

6222B-SRB-T

**Wi-Fi Dual-band 2X2 11ac +Bluetooth 4.2
Combo Module Datasheet**



6222B-SRB-T Module Datasheet

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	_____	Title
	_____	Signature
	_____	Date
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Revision History

Version	Date	Revision Content	Draft	Approved
1.0	2018/12/10	New version	Lzm	Jacky
1.1	2018/12/18	Modify the telephone number	Lzm	Lxy
1.2	2018/12/25	Modify the office and TEL	Lzm	Lxy
1.3	2019/05/07	Modify BT RF pin outline (4.1 Pin Outline – Page 10)	Wdd	Szs
1.4	2020/04/14	Update pin description	Lxy	SZS

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1 Overview

1.1 Introduction

Fn-Link Technology would like to announce 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 MAC/Baseband/RF WLAN single chip. For Wireless LAN(WLAN)operation. The integrated module provides SDIO interface for Wi-Fi . The module provides simple legacy and 20MHz/40MHz/80MHz co-existence mechanisms to ensure backward and network compatibility

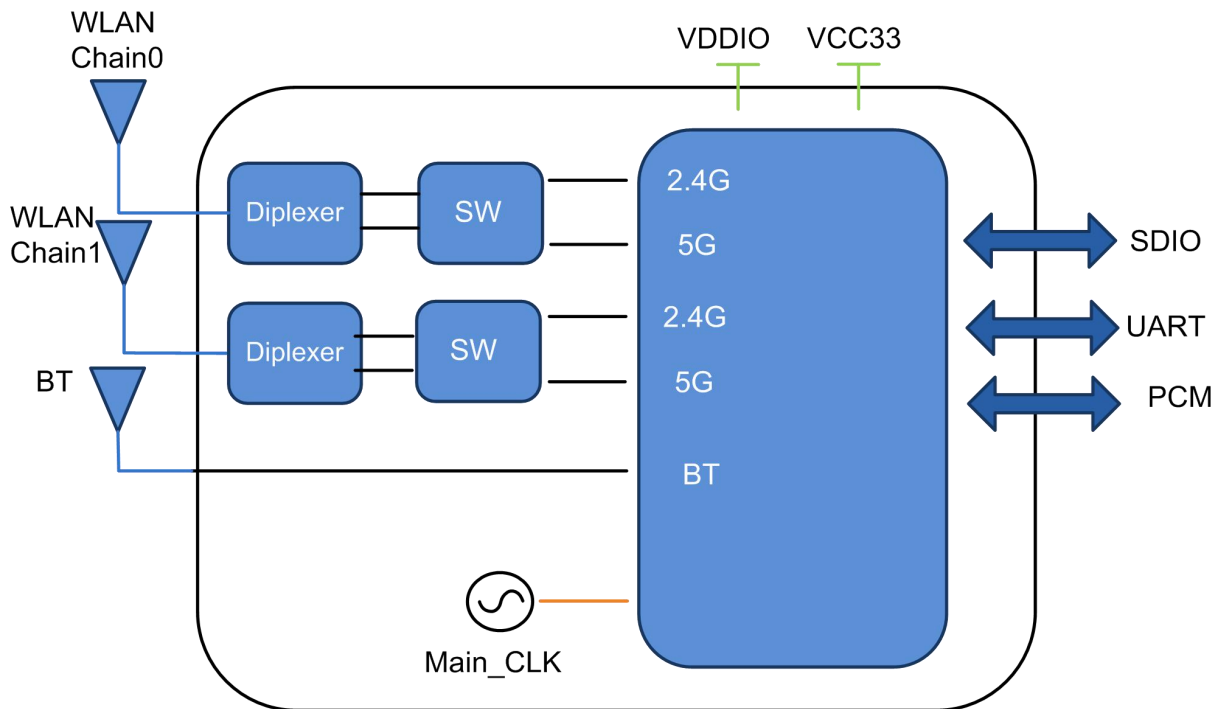
The wireless module complies with IEEE 802.11 a/b/g/n/ac 2x2 MIMO standard and it can achieve up to a speed of 867Mbps with dual stream in 802.11n to connect the wireless LAN. The integrated module provides SDIO interface for Wi-Fi, UART / PCM interface for Bluetooth.

This compact module is a total solution for a combination of Wi-Fi and Bluetooth V4.2 technologies. The module is specifically developed for all portable devices.

1.2 Features

- Highly integrated wireless local area network(WLAN) system-on-chip (SOC) for 5 GHZ 802.11ac, or 2.4G/5G 802.11n WLAN applications.
- Dual-stream spatial multiplexing up to 867 Mbps data rate.
- Supports 20/40MHz at 2.4GHz and supports 20/40/80MHz at 5GHz
- Supports low power SDIO3.0 interface for WLAN and UART/PCM interface for Bluetooth.
- Supports Bluetooth V4.2+HS, BLE and be backwards compatible with Bluetooth 1.2, 2.X+ enhance data rate.
- Supports WLAN-Bluetooth coexistence and ISM-LTE coexistence.
- Supports Bluetooth for class1 and class2 power level transmissions without requiring an external PA.
- BT host digital interface:
 - HCI UART (up to 4 Mbps)
 - PCM for audio data

Block Diagram:



1.3 General Specification

Model Name	6222B-SRB-T
Product Description	Support Wi-Fi/Bluetooth functionalities
Dimension	L x W x H: 15 x 13 x 1.8 (typical) mm
Wi-Fi Interface	Support SDIO V3.0
BT Interface	UART / PCM
Operating temperature	0°C to 70°C
Storage temperature	-40°C to 125°C

1.4 Recommended Operating Rating

		Min.	Typ.	Max.	Unit
Operating Temperature		0	25	70	deg.C
VCC33		3.15	3.3	3.45	V
VDDIO		1.7	1.8 or 3.3	3.45	V
Power Consumption	VCC33 = 3.3V(Unit:mA)				
	Wi-Fi on Mode	120			
	TX (2.4G HT20)	380			
	RX (2.4G HT20)	199			
	TX (5G HT40)	470			
	RX (5G HT40)	195			
	BT on	8.5			

※1.5 EEPROM Information

WI-FI

Vendor ID	024C
Product ID	B822

2 Wi-Fi RF Specification

2.1 2.4GHz RF Specification

Feature	Description			
WLAN Standard	IEEE 802.11 b/g/n 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 : 17dBm ± 2 dB			EVM ≤ -9dB
	802.11g /54Mbps : 15dBm ± 2 dB			EVM ≤ -25dB
	802.11n /MCS7 : 14dBm ± 2 dB			EVM ≤ -28dB
Spectrum Mask	Min. b/g/n	Typ. b/g/n	Max. b/g/n	Unit b/g/n
1st side lobes(to fc ±	-	-43/-30/-40	-	dBr

11MHZ)				
2st side lobes(to fc ± 22MHZ)	-	-52/-33/-58	-	dBr
Freq. Tolerance	-20/-20/-20	-	20/20/20	ppm
SISO Receive Sensitivity(11b,20MHz) @8% PER	- 1Mbps	PER @ -92 dBm		≤-83
	- 2Mbps	PER @ -90 dBm		≤-80
	- 5.5Mbps	PER @ -87 dBm		≤-79
	- 11Mbps	PER @ -85 dBm		≤-76
SISO Receive Sensitivity(11g,20MHz) @10% PER	- 6Mbps	PER @ -89 dBm		≤-85
	- 9Mbps	PER @ -88 dBm		≤-84
	- 12Mbps	PER @ -87 dBm		≤-82
	- 18Mbps	PER @ -84 dBm		≤-80
	- 24Mbps	PER @ -81 dBm		≤-77
	- 36Mbps	PER @ -78 dBm		≤-73
	- 48Mbps	PER @ -73 dBm		≤-69
SISO Receive Sensitivity(11n,20MHz) @10% PER	- 54Mbps	PER @ -71 dBm		≤-68
	- MCS=0	PER @ -89 dBm		≤-85
	- MCS=1	PER @ -86 dBm		≤-82
	- MCS=2	PER @ -84 dBm		≤-80
	- MCS=3	PER @ -80 dBm		≤-77
	- MCS=4	PER @ -77 dBm		≤-73
	- MCS=5	PER @ -72 dBm		≤-69
MIMO Receive Sensitivity(11n,20MHz) @10% PER	- MCS=6	PER @ -71 dBm		≤-68
	- MCS=7	PER @ -69 dBm		≤-67
	- MCS=8	PER @ -85 dBm		≤-82
	- MCS=9	PER @ -82 dBm		≤-79
	- MCS=10	PER @ -82 dBm		≤-77
	- MCS=11	PER @ -77 dBm		≤-74
	- MCS=12	PER @ -75 dBm,		≤-70
- MCS=13	PER @ -71 dBm		≤-66	
SISO Receive Sensitivity(11n,40MHz) @10% PER	- MCS=14	PER @ -70 dBm		≤-65
	- MCS=15	PER @ -68 dBm		≤-64
	- MCS=0,	PER @ -88 dBm		≤-82
	- MCS=1,	PER @ -85 dBm		≤-79
	- MCS=2,	PER @ -83 dBm		≤-77
	- MCS=3,	PER @ -79 dBm		≤-74
	- MCS=4,	PER @ -76 dBm		≤-70

	- MCS=5, PER @ -72 dBm	≤-66
	- MCS=6, PER @ -70 dBm	≤-65
	- MCS=7, PER @ -69 dBm	≤-64
MIMO Receive Sensitivity(11n,40MHz) @10% PER	- MCS=8, PER @ -84 dBm	≤-79
	- MCS=9, PER @ -82 dBm	≤-76
	- MCS=10 PER @ -80 dBm	≤-74
	- MCS=11 PER @ -76 dBm	≤-71
	- MCS=12 PER @ -73 dBm	≤-67
	- MCS=13 PER @ -69 dBm	≤-63
	- MCS=14 PER @ -67 dBm	≤-62
	- MCS=15 PER @ -65 dBm	≤-61
Maximum Input Level	802.11b : -10 dBm	
	802.11g/n : -20 dBm	
Antenna Reference	Small antennas with 0~2 dBi peak gain	

2.2 5GHz RF Specification

Conditions : VBAT=3.6V ; VDDIO=3.3V ; Temp:25°C

Feature	Description	
WLAN Standard	IEEE 802.11a/n/ac 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 table ¹	
Test Items	Typical Value	EVM
Output Power	802.11a /54Mbps : 13 dBm ± 2 dB	EVM ≤ -25dB
	802.11n /MCS7 : 12 dBm ± 2 dB	EVM ≤ -28dB
	802.11ac /MCS9 : 12 dBm ± 2 dB	EVM ≤ -32dB
SISO Receive Sensitivity (11a,20MHz) @10% PER	- 6Mbps PER @ -88 dBm	≤-85
	- 9Mbps PER @ -87 dBm	≤-84
	- 12Mbps PER @ -86 dBm	≤-82
	- 18Mbps PER @ -83 dBm	≤-80
	- 24Mbps PER @ -80 dBm	≤-77
	- 36Mbps PER @ -77 dBm	≤-73
	- 48Mbps PER @ -72 dBm	≤-69
	- 54Mbps PER @ -70 dBm	≤-68
SISO Receive Sensitivity (11n,20MHz) @10% PER	- MCS=0 PER @ -88 dBm	≤-85
	- MCS=1 PER @ -85 dBm	≤-82
	- MCS=2 PER @ -83 dBm	≤-80
	- MCS=3 PER @ -80 dBm	≤-77

	- MCS=4 PER @ -76 dBm	≤-73
	- MCS=5 PER @ -71 dBm	≤-69
	- MCS=6 PER @ -70 dBm	≤-68
	- MCS=7 PER @ -68 dBm	≤-67
MIMO Receive Sensitivity (11n,20MHz) @10% PER	- MCS=8 PER @ -89 dBm	≤-82
	- MCS=9 PER @ -87 dBm	≤-79
	- MCS=10 PER @ -85 dBm	≤-77
	- MCS=11 PER @ -81 dBm	≤-74
	- MCS=12 PER @ -79 dBm	≤-70
	- MCS=13 PER @ -74 dBm	≤-66
	- MCS=14 PER @ -73 dBm	≤-65
	- MCS=15 PER @ -71 dBm	≤-64
SISO Receive Sensitivity (11n,40MHz) @10% PER	- MCS=0 PER @ -85 dBm	≤-82
	- MCS=1 PER @ -82 dBm	≤-79
	- MCS=2 PER @ -80 dBm	≤-77
	- MCS=3 PER @ -77 dBm	≤-74
	- MCS=4 PER @ -73 dBm	≤-70
	- MCS=5 PER @ -69 dBm	≤-66
	- MCS=6 PER @ -67 dBm	≤-65
	- MCS=7 PER @ -66 dBm	≤-64
MIMO Receive Sensitivity (11n,40MHz) @10% PER	- MCS=8 PER @ -87 dBm	≤-79
	- MCS=9 PER @ -84 dBm	≤-76
	- MCS=10 PER @ -82 dBm	≤-74
	- MCS=11 PER @ -78 dBm	≤-71
	- MCS=12 PER @ -76 dBm	≤-67
	- MCS=13 PER @ -70 dBm	≤-63
	- MCS=14 PER @ -68 dBm	≤-62
	- MCS=15 PER @ -66 dBm	≤-61
SISO Receive Sensitivity (11ac,20MHz) @10% PER	- MCS=0, NSS1 PER @ -86 dBm	≤-82
	- MCS=1, NSS1 PER @ -84 dBm	≤-80
	- MCS=2, NSS1 PER @ -82 dBm	≤-77
	- MCS=3, NSS1 PER @ -79 dBm	≤-73
	- MCS=4, NSS1 PER @ -75 dBm	≤-69
	- MCS=5, NSS1 PER @ -70 dBm	≤-68
	- MCS=6, NSS1 PER @ -69 dBm	≤-67
	- MCS=7, NSS1 PER @ -68 dBm	≤-62
	- MCS=8, NSS1 PER @ -64 dBm	≤-60

MIMO Receive Sensitivity (11ac,20MHz) @10% PER	- MCS=0, NSS1 PER @ -88 dBm	≤-79
	- MCS=1, NSS1 PER @ -87 dBm	≤-77
	- MCS=2, NSS1 PER @ -85 dBm	≤-74
	- MCS=3, NSS1 PER @ -82 dBm	≤-71
	- MCS=4, NSS1 PER @ -78 dBm	≤-66
	- MCS=5, NSS1 PER @ -73 dBm	≤-65
	- MCS=6, NSS1 PER @ -72 dBm	≤-64
	- MCS=7, NSS1 PER @ -71 dBm	≤-59
	- MCS=8, NSS1 PER @ -67 dBm	≤-57
SISO Receive Sensitivity (11ac,40MHz) @10% PER	- MCS=0, NSS1 PER @ -84 dBm	≤-79
	- MCS=1, NSS1 PER @ -81 dBm	≤-77
	- MCS=2, NSS1 PER @ -79 dBm	≤-74
	- MCS=3, NSS1 PER @ -76 dBm	≤-70
	- MCS=4, NSS1 PER @ -73 dBm	≤-66
	- MCS=5, NSS1 PER @ -68 dBm	≤-65
	- MCS=6, NSS1 PER @ -67 dBm	≤-64
	- MCS=7, NSS1 PER @ -66 dBm	≤-59
	- MCS=8, NSS1 PER @ -61 dBm	≤-57
MIMO Receive Sensitivity (11ac,40MHz) @10% PER	- MCS=0, NSS2 PER @ -85 dBm	≤-79
	- MCS=1, NSS2 PER @ -83 dBm	≤-76
	- MCS=2, NSS2 PER @ -80 dBm	≤-74
	- MCS=3, NSS2 PER @ -77 dBm	≤-71
	- MCS=4, NSS2 PER @ -75 dBm	≤-67
	- MCS=5, NSS2 PER @ -70 dBm	≤-63
	- MCS=6, NSS2 PER @ -68 dBm	≤-62
	- MCS=7, NSS2 PER @ -67 dBm	≤-61
	- MCS=8, NSS2 PER @ -61 dBm	≤-56
	- MCS=9, NSS2 PER @ -59 dBm	≤-54
SISO Receive Sensitivity (11ac,80MHz) @10% PER	- MCS=0, NSS1 PER @ -81 dBm	≤-79
	- MCS=1, NSS1 PER @ -78 dBm	≤-76
	- MCS=2, NSS1 PER @ -76 dBm	≤-74
	- MCS=3, NSS1 PER @ -72 dBm	≤-71
	- MCS=4, NSS1 PER @ -69 dBm	≤-67
	- MCS=5, NSS1 PER @ -66 dBm	≤-63
	- MCS=6, NSS1 PER @ -64 dBm	≤-62
	- MCS=7, NSS1 PER @ -62 dBm	≤-61

	- MCS=8, NSS1 PER @ -58 dBm	≤-56
	- MCS=9, NSS1 PER @ -56 dBm	≤-54
MIMO Receive Sensitivity (11ac,80MHz) @10% PER	- MCS=0, NSS2 PER @ -80 dBm	≤-76
	- MCS=1, NSS2 PER @ -78 dBm	≤-73
	- MCS=2, NSS2 PER @ -75 dBm	≤-71
	- MCS=3, NSS2 PER @ -73 dBm	≤-68
	- MCS=4, NSS2 PER @ -70 dBm	≤-64
	- MCS=5, NSS2 PER @ -66 dBm	≤-60
	- MCS=6, NSS2 PER @ -63 dBm	≤-59
	- MCS=7, NSS2 PER @ -62 dBm	≤-58
	- MCS=8, NSS2 PER @ -56 dBm	≤-53
- MCS=9, NSS2 PER @ -55 dBm	≤-51	
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
	136	5680
5745MHz~5825MHz	140	5700
	149	5745
	153	5765
	157	5785

	161	5805
	165	5825

3 Bluetooth Specification

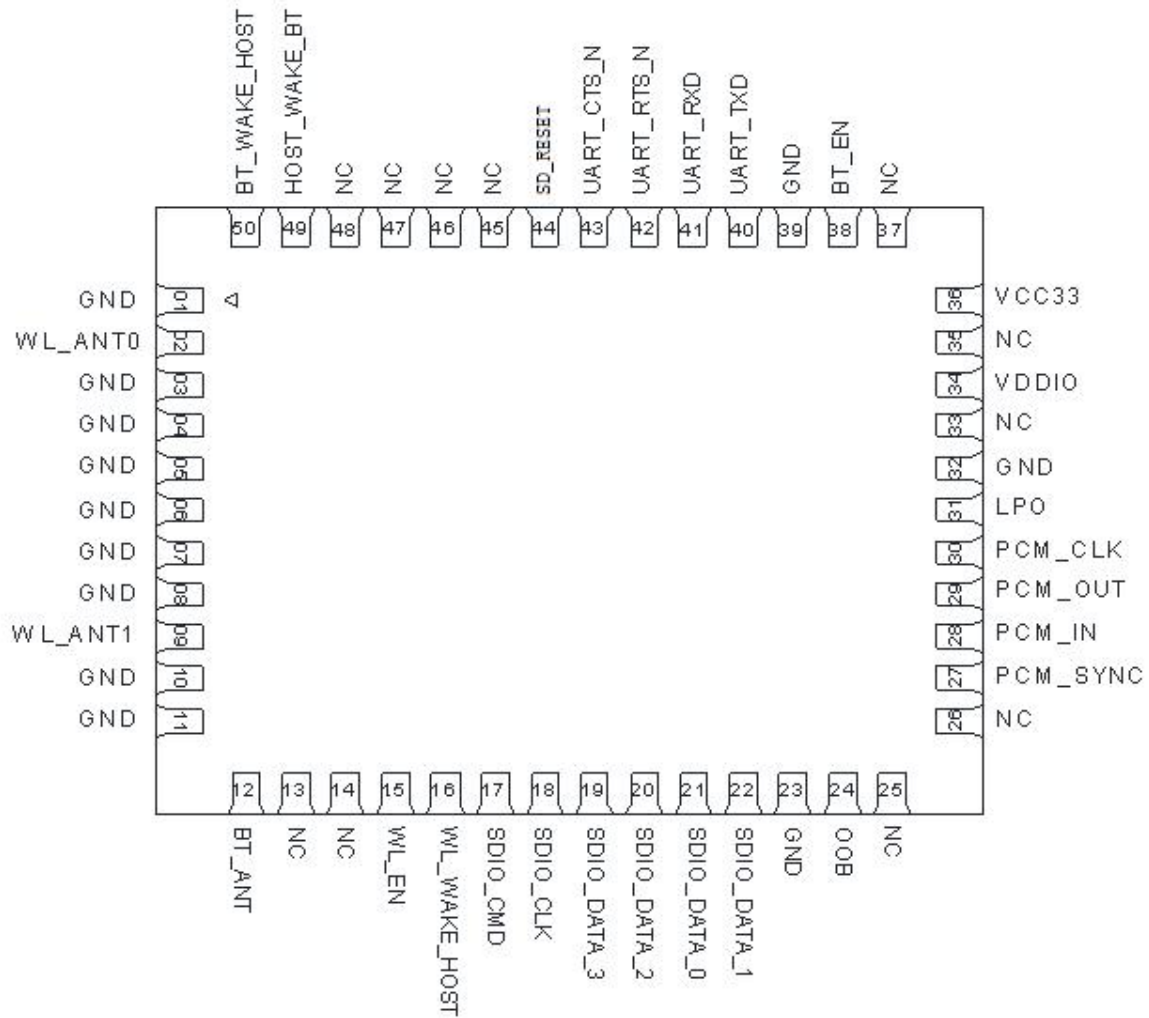
3.1 Bluetooth Specification

Feature	Description		
General Specification			
Bluetooth Standard	Bluetooth V4.2 of 1, 2 and 3 Mbps.		
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, $\pi/4$ -DQPSK, 8DPSK		
RF Specification			
	Min.	Typical.	Max.
Output Power (Class 1)		4 dBm	
Output Power (Class 2)		2 dBm	
Sensitivity @ BER=0.1% for GFSK (1Mbps)		-92 dBm	
Sensitivity @ BER=0.01% for $\pi/4$ -DQPSK (2Mbps)		-86 dBm	
Sensitivity @ BER=0.01% for 8DPSK (3Mbps)		-85 dBm	
Maximum Input Level	GFSK (1Mbps):-20dBm		
	$\pi/4$ -DQPSK (2Mbps) :-20dBm		
	8DPSK (3Mbps) :-20dBm		

4 Pin Assignments

4.1 Pin Outline

< TOP VIEW >



4.2 Pin Definition

NO	Name	Type	Description	Voltage
1	GND	—	Ground connections	
2	WL_ANT0	I/O	RF I/O port chain0	
3	GND	—	Ground connections	
4	GND	—	Ground connections	

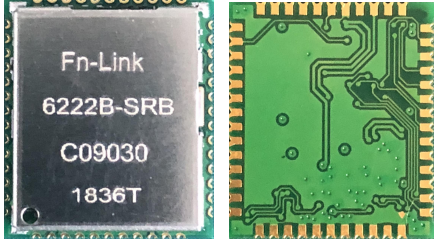
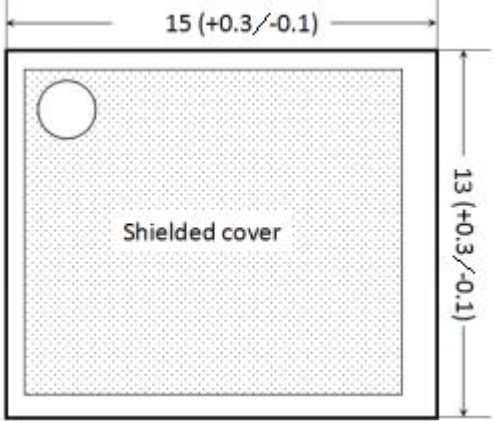
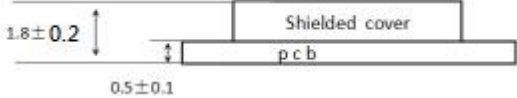
5	GND	—	Ground connections	
6	GND	—	Ground connections	
7	GND	—	Ground connections	
8	GND	—	Ground connections	
9	WL_ANT1	I/O	RF I/O port chain1	
10	GND	—	Ground connections	
11	GND	—	Ground connections	
12	BT_ANT	—	RF I/O port for BT	
13	NC	—	No connect	
14	NC	—	No connect	
15	WL_EN	I	Enable pin for WLAN device ON: pull high ; OFF: pull low <i>This pin function is not supported</i>	VDDIO
16	WL_WAKE_HOST	O	WLAN to wake-up HOST	VDDIO
17	SDIO_CMD	I/O	SDIO command line	1.8V or 3.3V
18	SDIO_CLK	I/O	SDIO clock line	1.8V or 3.3V
19	SDIO_DATA_3	I/O	SDIO data line 3	1.8V or 3.3V
20	SDIO_DATA_2	I/O	SDIO data line 2	1.8V or 3.3V
21	SDIO_DATA_0	I/O	SDIO data line 0	1.8V or 3.3V
22	SDIO_DATA_1	I/O	SDIO data line 1	1.8V or 3.3V
23	GND	—	Ground connections	
24	OOB	O	SDIO interrupt GPIO4	VDDIO
25	NC	—	No connect	
26	NC	—	No connect	
27	PCM_SYNC	I/O	PCM sync signal	VDDIO
28	PCM_IN	I	PCM data input	VDDIO
29	PCM_OUT	O	PCM Data output	VDDIO
30	PCM_CLK	I/O	PCM clock	VDDIO
31	LPO	I	External Low Power Clock input (32.768KHz)	
32	GND	—	Ground connections	
33	NC	—	No connect	
34	VDDIO	P	I/O Voltage supply input 1.8V or 3.3V	1.8V or 3.3V
35	NC	—	No connect	
36	VCC33	P	Main power voltage source input 3.3V	3.3V

37	NC	—	No connect	
38	BT_EN	I	Enable pin for Bluetooth device ON: pull high ; OFF: pull low	VDDIO
39	GND	—	Ground connections	
40	UART_TXD	O	Bluetooth UART interface	1.8V or 3.3V
41	UART_RXD	I	Bluetooth UART interface	1.8V or 3.3V
42	UART_RTS_N	O	Bluetooth UART interface Module pin is GND connection	
43	UART_CTS_N	I	Bluetooth UART interface	1.8V or 3.3V
44	SD_RESET	I	SD_RESET GPIO9 Pull low to shutdown WLAN	
45	NC	—	No connect	
46	NC	—	Can keep No connect Module pin is GND connection	
47	NC	—	No connect	
48	NC	—	Can keep No connect Module pin is GND connection	
49	HOST_WAKE_BT	I	HOST wake-up Bluetooth device	VDDIO
50	BT_WAKE_HOST	O	Bluetooth device to wake-up HOST	VDDIO

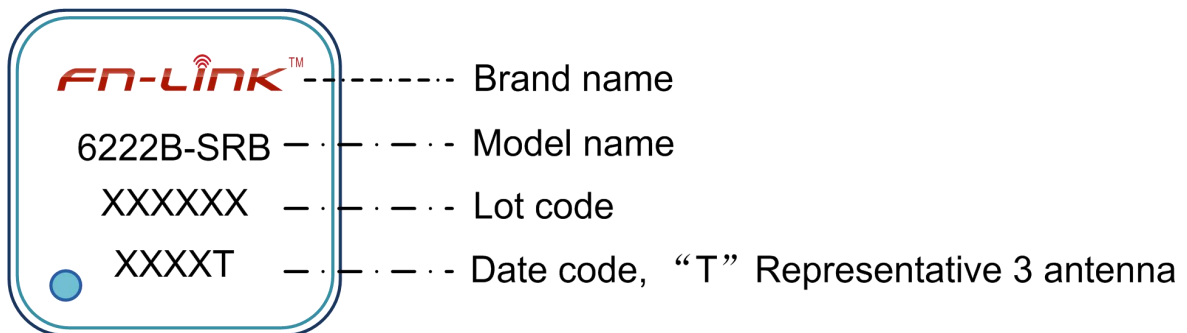
P:POWER I:INPUT O:OUTPUT VDDIO:1.8V or 3.3V

5 Dimensions

5.1 Module Picture

<p>L x W : 15 x 13 (+0.3/-0.1) mm</p> 	
<p>H: 1.8 (±0.2) mm</p>	
<p>Weight</p>	<p>0.79g</p>

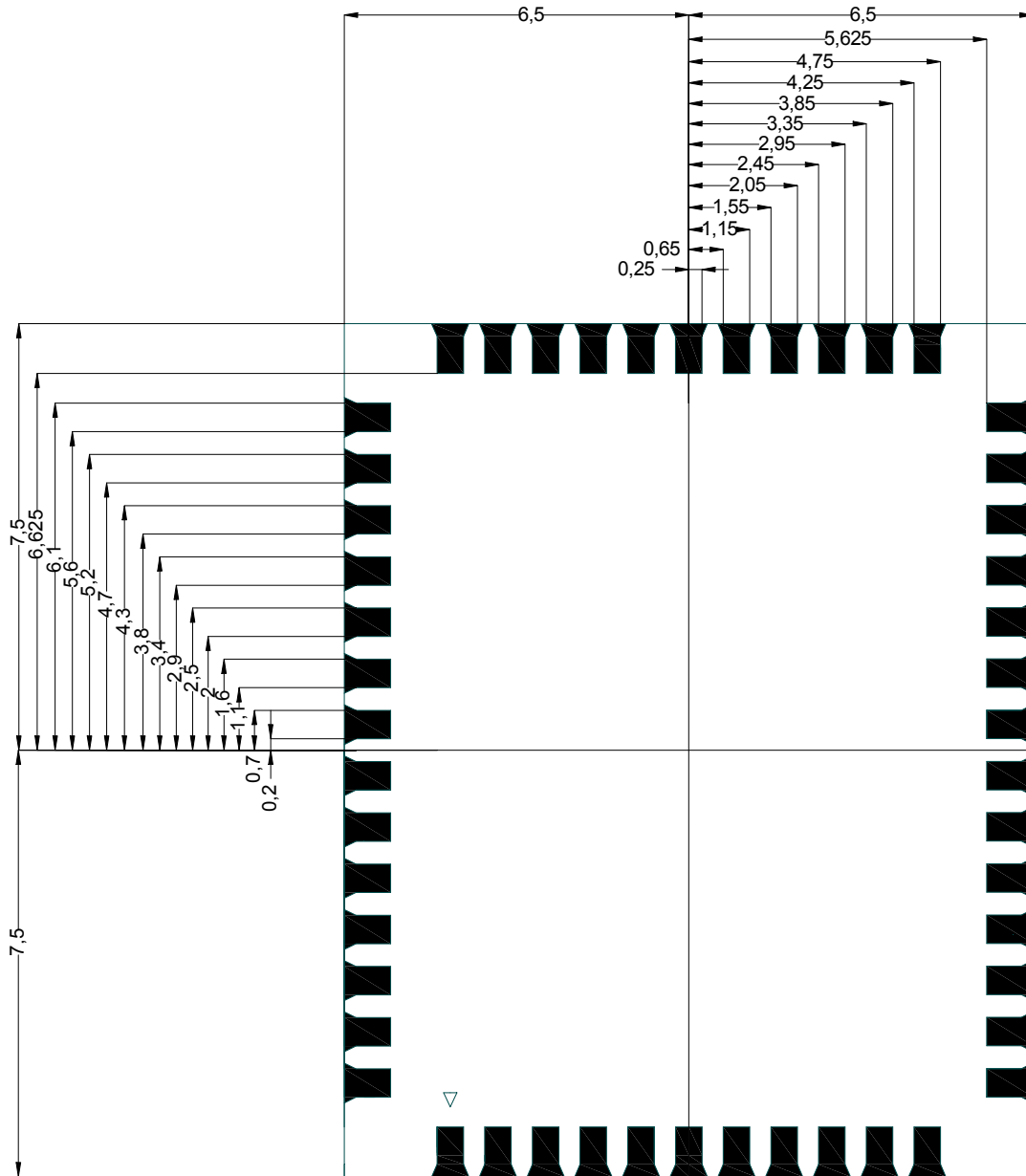
5.2 Marking Description



5.3 Module Physical Dimensions

(Unit: mm)

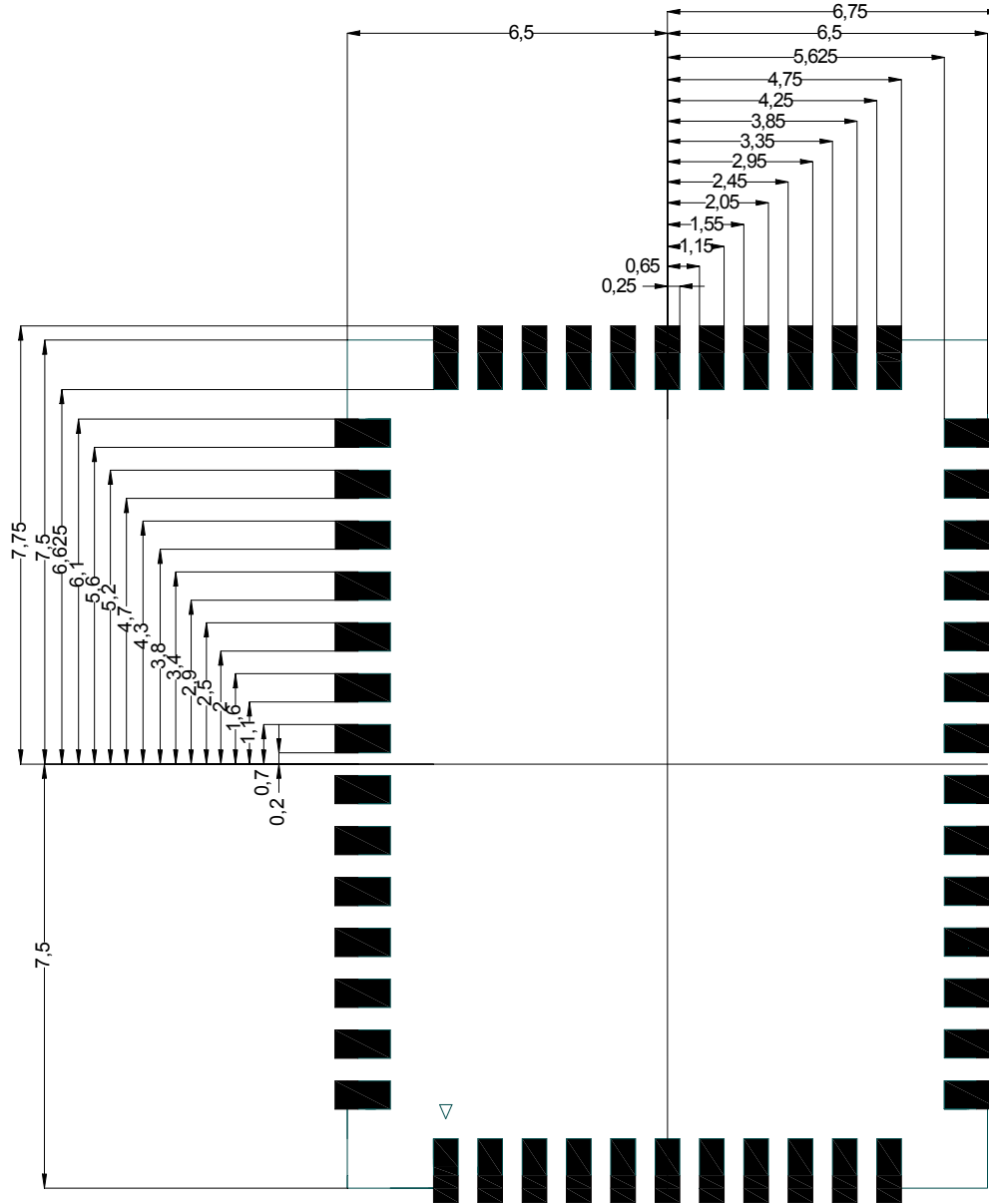
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5.4 Layout Recommendation

(Unit: mm)

< TOP VIEW >



6 Host Interface Timing Diagram

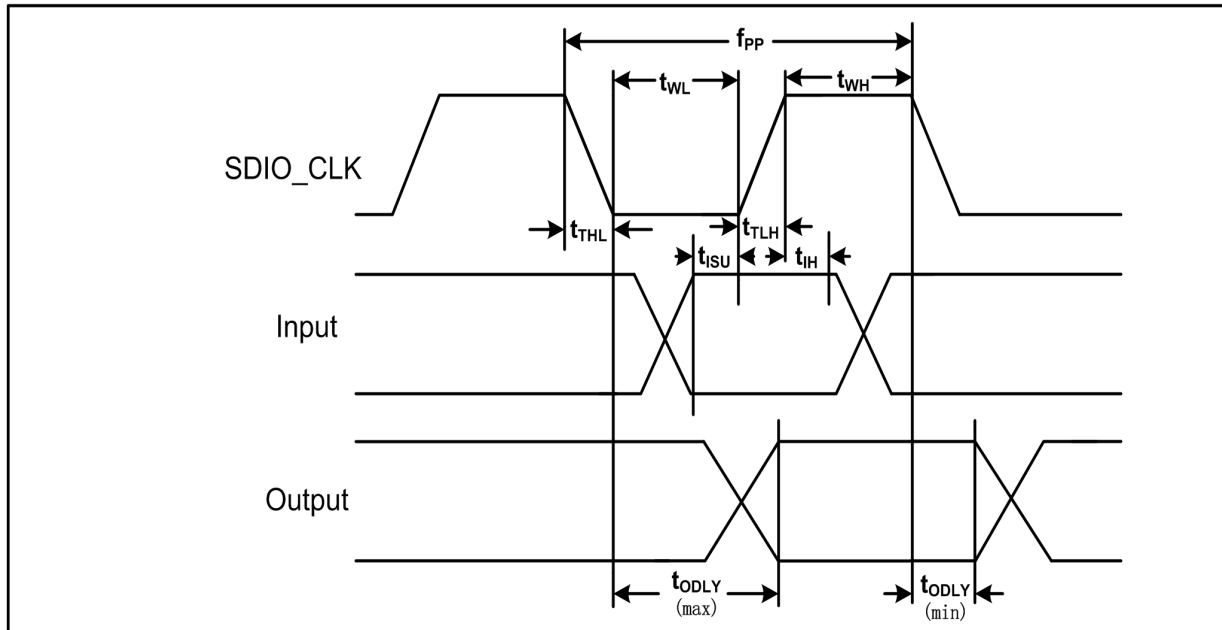
6.1 SDIO Pin Description

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

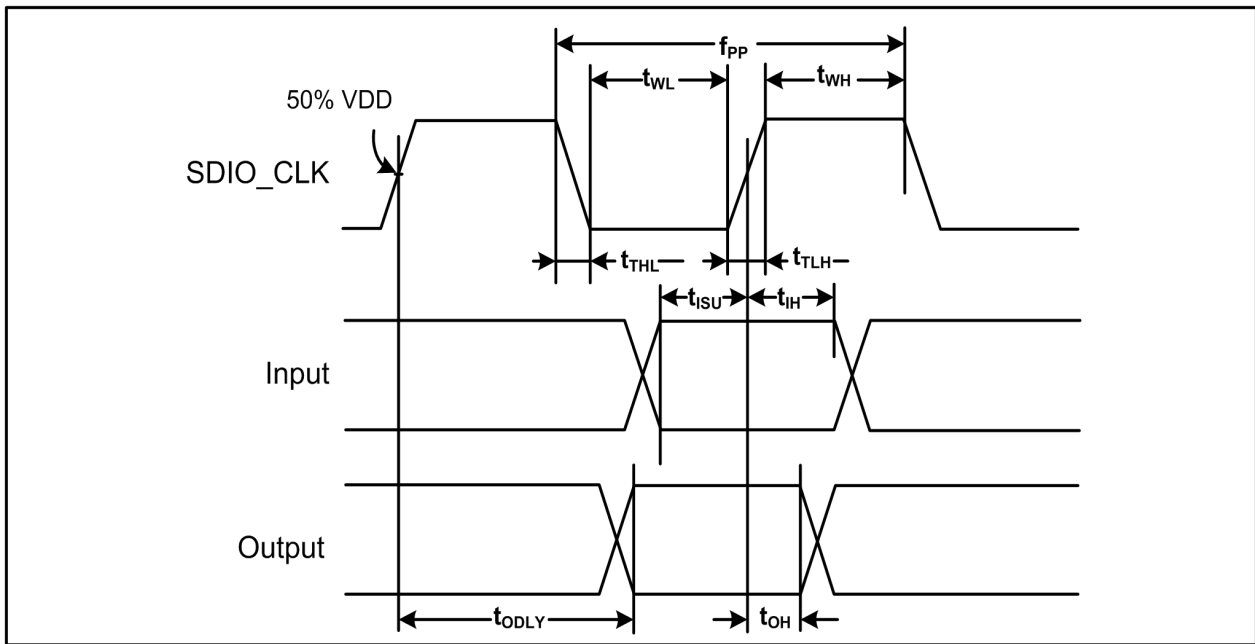
6.2 SDIO Default Mode Timing Diagram



Parameter	Symbol	Minimum	Typical	Maximum	Unit
SDIO CLK(All values are referred to minimum V_{IH} and maximum V_{IL}^b)					
Frequency - Data Transfer mode	f_{PP}	0	-	25	MHz
Frequency - Identification mode	f_{OD}	0	-	400	kHz
Clock low time	t_{WL}	10	-	-	ns
Clock high time	t_{WH}	10	-	-	ns
Clock rise time	t_{TLH}	-	-	10	ns
Clock low time	t_{THL}	-	-	10	ns
Inputs:CMD, DAT(referenced to CLK)					
Input setup time	t_{ISU}	5	-	-	ns
Input hold time	t_{IH}	5	-	-	ns
Outputs:CMD, DAT(referenced to CLK)					
Output delay time - Data Transfer mode	t_{ODLY}	0	-	14	ns
Output delay time - Identification mode	t_{ODLY}	0	-	50	ns

- a. Timing is based on $CL \leq 40$ pF load on CMD and Data.
- b. $\text{Min}(V_{ih}) = 0.7 \times V_{DDIO}$ and $\text{max}(V_{il}) = 0.2 \times V_{DDIO}$.

6.3 SDIO High Speed Mode Timing Diagram

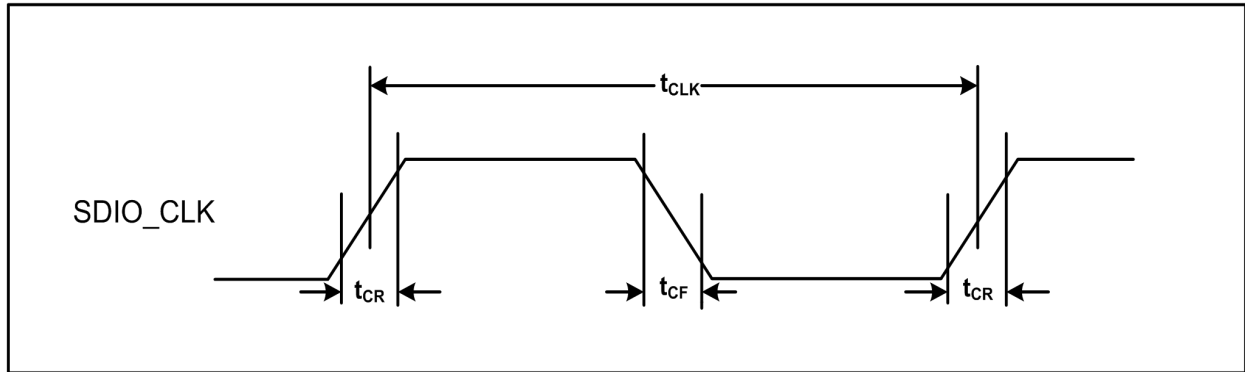


Parameter	Symbol	Minimum	Typical	Maximum	Unit
SDIO CLK(all values are referred to minimum VIH and maximum VIL^b)					
Frequency - Data Transfer mode	fPP	0	-	50	MHz
Frequency - Identification mode	fOD	0	-	400	kHz
Clock low time	tWL	7	-	-	ns
Clock high time	tWH	7	-	-	ns
Clock rise time	tTLH	-	-	3	ns
Clock low time	tTHL	-	-	3	ns
Inputs:CMD, DAT(referenced to CLK)					
Input setup time	tISU	6	-	-	ns
Input hold time	tIH	2	-	-	ns
Outputs:CMD, DAT(referenced to CLK)					
Output delay time - Data Transfer mode	tODLY	-	-	14	ns
Output delay time - Identification mode	tODLY	2.5	-	-	ns
Total system capacitance(each line)	CL	-	-	40	pF

- a. Timing is based on CL ≤ 40 pF load on CMD and Data.
- b. Min(Vih) = 0.7 × VDDIO and max(Vil) = 0.2 × VDDIO.

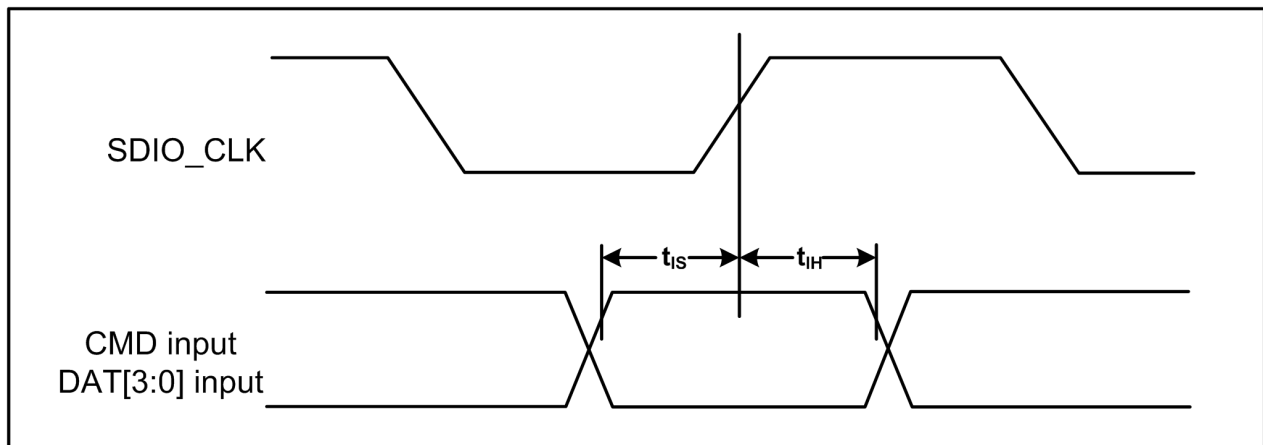
6.4 SDIO Bus Timing Specifications in SDR Modes

Clock timing(SDR Modes)



Parameter	Symbol	Minimum	Maximum	Unit	Comments
-	t_{CLK}	40	-	ns	SDR12 mode
-		20	-	ns	SDR25 mode
-		10	-	ns	SDR50 mode
-		4.8	-	ns	SDR104 mode
-	t_{CR}, t_{CF}	-	$0.2 \times t_{CLK}$	ns	$t_{CR}, t_{CF} < 2.00$ ns (max)@100 MHz, $C_{CARD} = 10$ pF $t_{CR}, t_{CF} < 0.96$ ns (max)@208 MHz, $C_{CARD} = 10$ pF
Clock duty	-	30	70	%	-

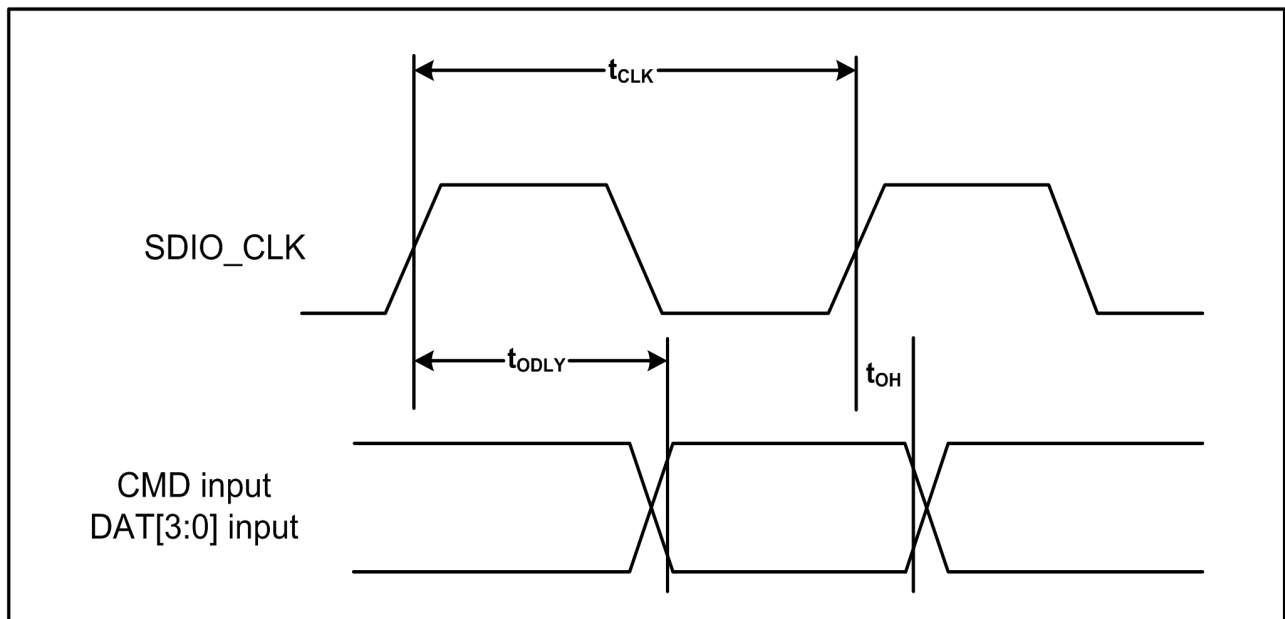
Card Input timing (SDR Modes)



Symbol	Minimum	Maximum	Unit	Comments
SDR104 Mode				
t_{IS}	1.70 ^a	-	ns	$C_{CARD} = 10\text{pF}$, $V_{CT} = 0.975\text{V}$
t_{IH}	0.80	-	ns	$C_{CARD} = 5\text{pF}$, $V_{CT} = 0.975\text{V}$
SDR50 Mode				
t_{IS}	3.00	-	ns	$C_{CARD} = 10\text{pF}$, $V_{CT} = 0.975\text{V}$
t_{IH}	0.80	-	ns	$C_{CARD} = 5\text{pF}$, $V_{CT} = 0.975\text{V}$

a. SDIO 3.0 specification value is 1.40 ns.

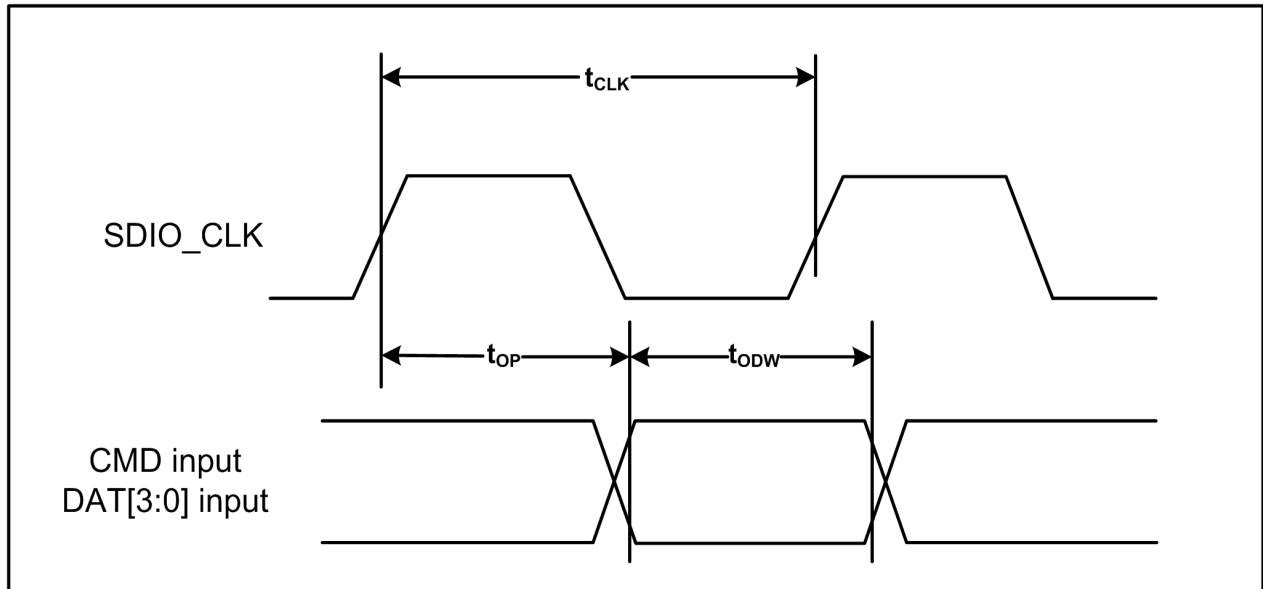
Card output timing (SDR Modes up to 100MHz)



Symbol	Minimum	Maximum	Unit	Comments
t_{ODLY}	-	7.85 ^a	ns	$t_{CLK} \geq 10\text{ ns}$ $C_L = 30\text{ pF}$ using driver type B for SDR50
t_{ODLY}	-	14.0	ns	$t_{CLK} \geq 20\text{ ns}$ $C_L = 40\text{ pF}$ using for SDR12, SDR25
t_{OH}	1.5	-	ns	Hold time at the $t_{ODLY}(\text{min})$ $C_L = 15\text{ pF}$

a. SDIO 3.0 specification value is 7.5 ns.

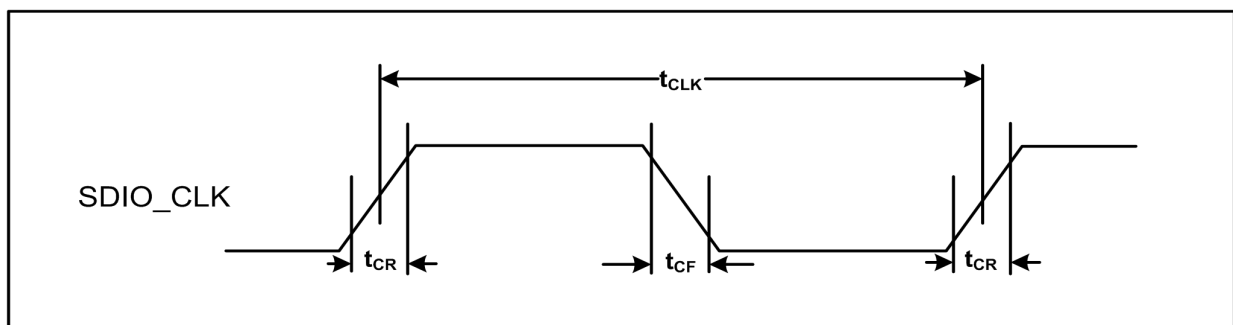
Card output timing (SDR Modes 100MHz to 208MHz)



Symbol	Minimum	Maximum	Unit	Comments
t_{OP}	0	2	UI	Card output phase
Δt_{OP}	-350	+1550	ps	Delay variation due to temp change after tuning
t_{ODW}	0.6	-	UI	$t_{ODW} = 2.88 \text{ ns @ } 208 \text{ MHz}$

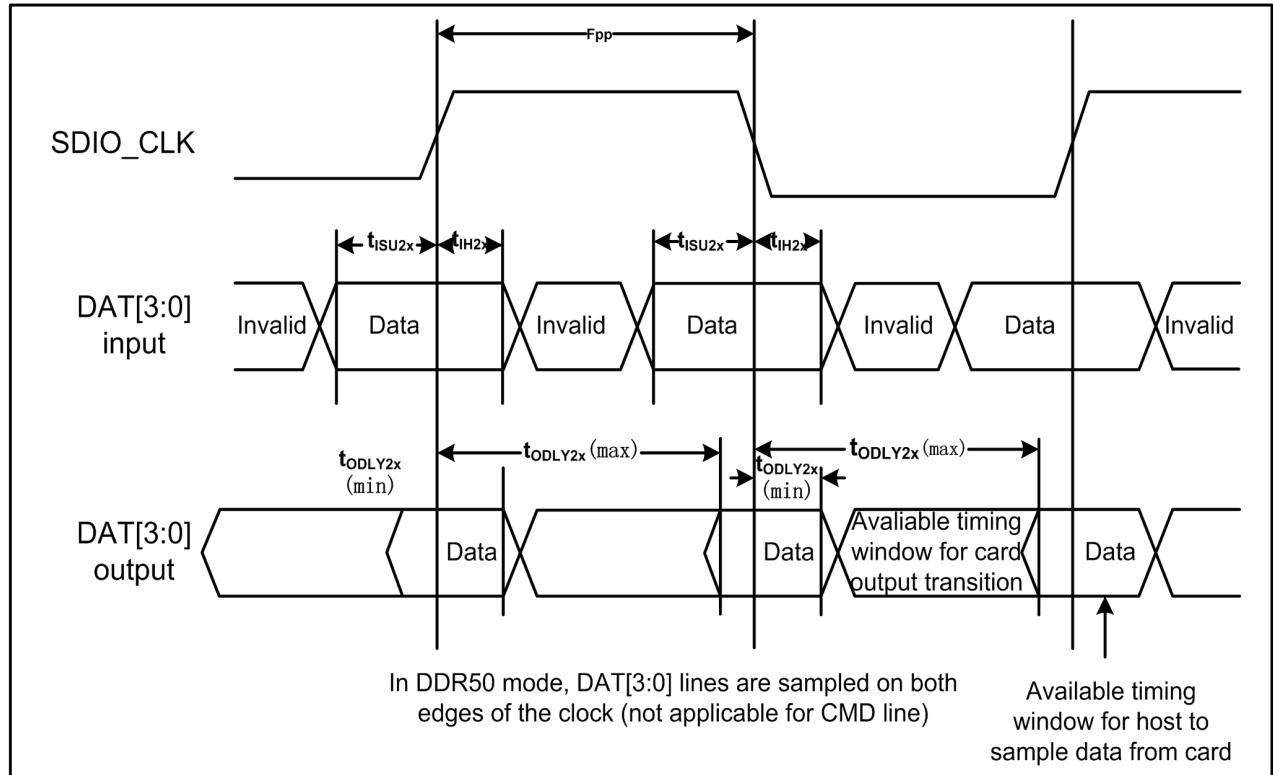
- $\Delta t_{OP} = +1550 \text{ ps}$ for junction temperature of $\Delta t_{OP} = 90$ degrees during operation
- $\Delta t_{OP} = -350 \text{ ps}$ for junction temperature of $\Delta t_{OP} = -20$ degrees during operation
- $\Delta t_{OP} = +2600 \text{ ps}$ for junction temperature of $\Delta t_{OP} = -20$ to $+125$ degrees during operation

6.5 SDIO Bus Timing Specifications in DDR50 Mode



parameter	Symbol	Minimum	Maximum	Unit	Comments
-	t_{CLK}	20	-	ns	DDR50 mode
-	t_{CR}, t_c	-	$0.2 \times t_{CLK}$	ns	$t_{CR}, t_{CF} < 4.00 \text{ ns (max) @ } 50 \text{ MHz, } C_{CARD} = 10 \text{ pF}$
Clock duty	-	45	55	%	-

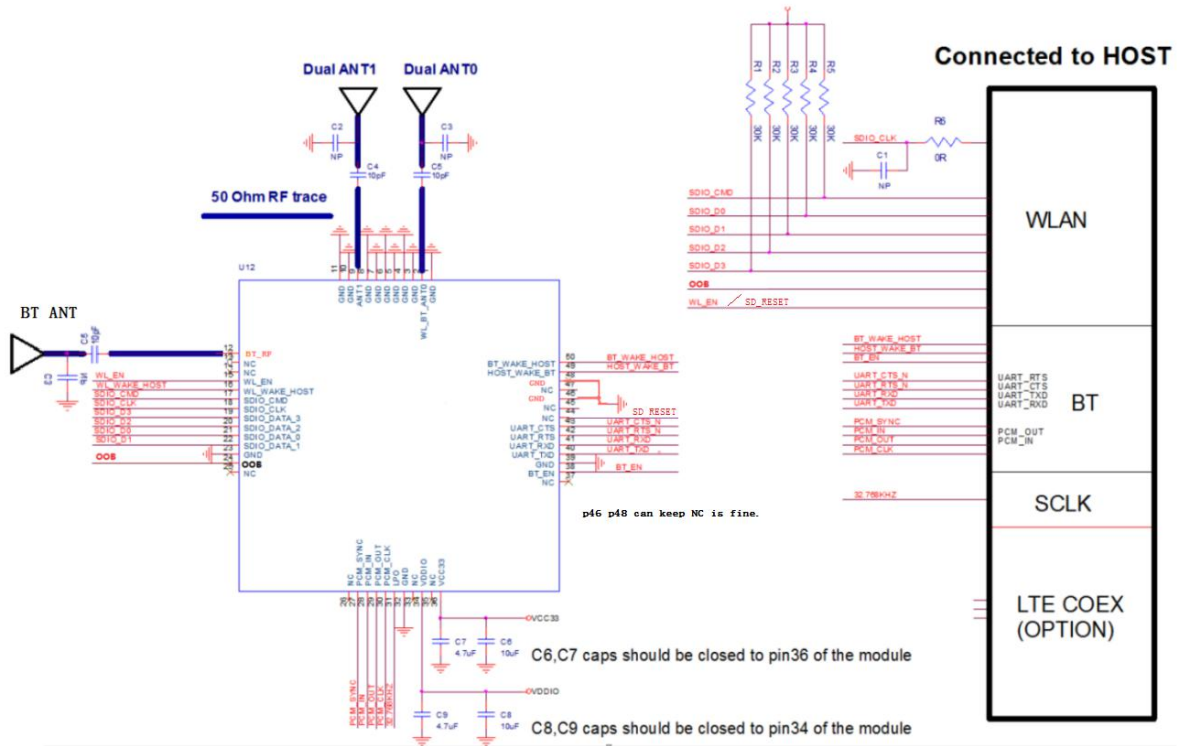
Data Timing



parameter	Symbol	Minimum	Maximum	Unit	Comments
Input CMD					
Input setup time	t_{ISU}	6	-	ns	$C_{CARD} < 10 \text{ pF}$ (1 Card)
Input hold time	t_{IH}	0.8	-	ns	$C_{CARD} < 10 \text{ pF}$ (1 Card)
Output CMD					
Output delay time	t_{ODLY}	-	13.7	ns	$C_{CARD} < 30 \text{ pF}$ (1 Card)
Output hold time	t_{OH}	1.5	-	ns	$C_{CARD} < 15 \text{ pF}$ (1 Card)
Input DAT					
Input setup time	t_{ISU2x}	3	-	ns	$C_{CARD} < 10 \text{ pF}$ (1 Card)
Input hold time	t_{IH2x}	0.8	-	ns	$C_{CARD} < 10 \text{ pF}$ (1 Card)
Output DAT					
Output delay time	t_{ODLY2x}	-	7.85 ^a	ns	$C_{CARD} < 25 \text{ pF}$ (1 Card)
Output hold time	t_{ODLY2x}	1.5	-	ns	$C_{CARD} < 15 \text{ pF}$ (1 Card)

a. SDIO 3.0 specification value is 7.0 ns

7 Reference Design



8 Ordering Information

Part No.	Description
FG6222BSRB-00	RTL8822BS, a/b/g/n/ac, Wi-Fi+BLE4.2, 2T2R+BT ANT, 13X15mm, SDIO+Uart+PCM, PCB V3.0

9 The Key Material List

Main	Analog switch	P2P RTC66005 QFN-8 (RICHWAVE)
ALT.	Analog switch	3T/MXD8730 QFN-8 (卓胜微)
Main	Shielding cover	F22BSSM13 Shield cover 13.91X11.75X1.35Xmm copper, no positioning foot
Main	Crystal	2520 40MHZ 15PF, 10ppm SX25Y040000BF1T-C(TKD)
Alternative	Crystal	2520 40MHZ 15PF, 10ppm -30+85 °C E2SB40E00001AE (HOSONIC)
Alternative	Crystal	2520 40MHZ 15PF, 10ppm (TST)
Alternative	Crystal	2520 40MHZ 15PF, 10ppm 8Z40000022 (TXC)
Main	Chipset	RTL8822BS-CG TFBGA121-6.5X6.5-0.5

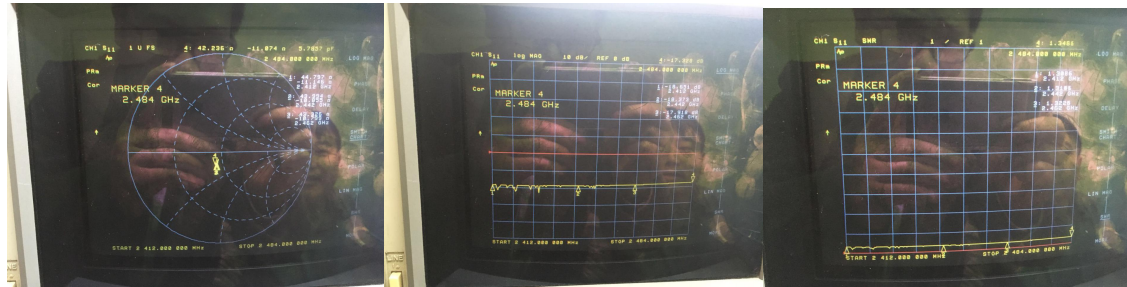
10 Test Report

10.1 2.4GHz S parameter

ANT0:



ANT1:

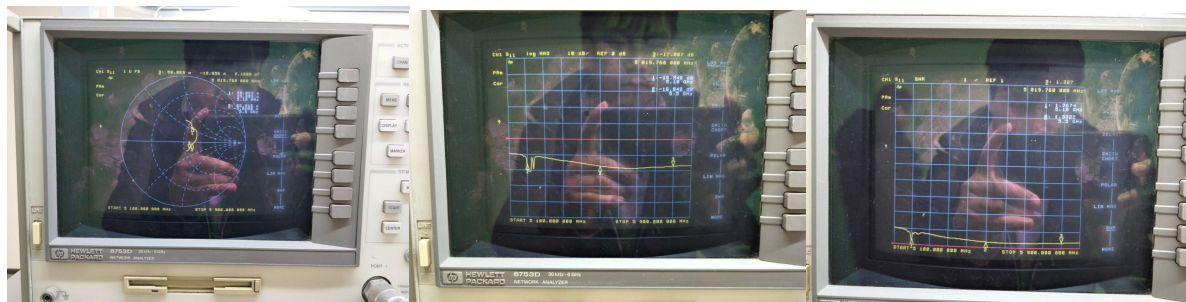


10.2 5GHz S parameter

ANT0:



ANT1:

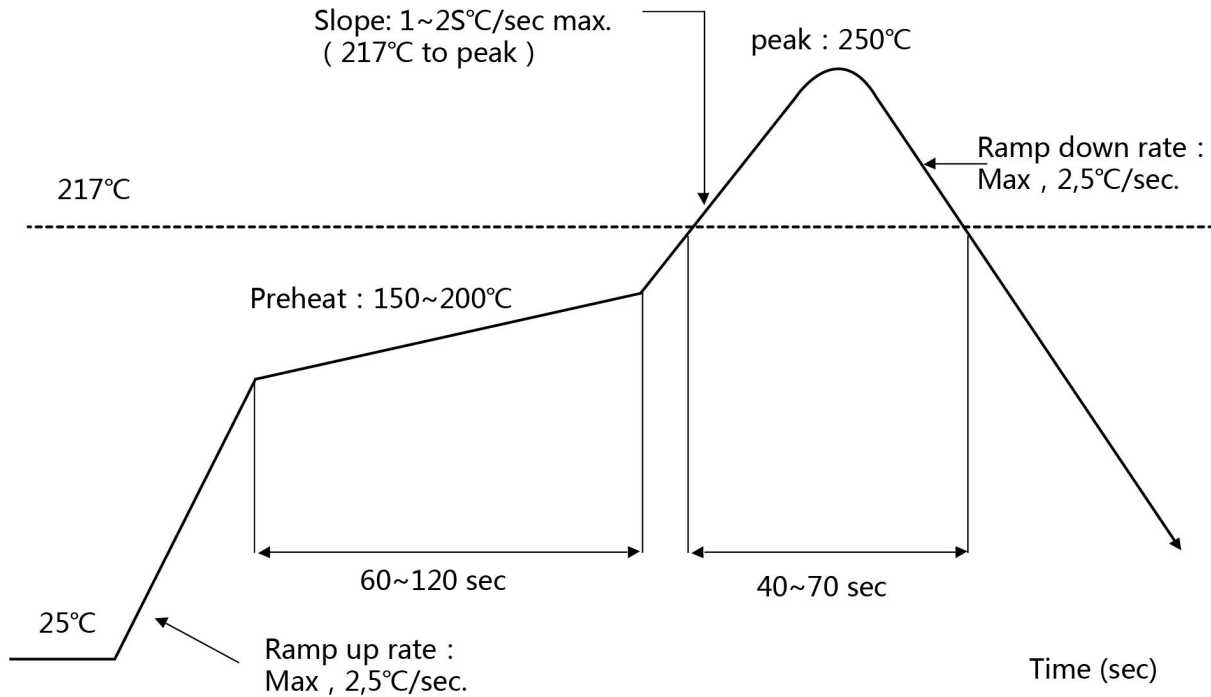


11 Recommended Reflow Profile

Referred to IPC/JEDEC standard.

Peak Temperature : <250°C

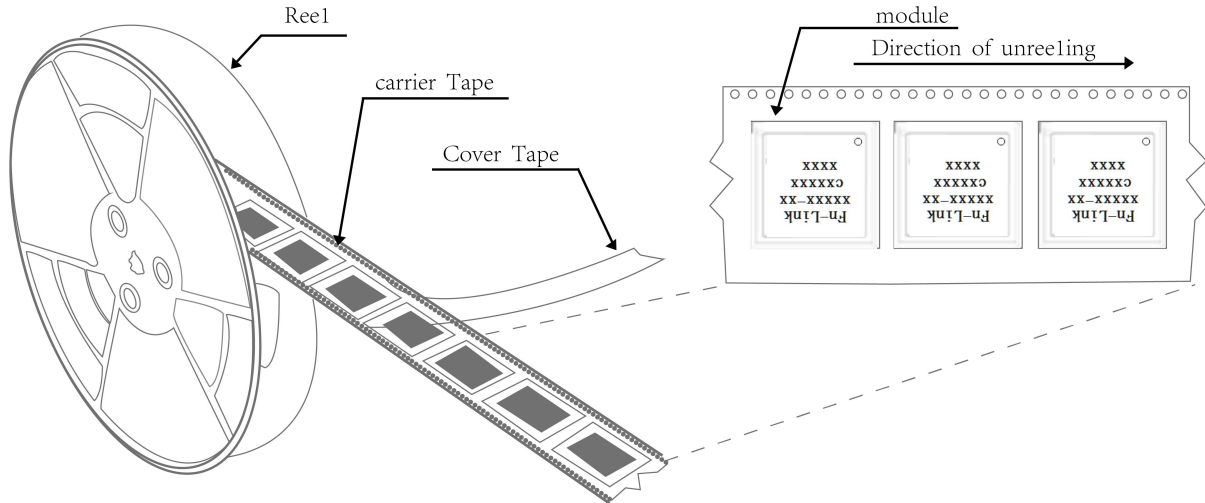
Number of Times : ≤2 times



12 Package Information

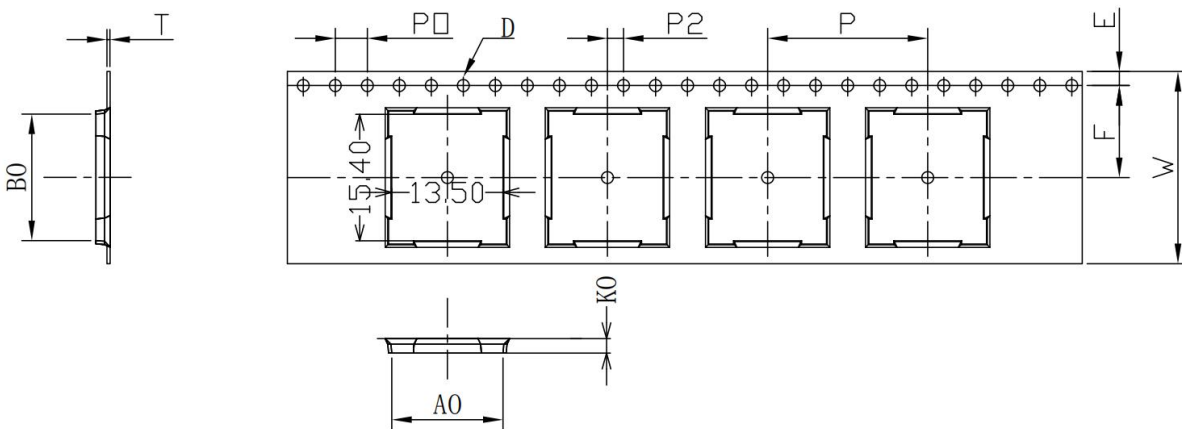
12.1 Reel

A roll of 1500pcs

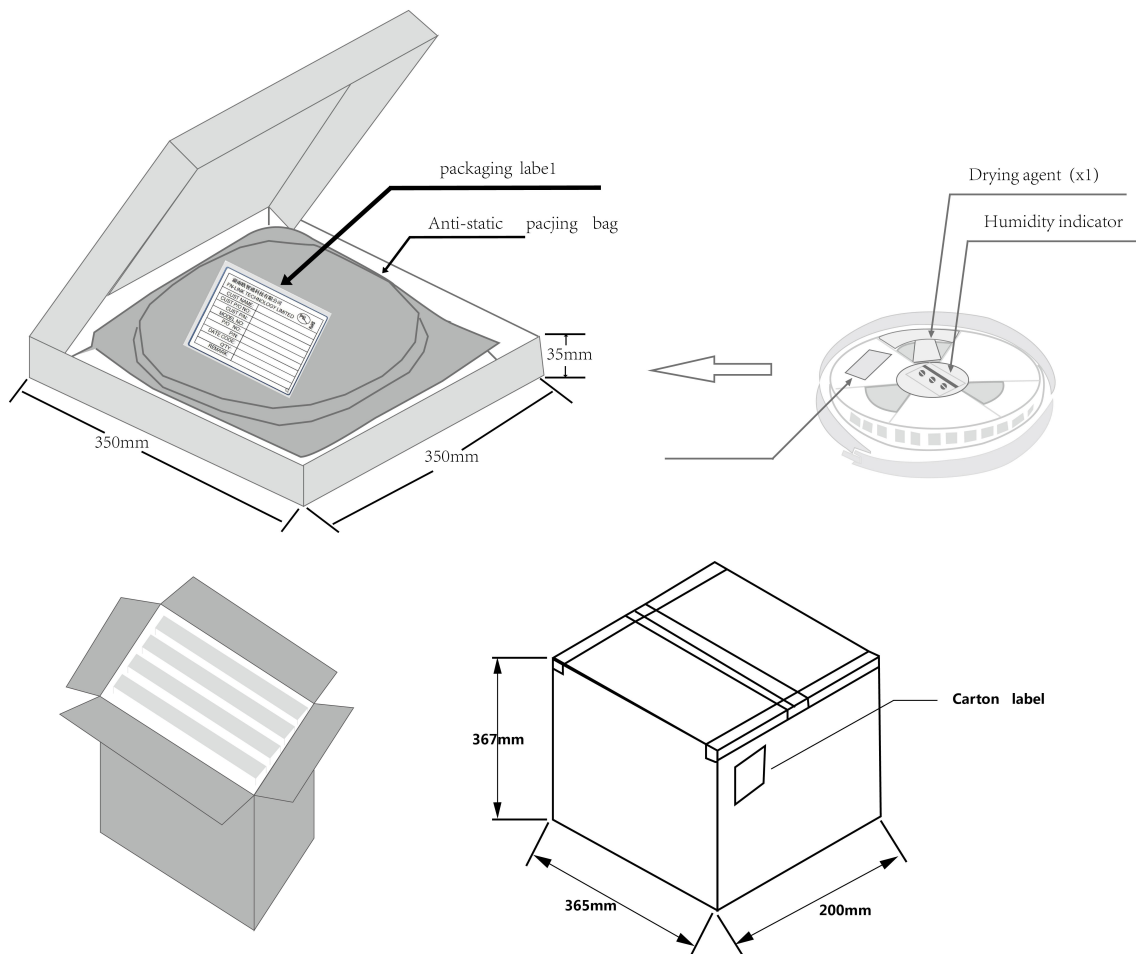


12.2 Carrier Tape Detail

ITEM	W	A0	B0	D	F	E	K0	PO	P2	P	T
DIM	24	13.50	15.40	1.50	11.5	1.75	1.80	4.0	2.0	20.0	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



12.4 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