FN-LINK欧智通

PRODUCT SPECIFICATION

6252BA-SR

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

Combo Module

Version:v1.1

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)

Customer: _____

Customer P/N: _____

Signature: _____

Date: _____

Office: 14th floor, Block B, phoenix zhigu, Xixiang Street, Baoan District, Shenzhen

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Revision History

Version	Date	Contents of Revision Change	Preparde	Checked	Approved

V1.0	2022/04/07	Initial Release	FC	LXY	QJP
V1.1	2022/09/28	Update SDIO timing description	LXY	LXY	QJP

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 x2.35 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

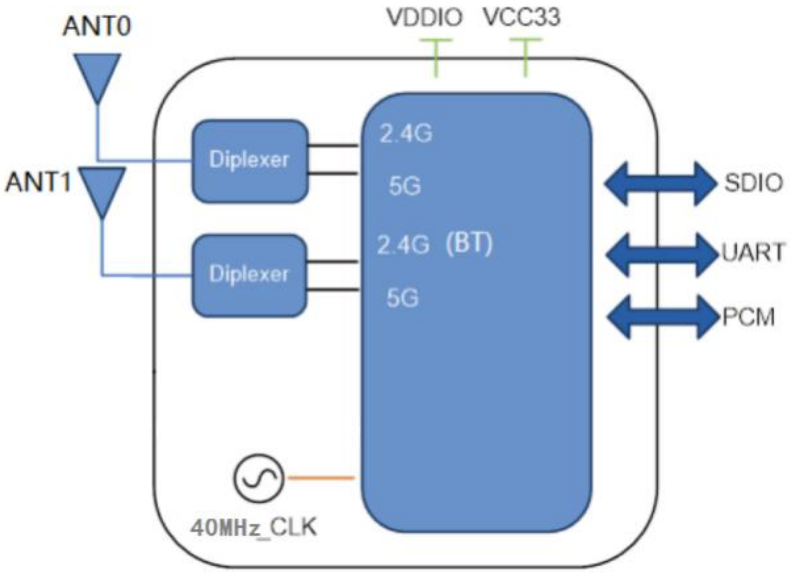
Host Interface

- 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[1]	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 (11n,20MHz) @10% PER	- MCS=0 PER @ -90 dBm	≤-85
	- MCS=7 PER @ -69 dBm	≤-67
SISO Receive Sensitivity (11n,40MHz) @10% PER	- MCS=0 PER @ -87 dBm	≤-82
	- MCS=7 PER @ -66 dBm	≤-64
SISO Receive Sensitivity (11ac,20MHz) @10% PER	- MCS=0 PER @ -90 dBm	≤ -82
	- MCS=8 PER @ -66 dBm	≤ -60
SISO Receive Sensitivity (11ac ,40MHz) @10% PER	- MCS=0 PER @ -87 dBm	≤ -79
	- MCS=9 PER @ -59 dBm	≤ -55
SISO Receive Sensitivity (11ax,20MHz) @10% PER	- MCS=0 PER @ -90 dBm	≤-74
	- MCS=11 PER @ -60 dBm	≤-52
SISO Receive Sensitivity (11ax ,40MHz) @10% PER	- MCS=0 PER @ -87 dBm	≤-71
	- 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[1]	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 (11a,20MHz) @10% PER	- 6Mbps PER @ -90 dBm	≤-85
	- 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 (11n,40MHz) @10% PER	- MCS=0 PER @ -87 dBm	≤-82
	- MCS=7 PER @ -66 dBm	≤-64
SISO Receive Sensitivity (11ac,20MHz) @10% PER	- MCS=0, NSS1 PER @ -90 dBm	≤ -82
	- MCS=8, NSS1 PER @ -66 dBm	≤ -60
SISO Receive Sensitivity (11ac ,40MHz) @10% PER	- MCS=0, NSS1 PER @ -87 dBm	≤ -79
	- MCS=9, NSS1 PER @ -59 dBm	≤ -55
SISO Receive Sensitivity (11ac,80MHz) @10% PER	- MCS=0, NSS1 PER @ -84 dBm	≤-79
	- MCS=9, NSS1 PER @ -56 dBm	≤-54
SISO Receive Sensitivity (11ax,20MHz) @10% PER	- MCS=0 PER @ -90 dBm	≤-74
	- MCS=11 PER @ -60 dBm	≤-52
SISO Receive Sensitivity (11ax ,40MHz) @10% PER	- MCS=0 PER @ -87 dBm	≤-71
	- MCS=11 PER @ -57 dBm	≤-49
SISO Receive Sensitivity (11ax,80MHz) @10% PER	- MCS=0 PER @ -84 dBm	≤-68
	- 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

[1]5GHz(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
	136	5680
	140	5700
5745MHz~5825MHz	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**		
General Specification			
Bluetooth Standard	Bluetooth V5.2.		
Host Interface	UART		
Antenna Reference	Small antennas with 0~2 dBi peak gain		
Frequency Band	2402 MHz ~ 2480 MHz		
Number of Channels	79 channels		
Modulation	GFSK, π/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)		-92	
Sensitivity @ BER=0.01% for π/4-DQPSK (2Mbps)		-86	
Sensitivity @ BER=0.01% for 8DPSK (3Mbps)		-85	
Maximum Input Level	GFSK (1Mbps):-20dBm		

	π/4-DQPSK (2Mbps) :-20dBm
	8DPSK (3Mbps) :-20dBm

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

5. ID setting information

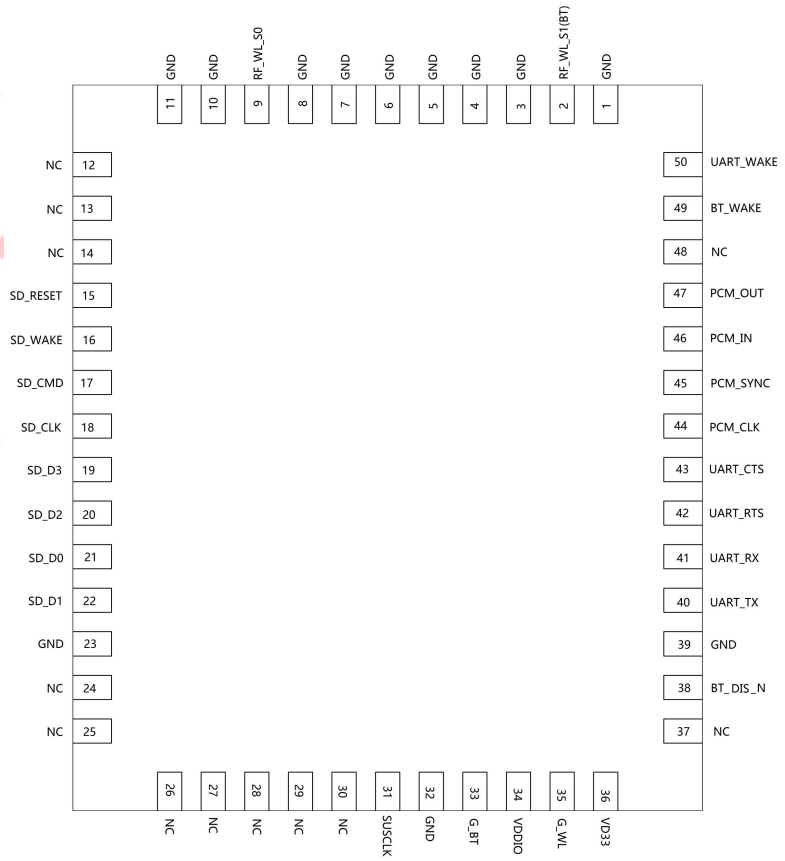
WI-FI

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	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	External Low Power Clock input (32.768KHz) If not used keep NC	

32	GND	—	Ground connections	
33	G_BT	—	GPIO5 If not used keep NC.	
34	VDDIO	P	I/O Voltage supply input 1.8V or 3.3V	1.8V or3.3V
35	G_WL	—	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	Enable pin for Bluetooth device ON: pull high; OFF: pull low External pull low to shut down BT	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

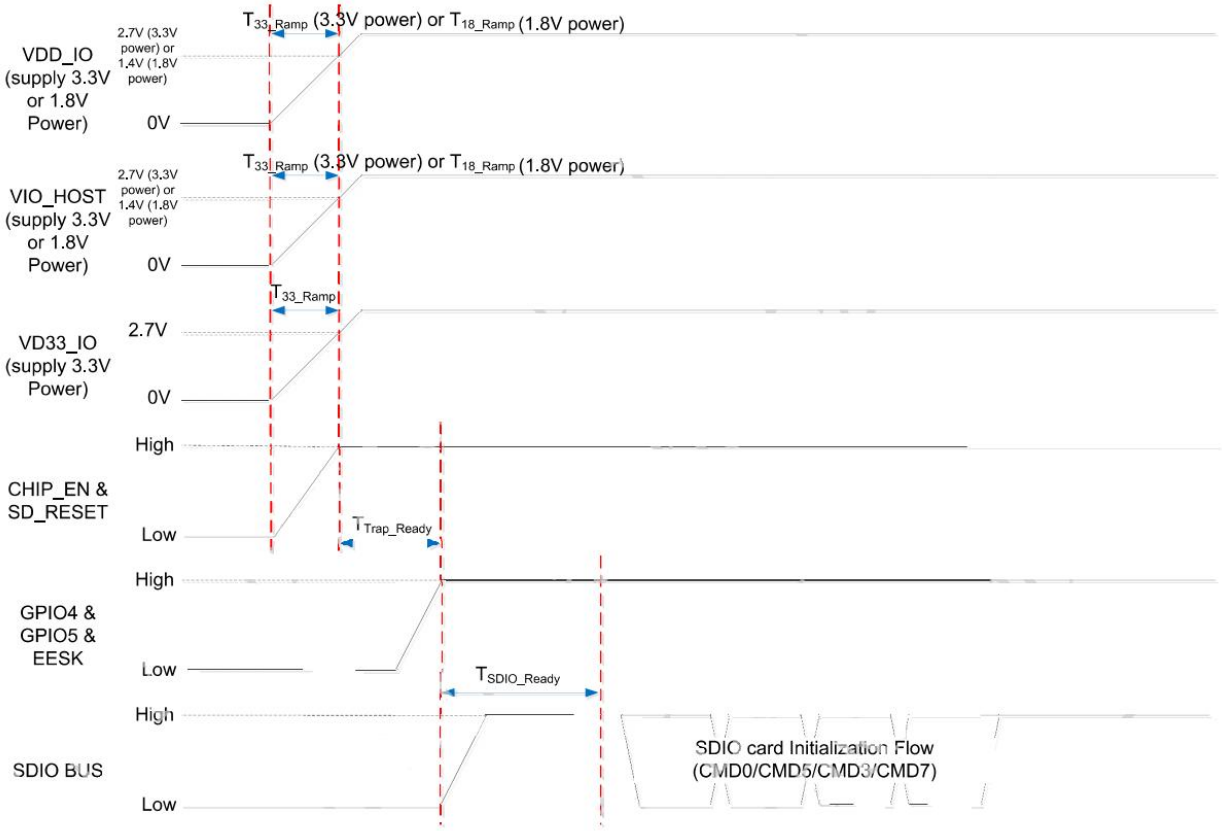
7. Electrical Specifications

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 UHSI speeds: SDR50(100 Mbps), SDR104(208MHz) and DDR50(50MHz, dual rates) in addition to the 3.3V default speed(25MHz) and high speed (50 MHz). It has the ability to stop the SDIO clock and map the interrupt signal into a GPIO pin. This ‘out-of-band’ interrupt signal notifies the host when the WLAN device wants to turn on the SDIO interface. The ability to force the control of the gated clocks from within the WLAN chip is also provided.

SDIO Pin Description

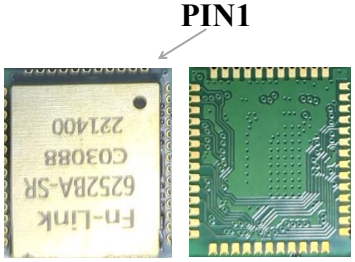
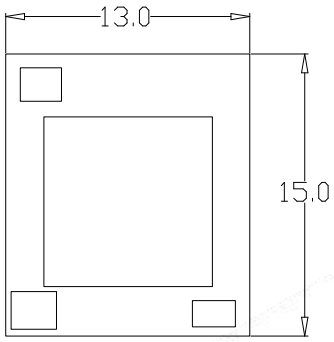
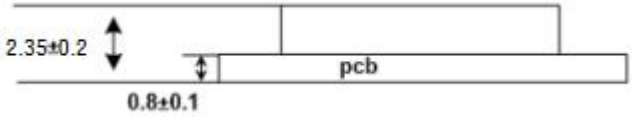
SD 4-Bit Mode	
DATA0	Data Line 0
DATA1	Data Line 1 or Interrupt
DATA2	Data Line 2 or Read Wait
DATA3	Data Line 3
CLK	Clock
CMD	Command Line

7.2.3 SDIO Timing Diagram

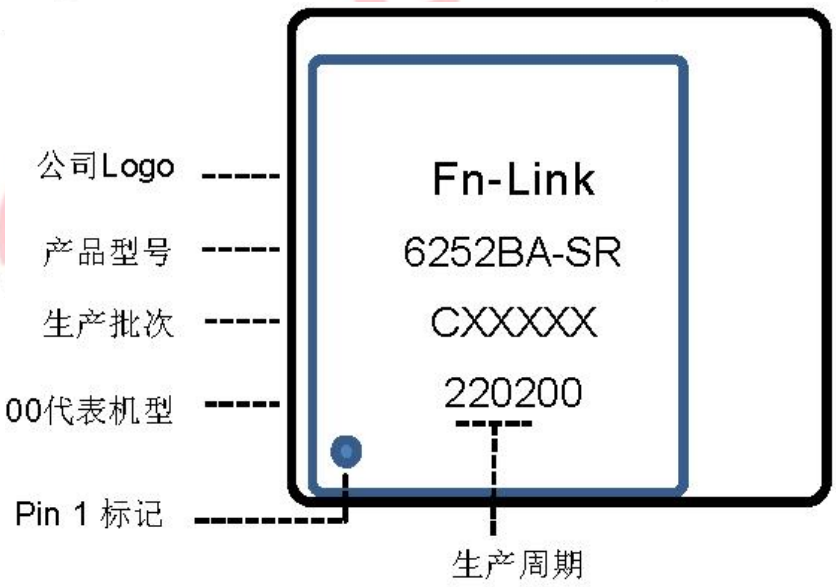
For timing criteria, please check specification in “SD specification Part1 Physical Layer Specification Version 3.01”

8. Size reference

8.1 Module Picture

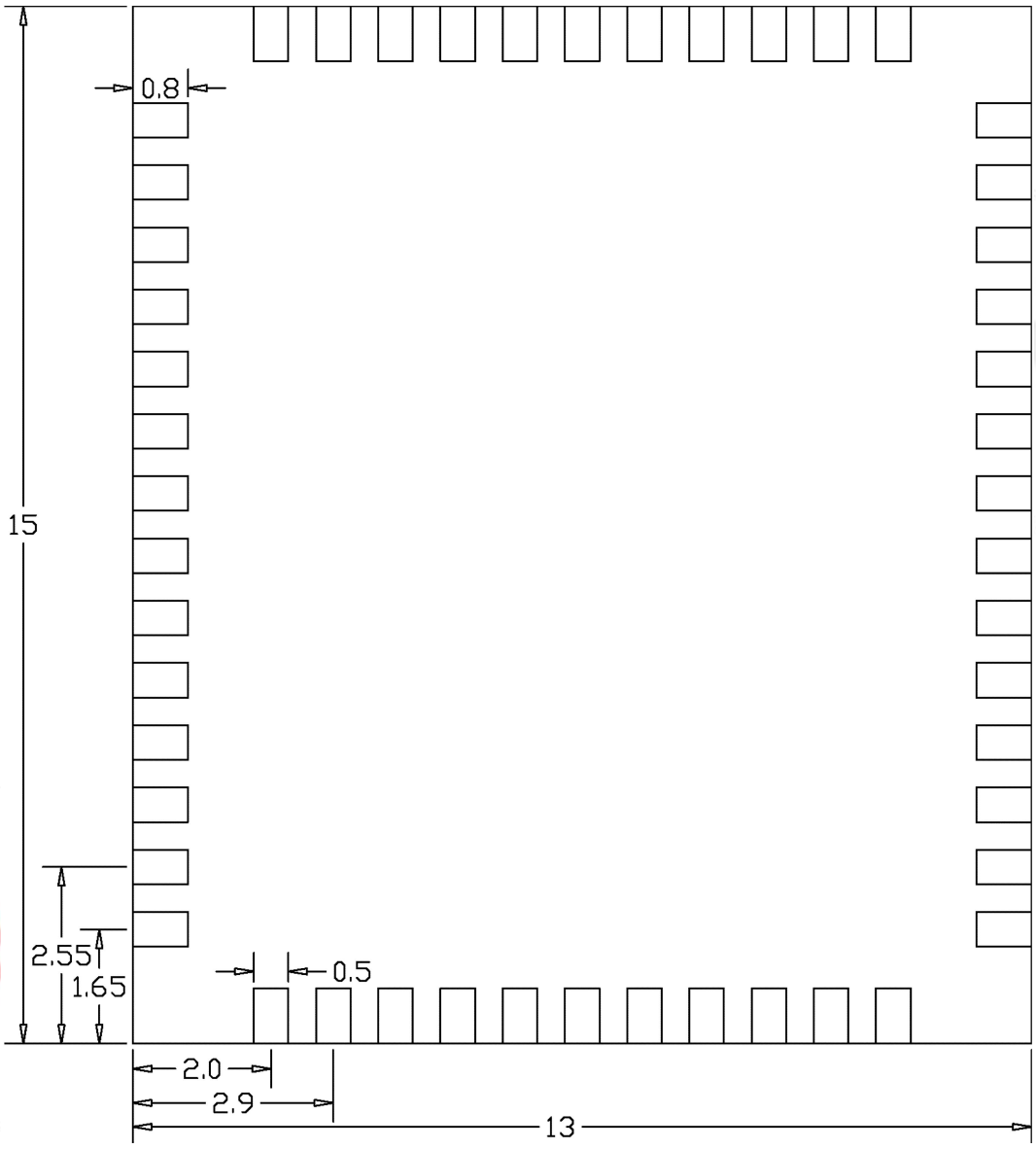
L x W : 15 x 13 (+0.3/-0.1) mm PIN1 	
H: 2.35 (±0.2) mm	
Weight	0.8g

8.2 Marking Description

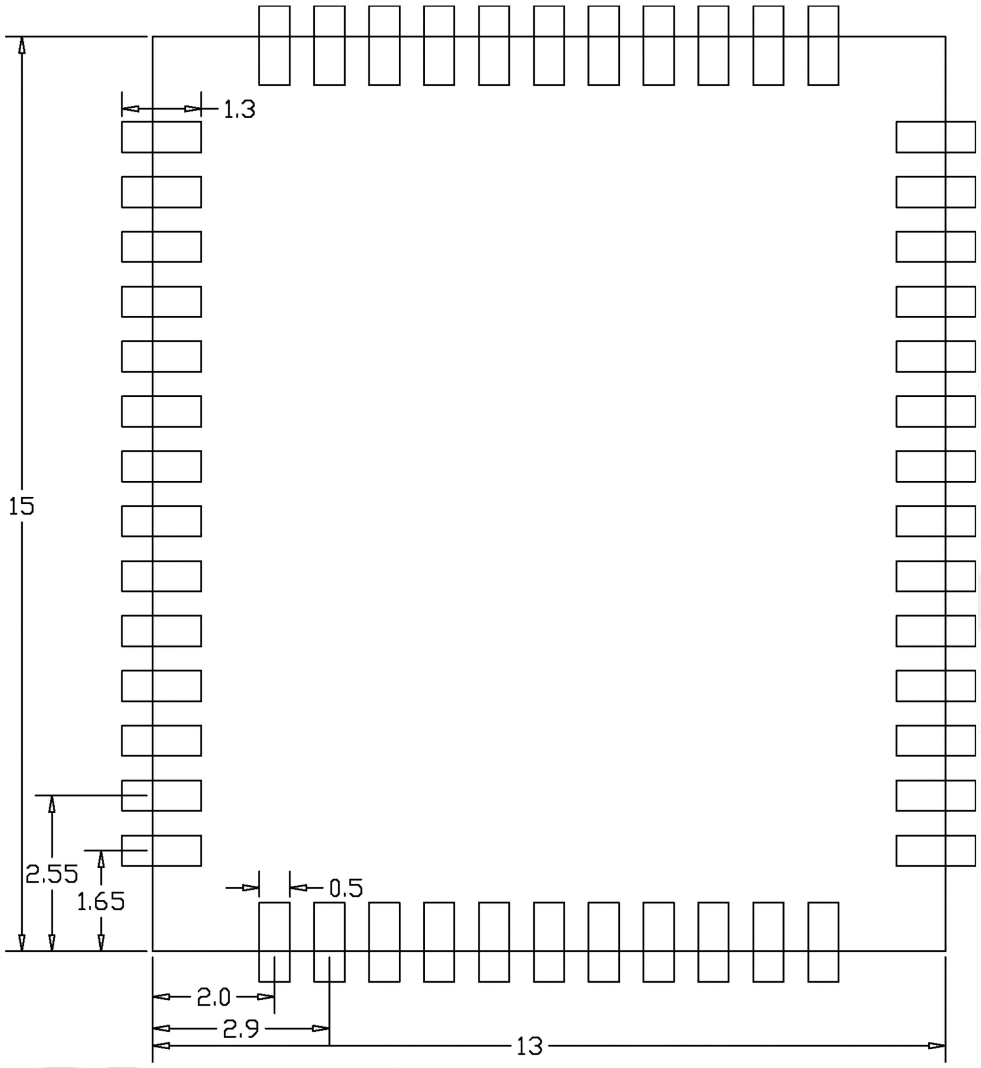


8.3 Physical Dimensions

<TOP View>



8.4 Layout Recommendation

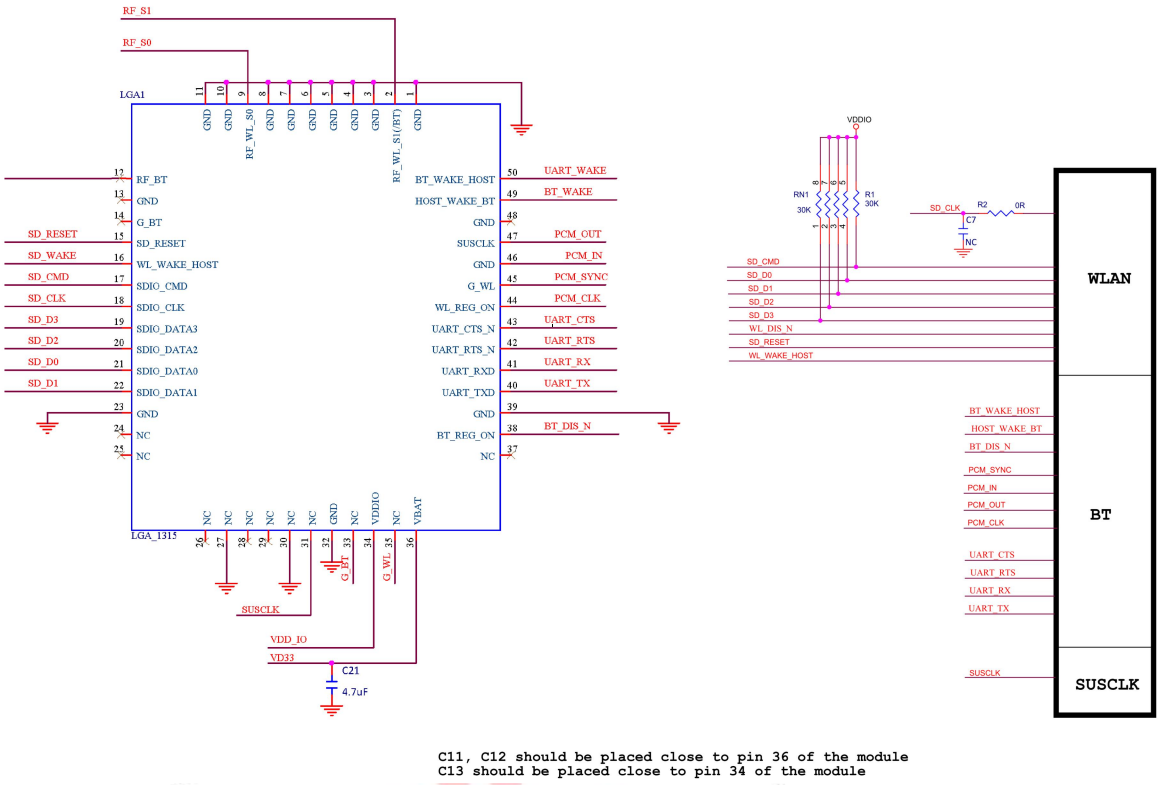


9. The Key Material List

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	Diplexer	DPX,1608,2.4G+5GHz	Glead, Walsin, ACX, Murata, TDK MAG.LAYERS,FTR

10. Reference Design



C11, C12 should be placed close to pin 36 of the module
C13 should be placed close to pin 34 of the module

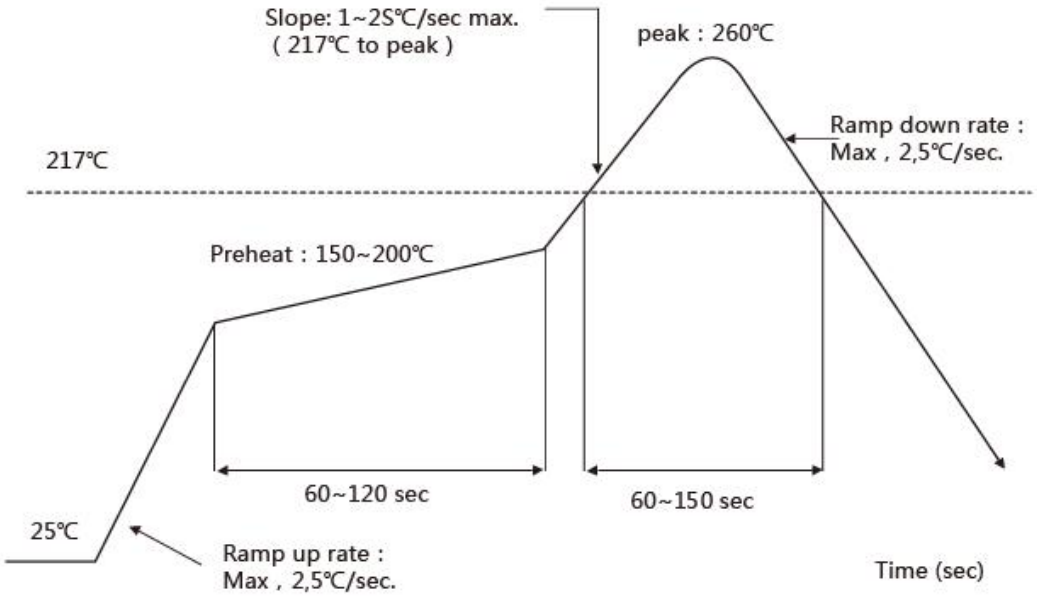
11. Recommended Reflow Profile

Referred to IPC/JEDEC standard.

Peak Temperature : <260°C

Time within 5° C of peak temperature：≥10s

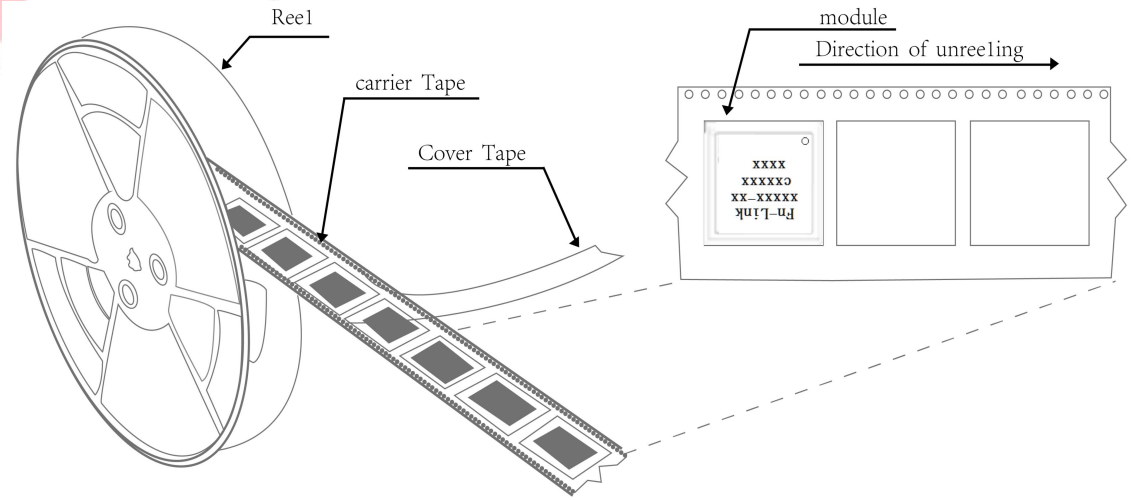
Number of Times : ≤2 times



12. Package

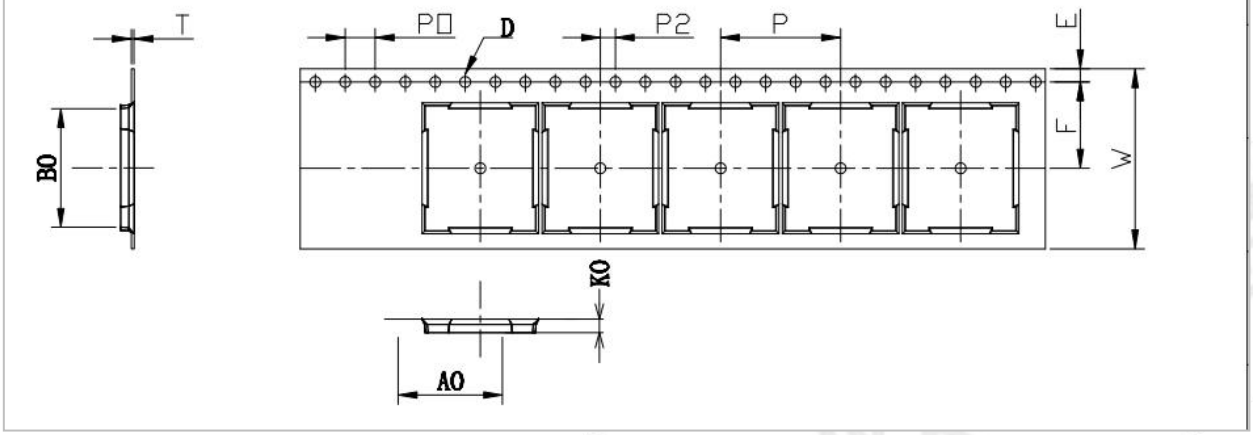
12.1 Reel

A roll of 1500pcs



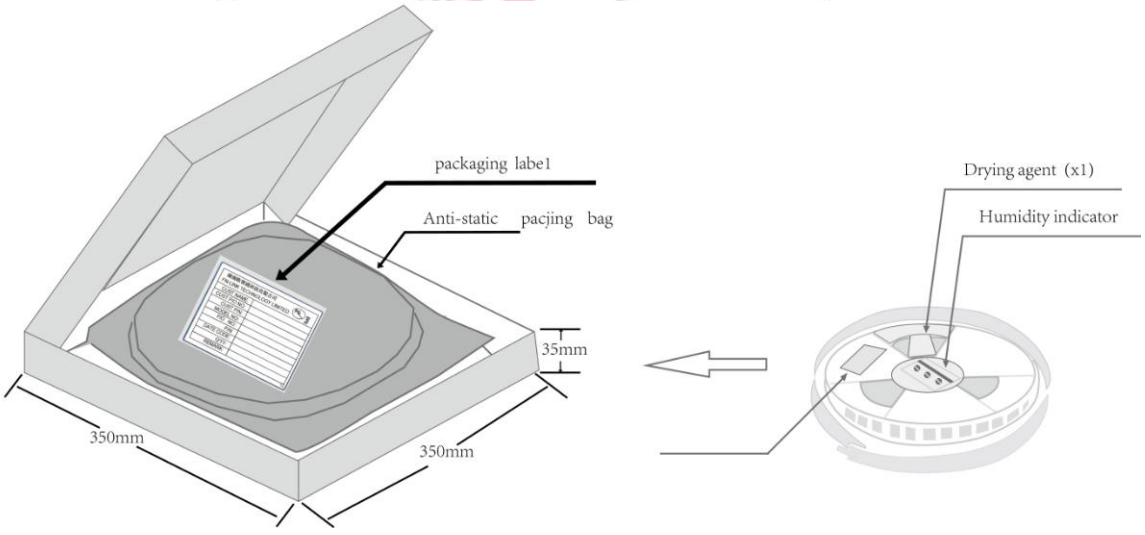
12.2 Carrier Tape Detail

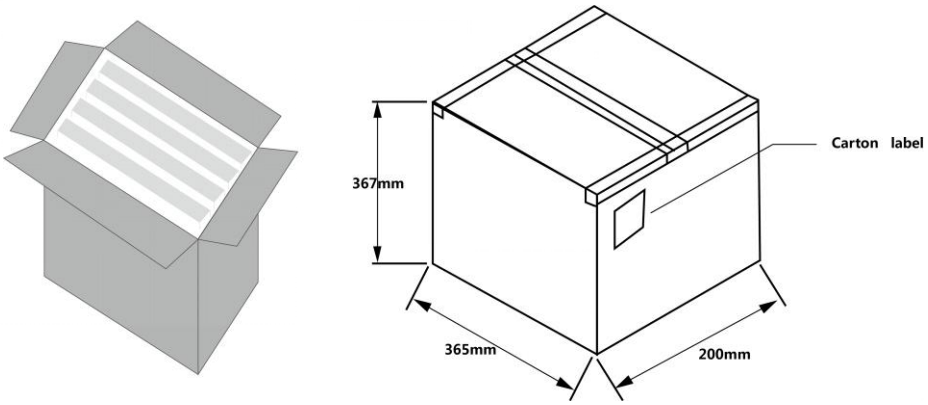
ITEM	W	A0	B0	D	F	E	K0	P0	P2	P	T
DIM	24	13.40	15.40	1.50	11.5	1.75	2.65	4.0	2.0	16.0	0.30
TOLE	+0.3 -0.3	±0.15	±0.15	+0.1 -0.0	+0.1 -0.1	±0.1	±0.10	±0.1	±0.1	±0.1	±0.05



12.3 Packaging Detail

the take-up package





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 <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