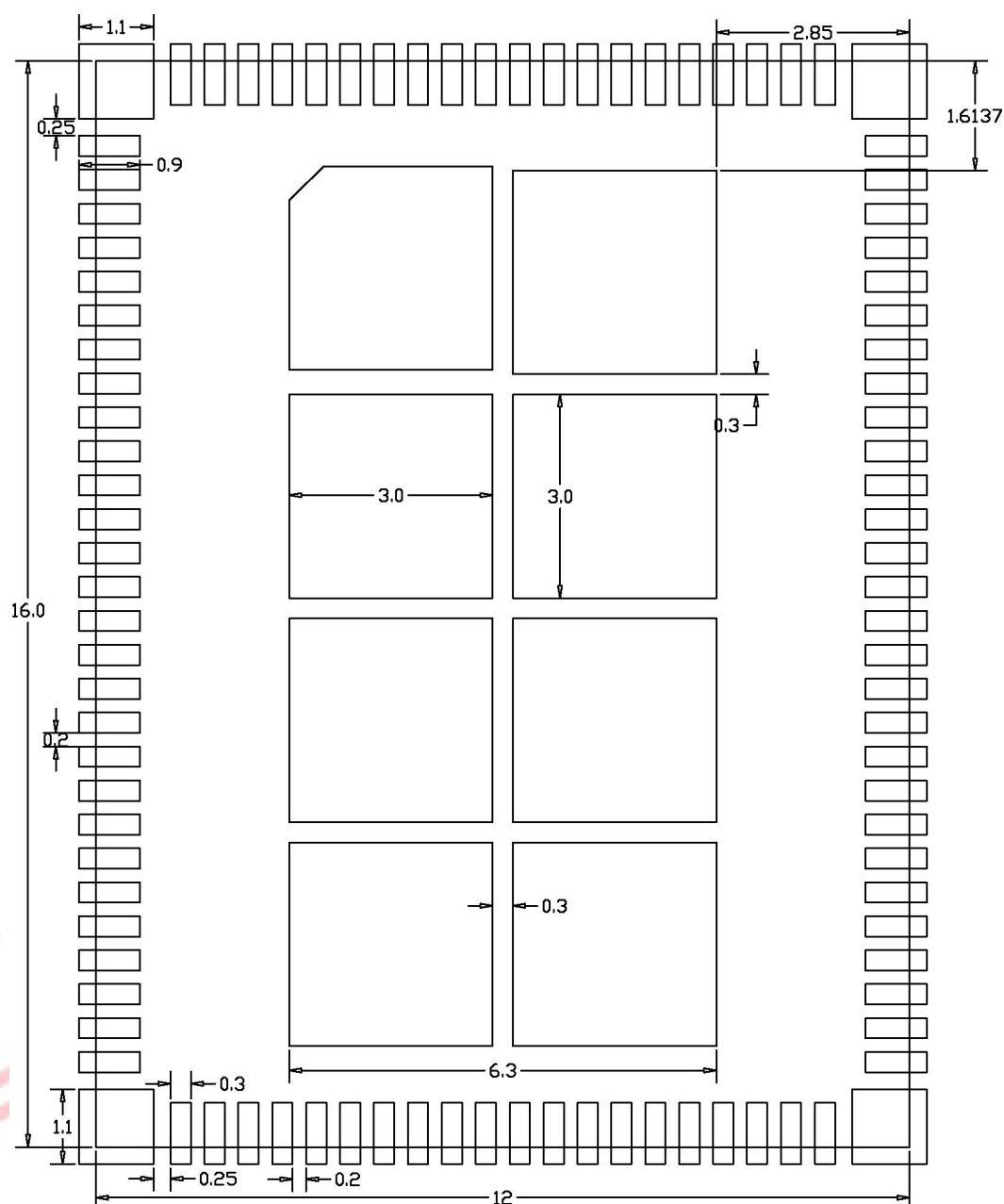


8.3 Physical Dimensions

<TOP View>



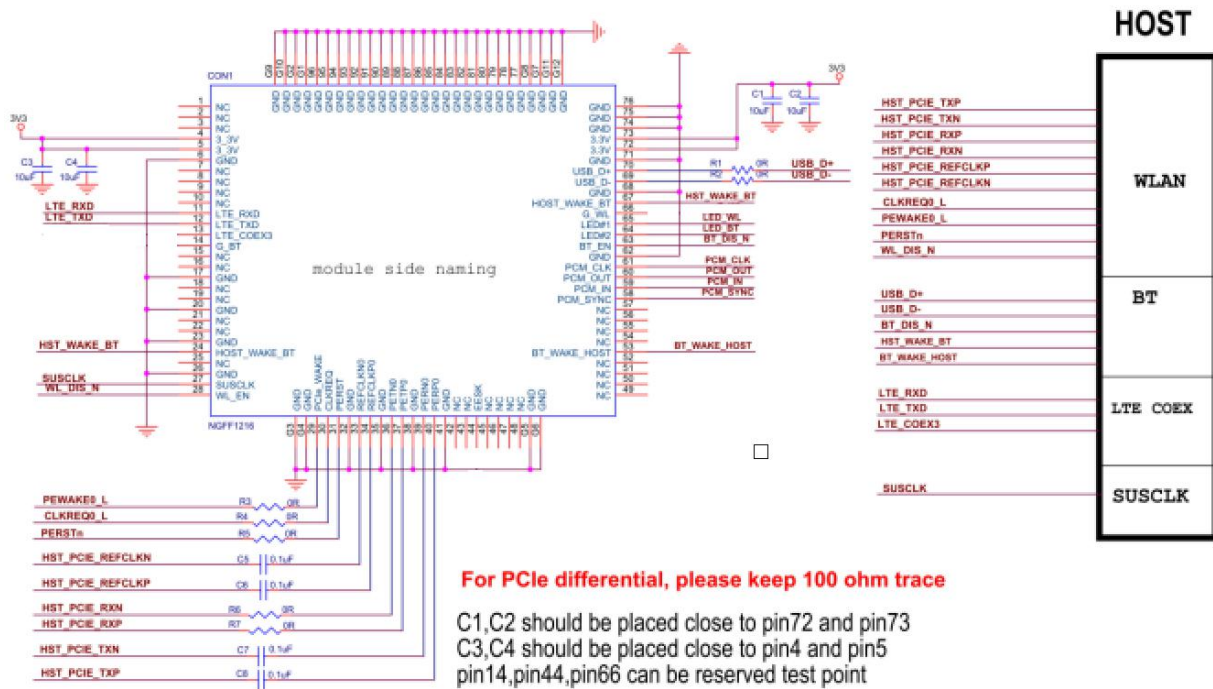
8.4 Layout Recommendation



9. The Key Material List

Item	Part Name	Description	Manufacturer
1	PCB	6252C-PUB 4L,12X16X0.4mm	欣强,XY-PCB, GDKX, Sunlord
2	Crystal	2016 40MHZ, ± 10 ppm, 12pF	ECEC, Hosonic, TKD, JWT, Murata
3	Chipset	RTL8852BE-CG	Realtek
4	Shielding	6252C-PUB-V2.0 Shielding	信太, 精力通

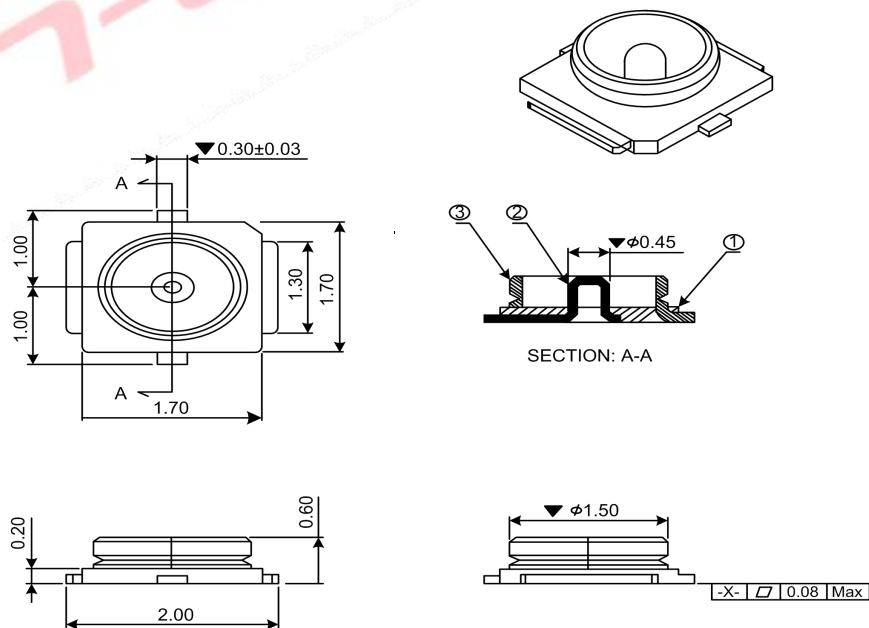
10. Reference Design



Note:

1. ANT_A, ANT_B are all support 2.4G/5G function, ANT_B is support Bluetooth also;
2. The module requires independent power supply, supply capacity $\geq 1000\text{mA}$ and ripple less than 150mV;
3. Do not share power with amplifier, camera, etc.

Connector Specification

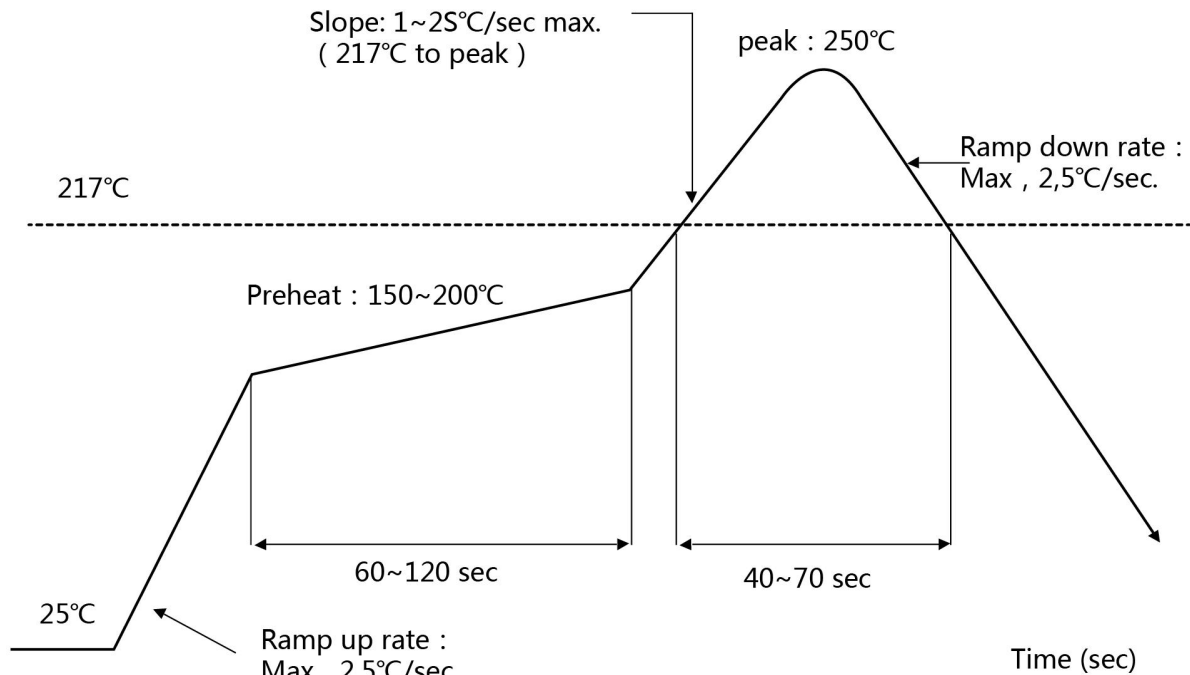


11. Recommended Reflow Profile

Referred to IPC/JEDEC standard.

Peak Temperature : <250°C

Number of Times : ≤2 times



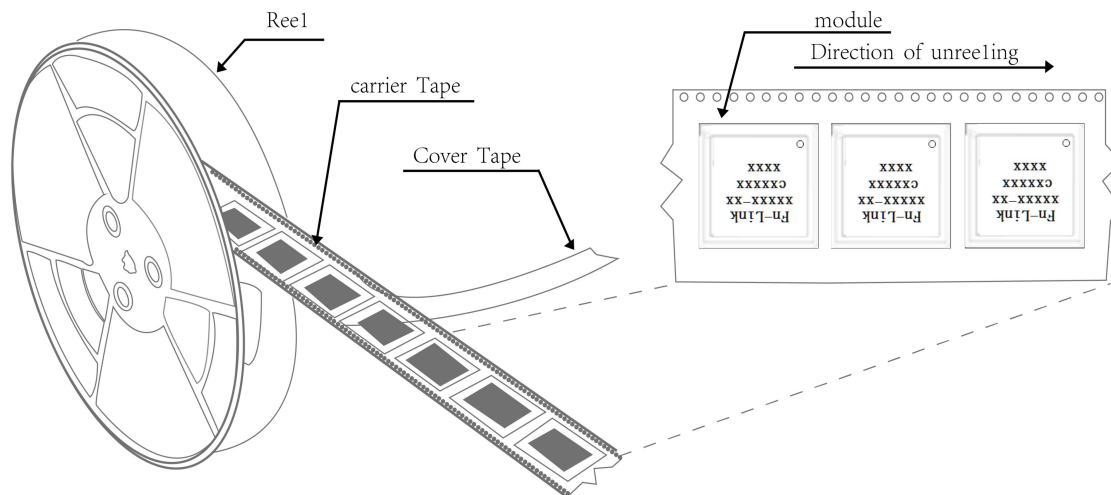
12. RoHS compliance

All hardware components are fully compliant with EU RoHS directive

13. Package

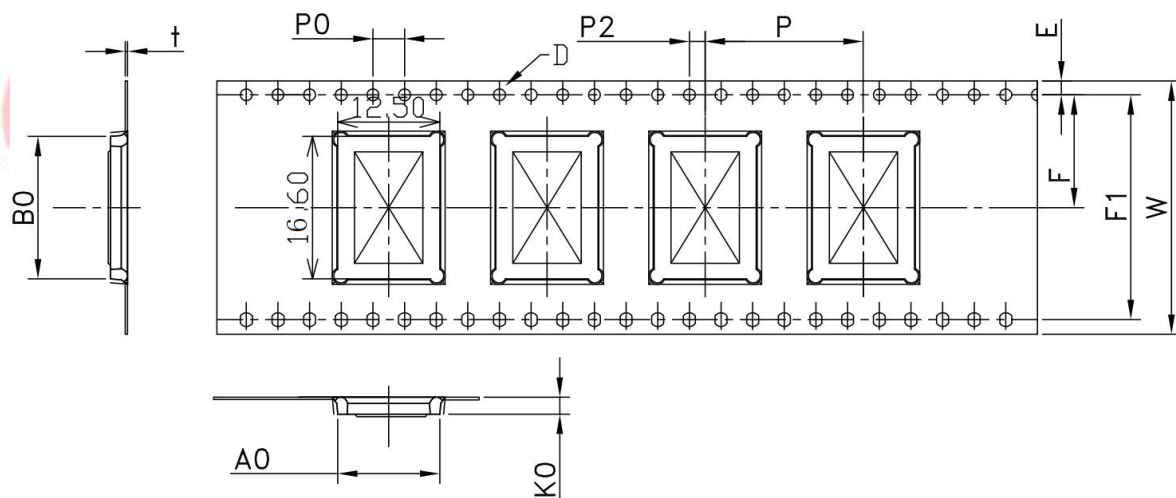
13.1 Reel

A roll of 2000pcs

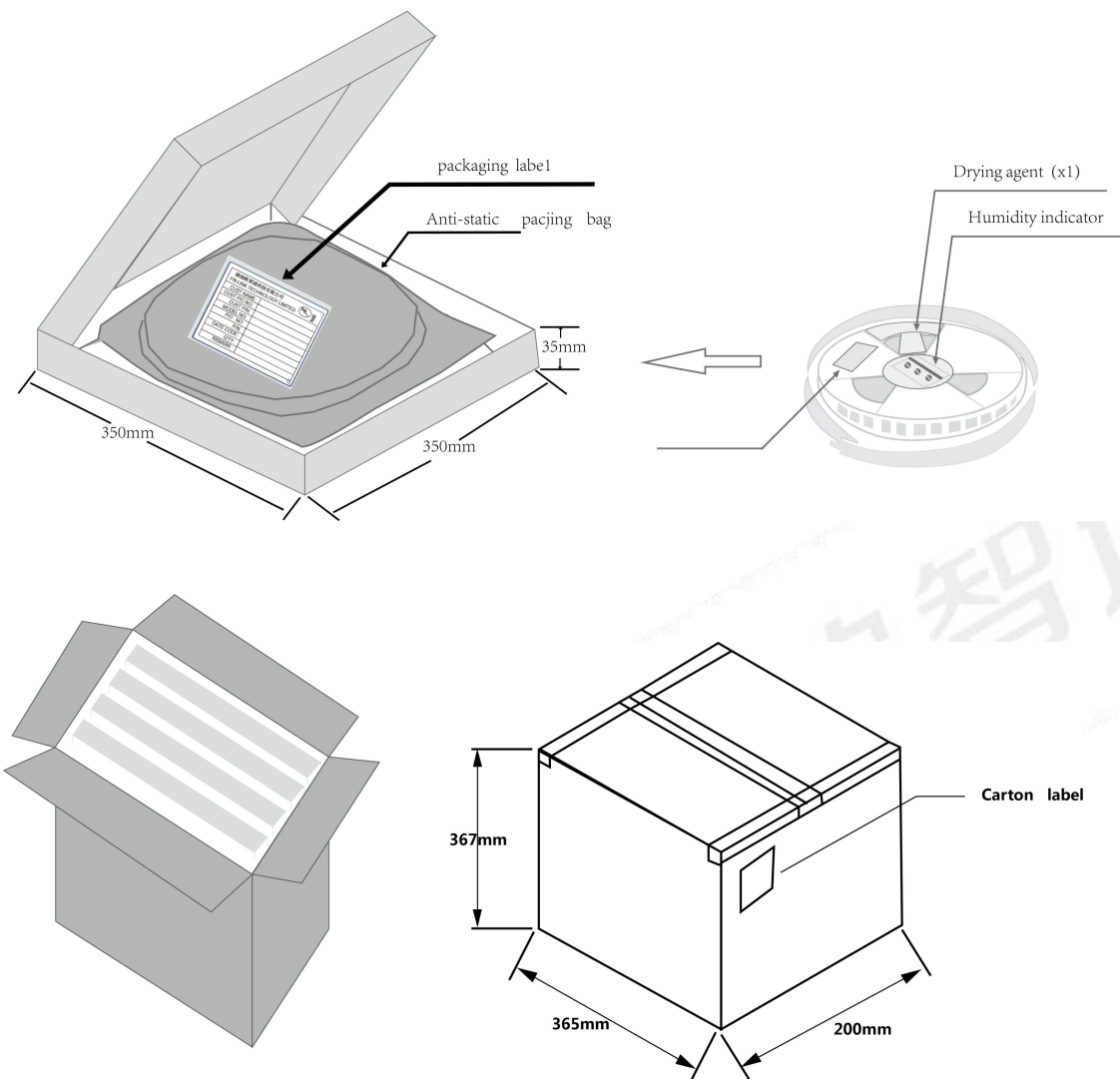


13.2 Carrier Tape Detail

ITEM	W	A0	B0	D	E	F	F1	K0	P0	P2	P	T
DIM	32	12.50	16.60	1.5	1.75	14.20	28.4	2.15	4.0	2.0	20.0	0.30
TOLE	$\begin{smallmatrix} +0.3 \\ -0.3 \end{smallmatrix}$	± 0.18	± 0.18	$\begin{smallmatrix} +0.1 \\ -0.0 \end{smallmatrix}$	± 0.1	± 0.15	± 0.10	± 0.10	± 0.1	± 0.15	± 0.1	± 0.05



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:

- Calculated shelf life in sealed bag: 12 months at $<40^{\circ}\text{C}$ and $<90\%$ relative humidity (RH)
- Environmental condition during the production: 30°C / 60% RH according to IPC/JEDEC J-STD-033A paragraph 5
- The maximum time between the opening of the sealed bag and the reflow process must be 168 hours if condition
- "IPC/JEDEC J-STD-033A paragraph 5.2" is respected
- Baking is required if conditions b) or c) are not respected
- Baking is required if the humidity indicator inside the bag indicates 10% RH or more

Warning & Statement

This module meets the requirements of Part 15 Subpart B, FCC Part 15 Subpart C, FCC Part 15 Subpart E

Integration is strictly limited to fixed categorized end-products where a separation distance of at least 20 cm between the radiating part and any human body can be assured during normal operating conditions.

This module only allows connection antenna in the instruction manual. If other antennas are used, re-evaluation is required.

This module is test stand-alone, if more another modules work together with this module, please evaluation the multiple RF exposure.

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.

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 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.

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 the following: "Contains Transmitter Module FCC ID: 2AATL-6252C-PUB".

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment.

This equipment must be installed and operated with minimum distance 20cm between radiator & your body

IMPORTANT NOTE:

Integration is strictly limited to mobile/fixed categorized end-products where a separation distance of at least 20 cm between the radiating part and any human body can be assured during normal operating conditions.

IMPORTANT NOTE:

In the event that these conditions can not be met (for example certain laptop configurations or co-location with another transmitter).then the FCC authorization is no longer considered valid and the FCC ID can not be used on the final product. In these circumstances, the OEM integrator will be responsible for re-evaluating the end product (including the transmitter) and obtaining a separate FCC authorization.

IMPORTANT NOTE:

This module is intended for OEM integrator only and the OEM integrators are instructed to ensure that the end user has no manual instructions to remove or install the device. The OEM integrator is still responsible for the FCC compliance requirement of the end product, which integrates this module.

LABEL OF THE END PRODUCT:

The final end product must be labeled in a visible area with the following “Contains FCC ID: 2AATL-6252C-PUB” .If the size of the end product is smaller than 8x10cm, then additional FCC part 15.19 statement is required to be available in the users manual: 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.