



## PRODUCT SPECIFICATION

# 6252BA-SR

**Wi-Fi Dual-band 2x2 11ax + Bluetooth 5.2**

**Combo Module**

Version:v1.3

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

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

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

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

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# 6252BA-SR Module Datasheet

Ordering Information	Part NO.	Description
	FG6252BASR-00	RTL8852BS, a/b/g/n/ac/ax Wi-Fi, 2T2R, BT5.0,13*15mm, SDIO,UART,Dual antenna (PIN AP6275S)

Target power:

2.4G: 19/18/17/13

5G: 18/17/15/13

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# 1. General Description

## 1.1 Introduction

6252BA-SR is a low-cost and low-power consumption module which has all of the Wi-Fi functionalities. It is a highly-integrated IEEE 802.11 a/b/g/n/ac/ax MAC/Baseband/RF WLAN single chip. For Wireless LAN operation. The integrated module provides SDIO 3.0 interface for Wi-Fi. The module provides simple legacy and 20MHz/40MHz/80MHz co-existence mechanism to ensure backward and network compatibility.

The wireless module complies with IEEE 802.11 a/b/g/n/ac/ax 2x2 MIMO standard and the speed can achieve up to 1201Mbps with dual stream in 802.11ax. The integrated module provides SDIO interface for Wi-Fi, UART / PCM interface for Bluetooth.

This combo module is a total solution for a combination of Wi-Fi and Bluetooth V5.2 technologies. The module is specifically developed for all portable devices.

## 1.2 Description

Model Name	6252BA-SR
Product Description	Support Wi-Fi/Bluetooth functionalities
Dimension	L x W x H: 15 x 13 x 2.35 mm
Wi-Fi Interface	Support SDIO V1.0/V2.0/V3.0
BT Interface	UART / PCM
OS supported	Android /Linux/iOS /WIN10
Operating temperature	0°C to 70°C
Storage temperature	-40°C to 85°C

## 2. Features

### General Features

- Highly integrated wireless local area network (WLAN) system-on-chip (SOC) for 802.11a/b/g/n/ac/ax WLAN applications
- Supports Dual band Single concurrent (2.4G/5G).
- Dual-stream spatial multiplexing up to 1201 Mbps data rate.
- Supports 20/40MHz at 2.4GHz and supports 20/40/80MHz at 5GHz
- Supports Transmit Beamforming

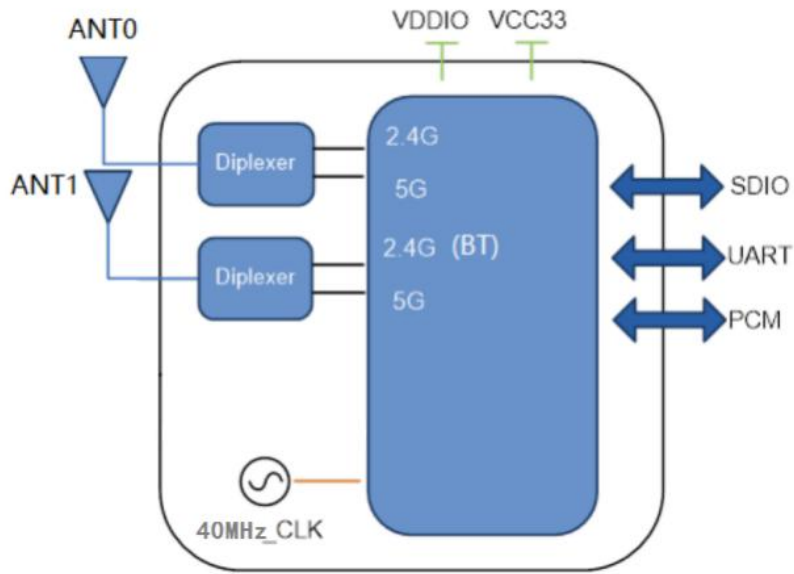
### Host Interface

- Supports low power SDIO3.0(complies with SDIO 1.1/2.0) interface for WLAN and UART/PCM interface for Bluetooth.

### Bluetooth Features

- Supports Bluetooth system (BT5.2 Logo Compliant)
- Supports WLAN/Bluetooth coexistence
- Compatible with Bluetooth v2.1+EDR.
- Dual Mode support: Simultaneous LE and BR/EDR
- BT host digital interface:
  - HCI UART
  - PCM for audio data

### 3. Block Diagram



### 4. General Specification

#### 4.1 WI-FI 2.4GHz Specification

Feature	Description		
WLAN Standard	IEEE 802.11 b/g/n/ac/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 <sup>1</sup>	802.11b /11Mbps	19dBm ± 2 dB	EVM ≤ -10dB
	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	± 20ppm		
SISO Receive Sensitivity (11b,20MHz) @8% PER	- 1Mbps	PER @ -94 dBm	≤-83
	- 11Mbps	PER @ -85 dBm	≤-76
SISO Receive Sensitivity	- 6Mbps	PER @ -90 dBm	≤-85

(11g,20MHz) @10% PER	- 54Mbps	PER @ -71 dBm	≤-68
SISO Receive Sensitivity	- MCS=0	PER @ -90 dBm	≤-85
(11n,20MHz) @10% PER	- MCS=7	PER @ -69 dBm	≤-67
SISO Receive Sensitivity	- MCS=0	PER @ -87 dBm	≤-82
(11n,40MHz) @10% PER	- MCS=7	PER @ -66 dBm	≤-64
SISO Receive Sensitivity	- MCS=0	PER @ -90 dBm	≤-82
(11ac,20MHz) @10% PER	- MCS=8	PER @ -66 dBm	≤-60
SISO Receive Sensitivity	- MCS=0	PER @ -87 dBm	≤-79
(11ac ,40MHz) @10% PER	- MCS=9	PER @ -59 dBm	≤-55
SISO Receive Sensitivity	- MCS=0	PER @ -90 dBm	≤-74
(11ax,20MHz) @10% PER	- MCS=11	PER @ -60 dBm	≤-52
SISO Receive Sensitivity	- MCS=0	PER @ -87 dBm	≤-71
(11ax ,40MHz) @10% PER	- MCS=11	PER @ -57 dBm	≤-49
Maximum Input Level	802.11b : -10 dBm		
	802.11g/n : -20 dBm		
Antenna Reference	Small antennas with 0~2 dBi peak gain		

## 4.2 WI-FI 5GHz Specification

Feature	Description		
WLAN Standard	IEEE 802.11a/n/ac/ax, Wi-Fi compliant		
Frequency Range	5.15 GHz ~ 5.850 GHz(5.0 GHz ISM Band)		
Test Items	Typical Value	EVM	
Output Power <sup>1</sup>	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		
Spectrum Mask	Meet with IEEE standard		
Freq. Tolerance	± 20ppm		
SISO Receive Sensitivity	- 6Mbps	PER @ -90 dBm	≤-85
(11a,20MHz) @10% PER	- 54Mbps	PER @ -71 dBm	≤-68
SISO Receive Sensitivity	- MCS=0	PER @ -90 dBm	≤-85



(11n,20MHz) @10% PER	- MCS=7	PER @ -69 dBm	≤-67
SISO Receive Sensitivity	- MCS=0	PER @ -87 dBm	≤-82
(11n,40MHz) @10% PER	- MCS=7	PER @ -66 dBm	≤-64
SISO Receive Sensitivity	- MCS=0, NSS1	PER @ -90 dBm	≤ -82
(11ac,20MHz) @10% PER	- MCS=8, NSS1	PER @ -66 dBm	≤ -60
SISO Receive Sensitivity	- MCS=0, NSS1	PER @ -87 dBm	≤ -79
(11ac ,40MHz) @10% PER	- MCS=9, NSS1	PER @ -59 dBm	≤ -55
SISO Receive Sensitivity	- MCS=0, NSS1	PER @ -84 dBm	≤-79
(11ac,80MHz) @10% PER	- MCS=9, NSS1	PER @ -56 dBm	≤-54
SISO Receive Sensitivity	- MCS=0	PER @ -90 dBm	≤-74
(11ax,20MHz) @10% PER	- MCS=11	PER @ -60 dBm	≤-52
SISO Receive Sensitivity	- MCS=0	PER @ -87 dBm	≤-71
(11ax ,40MHz) @10% PER	- MCS=11	PER @ -57 dBm	≤-49
SISO Receive Sensitivity	- MCS=0	PER @ -84 dBm	≤-68
(11ax,80MHz) @10% PER	- MCS=11	PER @ -54 dBm	≤-46
Maximum Input Level	802.11a/n: -30 dBm		
Antenna Reference	Small antennas with 0~2 dBi peak gain		

2. 2.4G,5G output power control by firmware power by rate table, the table value must same with module target power

**15GHz(20MHz) Channel table**

Band range	Operating Channel Numbers	Channel center frequencies(MHz)
5150MHz~5250MHz	36	5180
	40	5200
	44	5220
	48	5240
5250MHz~5350MHz	52	5260
	56	5280
	60	5300
	64	5320
5470MHz~5725MHz	100	5500
	104	5520
	108	5540
	112	5560
	116	5580
	120	5600
	124	5620

	128	5640
	132	5660
	136	5680
	140	5700
5725MHz~5850MHz	149	5745
	153	5765
	157	5785
	161	5805
	165	5825

Note: The Wi-Fi RF specification data will be updated in future version.

### 4.3 Bluetooth Specification

Feature	Description
<b>General Specification</b>	
Bluetooth Standard	BDR(1Mbps),EDR(2Mbps & 3Mbps),LE(1Mbps),2LE(2Mbps)
Host Interface	UART
Frequency Band	2400 MHz ~ 2483.5 MHz
Number of Channels	79 channels for classic,40 channels for BLE
Modulation	GFSK, $\pi/4$ -DQPSK,8DPSK
<b>RF Specification</b>	
<b>Output Power , tolerance <math>\pm 3</math> dB</b>	
	<b>CL1(dBm)</b>
BDR Output Power	5
EDR Output Power	5
BLE Output Power	5
<b>Sensitivity, tolerance : /</b>	
Sensitivity @ BER=0.1% for GFSK (1Mbps)	-92
Sensitivity @ BER=0.01% for $\pi/4$ -DQPSK (2Mbps)	-86

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

Note: The Bluetooth Specification will be updated in future version.

## 5. ID setting information

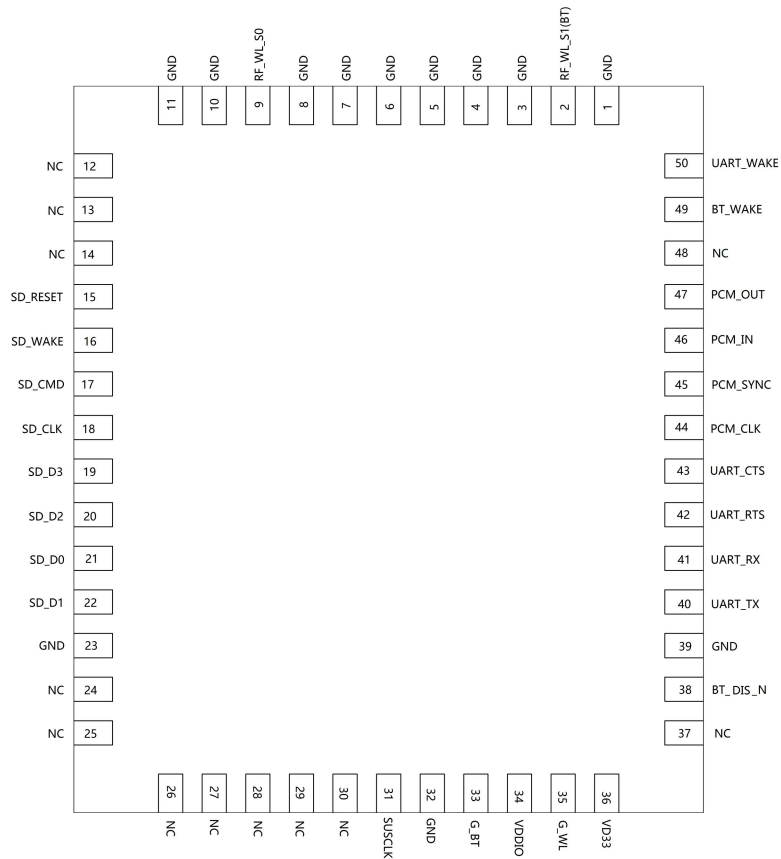
WI-FI

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	GND	—	Ground connections	
2	RF_S1	I/O	RF I/O port chain1, dual band Wi-Fi and BT (for 2ant type)	
3	GND	—	Ground connections	
4	GND	—	Ground connections	
5	GND	—	Ground connections	
6	GND	—	Ground connections	
7	GND	—	Ground connections	
8	GND	—	Ground connections	
9	RF_S0	I/O	RF I/O port chain0, dual band Wi-Fi	
10	GND	—	Ground connections	
11	GND	—	Ground connections	
12	NC	—	No connect	
13	NC	—	No connect	
14	NC	—	No connect	

15	SD_RESET	I/PU	Reset Pin for SDIO interface ON: pull high; OFF: pull low Low for disable SDIO interface	VDDIO
16	SD_WAKE	O	WLAN to wake-up HOST	VDDIO
17	SDIO_CMD	I/O	SDIO command line	VDDIO
18	SDIO_CLK	I/O	SDIO clock line	VDDIO
19	SDIO_D3	I/O	SDIO data line 3	VDDIO
20	SDIO_D2	I/O	SDIO data line 2	VDDIO
21	SDIO_D0	I/O	SDIO data line 0	VDDIO
22	SDIO_D1	I/O	SDIO data line 1	VDDIO
23	GND	—	Ground connections	
24	NC	—	No connect	
25	NC	—	No connect	
26	NC	—	No connect	
27	GND	—	Ground connections	
28	NC	—	No connect	
29	NC	—	No connect	
30	GND	—	Ground connections	
31	SUSCLK	I/PD	External Low Power Clock input (32.768KHz) If not used keep NC	
32	GND	—	Ground connections	
33	G_BT	I/O/PD	GPIO5 If not used keep NC.	
34	VDDIO	P	I/O Voltage supply input 1.8V or 3.3V	1.8V or 3.3V
35	G_WL	I/O/PD	GPIO4, G_WL If not used keep NC. Do not pull high on this pin.	
36	VD33	P	Main power voltage source input 3.3V	3.3V
37	NC	—	No connect	
38	BT_DIS_N	I/PU	Enable pin for Bluetooth device ON: pull high; OFF: pull low External pull low to shut down BT, but when module in initial step do not pull low.	VDDIO
39	GND	—	Ground connections	
40	UART_TX	O	Bluetooth UART interface	VDDIO
41	UART_RX	I	Bluetooth UART interface	VDDIO
42	UART_RTS	O	Bluetooth UART interface	VDDIO

43	UART_CTS	I	Bluetooth UART interface	VDDIO
44	PCM_CLK	I/O	PCM clock	VDDIO
45	PCM_SYNC	I/O	PCM sync signal	VDDIO
46	PCM_IN	I	PCM data input	VDDIO
47	PCM_OUT	O	PCM Data output	VDDIO
48	NC	—	No connect	
49	BT_WAKE	O	HOST wake-up BT device	VDDIO
50	UART_WAKE	O	BT device wake-up HOST	VDDIO

P:POWER I:INPUT O:OUTPUT VDDIO:3.3V

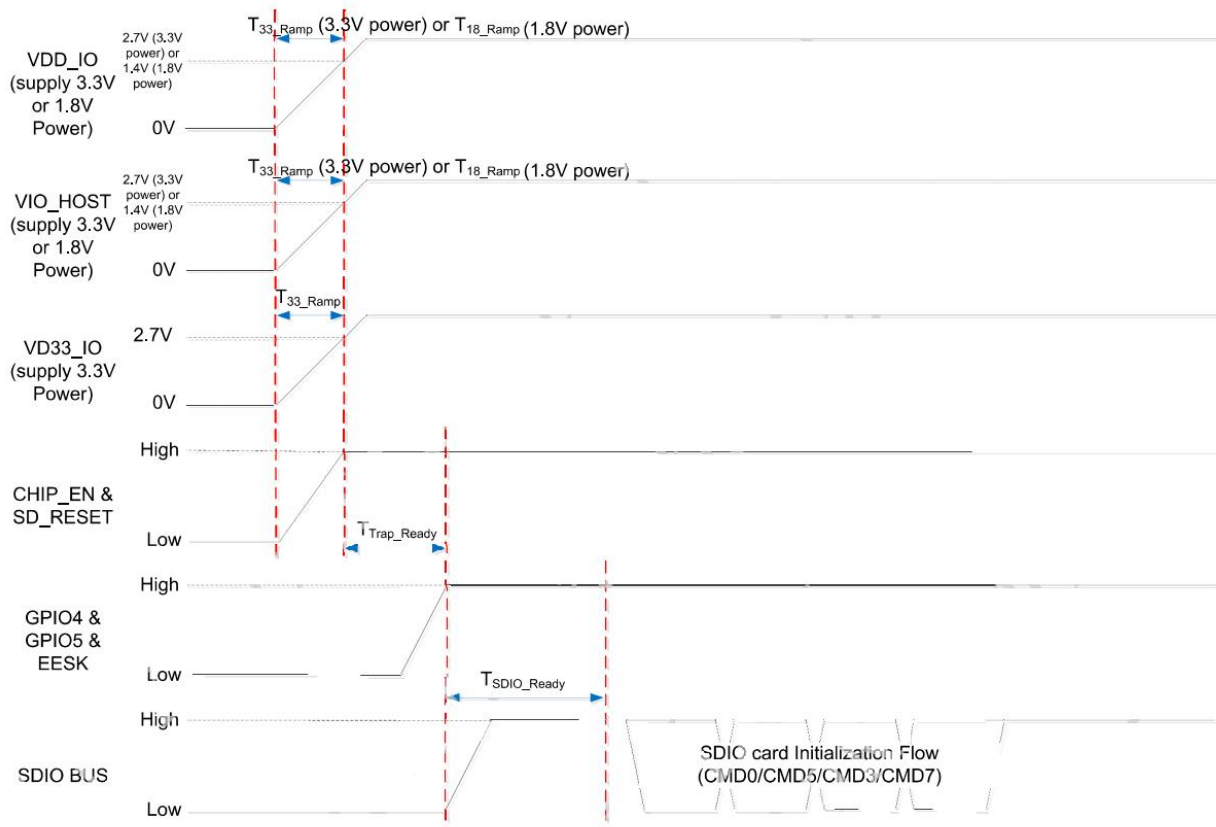
## 7. Electrical Specifications

### 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
VDDIO (3.3V)	-	3.3	3.6	V
VDDIO (1.8V)	1.68	1.8	1.98	V

## 7.2 Interface Circuit time series

### 7.2.1 Power on sequence



	Min.	Typical	Max.	Unit	Description
T18_Ramp	0.5	1.5	5	ms	The 1.8V power ramp up duration.
T33_Ramp	0.5	1.5	5	ms	The 3.3V power ramp up duration.
TTrap_Ready	400	500	X	ms	WLAN eFuse autoload. TTrap_Ready = 500ms (Typical)
TSDIO_Ready	10	20	X	ms	SDIO Not Ready Duration. In this state, the RTL8852BS may respond to commands without the ready bit being set. After the ready bit is set, the host will initiate complete card detection procedure.

### 7.2.2 SDIO Pin Description

The module supports SDIO version 3.0 for all 1.8V 4-bit in addition v2.0 to the 3.3V .

#### SDIO Pin Description

SD 4-Bit Mode	
DATA0	Data Line 0
DATA1	Data Line 1 or Interrupt
DATA2	Data Line 2 or Read Wait

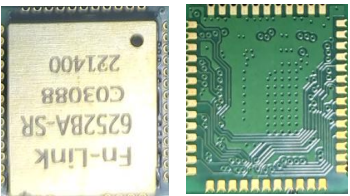
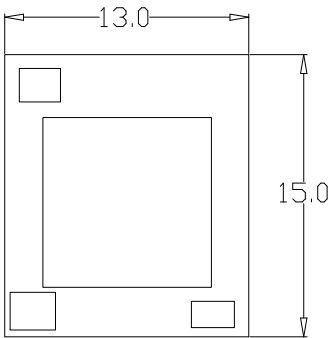
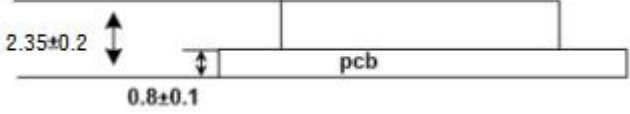
DATA3	Data Line 3
CLK	Clock
CMD	Command Line

### 7.2.3 SDIO Timing Diagram

For timing criteria, please check specification in “SD specification Part1 Physical Layer Specification Version 3.01”

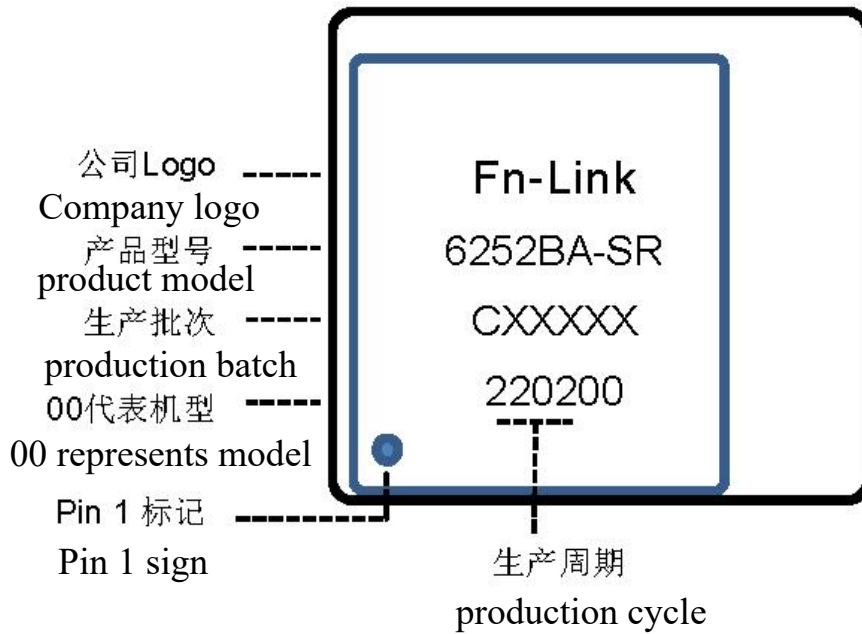
## 8. Size reference

### 8.1 Module Picture

<p><b>L x W : 15 x 13 (+0.3/-0.1) mm</b></p> <p><b>PIN1</b></p> 	
<p><b>H: 2.35 (±0.2) mm</b></p>	
<p><b>Weight</b></p>	<p><b>0.8g</b></p>

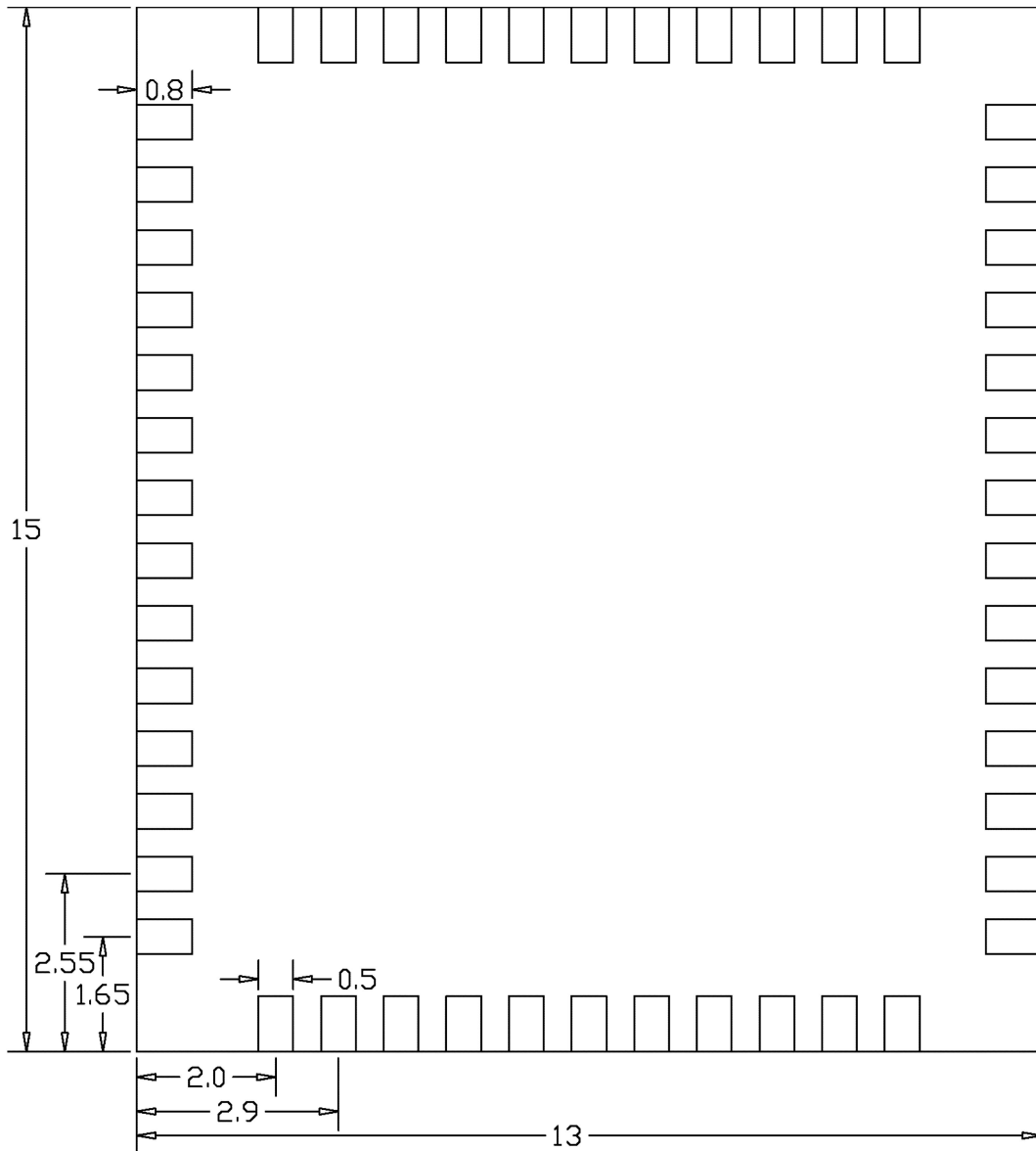


## 8.2 Marking Description

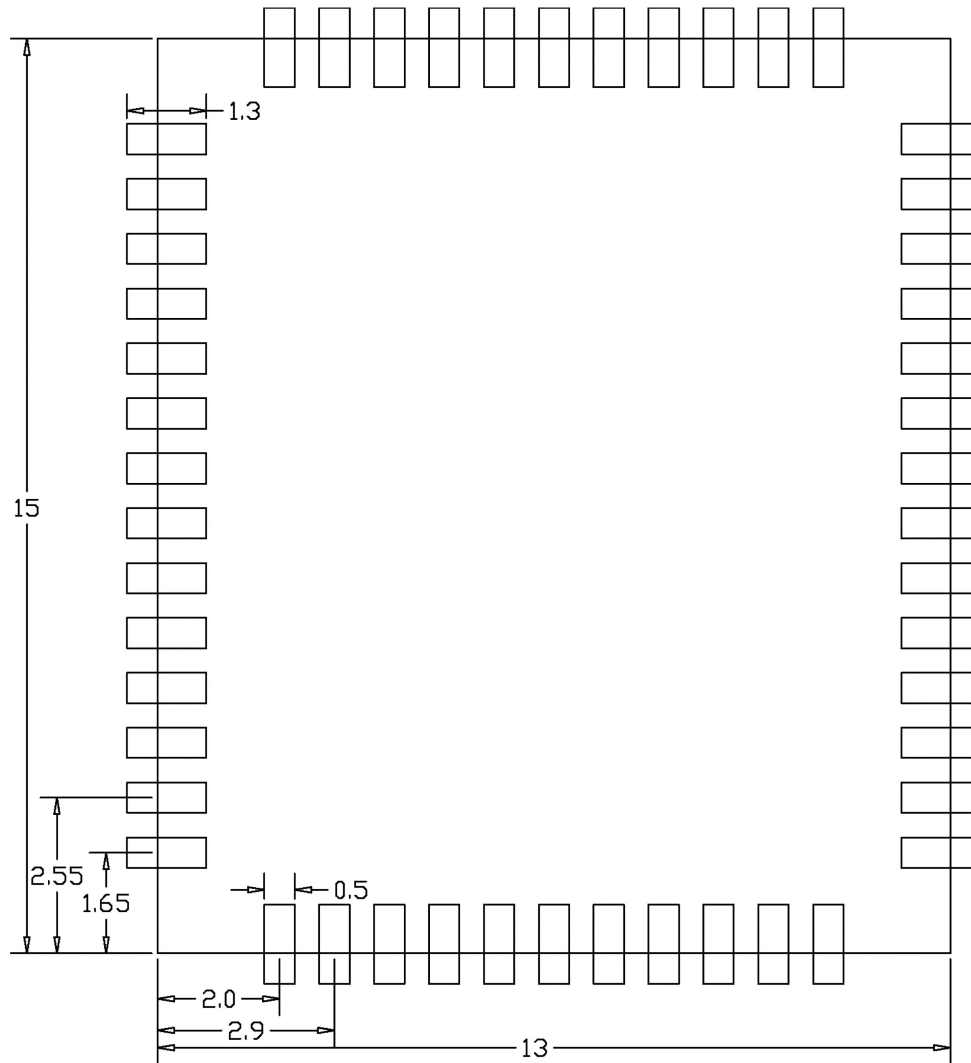


## 8.3 Physical Dimensions

<TOP View>



### 8.4 Layout Recommendation

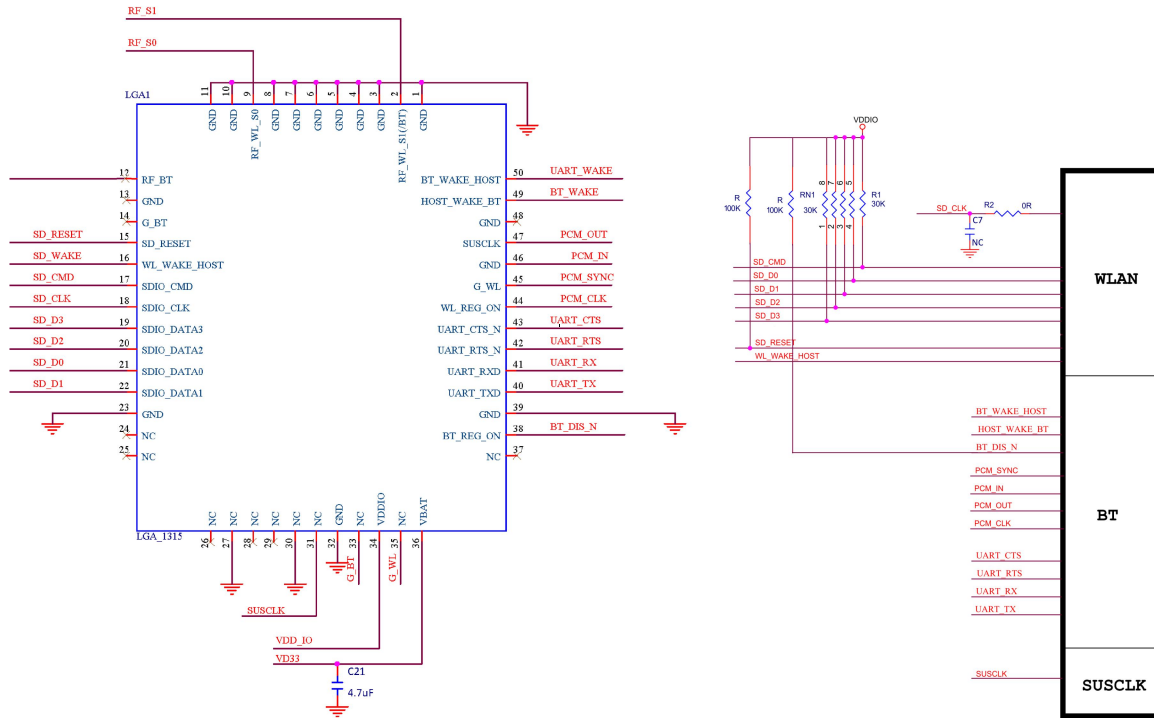


### 9. The Key Material List

Item	Part Name	Description	Manufacturer
1	PCB	6252BA-SR,4L,FR4,13×15-0.8mm	XY-PCB, GDKX, Sunlord, SLPCB, Truly
2	Crystal	2016 40MHz ±10ppm 12pF	ECEC, Hosonic, TKD, JWT
3	Chipset	RTL8852BS	Realtek
4	Shielding	6252BA-SR Shielding	信太, 精力通, 卓益
5	Inductor	0603 2.2uH, ±10%	Sunlord, Ceaiya, Cenker, Chilisin, Inpaq
6	Inductor	2016 1.0uH, ±20%	Sunlord, Ceaiya, Cenker, Chilisin, Inpaq

7	Duplexer	DPX,1608,2.4G+5GHz	Glead, Walsin, ACX, Murata, TDK MAG.LAYERS,FTR
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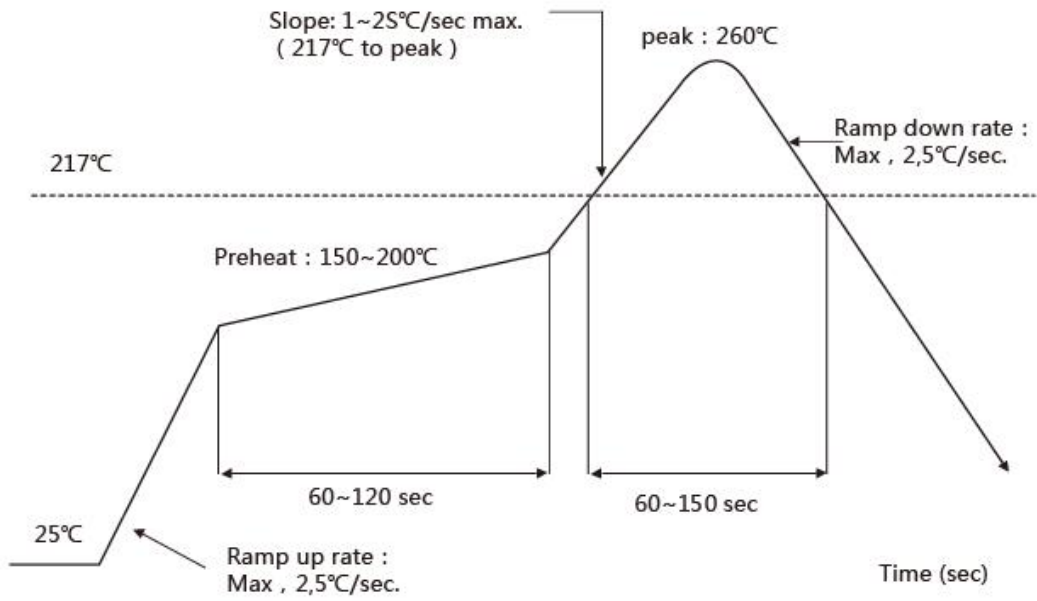
### 10. Reference Design



CAP should be placed close to pin 36 of the module  
CAP should be placed close to pin 34 of the module

### 11. Recommended Reflow Profile

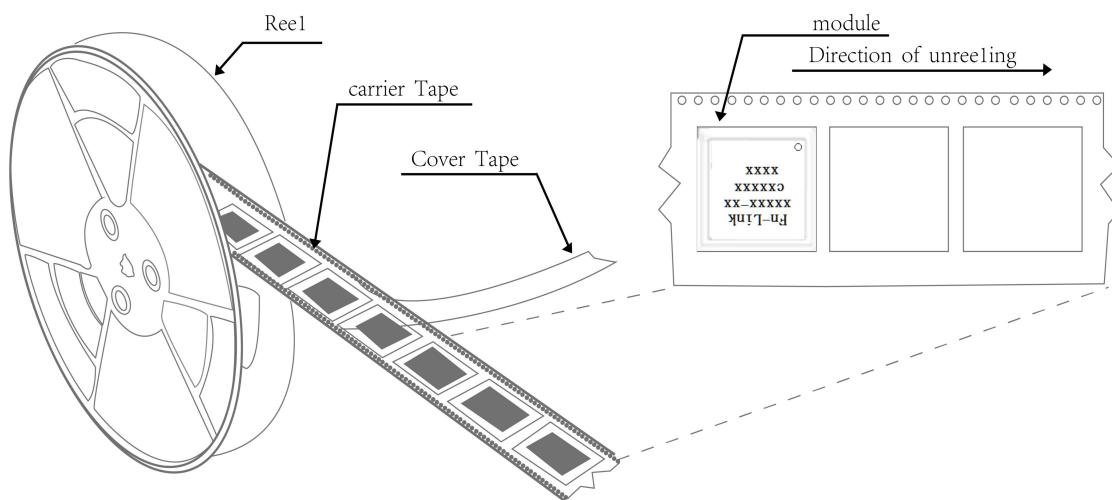
- Referred to IPC/JEDEC standard.
- Peak Temperature : <260°C
- Time within 5° C of peak temperature: ≥10s
- Number of Times : ≤2 times



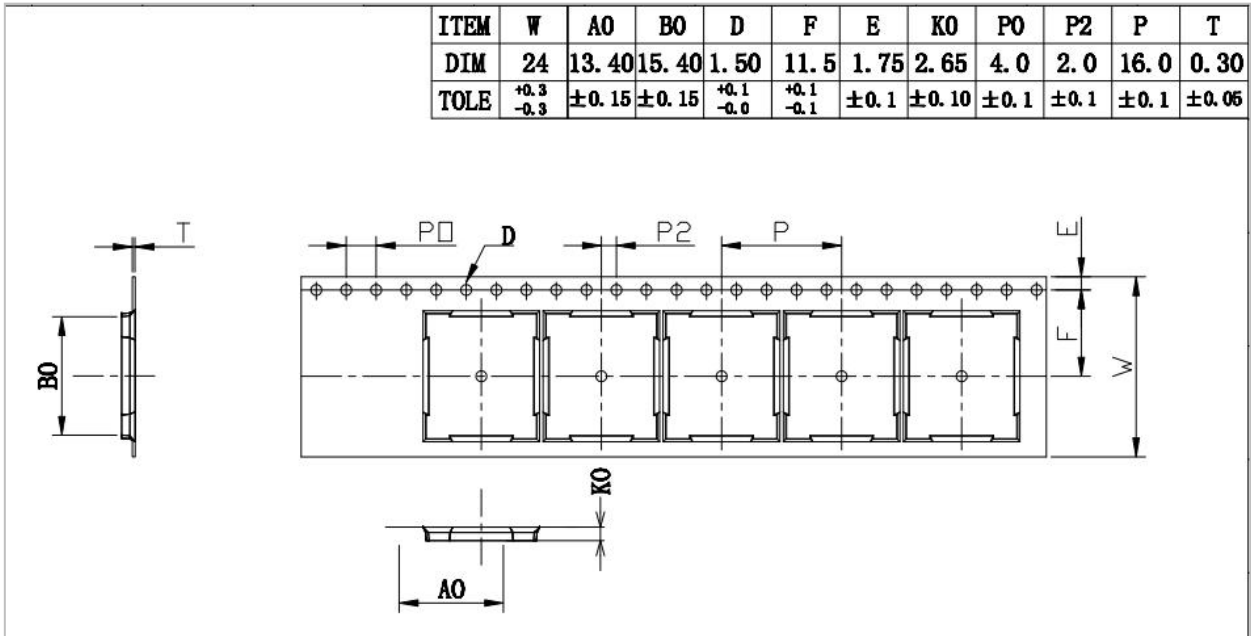
## 12. Package

### 12.1 Reel

A roll of 1500pcs

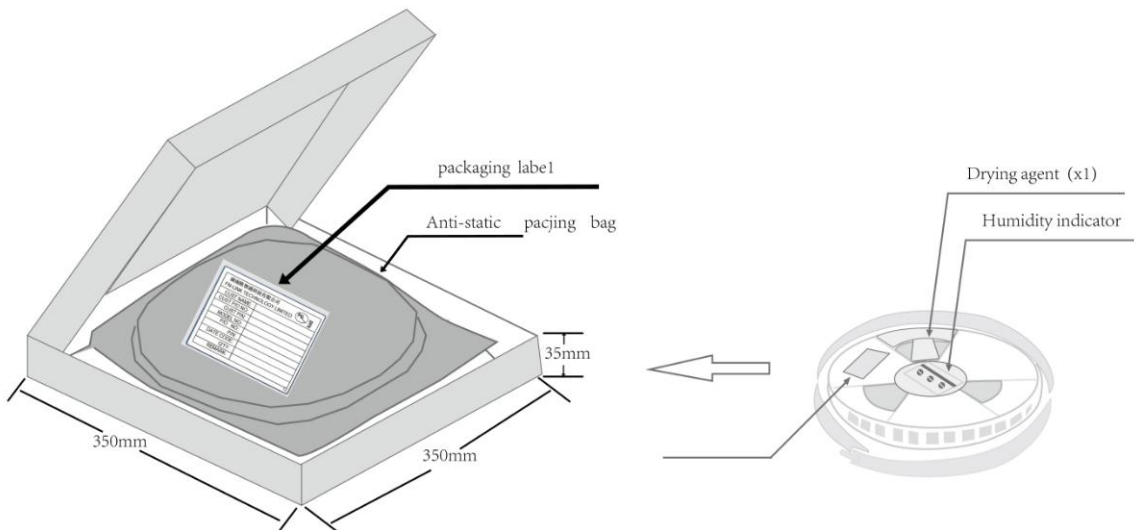


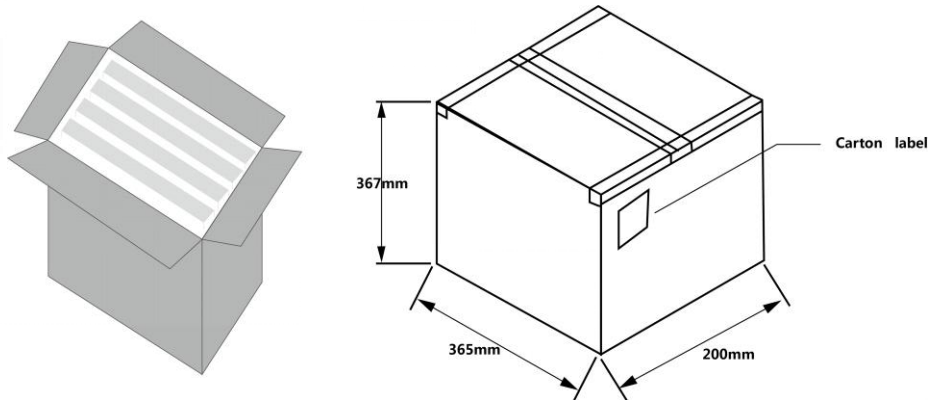
### 12.2 Carrier Tape Detail



### 12.3 Packaging Detail

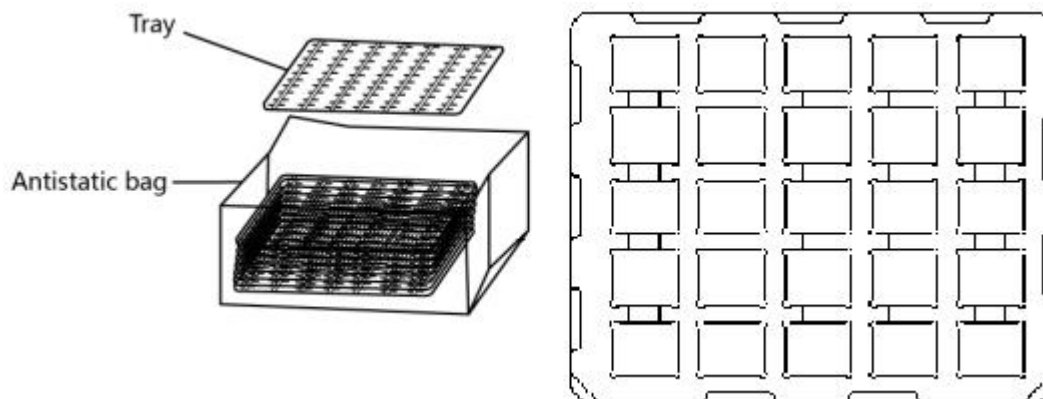
the take-up package





## 12.4 Tray

Use pallet packaging for less than 300 pieces



## 13. 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 <math><40^{\circ}\text{C}</math> and <math><90\%</math> relative humidity (RH).
- b) Environmental condition during the production: <math>30^{\circ}\text{C}</math> / 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



## **FCC Statement**

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.

(2) This device must accept any interference received, including interference that may cause undesired operation.

2. 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 and can radiate radio frequency energy and, if not installed and used in accordance with the 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.

This equipment should be installed and operated with a minimum distance of 20 cm between the radiator and your body.

## **ISED Statement**

This device contains licence-exempt transmitter(s)/receiver(s) that comply with Innovation, Science and Economic Development Canada's licence-exempt RSS(s). Operation is subject to the following two conditions:

This device may not cause interference.

This device must accept any interference, including interference that may cause undesired operation of the device.

This equipment should be installed and operated with a minimum distance of 20 cm between the radiator and your body

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes :

(1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

Cet équipement doit être installé et utilisé avec une distance minimale de 20 cm entre le radiateur et votre corps

The Module is designed to comply with the FCC statement. FCC ID is 2AATL-6252BA-SR. The host system using Module, should have label indicated it contain modular's FCC ID: 2AATL-6252BA-SR. This radio module must not installed to colocate and operating simultaneously with other radios in host system additional testing and equipment authorization may be required to operating simultaneously with other radio.

The Module and its antenna must not be co-located or operating in conjunction with any other transmitter or antenna within a host device.

The modular must be installed in the host that assign by Company name: FN-LINK TECHNOLOGY LIMITED. Model no.: 6252BA-SR if other host types used would need further evaluation and possible C2PC if they are not significantly similar to the one tested The WIFI Module is designed for a compact PCB design .It should be installed and operated with host or other minimum distance of 20 centimeters between the radiator and your body." To comply with FCC regulations limiting both maximum RF output power and human exposure to RF radiation, the maximum antenna gain including cable loss in a mobile-only exposure condition must not exceed 2.77dBi in the 2.4G band and 4.56dBi in the 5G band. The module uses IPEX antenna interface and use dipole antenna,this antenna is sold with the module.

Notice to OEM integrator

The end user manual shall include all required regulatory information/warning as show in this manual. The OEM integrator is responsible for testing their end-product for any additional compliance requirements required with this module installed. If the final product contains circuits of other FCC PART 15 Subparts,the final host product still requires Part 15 Subpart B compliance testing with the modular transmitter installed The intended use is generally not for the general public.It is generally for industry/commercial use. The connector is within the transmitter enclosure and can only be accessed by disassembly of the transmitter that is not nomally required, the user has no access to the connector.Installation must be controlled. Installation requires special training.

This device complies with Part 15 of the FCC Rules.

This equipment should be installed and operated with a minimum distance of 20 cm between the radiator and your body

Operations in the 5.15-5.35GHz band are restricted to indoors usage only.