

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

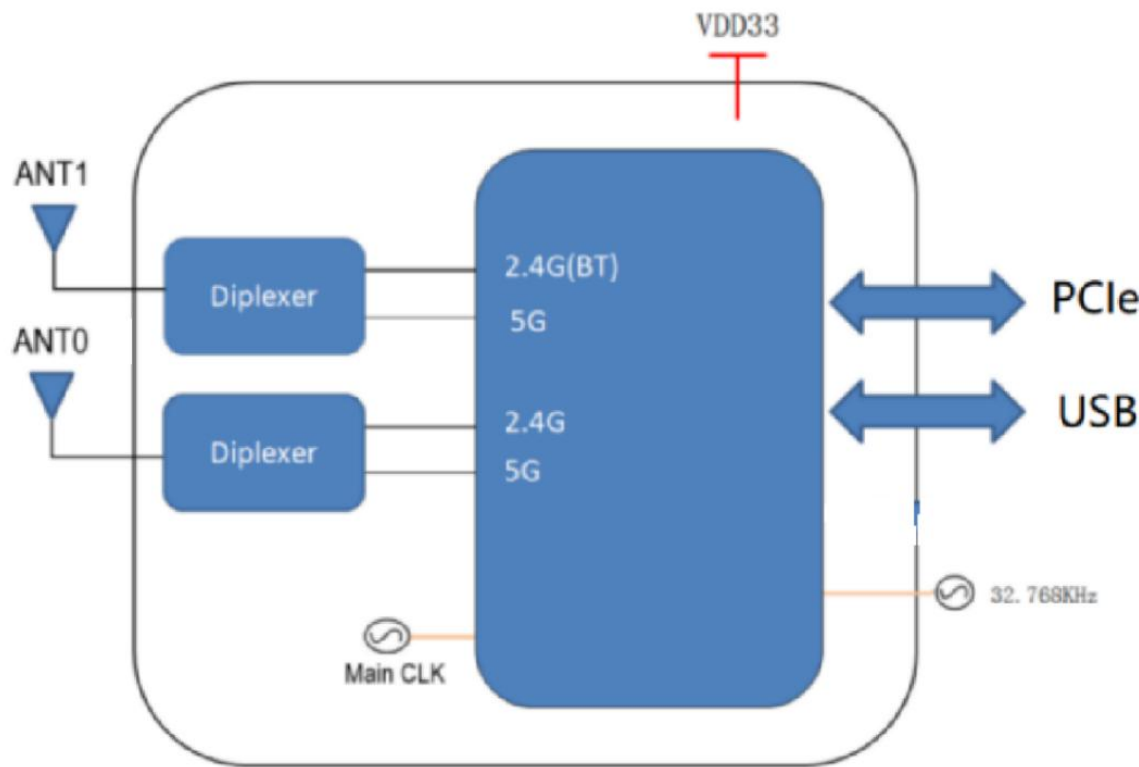
Host Interface

- 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	2.400 GHz ~ 2.497 GHz (2.4 GHz ISM Band)	
Number of Channels	2.4GHz: Ch1 ~ Ch14	
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	Small antennas with 0~2 dBi peak gain		

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	4.900 GHz ~ 5.845 GHz (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	Small antennas with 0~2 dBi peak gain	

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	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		
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		

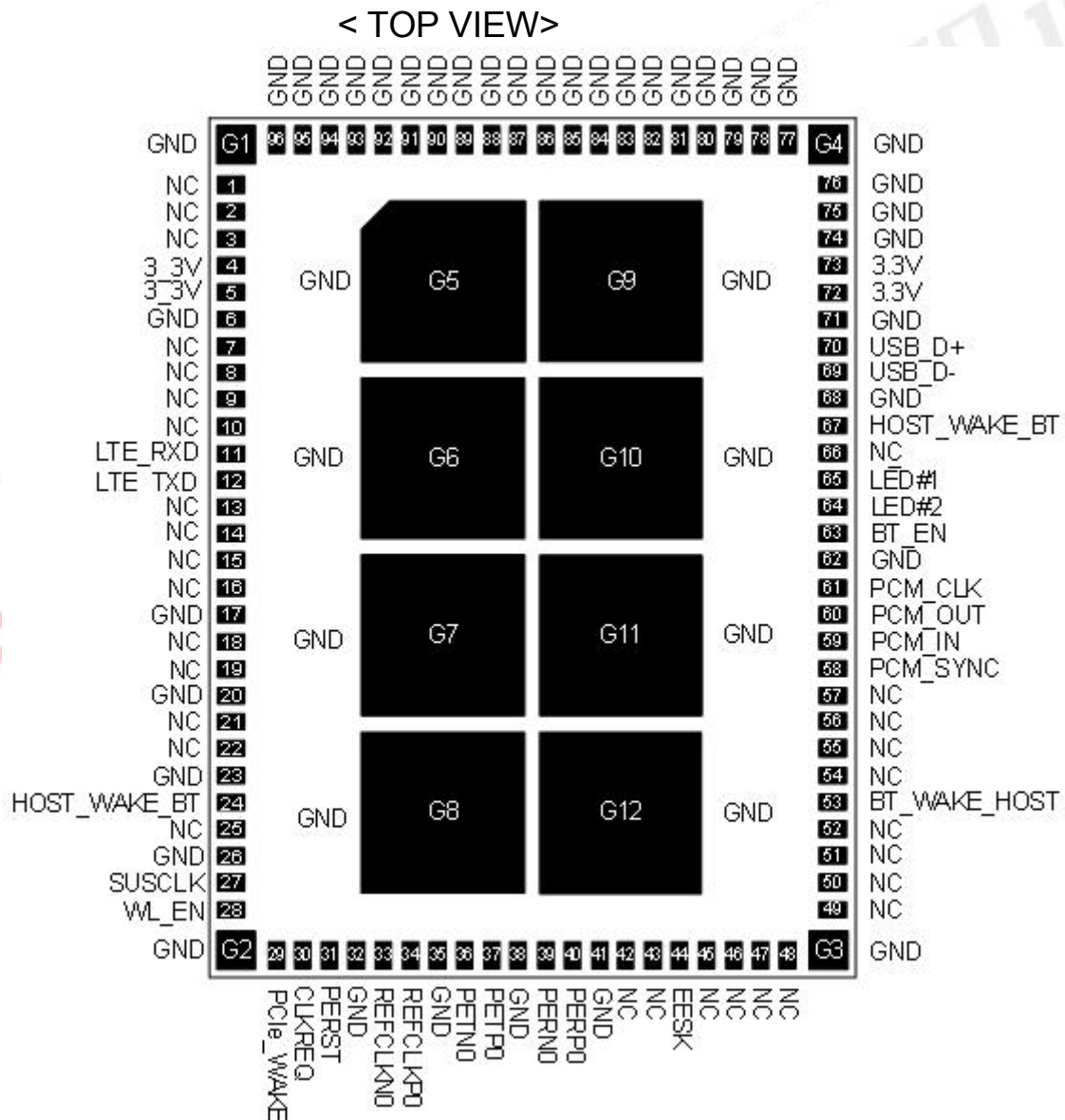
5. ID setting information

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

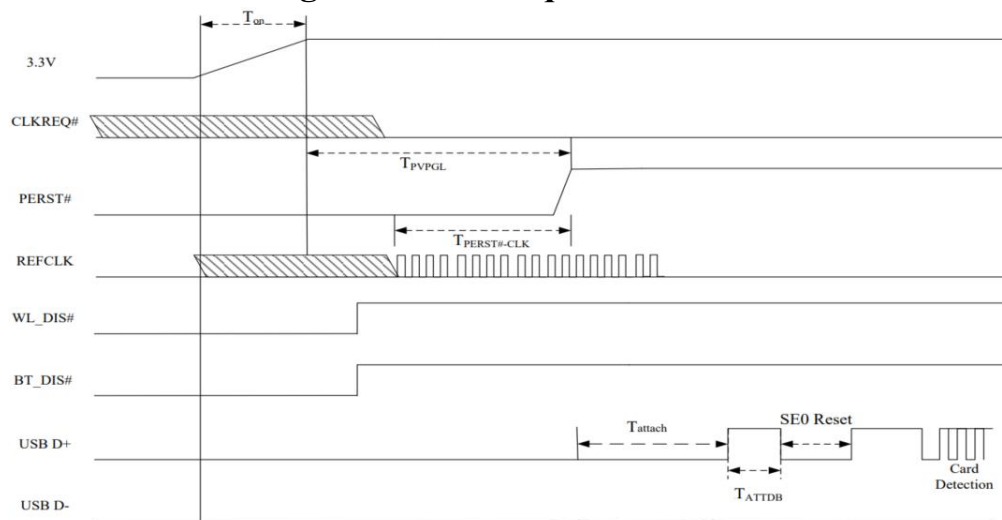
The digital IO supports VDD33 or VDD18 application.

	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

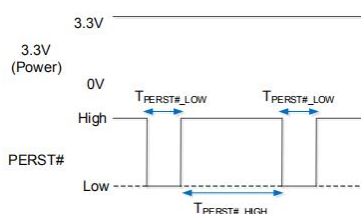
T_{ATTDB}: the debounce interval with a minimal duration of 100ms that provided by the USB system Software

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

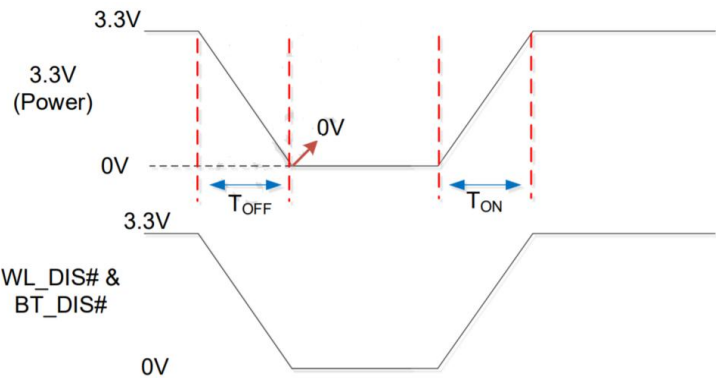
7.4.1 PCIe PERST# Timing Sequence



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

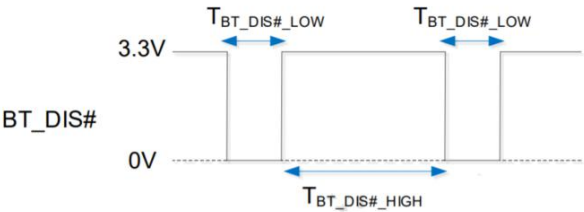


RTL8822CE-CG Power Off Timing Parameters

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



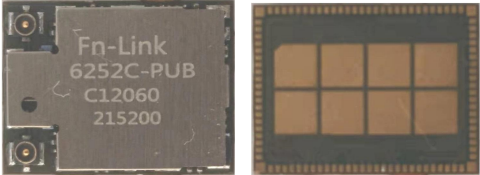
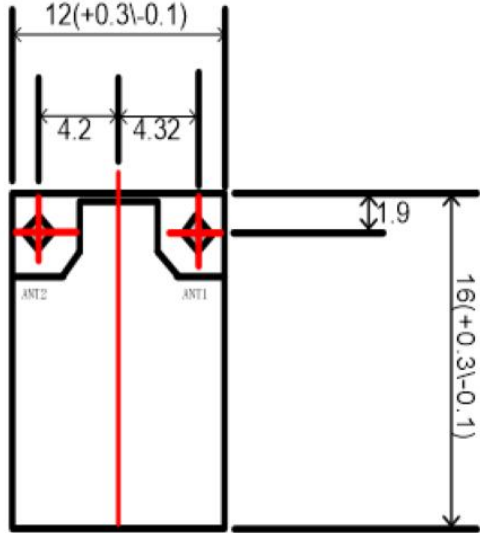
	Min	Typical	Max	Unit	Description
BT_DIS#_LOW	200	--	--	ms	BT_DIS# low duration
BT_DIS#_HIGH	500	--	--	ms	BT_DIS# high duration

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

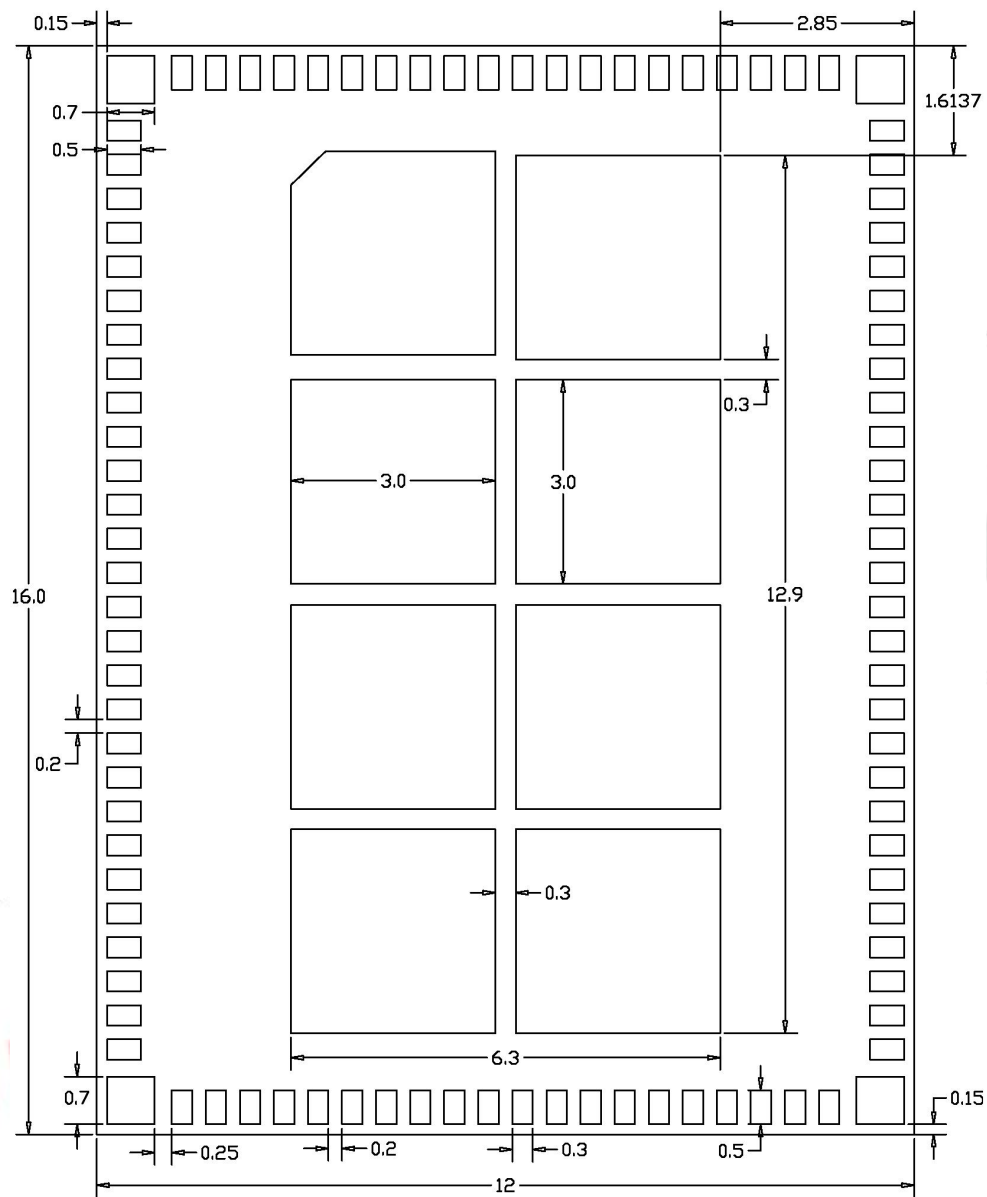
< TOP VIEW >

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

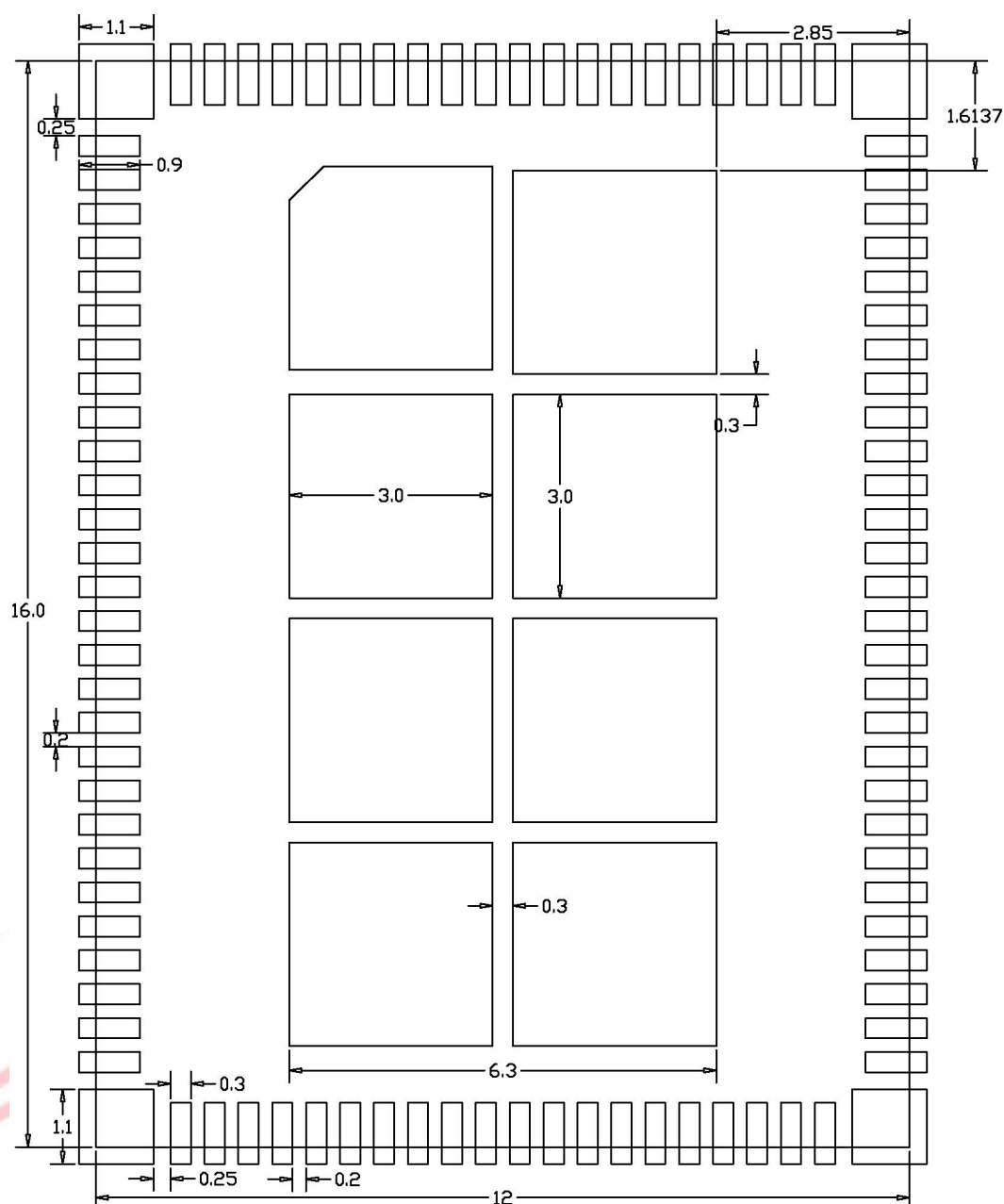


8.3 Physical Dimensions

<TOP View>



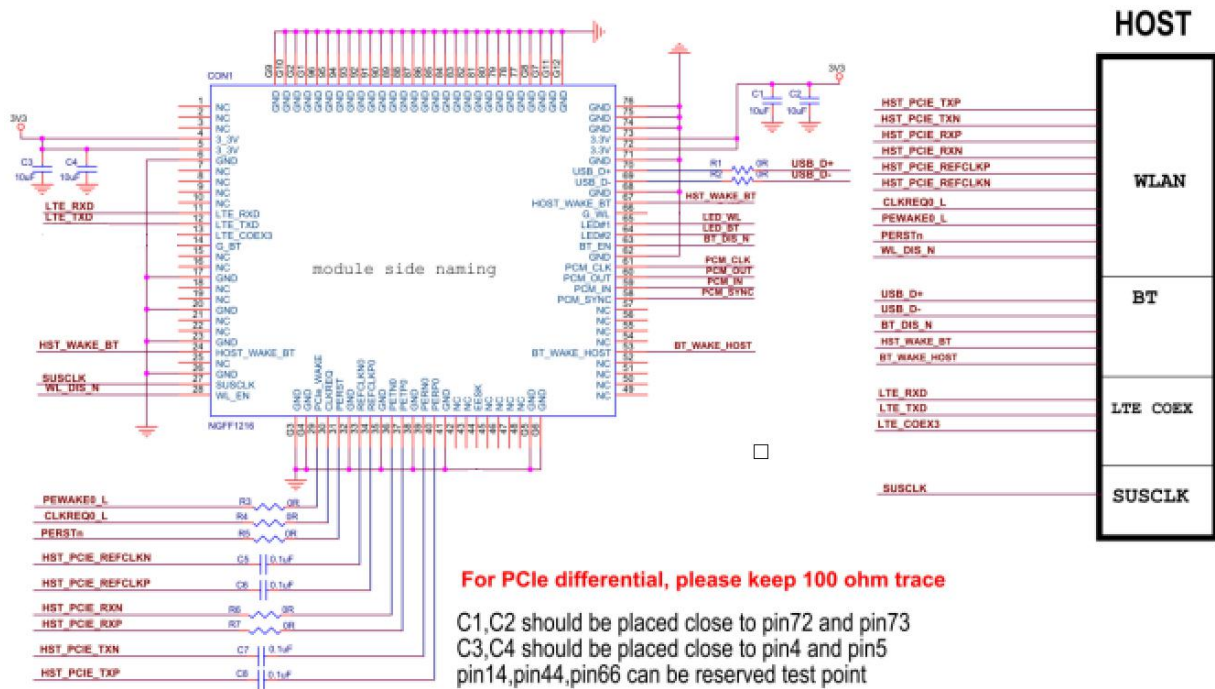
8.4 Layout Recommendation



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

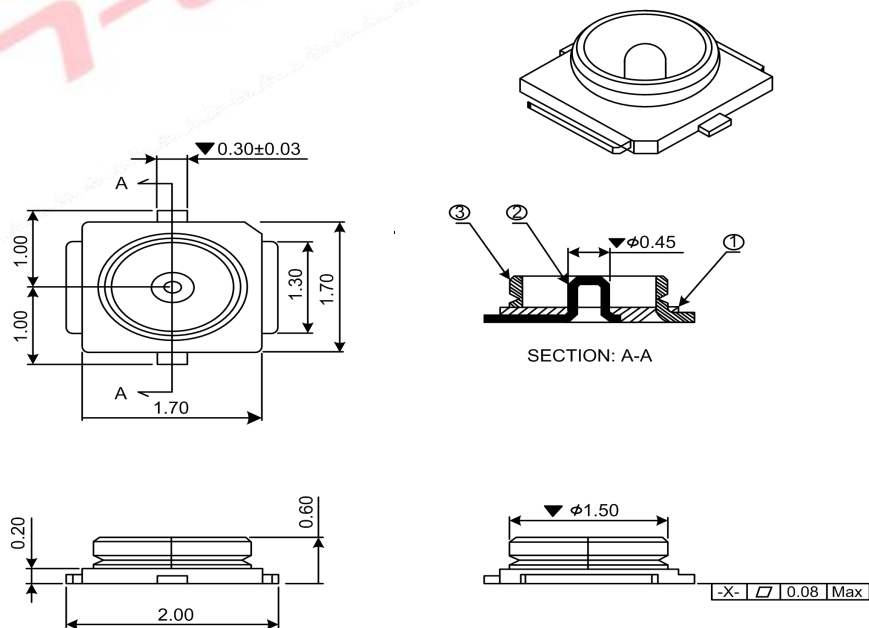
10. Reference Design



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

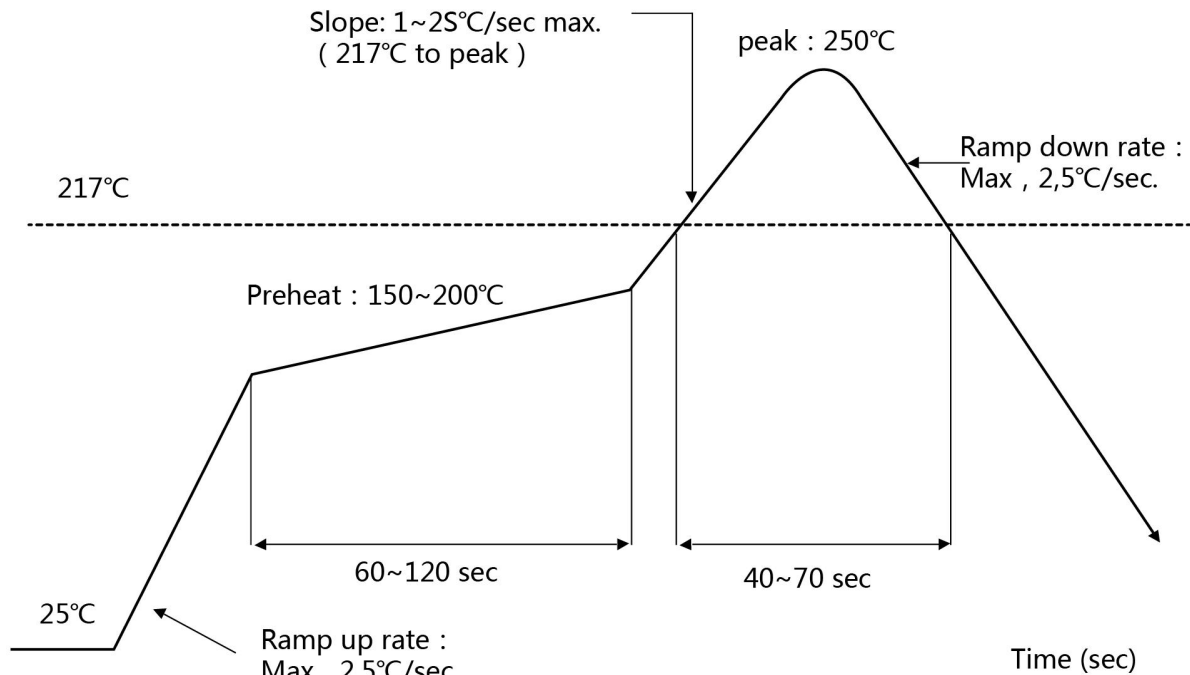


11. Recommended Reflow Profile

Referred to IPC/JEDEC standard.

Peak Temperature : <250°C

Number of Times : ≤2 times



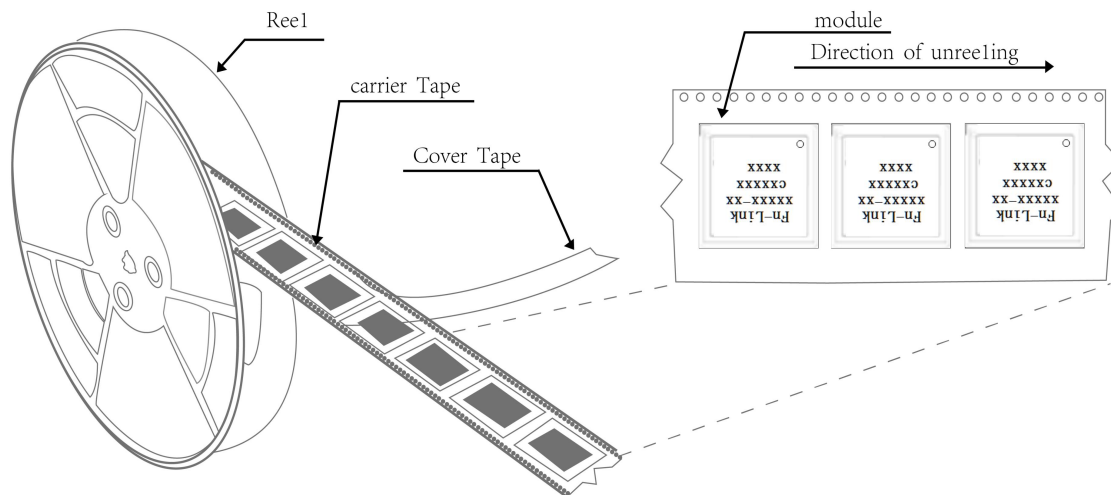
12. RoHS compliance

All hardware components are fully compliant with EU RoHS directive

13. Package

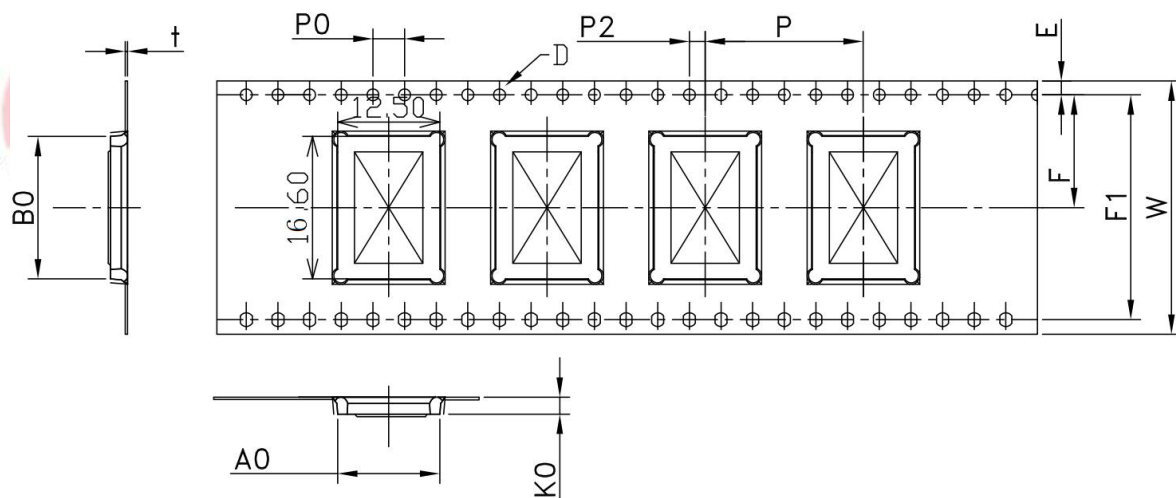
13.1 Reel

A roll of 2000pcs

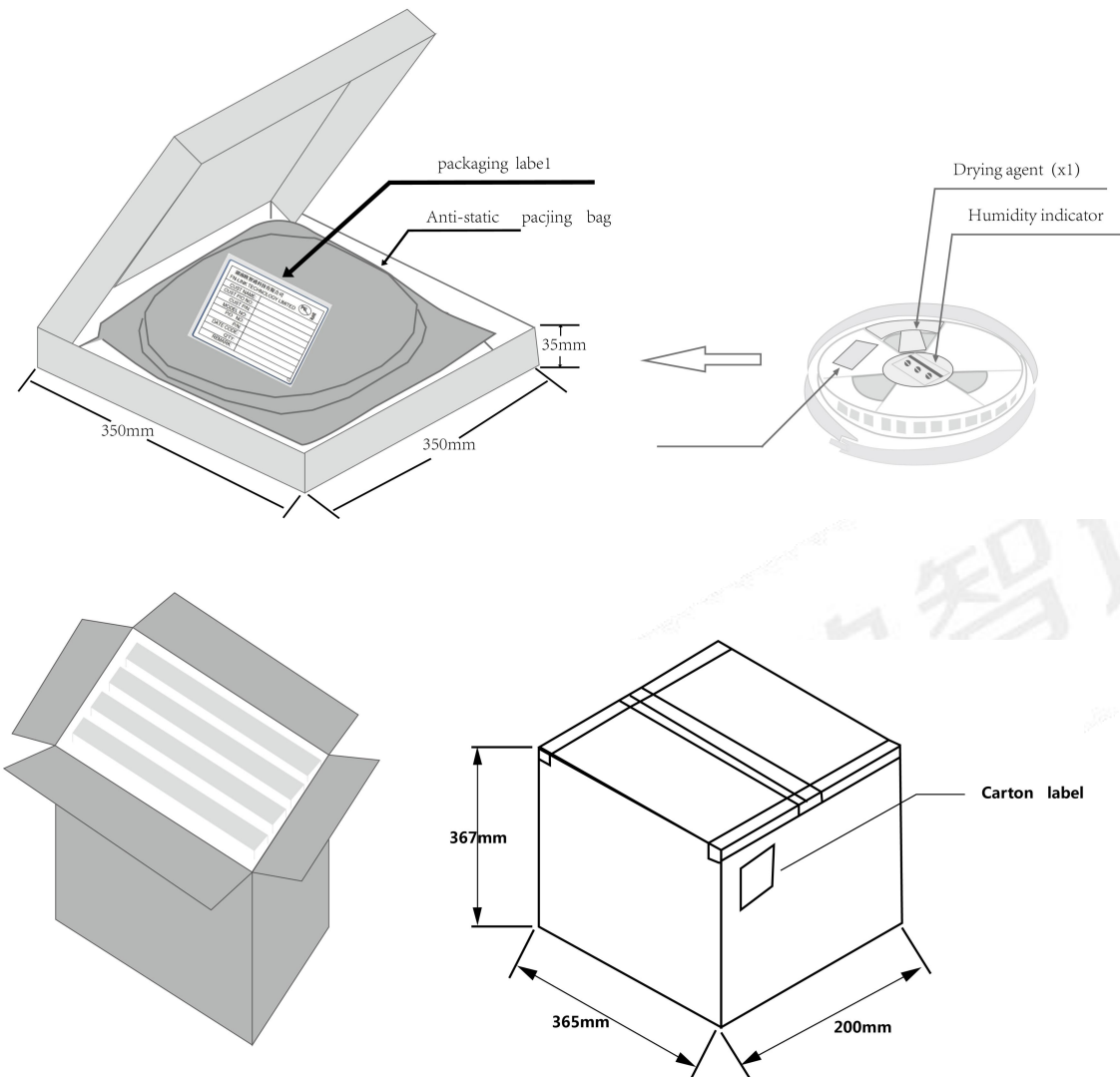


13.2 Carrier Tape Detail

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
- The device are restricted to indoor operation only in the band 5150-5250 MHz.

Integration instructions for host product manufacturers according to KDB 996369 D03 OEMManual v01

Conditions on using FN-LINK TECHNOLOGY LIMITED regulatory approvals:

- A. Customer must ensure that its product (The “Wi-Fi/BT module”) is electrically identical to FN-LINK TECHNOLOGY LIMITED reference designs. Customer acknowledges that any modifications to FN-LINK TECHNOLOGY LIMITED reference designs may invalidate regulatory approvals in relation to the CUSTOMER Product, or may necessitate notifications to the relevant regulatory authorities.
- B. Customer is responsible for ensuring that antennas used with the product are of the same type, with same or lower gains as approved and providing antenna reports to FN-LINK TECHNOLOGY LIMITED
- C. Customer is responsible for regression testing to accommodate changes to FN-LINK TECHNOLOGY LIMITED reference designs, new antennas, and portable RF exposure safety testing/approvals.
- D. Appropriate labels must be affixed to the CUSTOMER Product that comply with applicable regulations in all respects.
- E. A user’s manual or instruction manual must be included with the customer product that contains the text as required by applicable law. Without limitation of the foregoing, an example (for illustration purposes only) of possible text to include is set forth below:

2.2 List of applicable FCC rules

FCC Part 15 Subpart C 15.247, FCC Part 15 Subpart E

2.3 Specific operational use conditions

Radio Technology: Bluetooth BR/EDR

Operation frequency: 2402-2480MHz

Channel No.: 79 Channels

Channel spacing: 1MHz

Modulation type: GFSK, $\pi/4$ DQPSK, 8DPSK

Antenna Type: FPC Antenna, max gain 3.92dBi (Antenna information is provided by applicant.)

Radio Technology: Bluetooth BLE

Operation frequency: 2402-2480MHz

Channel No.: 40 channels

Data rate: 1Mbps/2Mbps

Channel Separation: 2MHz

Modulation: GFSK

Antenna Type: FPC Antenna, max gain 3.92dBi (Antenna information is provided by applicant.)

Radio Technology: 2.4G WIFI

Operation frequency: 2412MHz-2462MHz for IEEE 802.11 b, g, n/HT20, ax20,
2422MHz~2452MHz for IEEE802.11n/HT40, ax40

Channel No.: 802.11b/802.11g /802.11n (HT20)/802.11ax20: 11
802.11(HT40)/802.11ax40: 7

Modulation type: IEEE 802.11b: DSSS (CCK, DQPSK, DBPSK)

IEEE 802.11g: OFDM (64QAM, 16QAM, QPSK, BPSK)

IEEE 802.11n: OFDM (64QAM, 16QAM, QPSK, BPSK)

IEEE 802.11ax: OFDMA (64QAM, 16QAM, QPSK, BPSK,
256QAM, 1024QAM)

Antenna Type: FPC Antenna 1, max gain 3.92dBi,

FPC Antenna 2, max gain 3.99dBi.

The antenna MIMO combining gain is 6.97dBi. (Antenna information is provided by applicant.)

Radio Technology: 5G WIFI

Operation Frequency: 802.11a/n (HT20)/ac (VHT20)/ax20: 5180~5240MHz; 5260-5320MHz; 5500-5700MHz; 5745~5825MHz

802.11n (HT40)/ac (VHT40)/ax40: 5190~5230MHz; 5270-5310MHz; 5510-5670MHz; 5755~5795MHz

802.11ac (VHT80)/ax (VHT80): 5210MHz, 5290MHz, 5530MHz, 5775MHz

Channel separation: 20MHz for 802.11a/ 802.11ac (VHT20)/ 802.11n (HT20)/ax20
40MHz for 802.11ac (VHT40)/ 802.11n (HT40)/ax40

80MHz for 802.11ac (VHT80)/802.11ax (VHT80)

Modulation technology: IEEE 802.11n: OFDM (64QAM, 16QAM, QPSK, BPSK)

IEEE 802.11a: OFDM (64QAM, 16QAM, QPSK, BPSK)

IEEE 802.11ac: OFDM (64QAM, 16QAM, QPSK, BPSK)

IEEE 802.11ax: OFDMA (64QAM, 16QAM, QPSK, BPSK, 256QAM, 1024QAM)

Antenna Type: FPC Antenna 1, max gain 4.25 dBi,

FPC Antenna 2, max gain 4.48 dBi.

The antenna MIMO combining gain is 7.38dBi.(Antenna information is provided by applicant.)

The module can be used for mobile applications with a maximum 7.38dBi antenna. The host manufacturer installing this module into their product must ensure that the final composite product complies with the FCC requirements by a technical assessment or evaluation to the FCC rules, including the transmitter operation. The host manufacturer has to be aware not to provide information to the end user regarding how to install or remove this RF module in the user's manual of the end product which integrates this module. The end user manual shall include all required regulatory information/warning as shown in this manual.

2.4 Limited module procedures

Not applicable. The module is a Single module and complies with the requirement of FCC Part 15.212.

2.5 Trace antenna designs

The antenna used is the FPC antenna on the module.

2.6 RF exposure considerations

The antennas used for this transmitter must be installed to provide a separation distance of at least 20cm from all persons and must not be located or operating in conjunction with any other antenna or transmitter.

2.7 FCC statements

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.

2.8 Antennas

Antenna Specification are as follows:

Antenna Type: FPC antenna

Antenna Gain (Peak):

EDR Antenna Gain: FPC Antenna 1, max gain 3.92dBi

BLE Antenna Gain: FPC Antenna 1, max gain 3.92dBi

2.4GWIFI Antenna Gain:

FPC Antenna 1, max gain 3.92dBi

FPC Antenna 2, max gain 3.99dBi

The antenna MIMO combining gain is 6.97dBi

5GWIFI Antenna Gain:

FPC Antenna 1, max gain 4.25dBi

FPC Antenna 2, max gain 4.48dBi

The antenna MIMO combining gain is 7.38dBi

This device is intended only for host manufacturers under the following conditions:
The transmitter module may not be co-located with any other transmitter or antenna;

As long as the conditions above are met, further transmitter test will not be required. However, the host manufacturer is still responsible for testing their end-product for any additional compliance requirements required with this module installed (for example, digital device emissions, PC peripheral requirements, etc.).

2.9 Label and compliance information

Host product manufacturers need to provide a physical or e-label stating “Contains FCC ID: 2AATL-6252C-PUB” With their finished product.

2.10 Information on test modes and additional testing requirements

Radio Technology: Bluetooth BR/EDR

Operation frequency: 2402-2480MHz

Channel No.: 79 Channels

Channel spacing: 1MHz

Modulation type: GFSK, $\pi/4$ DQPSK, 8DPSK

Antenna Type: FPC Antenna, max gain 3.92dBi (Antenna information is provided by applicant.)

Radio Technology: Bluetooth BLE

Operation frequency: 2402-2480MHz

Channel No.: 40 channels

Data rate: 1Mbps/2Mbps

Channel Separation: 2MHz

Modulation: GFSK

Antenna Type: FPC Antenna, max gain 3.92dBi (Antenna information is provided by applicant.)

Radio Technology: 2.4G WIFI

Operation frequency: 2412MHz-2462MHz for IEEE 802.11 b, g, n/HT20, ax20,
2422MHz~2452MHz for IEEE802.11n/HT40, ax40

Channel No.: 802.11b/802.11g /802.11n (HT20)/802.11ax20: 11
802.11(HT40)/802.11ax40: 7

Modulation type: IEEE 802.11b: DSSS (CCK, DQPSK, DBPSK)

IEEE 802.11g: OFDM (64QAM, 16QAM, QPSK, BPSK)

IEEE 802.11n: OFDM (64QAM, 16QAM, QPSK, BPSK)

IEEE 802.11ax: OFDMA (64QAM, 16QAM, QPSK, BPSK,
256QAM, 1024QAM)

Antenna Type: FPC Antenna 1, max gain 3.92dBi,

FPC Antenna 2, max gain 3.99dBi.

The antenna MIMO combining gain is 6.97dBi. (Antenna information is provided by applicant.)

Radio Technology: 5G WIFI

Operation Frequency: 802.11a/n (HT20)/ac (VHT20)/ax20: 5180~5240MHz; 5260-5320MHz; 5500-5700MHz; 5745~5825MHz

802.11n (HT40)/ac (VHT40)/ax40: 5190~5230MHz; 5270-5310MHz; 5510-5670MHz; 5755~5795MHz

802.11ac (VHT80)/ax (VHT80): 5210MHz, 5290MHz, 5530MHz, 5775MHz

Channel separation: 20MHz for 802.11a/ 802.11ac (VHT20)/ 802.11n (HT20)/ax20
40MHz for 802.11ac (VHT40)/ 802.11n (HT40)/ax40

80MHz for 802.11ac (VHT80)/802.11ax (VHT80)

Modulation technology: IEEE 802.11n: OFDM (64QAM, 16QAM, QPSK, BPSK)

IEEE 802.11a: OFDM (64QAM, 16QAM, QPSK, BPSK)

IEEE 802.11ac: OFDM (64QAM, 16QAM, QPSK, BPSK)

IEEE 802.11ax: OFDMA (64QAM, 16QAM, QPSK, BPSK, 256QAM, 1024QAM)

Antenna Type: FPC Antenna 1, max gain 4.25dBi,

FPC Antenna 2, max gain 4.48dBi.

The antenna MIMO combining gain is 7.38dBi.(Antenna information is provided by applicant.)

Host manufacturer must perform test of radiated & conducted emission and spurious emission, etc according to the actual test modes for a stand-alone modular transmitter in a host, as well as for multiple simultaneously transmitting modules or other transmitters in a host product.

Only when all the test results of test modes comply with FCC requirements, then the end product can be sold legally.

2.11 Additional testing, Part 15 Subpart B disclaimer

The modular transmitter is only FCC authorized for FCC Part 15 Subpart C 15.247 that 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 circuitry), 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.