PRODUCT SPECIFICATION

6252C-PUB

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

Combo Module

Version:v1.7

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

TEL:+86-755-2955-8186 Website:www.fn-link.com

6252C-PUB Module Datasheet

	Part NO.	Description
Ordering Information	FG6252CPUB-01	RTL8852BE-CG/wifi6/2T2R+BT,802.11a/b/g/n/ac/ax+BLE5.2,2T2R,PCIE+USB,12*16,PCIE 接口,V3.0

CONTENTS

Revision History

Version	Date	Contents of Revision Change	Draft	Checked	Approved
V1.0	2023/08/22	New version	LXP	TZQ	QJP
V1.1	2023/09/22	Add OS supported Win11	LXP	TZQ	QJP
V1.2	2023/11/14	Update antenna connector information Add Certificate No Add Power Consumption data	LXP	TZQ	QJP
V1.3	2023/12/21	Add No 02	LXP	TZQ	QJP
V1.4	2024/01/23	Delete 2.4G part of the VHT rate specification	LXP	TZQ	QJP
V1.5	2024/03/26	Delete Part NO. -02	LXP	TZQ	QJP
V1.6	2024/09/10	Update Marking Description	LXP	TZQ	QJP
V1.7	2024/11/08	Add Module picture	LXP	TZQ	QJP

1. General Description

1.1 Introduction

The fn-link 6252C-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 fora high-performance integrated wireless and Bluetooth device

1.2 Description

Model Name	6252C-PUB
Product Description	Support Wi-Fi/Bluetooth functionalities
Dimension	L x W x H: 16x 12x 1.91 (typical) mm
Wi-Fi Interface	Support PCIe
BT Interface	USB
OS supported	Android /Linux/ Win CE/Win 11 /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

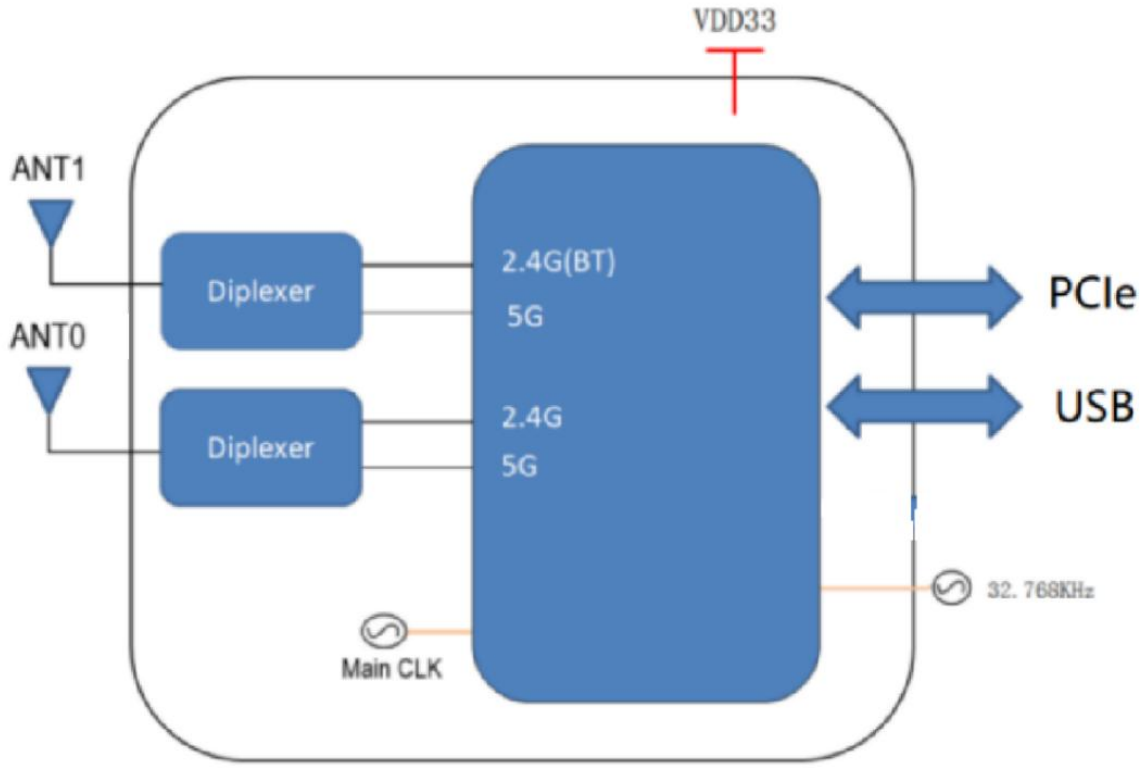
Host Interface

- 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/ax 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: 19dBm ± 2 dB	EVM ≤ -9dB
	802.11g /54Mbps: 18dBm ± 2 dB	EVM ≤ -25dB
	802.11n /MCS7: 17dBm ± 2 dB	EVM ≤ -28dB
	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	±20ppm	
SISO Receive Sensitivity (11b,20MHz) @8% PER	- 1Mbps @ -94 dBm	≤-83 dBm
	- 11Mbps @ -85 dBm	≤-76 dBm
Receive Sensitivity	- 6Mbps @ -90 dBm	≤-85 dBm

(11g,20MHz) @10% PER	- 54Mbps @ -71 dBm	≤-68 dBm
Receive Sensitivity (11n,20MHz) @10% PER	- MCS=0 @ -90 dBm	≤-85 dBm
	- MCS=7 @ -69 dBm	≤-67 dBm
Receive Sensitivity (11n,40MHz) @10% PER	- MCS=0 @ -87 dBm	≤-82 dBm
	- MCS=7 @ -66 dBm	≤-64 dBm
Receive Sensitivity (11ax,20MHz) @10% PER	- MCS=0 @ -90 dBm	≤-74 dBm
	- MCS=11 @ -60 dBm	≤-52 dBm
Receive Sensitivity (11ax ,40MHz) @10% PER	- MCS=0 @ -87 dBm	≤-71 dBm
	- MCS=11 @ -57 dBm	≤-49 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	5.150 GHz ~ 5.850 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 ± 2 dB	EVM ≤ -25dB
	802.11n /MCS7: 17 dBm ± 2 dB	EVM ≤ -28dB
	802.11ac VHT20 MCS8: 16 dBm ± 2 dB	EVM ≤ -30dB
	802.11ac VHT40 MCS9: 15 dBm ± 2 dB	EVM ≤ -32dB
	802.11ac VHT80 MCS9: 15 dBm ± 2 dB	EVM ≤ -32dB
	802.11ax HE20 MCS11: 13 dBm ± 2 dB	EVM ≤ -35dB
	802.11ax HE40 MCS11: 13 dBm ± 2 dB	EVM ≤ -35dB
	802.11ax HE80 MCS11: 13 dBm ± 2 dB	EVM ≤ -35dB
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	- MCS=0, NSS1 @ 90 dBm	≤-82

(11ac,20MHz)@10% PER	- 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	

4.3 Bluetooth Specification

Feature	**Description**
General Specification	
Bluetooth Standard	BDR(1Mbps),EDR(2Mbps & 3Mbps),LE(1Mbps),2LE(2Mbps)
Host Interface	USB
Frequency Band	2400 MHz ~ 2483.5 MHz
Number of Channels	79 channels for classic,40 channels for BLE
Modulation	GFSK, π/4-DQPSK,8DPSK
RF Specification	
Output Power , tolerance +/-3 dB	
	CL1(dBm)
BDR Output Power	5
EDR Output Power	5
BLE Output Power	5
Sensitivity, tolerance : /	
Sensitivity @ BER=0.1% for GFSK (1Mbps)	-90

Sensitivity @ BER=0.01% for π/4-DQPSK (2Mbps)	-88
Sensitivity @ BER=0.01% for 8DPSK (3Mbps)	-85
Sensitivity @ BLE=30.8% for LE (1Mbps)	-93
Sensitivity @ BLE=30.8% for 2LE (2Mbps)	-90
Maximum Input Level	GFSK (1Mbps):-20dBm
	π/4-DQPSK (2Mbps) :-20dBm
	8DPSK (3Mbps) :-20dBm

5. ID setting information

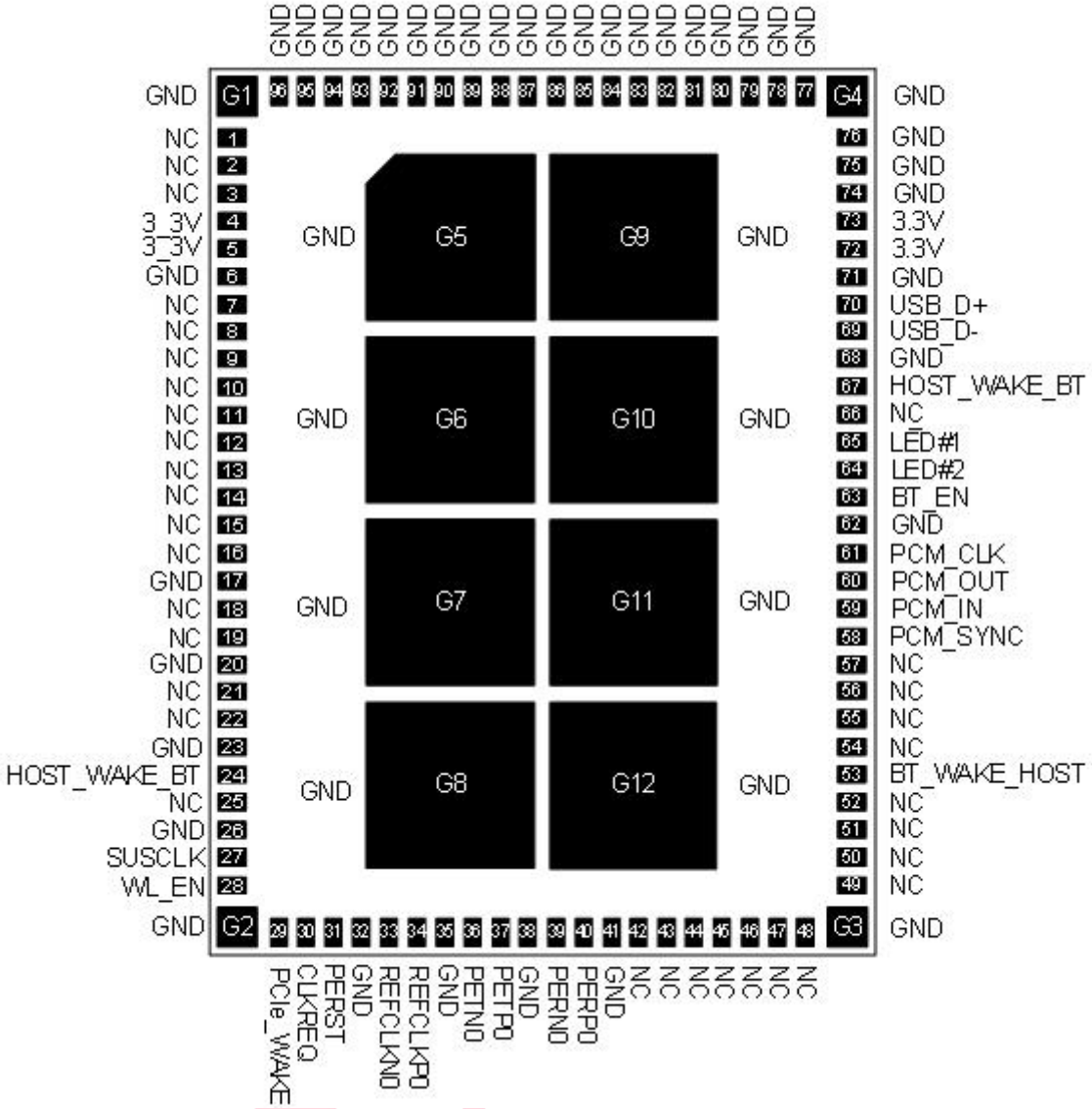
WI-FI

Vendor ID	TBD
Product ID	TBD

6. Pin Definition

6.1 Pin Outline

< TOP VIEW>



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	NC	—	No connect	
12	NC	—	No connect	
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, open drain, active low	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	NC	—	No connect	
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.

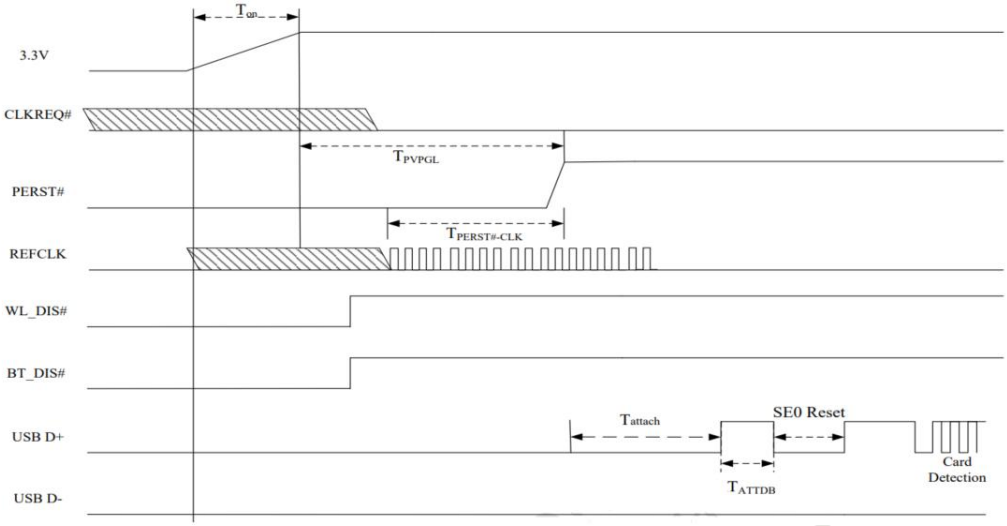
	MIN	TYP	MAX	Unit
Operating Temperature	0	25	70	deg.C
VDD33	3.0	3.3	3.6	V

7.2 Power Consumption

2.4G	Test condition: VBAT=3.3V / VDDIO=3.3V	
	Current @ TX	Current @ RX
	Maximum(mA)	Maximum(mA)
11M@20dbm	397	136
54M@18dbm	200	157
MCS7 HT20@17dbm	194	157
MCS7 HT40@17dbm	179	158
MCS8 VHT20@16dbm	187	157
MCS9 VHT40@15dbm	174	158
MCS11 HE20@13dbm	181	157
MCS11 HE40@13dbm	175	158

5G	Test condition: VBAT=3.3V / VDDIO=3.3V	
	Current @ TX	Current @ RX
	Maximum(mA)	Maximum(mA)
54M@18dbm	192	153
MCS7 HT20@17dbm	186	153
MCS7 HT40@17dbm	173	154
MCS8 VHT20@16dbm	181	153
MCS9 VHT40@15dbm	170	154
MCS9 VHT80@15dbm	171	160
MCS11 HE20@13dbm	176	153
MCS11 HE40@13dbm	171	154
MCS11 HE80@13dbm	176	160

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

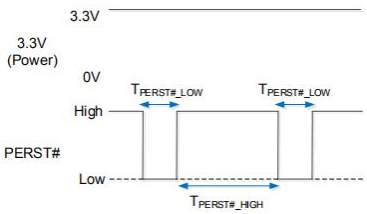
T_{ATTDB}: the debounce interval with a minimal duration of 100ms that provided by the USB system Software

$T_{SE0\ Reset}$: 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

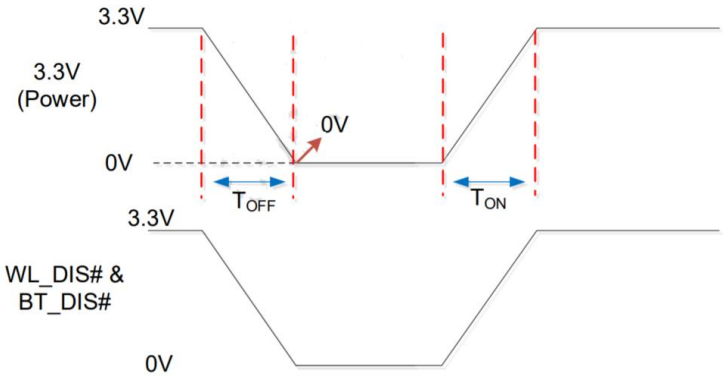
7.4.1 PCIe PERST# Timing Sequence



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

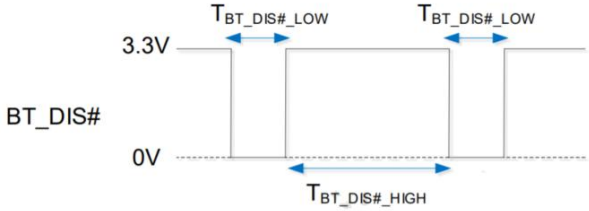


RTL8822CE-CG Power Off Timing Parameters

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

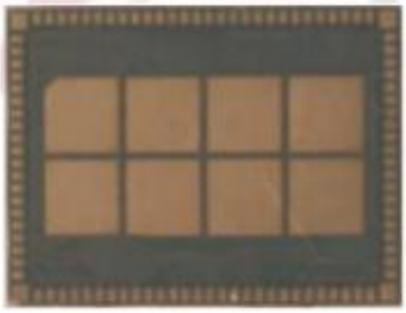
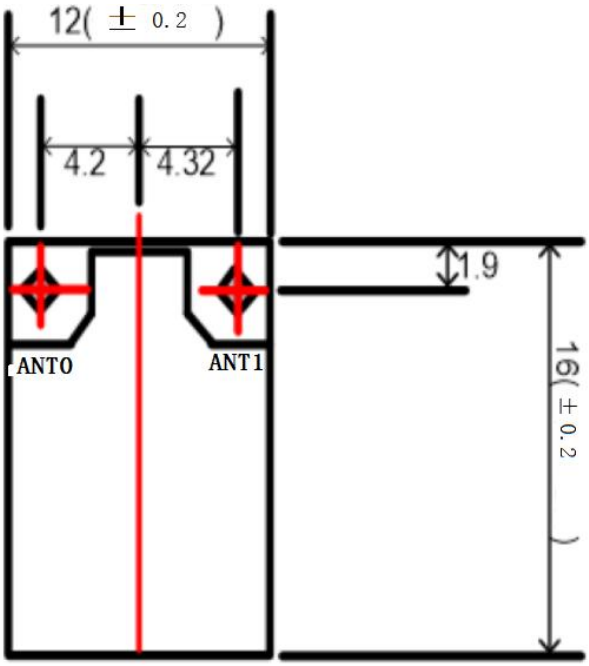
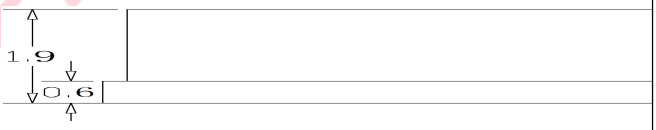


	Min	Typical	Max	Unit	Description
BT_DIS#_LOW	200	--	--	ms	BT_DIS# low duration
BT_DIS#_HIGH	500	--	--	ms	BT_DIS# high duration

8. Size reference

8.1 Module Picture

<table>
<tr><td>L x W : 16 x 12 (±0.2) mm
 

  </td><td> 
</td></tr>
<tr><td>H: 1.91 (±0.2) mm</td><td> 
</td></tr>
<tr><td>Weight</td><td>0.84(±0.1)g</td></tr>
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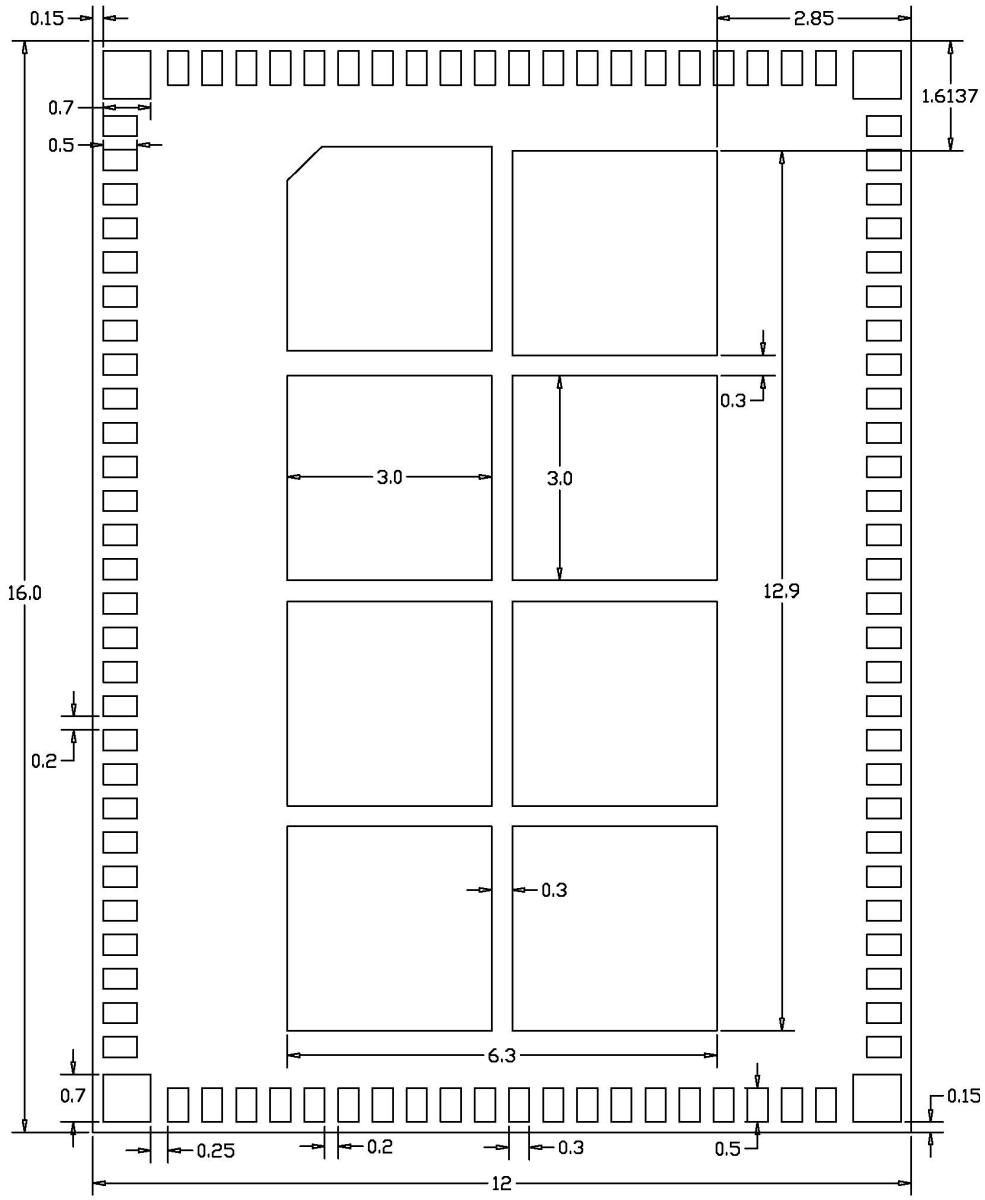
8.2 Marking Description

8.3 List of certified information

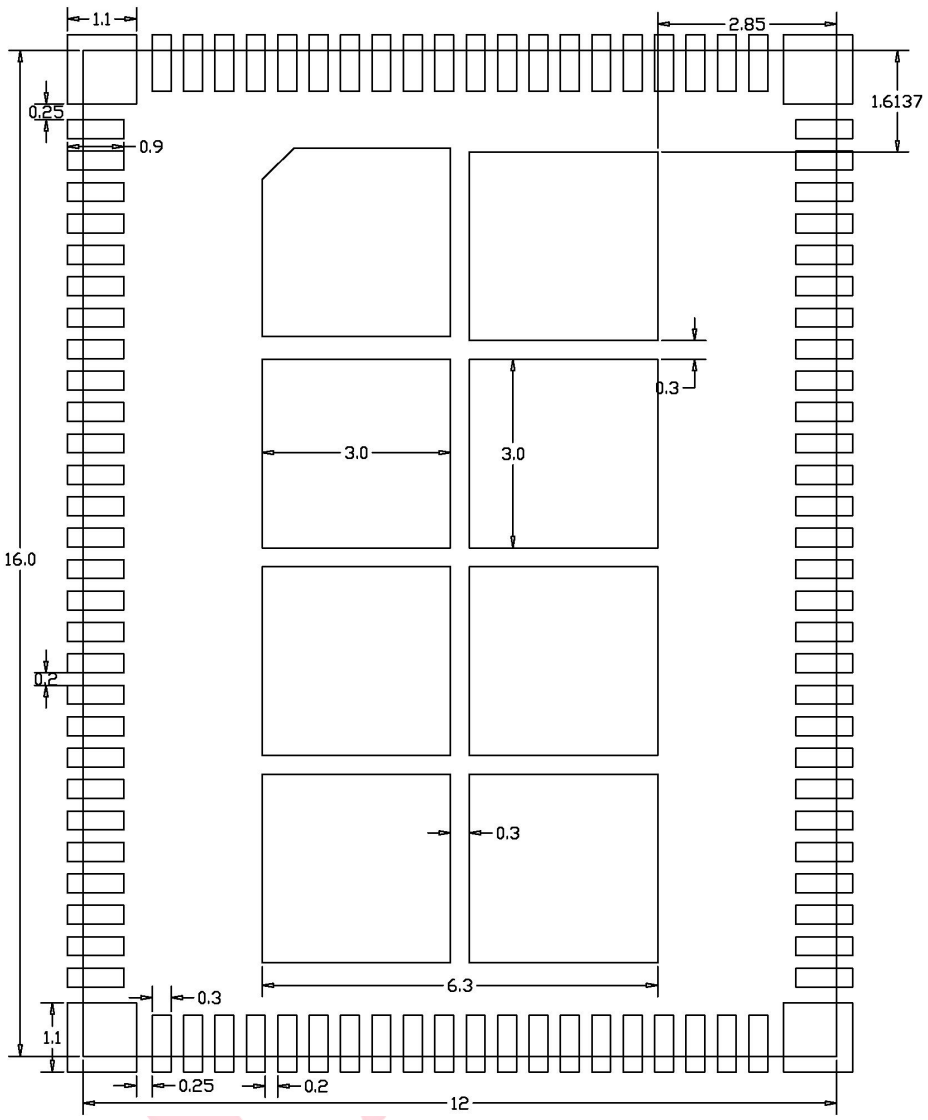
Certification project	Certificate number
SRRC	CMIIT ID:2022AP9213(M)
FCC	2AATL-6252C-PUB
CE	1622 - RED - 484460
IC	TBD
NCC	TBD
KCC	TBD
TELEC	218-483819
Brazil	TBD
Argentina	TBD
Japan	TBD
UKCA	1622-UK-484460

8.4 Physical Dimensions

<TOP View>



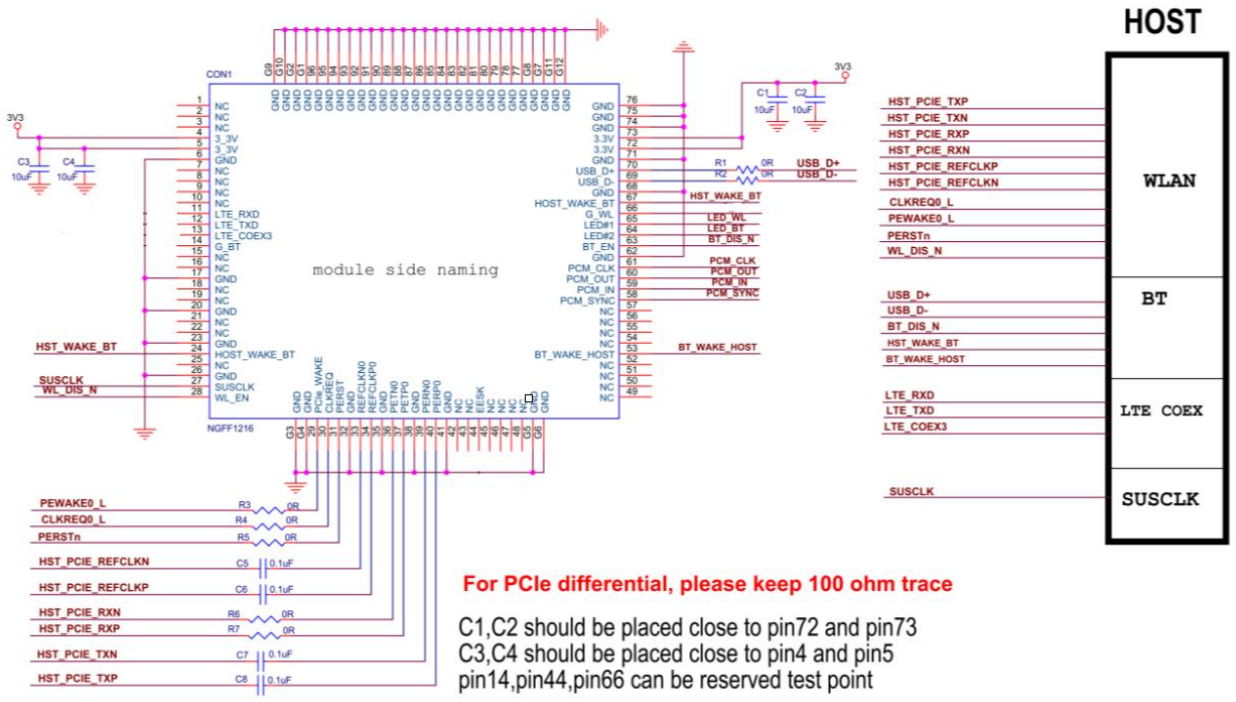
8.5 Layout Recommendation



9. The Key Material List

Item	Part Name	Description	Manufacturer
1	PCB	6252C-PUB 4L,12X16X0.6mm	欣强,XY-PCB, GDKX, Sunlord，TRULY
2	Crystal	2016 40MHZ,±10ppm,12pF	ECEC, Hosonic, TKD, JWT,Murata
3	Chipset	RTL8852BE-CG	Realtek
4	Shielding	6252C-PUB-V2.0 Shielding	信太，精力通，卓益
5	ipex	4 代 TA-RF03-001-03-811,CD-ARF004-P01K	创迪尔

10. Reference Design



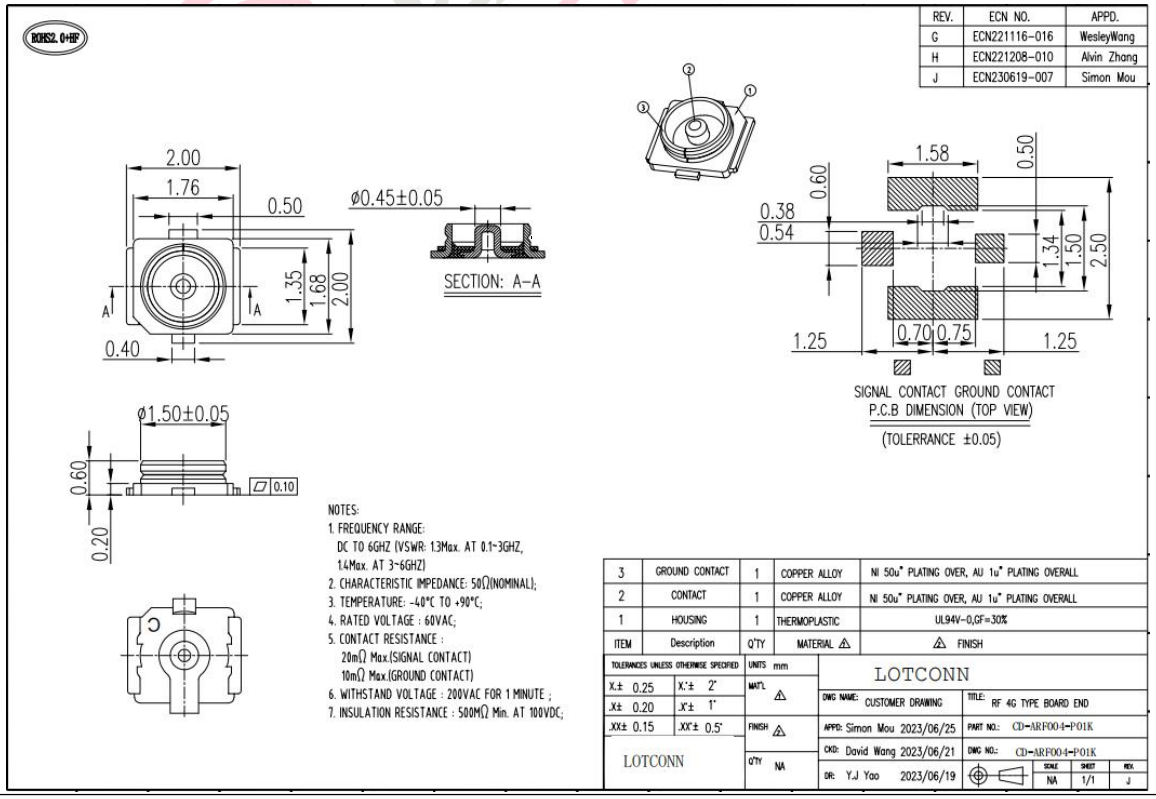
Note:

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 ≥ 1000mA and ripple less than 150mV;

3. Do not share power with amplifier, camera, etc.

Connector Specification

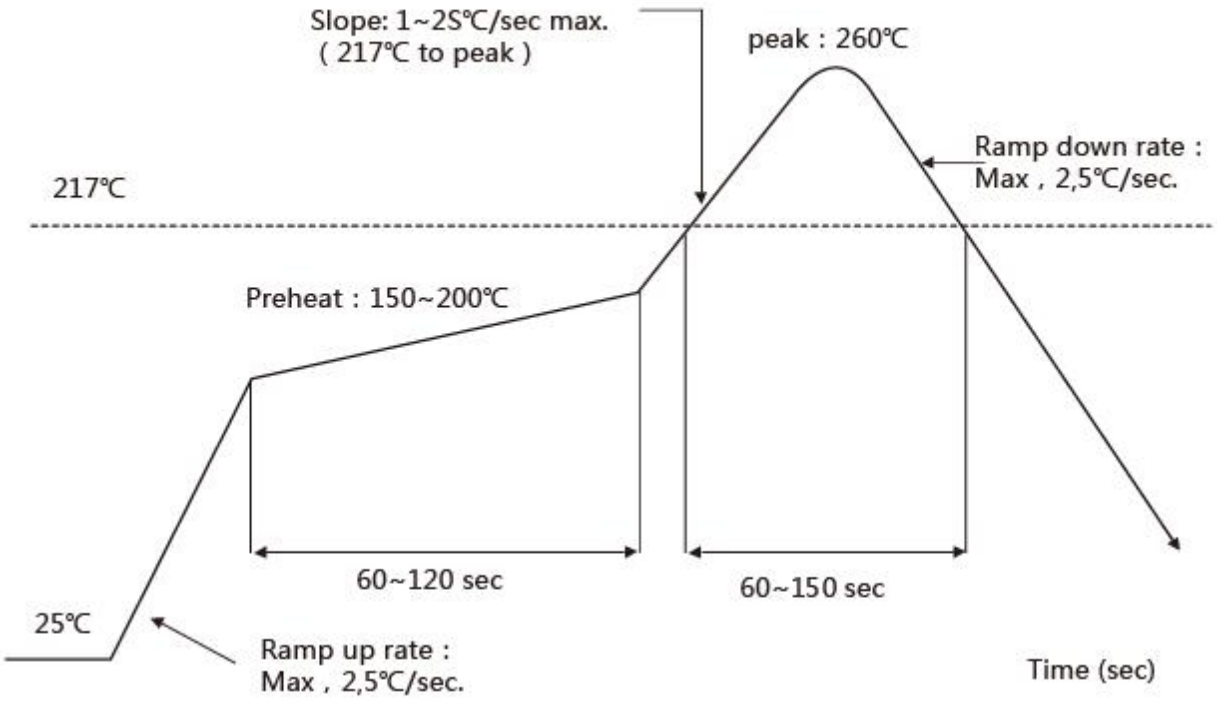


11. Recommended Reflow Profile

Referred to IPC/JEDEC standard.

Peak Temperature : <260°C

Number of Times : ≤2 times



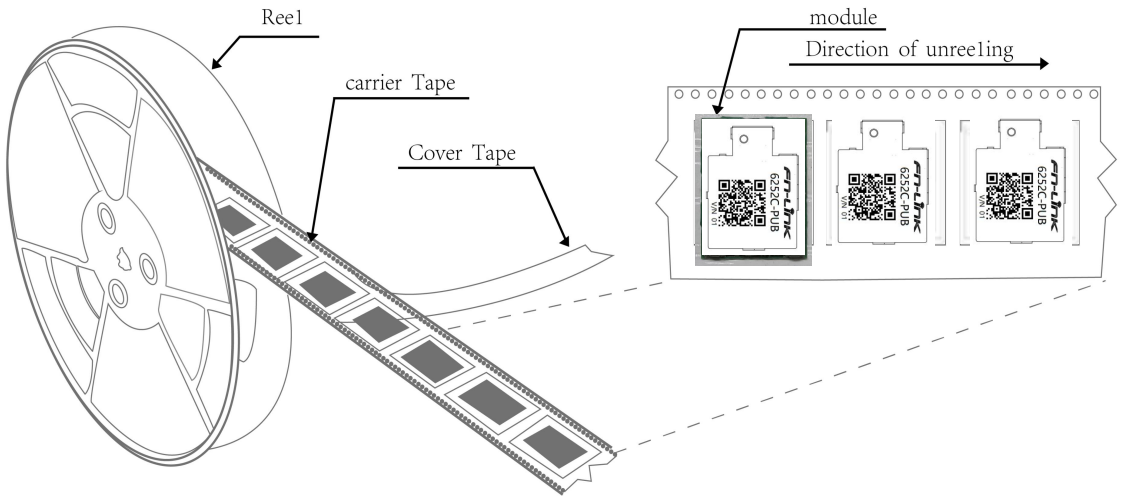
12. RoHS compliance

All hardware components are fully compliant with EU RoHS directive

13. Package

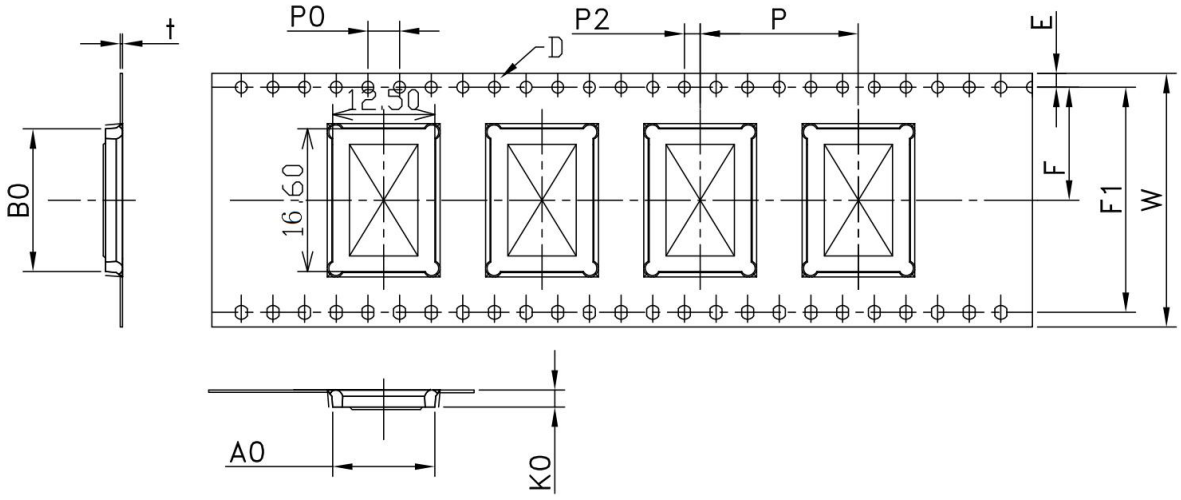
13.1 Reel

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	+0.3 −0.3	±0.18	±0.18	+0.1 −0.0	±0.1	±0.15	±0.10	±0.10	±0.1	±0.15	±0.1	±0.05



13.3 Packaging Detail

the take-up package

Using self-adhesive tape

Size of black tape:24mm*32.6m the cover tape :2.13mm*32.6m

Color of plastic disc:blue

A roll of 2000pcs

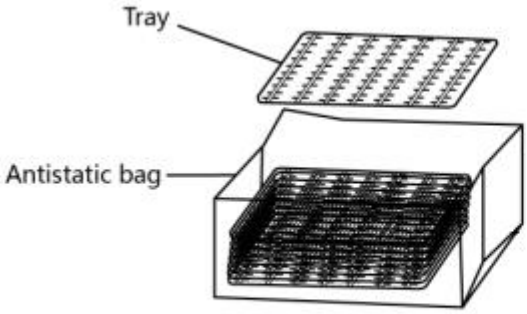
NY bag size:460mm*385mm

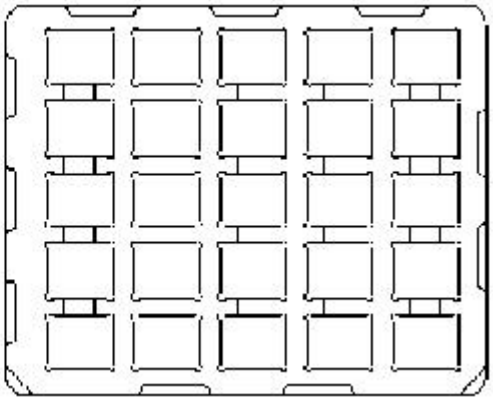
size ： 350*350*35mm

The packing case size:350*210*370mm

13.4 Tray

Use pallet packaging for less than 300 pieces





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