L287B-SR

Wi-Fi Dual-band 1X1 11a/b/g/n/ac +Bluetooth 5.0

Combo Module Datasheet

L287B-SR Module Datasheet

Office: 6 Floor, Building U6, Junxiang U8 Park,
Hangcheng Avenue, Bao'an District,
Shenzhen City, CHINA
Factory: No.8, Litong Road, Liuyang Economic & Technical
Development Zone, Changsha, Hunan, CHINA
TEL: +86-755-2955-8186
Website: www.fn-link.com

Customer Approval : _____ Company

_____ Title

_____ Signature

_____ Date

_____ Fn-Link

Revision History

Version	Date	Revision Content	Draft	Approved
1.0	2021/03/23	Draft version	Lgp	Szs
1.1	2021/03/31	Correct typos	Wesley	Szs
1.2	2021/05/06	Pin map change	Wesley	Szs
1.3	2021/05/20	Change pin13 to NC	Wesley	Szs
1.4	2021/06/11	Refine section 1.3, 1.4, 2.1, 2.2, 4.2, 5.1, 6.1 and 7	Wesley	Qjp
1.5	2021/07/16	Add power consumption, refine section 2.1 and 3.1.	Wesley	Qjp
1.6	2021/08/18	Add notice for UART baud-rate and VCC power supply; correct typos.	Wesley	Qjp

CONTENTS

1 Overview

1.1 Introduction

L287B-SR has dual-band Wi-Fi and Bluetooth functionalities. It is based on NXP 88W8987 chipset, a highly-integrated IEEE 802.11a/b/g/n/ac MAC/Baseband/RF WLAN and Bluetooth Baseband/RF single chip.

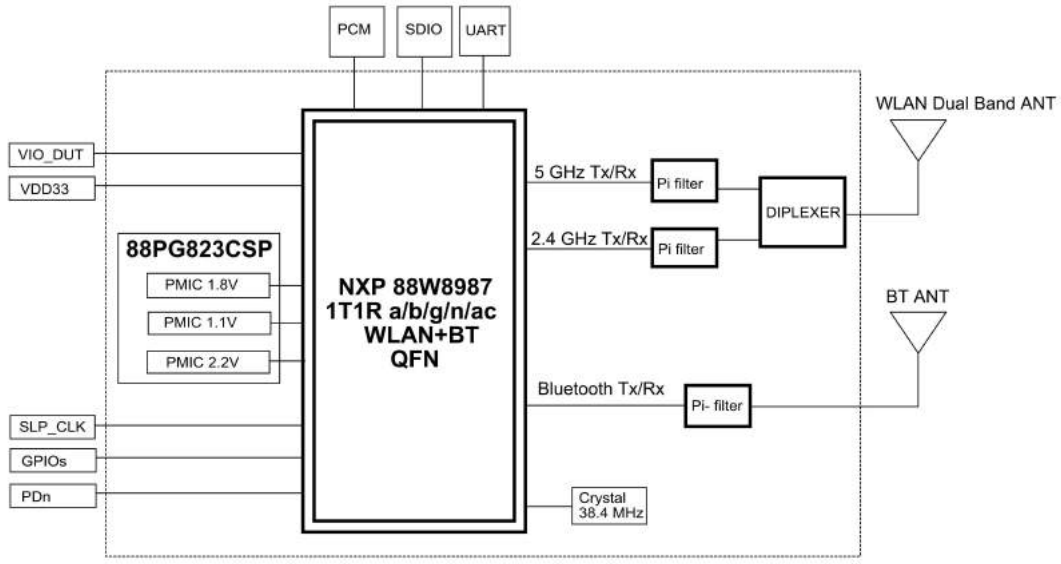
The module provides SDIO3.0 interface for Wi-Fi and HS-UART/PCM for Bluetooth.

L287B-SR can achieve up to a speed of 433.3Mbps with single stream 802.11ac WLAN connection. It is a perfect solution for a combination of Wi-Fi and BT technologies.

1.2 Features

- NXP 88W8987 inside
- CMOS MAC, Baseband PHY and RF in a single chip for IEEE 802.11 a/b/g/n/ac
- Support 802.11ac 1x1, compliant with MU-MIMO STA mode
- Maximum rate 433Mbps in 80MHz bandwidth
- SDIO3.0 interface for WLAN
- Support Bluetooth V5.0 features
- HS-UART and PCM interface for BT
- Bluetooth LE supports Broadcaster, Observer, Central, and Peripheral roles
- Supports link layer topology to be master and slave (connects up to 16 links)
- Wi-Fi/Bluetooth coexistence protocol support

1.3 Block Diagram



1.4 General Specification

Model Name	L287B-SR
Dimension	L x W x H: 15 x 13 x 2.15 mm (typical)
Wi-Fi Interface	SDIO3.0
BT Interface	UART / PCM
Operating temperature	-30°C to 85°C
Storage temperature	-40°C to 125°C

[Note] Baud-rate of UART interface is 3000000 by default.

1.5 Recommended Operating Rating

	Min.	Typ.	Max.	Unit
Operating Temperature	-30	25	85	°C
VCC33	3.135	3.3	3.465	V
VDDIO	1.71	1.8	1.89	V

1.6 Power Consumption

[Note] The consumption is quite high while module initializing, please make sure the current supply of VCC33 power is greater than 1A.

Band	Mode		Current Consumption(Unit:mA) VCC33 = VIO = 3.3V
NA	Idle		57
2.4GHz	Continue Tx	11b 1Mbps @17dBm	483
		11g 6Mbps @17dBm	457
		11n HT20 mcs0@14dBm	475
		11n HT40 mcs0@14dBm	464
	Continue Rx	11b 1Mbps	72
		11n HT40 mcs7	72
5GHz	Continue Tx	11a 6Mbps @17.5dBm	470
		11ac VHT20 mcs0 @17dBm	492
		11ac VHT40 mcs0 @17dBm	485
		11ac VHT80 mcs0 @11dBm	292
	Continue Rx	11a 6Mbps	70
		11n HT40 mcs7	82
		11ac VHT20 mcs9	70
		11ac VHT80 mcs9	93

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 ~ 2.4835 GHz (2.4 GHz ISM Band)			
Number of Channels	2.4GHz：Ch1 ~ Ch14			
Spectrum Mask	Min. b/g/n	Typ. b/g/n	Max. b/g/n	Unit b/g/n
1st side lobes(to fc ± 11MHZ)	-	-43/-30/-40	-	dBr
2st side lobes(to fc ± 22MHZ)	-	-52/-33/-58	-	dBr
Freq. Tolerance	-20/-20/-20	-	20/20/20	ppm
Test Items	**Typical Value**			**EVM**
Output Power	802.11b /11Mbps: 17dBm ± 1.5 dB			EVM ≤ -9dB
	802.11g /54Mbps: 15dBm ± 1.5 dB			EVM ≤ -25dB
	802.11n /MCS7: 14dBm ± 1.5 dB			EVM ≤ -28dB
Test Items	**TYP Test Value**			**Standard Value**
SISO Receive Sensitivity (11b,20MHz) @8% PER	- 1Mbps	≤ -92 dBm		≤ -85 dBm
	- 11Mbps	≤ -82 dBm		≤ -76 dBm
SISO Receive Sensitivity (11g,20MHz) @10% PER	- 6Mbps	≤ -86 dBm		≤ -82 dBm
	- 54Mbps	≤ -71 dBm		≤ -65 dBm
SISO Receive Sensitivity (11n,20MHz) @10% PER	- MCS=0	≤ -86 dBm		≤ -82 dBm
	- MCS=7	≤ -67 dBm		≤ -64 dBm
SISO Receive Sensitivity (11n ,40MHz) @10% PER	- MCS=0	≤ -83 dBm		≤ -79 dBm
	- MCS=7	≤ -65 dBm		≤ -61 dBm
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

Feature	Description	
WLAN Standard	IEEE 802.11a/n/ac 1x1, Wi-Fi compliant	
Frequency Range	5.150 GHz ~ 5.850 GHz (5.0 GHz Band)	
Number of Channels	5.0GHz：Please see the table[1]	
Test Items	**Typical Value**	**EVM**
Output Power	802.11a /54Mbps: 15 dBm ± 1.5 dB	EVM ≤ -25dB
	802.11n /MCS7: 14 dBm ± 1.5 dB	EVM ≤ -28dB
	802.11ac VHT20/MCS8: 13 dBm ± 1.5 dB VHT40/MCS9: 13 dBm ± 1.5 dB VHT80/MCS9: 11 dBm ± 1.5 dB	EVM ≤ -32dB
Test Items	**Test Value**	**Standard Value**
Receive Sensitivity (11a, 20MHz) @10% PER	- 6Mbps ≤ -86 dBm	≤ -82 dBm
	- 54Mbps ≤ -71 dBm	≤ -65 dBm
Receive Sensitivity (11n,20MHz) @10% PER	- MCS=0 ≤ -86 dBm	≤ -82 dBm
	- MCS=7 ≤ -67 dBm	≤ -64 dBm
Receive Sensitivity (11n,40MHz) @10% PER	- MCS=0 ≤ -82 dBm	≤ -79 dBm
	- MCS=7 ≤ -64 dBm	≤ -61 dBm
Receive Sensitivity (11ac,20MHz) @10% PER	- MCS=0 ≤ -85 dBm	≤ -82 dBm
	- MCS=8 ≤ -64 dBm	≤ -59 dBm
Receive Sensitivity (11ac,40MHz) @10% PER	- MCS=0 ≤ -82 dBm	≤ -79 dBm
	- MCS=9 ≤ -59 dBm	≤ -54 dBm
Receive Sensitivity (11ac,80MHz) @10% PER	- MCS=0 ≤ -79 dBm	≤ -76 dBm
	- MCS=9 ≤ -55 dBm	≤ -51 dBm
Maximum Input Level	802.11a/n: -30 dBm	
Antenna Reference	Small antennas with 0~2 dBi peak gain	

Conditions : VBAT=3.3V ; VDDIO=1.8V ; Temp:25°C

[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

3 Bluetooth Specification

3.1 Bluetooth Specification

Feature	Description		
General Specification			
Bluetooth Standard	Bluetooth V5.0		
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,8DPSK		
RF Specification			
	Min.	**Typical.**	**Max.**
Output Power (BR/LE)		10 dBm	
Output Power (EDR)Note1		7 dBm	
Sensitivity @ BER=0.1% for GFSK (1Mbps)Note2		-92dBm	
Sensitivity @ BER=0.01% for π/4-DQPSK (2Mbps)Note2		-86dBm	
Sensitivity @ BER=0.01% for 8DPSK (3Mbps)Note2		-85dBm	
Maximum Input Level	GFSK (1Mbps): -20dBm		
	π/4-DQPSK (2Mbps): -20dBm		
	8DPSK (3Mbps): -20dBm		

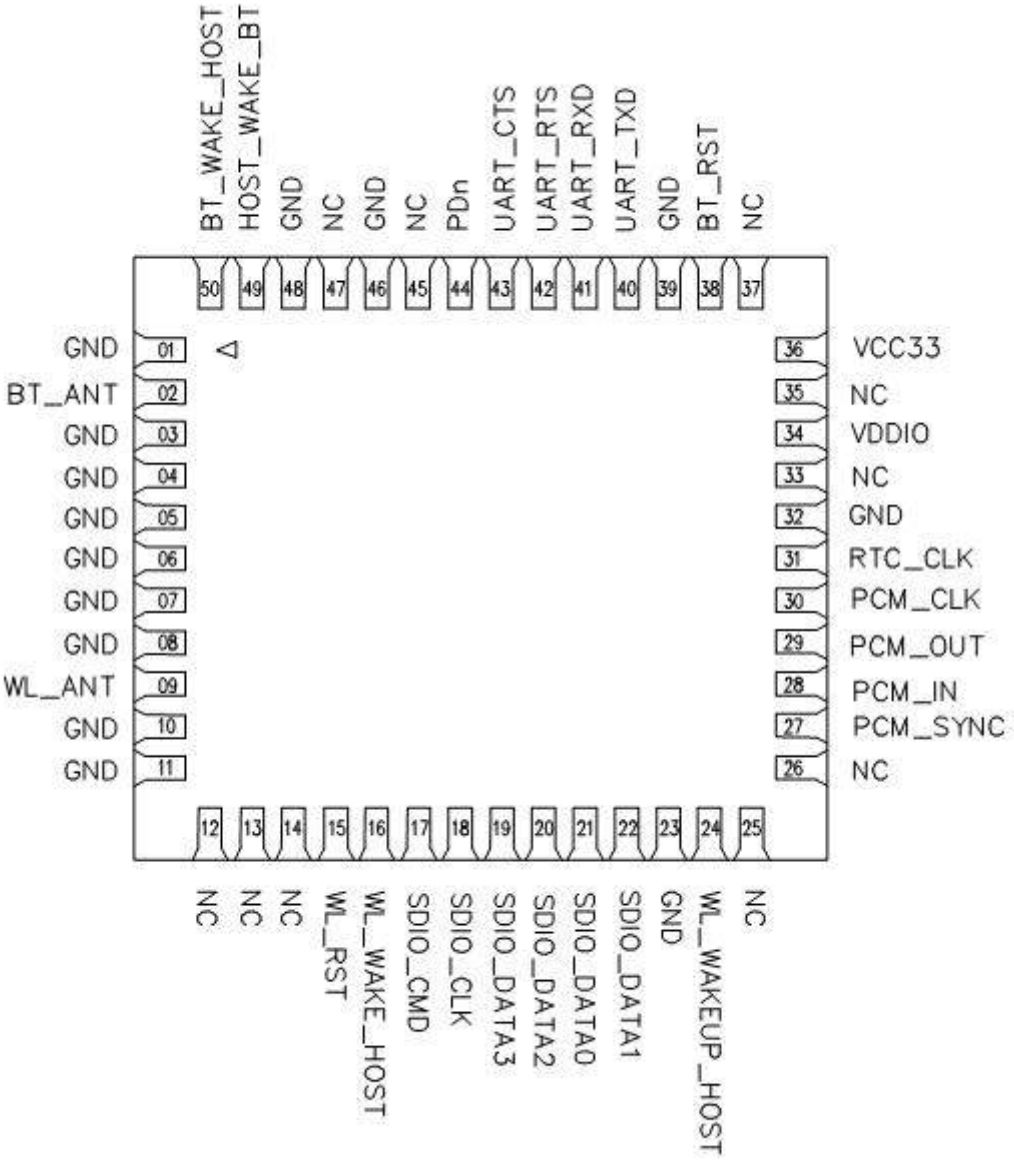
Note1: By default, 88W8987's EDR TX power is 3dBm less than BR TX power.

Note2: Desense of ~7 dB at CH 2419 MHz, ~4 dB at CH 2432 MHz, ~3 dB at 2457 MHz, ~4 dB at 2458 MHz due to internal clock harmonics of chipset.

4 Pin Assignments

4.1 Pin Outline

< TOP VIEW >



4.2 Pin Definition

NO	Name	Type	Description	Voltage
1	GND	—	Ground connections	
2	BT_ANT	I/O	RF I/O port for BT	
3	GND	—	Ground connections	

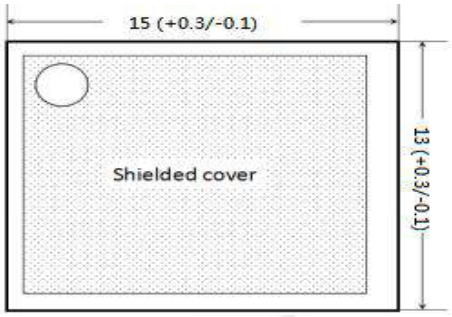
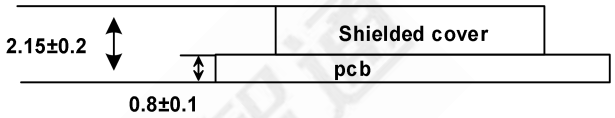
4	GND	—	Ground connections	
5	GND	—	Ground connections	
6	GND	—	Ground connections	
7	GND	—	Ground connections	
8	GND	—	Ground connections	
9	WL_ANT	I/O	RF I/O port for dual band Wi-Fi	
10	GND	—	Ground connections	
11	GND	—	Ground connections	
12	NC	—	No connect	
13	NC	—	No connect	
14	NC	—	No connect	
15	WL_RST	I	WLAN independent reset, internal pull up	1.8V
16	WL_WAKE_HOST	O	WLAN wake-up HOST, internal pull up	1.8V
17	SDIO_CMD	I/O	SDIO command line	1.8V
18	SDIO_ CLK	I/O	SDIO clock line	1.8V
19	SDIO_DATA_3	I/O	SDIO data line 3	1.8V
20	SDIO_DATA_2	I/O	SDIO data line 2	1.8V
21	SDIO_DATA_0	I/O	SDIO data line 0	1.8V
22	SDIO_DATA_1	I/O	SDIO data line 1	1.8V
23	GND	—	Ground connections	
24	WL_WAKE_HOST	O	WLAN wake-up HOST, Internally short to module PIN 16	1.8V
25	NC	—	No connect	
26	NC	—	No connect	
27	PCM_SYNC	I/O	PCM sync signal	1.8V
28	PCM_IN	I	PCM data input	1.8V
29	PCM_OUT	O	PCM Data output	1.8V
30	PCM_CLK	I/O	PCM clock	1.8V
31	RTC_CLK	I	External Low Power Clock input (32.768KHz) If not used keep NC	VDDIO
32	GND	—	Ground connections	
33	NC	—	No connect	
34	VDDIO	P	I/O Voltage supply input	1.8V

35	NC	—	No connect	
36	VCC33	P	Main power voltage source input	3.3V
37	NC	—	No connect	
38	BT_RST	I	Bluetooth independent reset, internal pull up	1.8V
39	GND	—	Ground connections	
40	UART_TXD	O	Bluetooth UART interface	1.8V
41	UART_RXD	I	Bluetooth UART interface	1.8V
42	UART_RTS_N	O	Bluetooth UART interface	1.8V
43	UART_CTS_N	I	Bluetooth UART interface	1.8V
44	PDn	I	Full Power-down, active low internal pull up	1.8V to 3.3V
45	NC	—	No connect	
46	GND	—	Ground connections	
47	NC	—	No connect	
48	GND	—	Ground connections	
49	HOST_WAKE_BT	I	HOST wake-up Bluetooth device, internal pull up	1.8V
50	BT_WAKE_HOST	O	Bluetooth device to wake-up HOST, internal pull up	1.8V

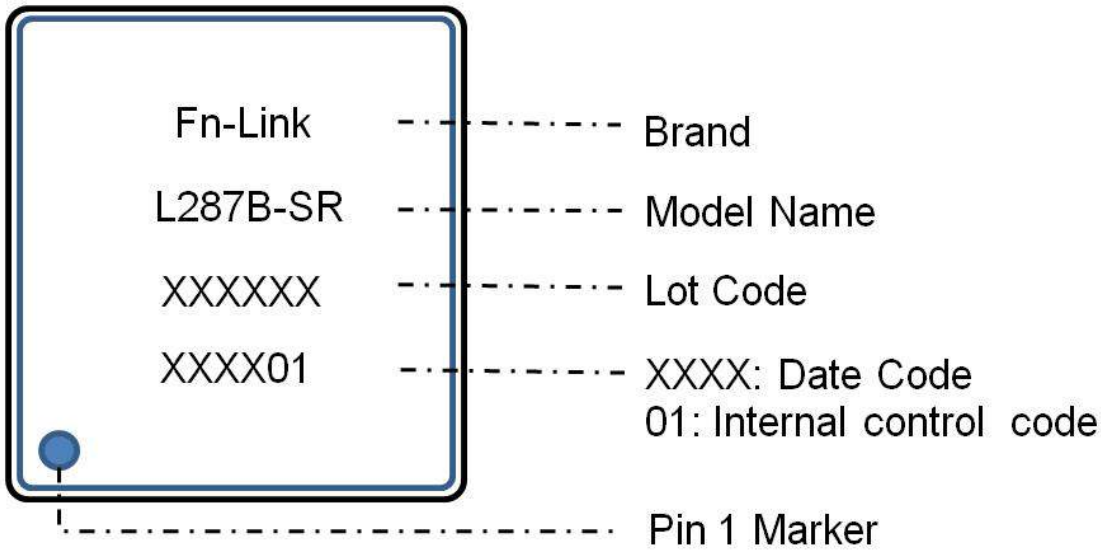
P:POWER I:INPUT O:OUTPUT VDDIO:1.8V

5 Dimensions

5.1 Module Picture

L x W : 15 x 13 (+0.3/-0.1) mm	
H: 2.15 (±0.2) mm	
Weight	0.855g

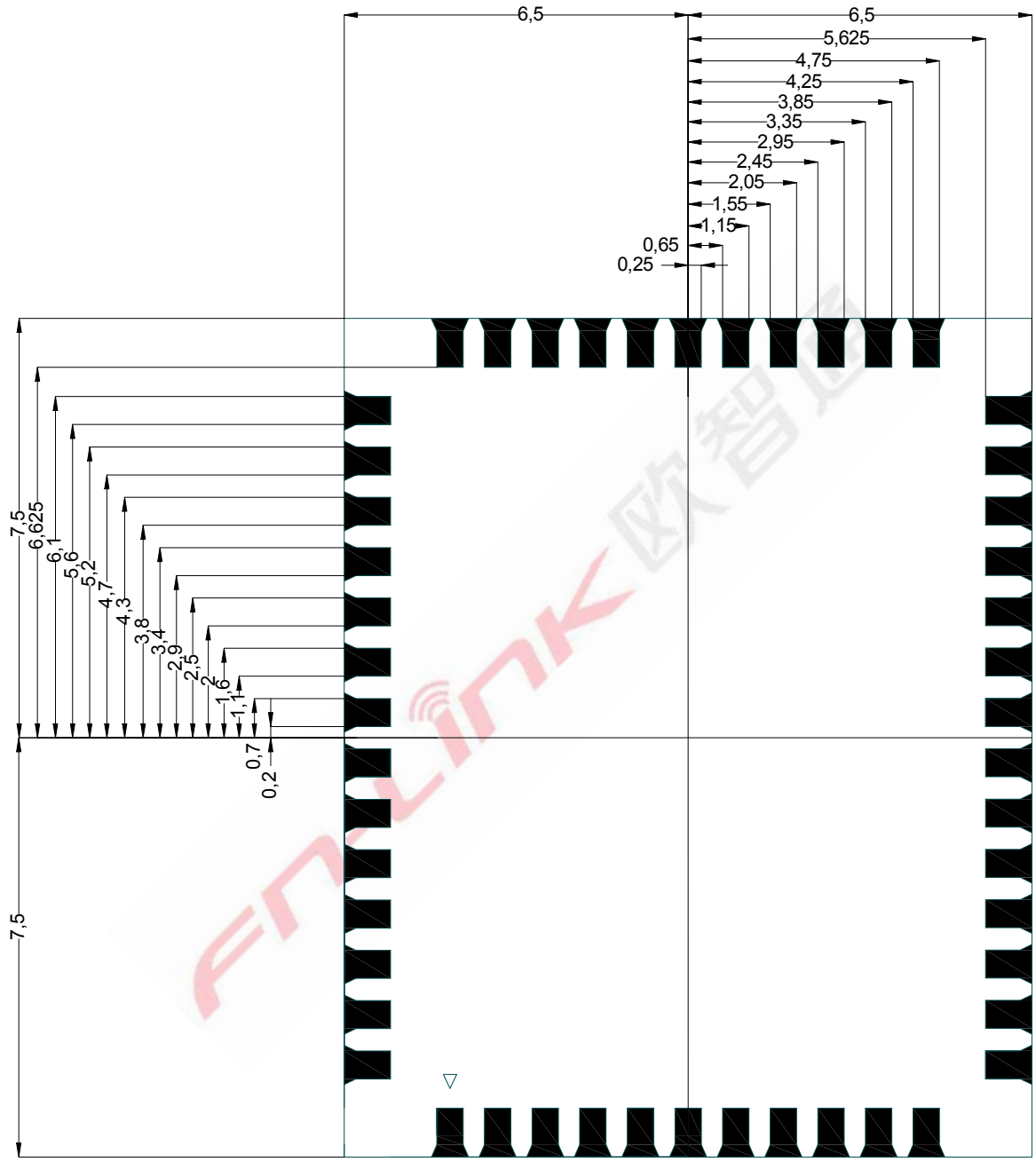
5.2 Marking Description



5.3 Module Physical Dimensions

(Unit: mm)

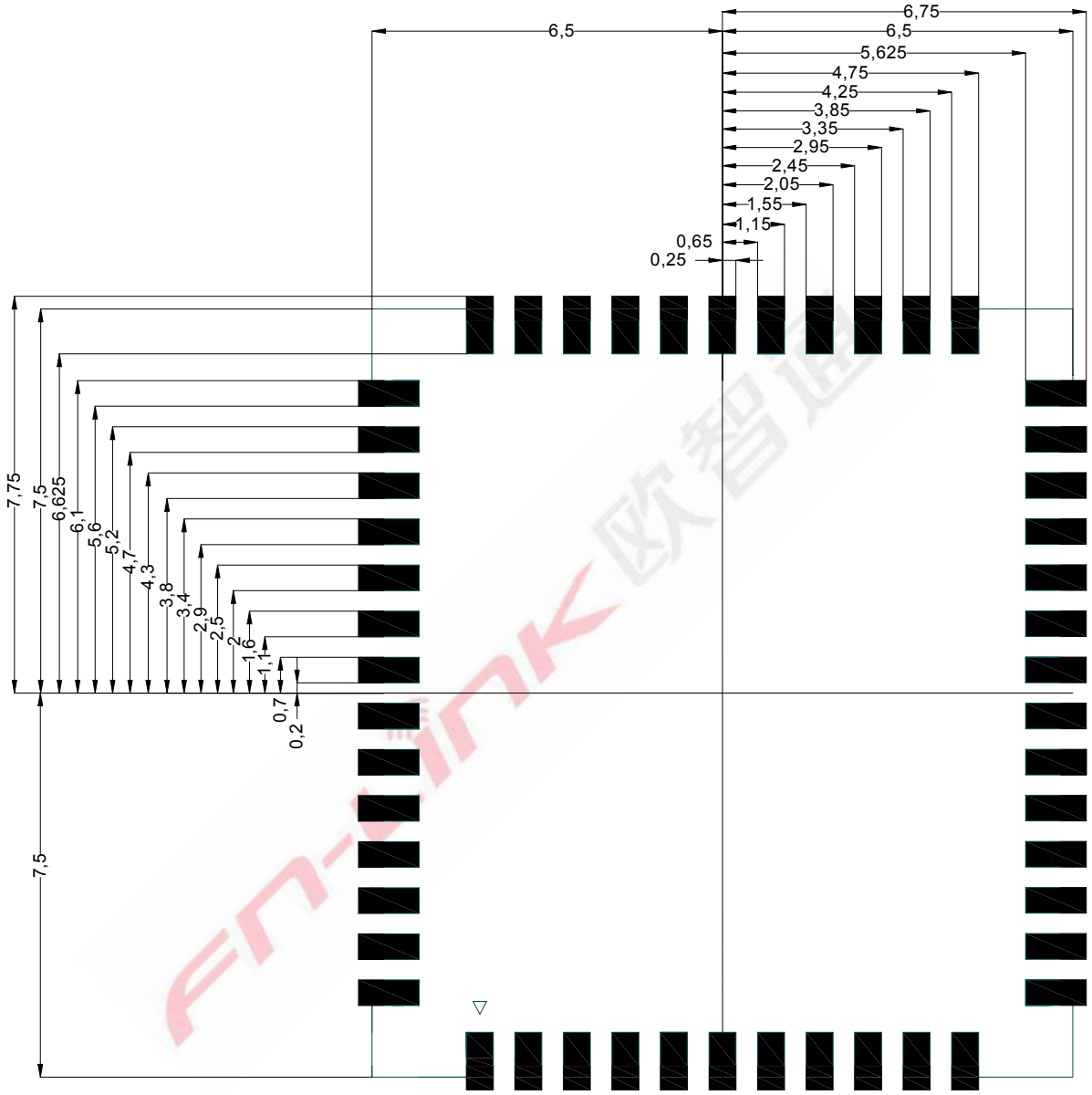
< TOP VIEW >



5.4 Layout Recommendation

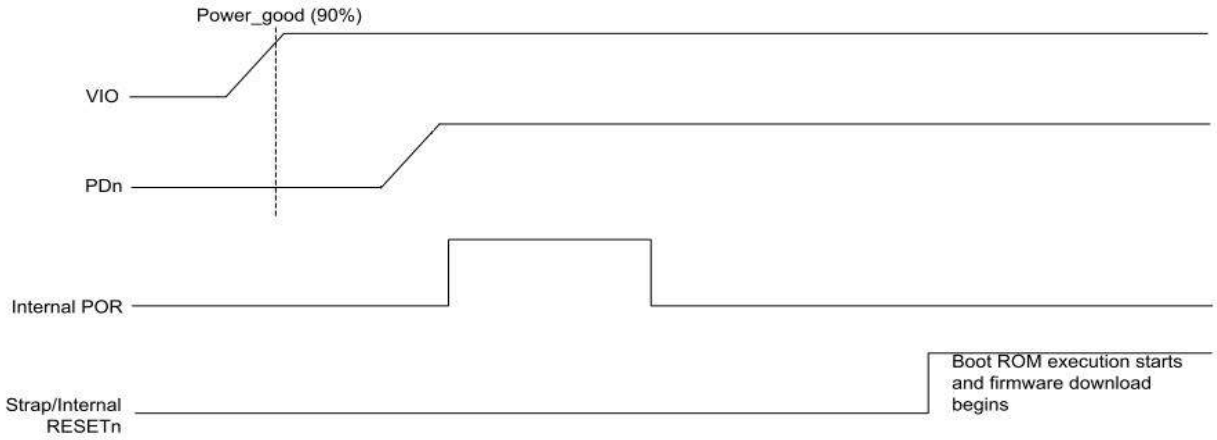
(Unit: mm)

< TOP VIEW >



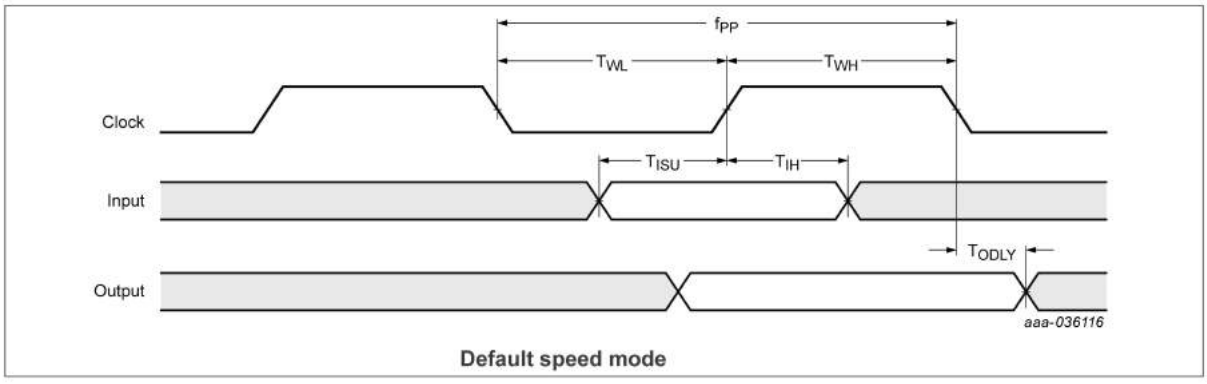
6 Power-up Sequence and Timing Specification

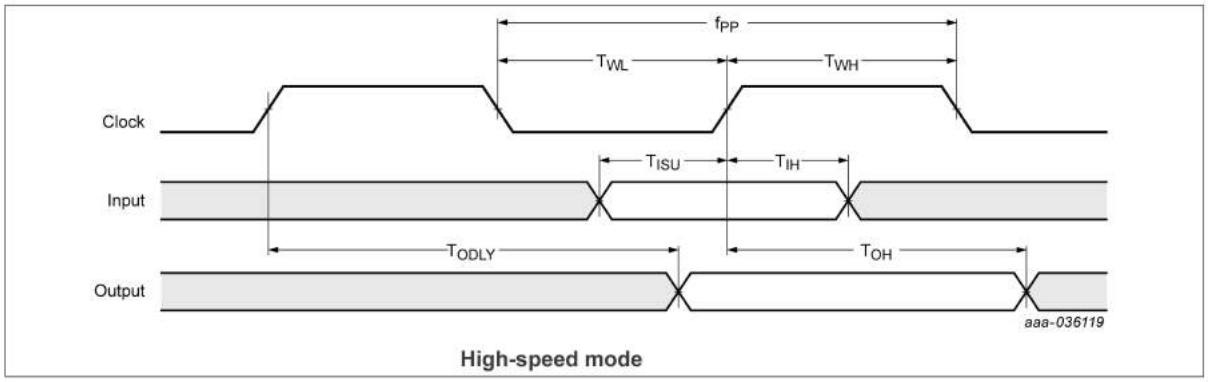
6.1 Power-up sequence



- VDDIO must be good (90%) before or at the same time VCC33 starts ramping up.
- VDDIO must be good (90%) before or at the same time PDn starts ramping up.
- Ramp-up time of VDDIO must be <100 ms.
- All supplies must be monotonic.

6.2 SDIO Default Speed, High Speed Mode Timing

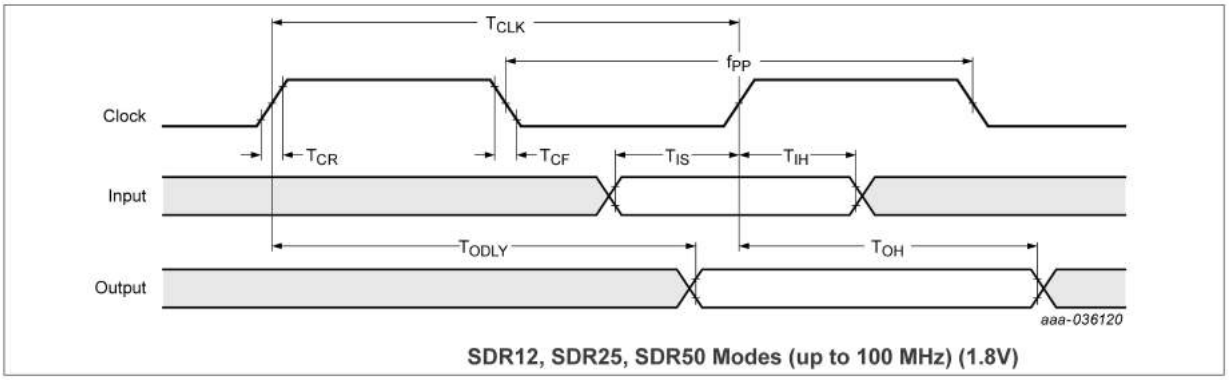




High-speed mode

Symbol	Parameter	Condition	Min	Typ	Max	Unit
f_{PP}	Clock frequency	Normal	0	--	25	MHz
		High-speed	0	--	50	MHz
T_{WL}	Clock low time	Normal	10	--	--	ns
		High-speed	7	--	--	ns
T_{WH}	Clock high time	Normal	10	--	--	ns
		High-speed	7	--	--	ns
T_{ISU}	Input setup time	Normal	5	--	--	ns
		High-speed	6	--	--	ns
T_{IH}	Input hold time	Normal	5	--	--	ns
		High-speed	2	--	--	ns
T_{ODLY}	Output delay time	Normal	--	--	14	ns
	CL ≤ 40 pF (1 card)	High-speed	--	--	14	ns
T_{OH}	Output hold time	High-speed	2.5	--	--	ns

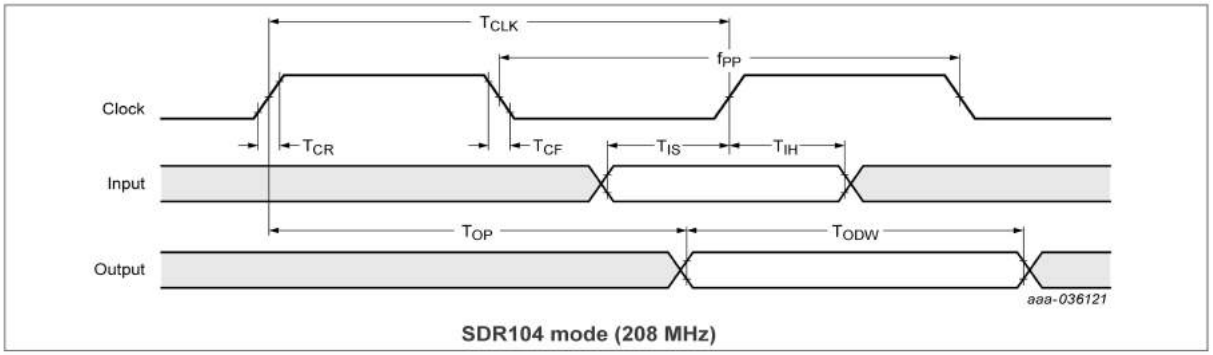
6.3 SDIO SDR12, SDR25, SDR50 modes (up to 100 MHz) (1.8V)



SDR12, SDR25, SDR50 Modes (up to 100 MHz) (1.8V)

Symbol	Parameter	Condition	Min	Typ	Max	Units
f_{PP}	Clock frequency	SDR12/25/50	25	--	100	MHz
T_{IS}	Input setup time	SDR12/25/50	3	--	--	ns
T_{IH}	Input hold time	SDR12/25/50	0.8	--	--	ns
T_{CLK}	Clock time	SDR12/25/50	10	--	40	ns
T_{CR}, T_{CF}	Rise time, fall time T_{CR}, T_{CF} < 2 ns (max) at 100 MHz C_{CARD} = 10 pF	SDR12/25/50	--	--	0.2*T_{CLK}	ns
T_{ODLY}	Output delay time C_L ≤ 30 pF	SDR12/25/50	--	--	7.5	ns
T_{OH}	Output hold time C_L = 15 pF	SDR12/25/50	1.5	--	--	ns

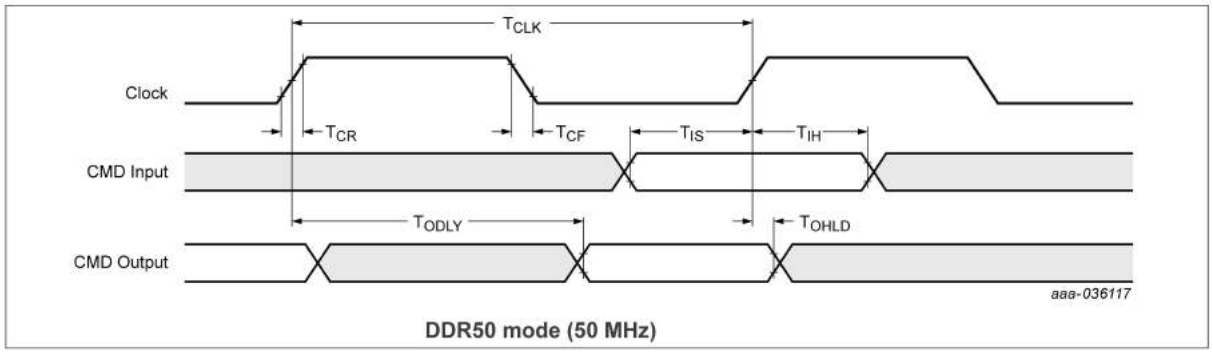
6.4 SDIO SDR104 mode (208 MHz) (1.8V)



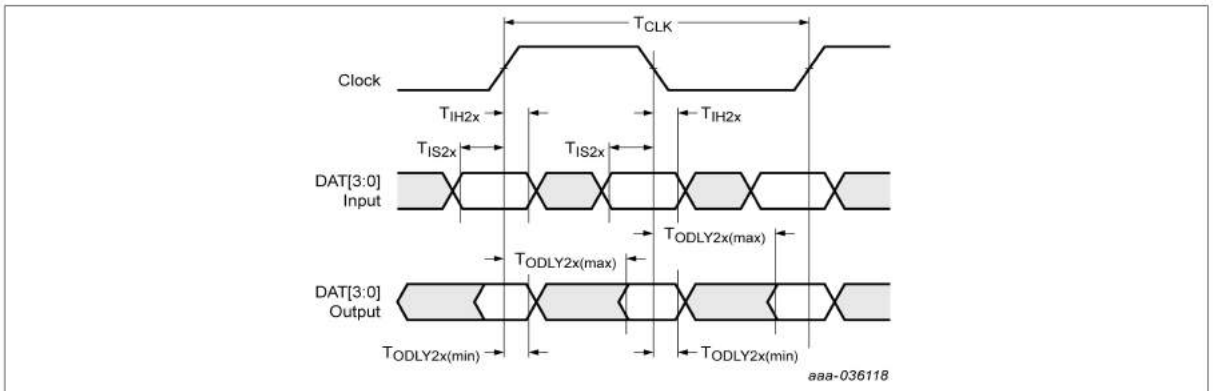
SDR104 mode (208 MHz)

Symbol	Parameter	Condition	Min	Typ	Max	Unit
f_{PP}	Clock frequency	SDR104	0	--	208	MHz
T_{IS}	Input setup time	SDR104	1.4	--	--	ns
T_{IH}	Input hold time	SDR104	0.8	--	--	ns
T_{CLK}	Clock time	SDR104	4.8	--	--	ns
T_{CR}, T_{CF}	Rise time, fall time T_{CR}, T_{CF} < 0.96 ns (max) at 208 MHz C_{CARD} = 10 pF	SDR104	--	--	0.2*T_{CLK}	ns
T_{OP}	Card output phase	SDR104	0	--	10	ns
T_{ODW}	Output timing of variable data window	SDR104	2.88	--	--	ns

6.5 SDIO DDR50 mode (50 MHz) (1.8V)



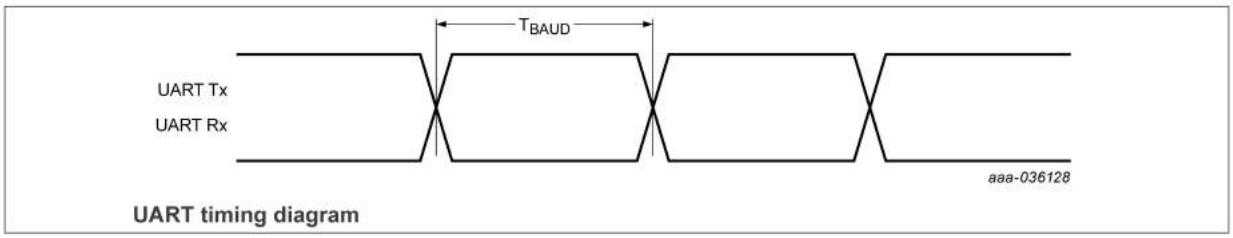
DDR50 mode (50 MHz)



DDR50 mode (50 MHz)

Symbol	Parameter	Condition	Min	Typ	Max	Units
Clock						
T_{CLK}	Clock time 50 MHz (max) between rising edges	DDR50	20	--	--	ns
T_{CR}, T_{CF}	Rise time, fall time T_{CR}, T_{CF} < 4.00 ns (max) at 50 MHz C_{CARD} = 10 pF	DDR50	--	--	0.2*T_{CLK}	ns
Clock Duty	--	DDR50	45	--	55	%
CMD Input (referenced to clock rising edge)						
T_{IS}	Input setup time C_{CARD} ≤ 10 pF (1 card)	DDR50	6	--	--	ns
T_{IH}	Input hold time C_{CARD} ≤ 10 pF (1 card)	DDR50	0.8	--	--	ns
CMD Output (referenced to clock rising edge)						
T_{ODLY}	Output delay time during data transfer mode C_L ≤ 30 pF (1 card)	DDR50	--	--	13.7	ns
T_{OHLD}	Output hold time C_L ≥ 15 pF (1 card)	DDR50	1.5	--	--	ns
DAT[3:0] Input (referenced to clock rising and falling edges)						
T_{IS2x}	Input setup time C_{CARD} ≤ 10 pF (1 card)	DDR50	3	--	--	ns
T_{IH2x}	Input hold time C_{CARD} ≤ 10 pF (1 card)	DDR50	0.8	--	--	ns
DAT[3:0] Output (referenced to clock rising and falling edges)						
$T_{ODLY2x\ (max)}$	Output delay time during data transfer mode C_L ≤ 25 pF (1 card)	DDR50	--	--	7.0	ns
$T_{ODLY2x\ (min)}$	Output hold time C_L ≥ 15 pF (1 card)	DDR50	1.5	--	--	ns

6.6 High-speed UART specifications

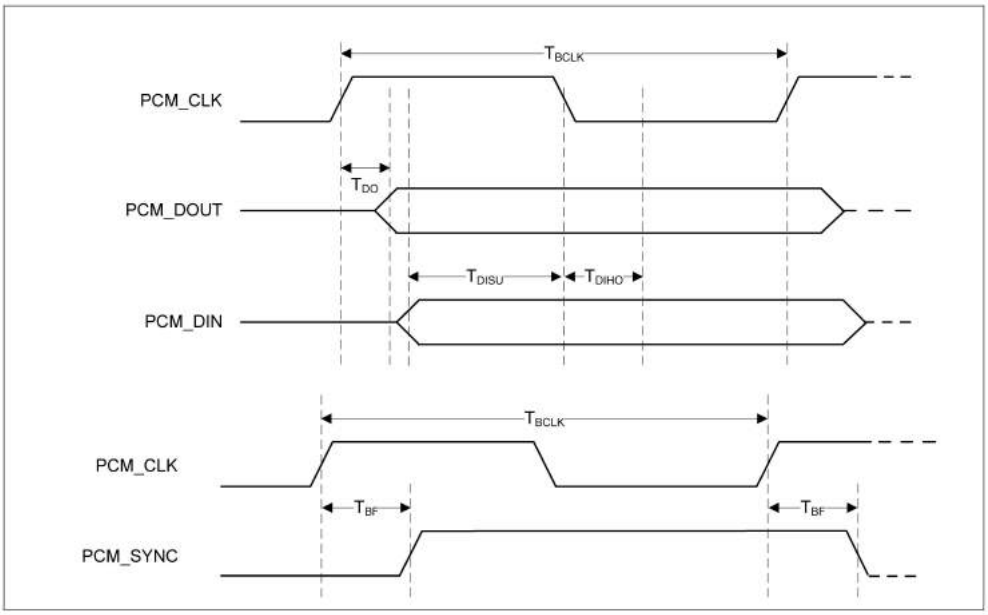


UART timing diagram

Symbol	Parameter	Condition	Min	Typ	Max	Unit
T_{BAUD}	Baud rate	38.4 MHz input clock	250	--	--	ns

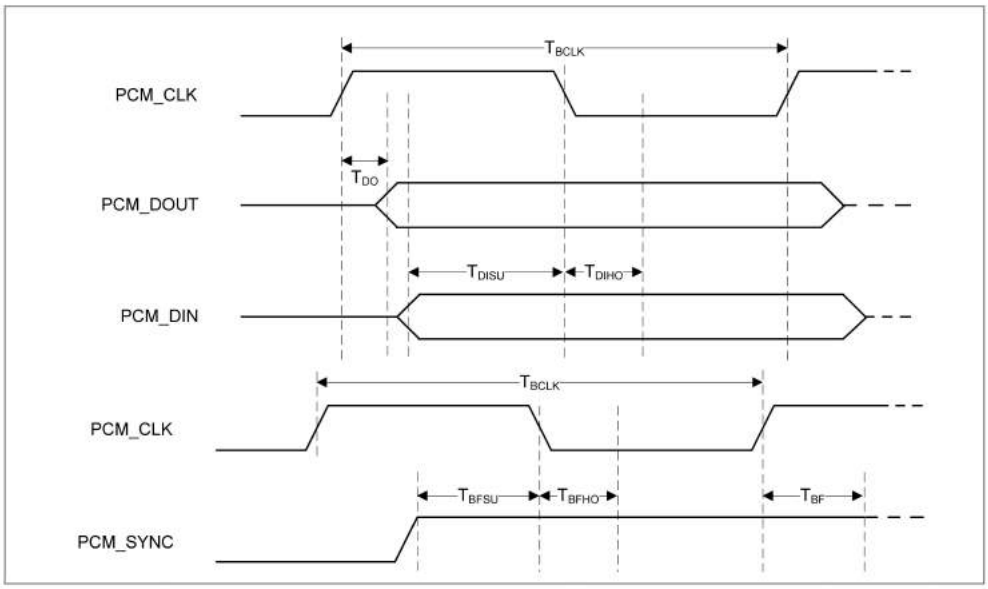
6.7 Bluetooth PCM Timing

Master Mode



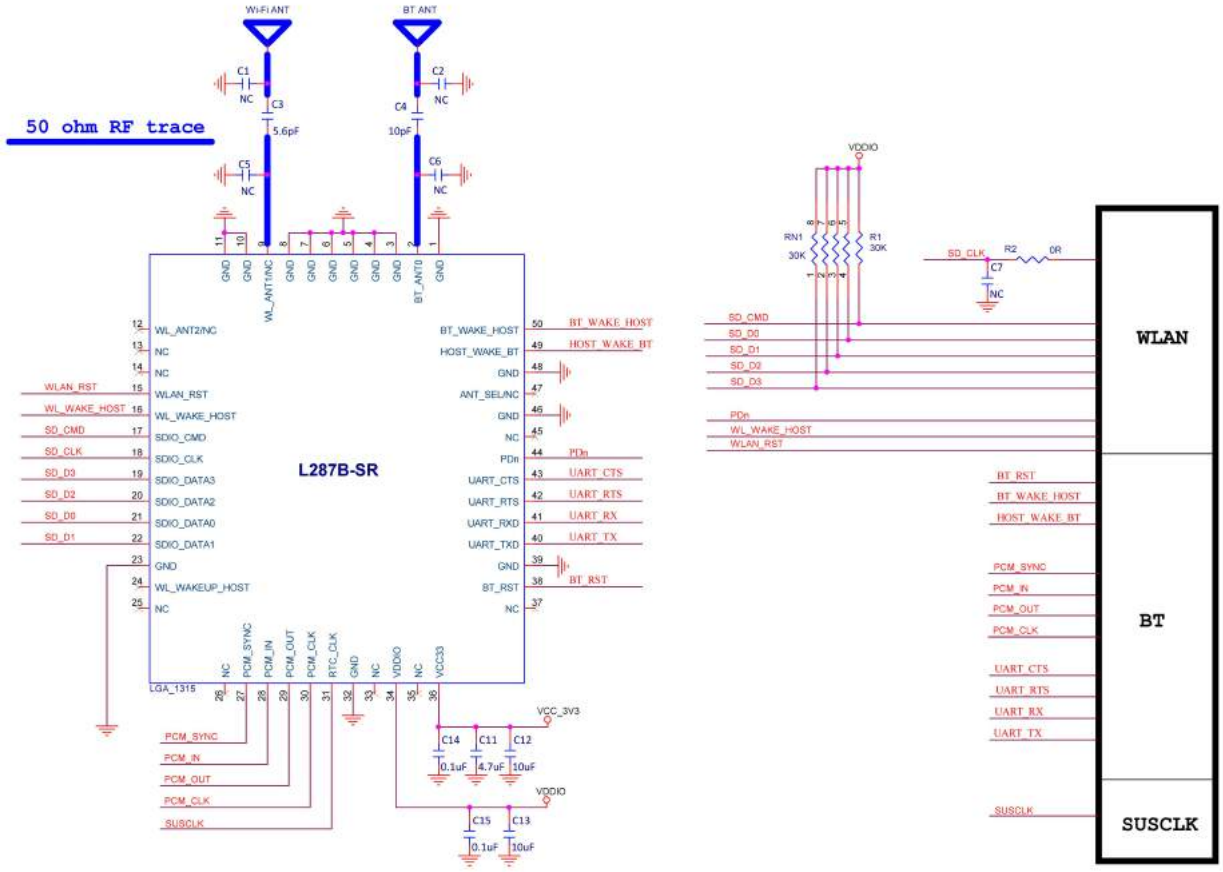
Symbol	Parameter	Condition	Min	Typ	Max	Unit
F_{BCLK}	Bit clock frequency	--	--	2/2.048	--	MHz
Duty $Cycle_{BCLK}$	Bit clock duty cycle	--	0.4	0.5	0.6	--
$T_{BCLK\ rise/fall}$	PCM_CLK rise/fall time	--	--	3	--	ns
T_{DO}	Delay from PCM_CLK rising edge to PCM_DOUT rising edge	--	--	--	15	ns
T_{DISU}	Setup time for PCM_DIN before PCM_ CLK falling edge	--	20	--	--	ns
T_{DIHO}	Hold time for PCM_DIN after PCM_CLK falling edge	--	15	--	--	ns
T_{BF}	Delay from PCM_CLK rising edge to PCM_SYNC rising edge	--	--	--	15	ns

Slave mode



Symbol	Parameter	Condition	Min	Typ	Max	Unit
F_{BCLK}	Bit clock frequency	--	--	2/2.048	--	MHz
Duty $Cycle_{BCLK}$	Bit clock duty cycle	--	0.4	0.5	0.6	--
$T_{BCLK\ rise/fall}$	PCM_CLK rise/fall time	--	--	3	--	ns
T_{DO}	Delay from PCM_CLK rising edge to PCM_DOUT rising edge	--	--	--	30	ns
T_{DISU}	Setup time for PCM_DIN before PCM_CLK falling edge	--	15	--	--	ns
T_{DIHO}	Hold time for PCM_DIN after PCM_CLK falling edge	--	10	--	--	ns
T_{BFSU}	Setup time for PCM_SYNC before PCM_CLK falling edge	--	15	--	--	ns
T_{BFHO}	Hold time for PCM_SYNC after PCM_CLK falling edge	--	10	--	--	ns

7 Reference Design



8 Ordering Information

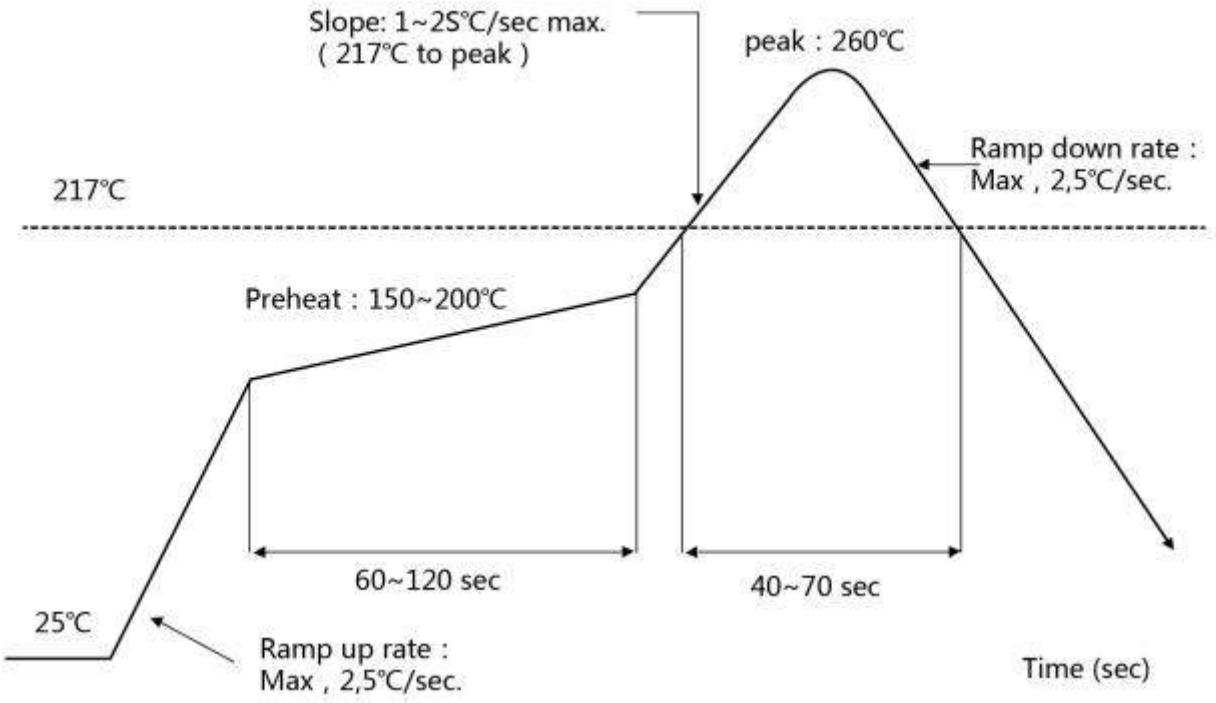
Part No.	Description
FGL287BSRX-01	88W8987-A2-NYEE, a/b/g/n/ac, Wi-Fi, BT5.0, 1T1R, SDIO+UART, 2 Antenna version, PCB V2.0, 13x15mm

9 The Key Material List

Item	Part Name	Description	Manufacturer
1	Inductor	2016 2.2uH,±20%	Sunlord, Ceaiya, Cenker, TAIYO YUDEN
2	Diplexer	1608 Dual-band, dual-mode 2.4GHz/5GHz WLAN	Glead, Walsin, ACX, Murata, MAG.LAYERS
3	Crystal	2016 38.4MHz	ECEC, TKD, Hosonic, JWT, TXC
4	Chipset	88W8987-A2-NYEE	NXP
5	PCB	FR4, GREEN	GDKX, Brain-power, Sunlord, Piotek

10 Recommended Reflow Profile

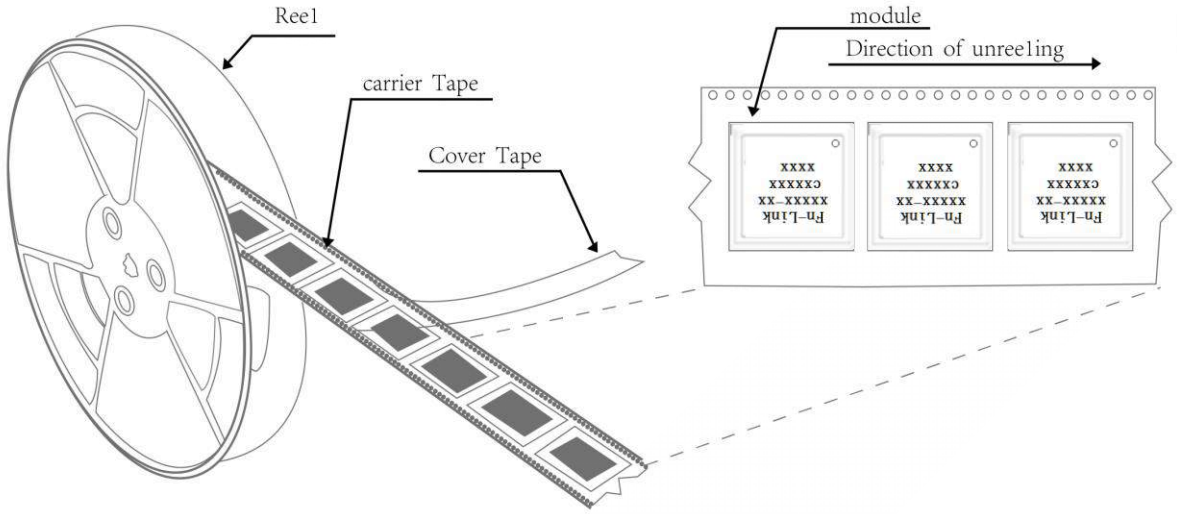
Referred to IPC/JEDEC standard.
Peak Temperature : ≤260°C
Number of Times : ≤2 times



11 Package Information

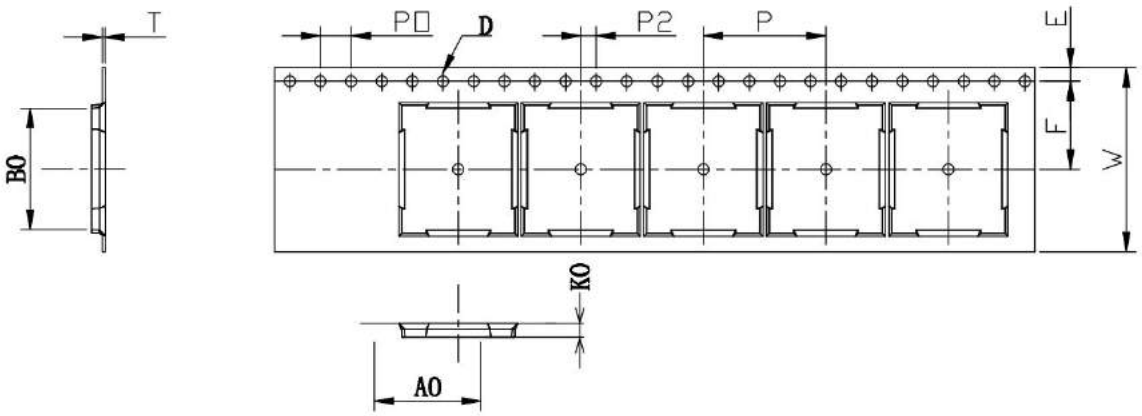
11.1 Reel

A roll of 1500pcs

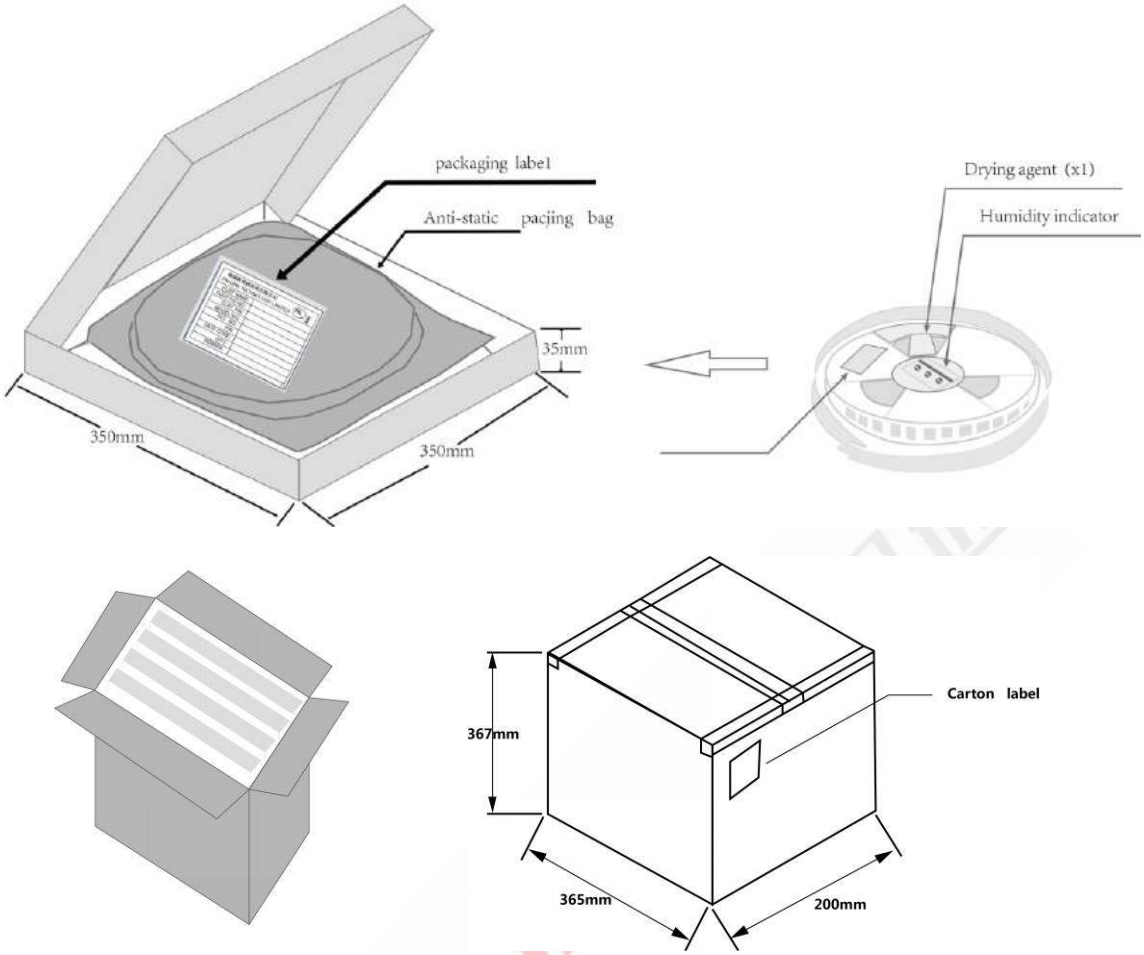


11.2 Carrier Tape Detail

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

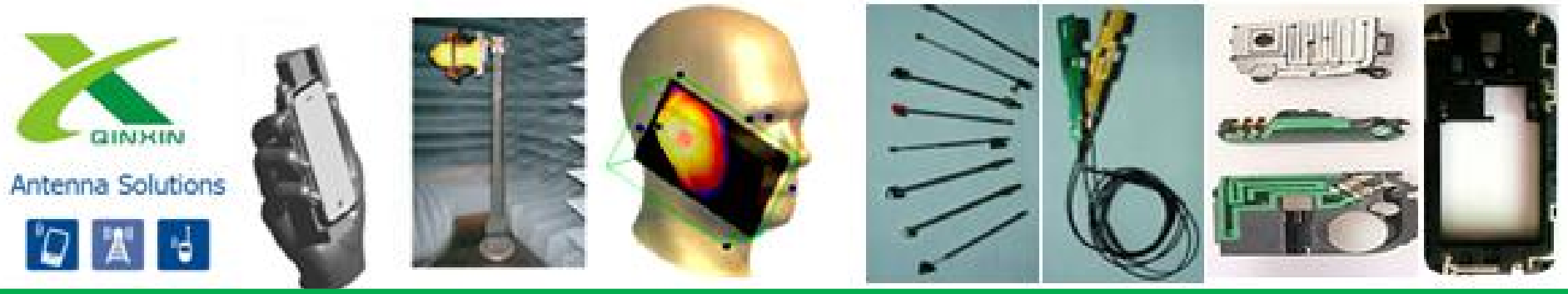


11.3 Packaging Detail



11.4 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:
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



天线测试报告 V1.0

联系方式:
13410505014
wangyuanjian@qinxinsz.com
357932305@qq.com

射频： 刘工

日期： 2020.08.12

目录

测试环境

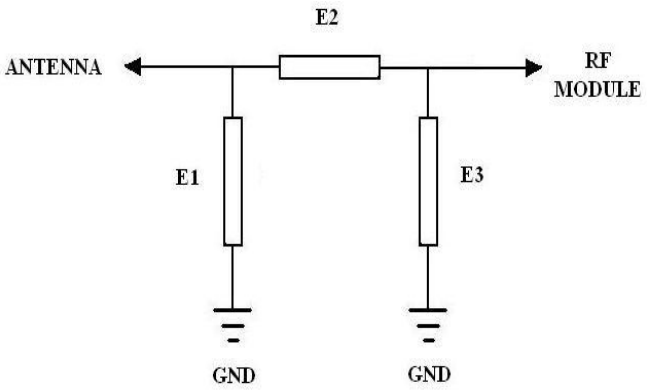
- 天线特性使用ETS测试系统微波暗室，微波暗室尺寸7m x 4m x 3m ，测试频率700MHz---6GHz.
- S11 测试使用Agilent E5071B 网络分析仪

微波暗室

Agilent E5071B 网络分析仪

1.匹配电路：

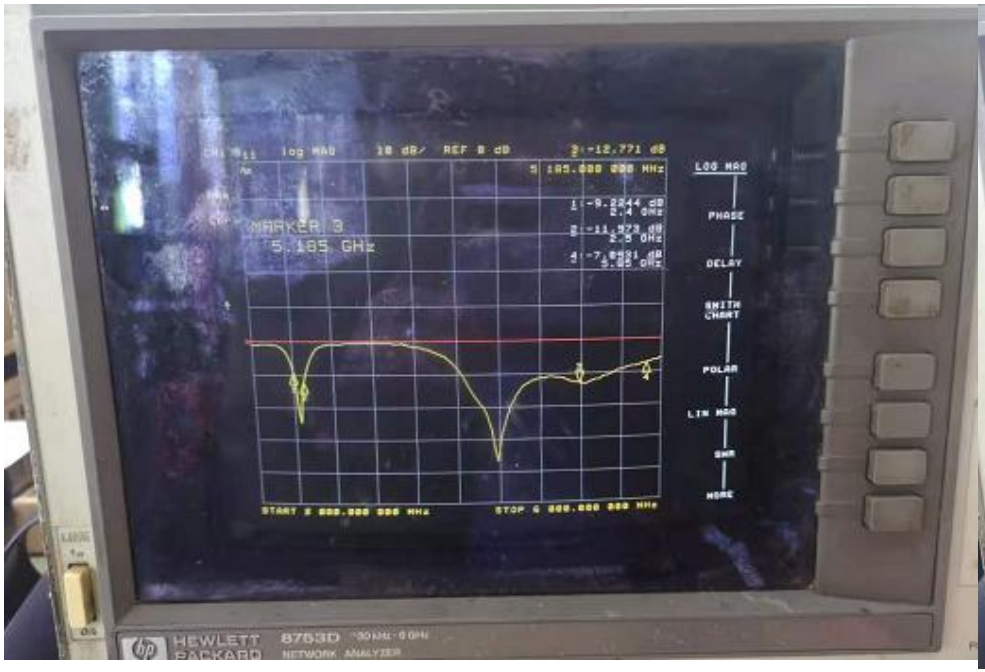
匹配电路是否有改动：否



WIFI	
Element	Value
E1	**无**
E2	**无**
E3	**无**

2.无源图

回波损耗图



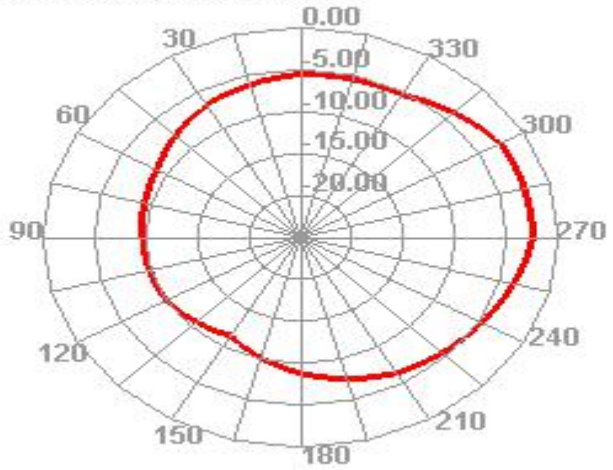
Smith 图

3.无源效率

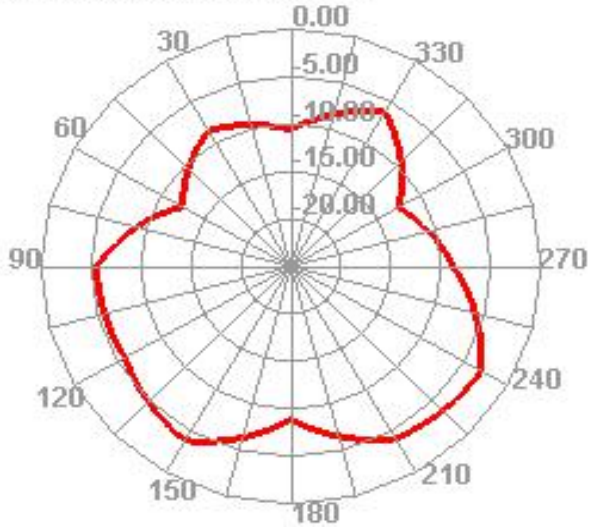
2.4-2.5GHz

Freq (MHz)	Effi (%)	Effi (dB)	Gain (dBi)
2400	36.65	-4.52	2.35
2410	35.79	-4.35	2.07
2420	35.46	-4.67	2.02
2430	37.56	-4.51	2.37
2440	38.27	-3.21	2.75
2450	40.45	-3.72	2.88
2460	42.16	-3.75	2.89
2470	42.71	-4.45	2.82
2480	39.54	-4.73	2.24
2490	38.78	-4.57	2.18
2500	37.68	-4.34	2.34

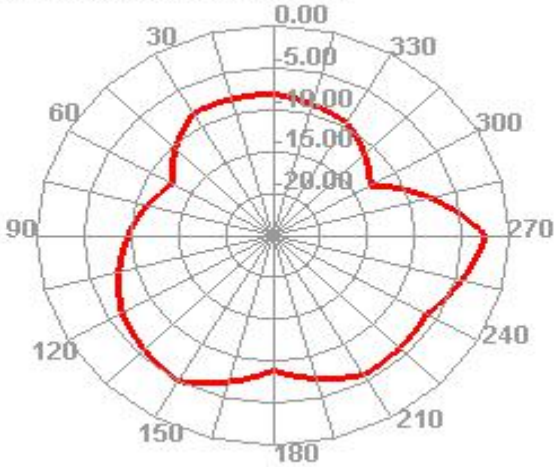
2410.000MHz H



2410.000MHz E1



2410.000MHz E2

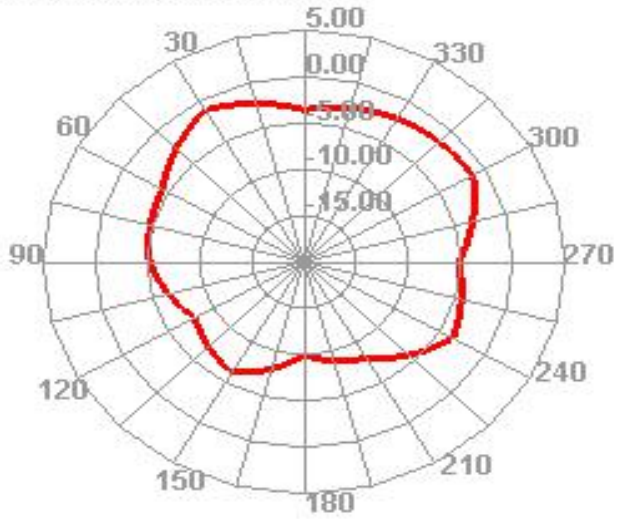


3.无源效率

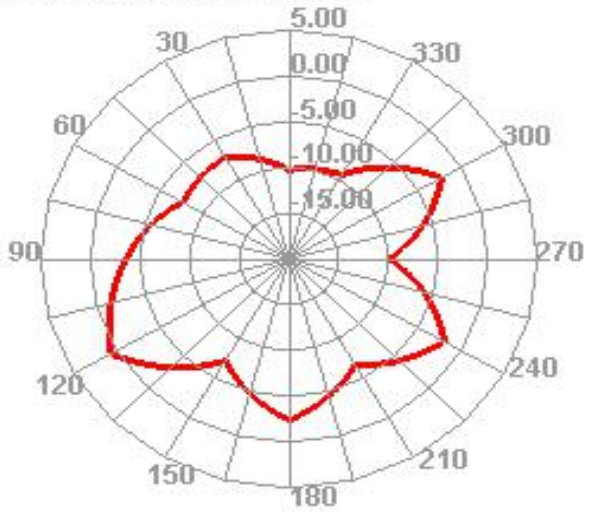
5.15-5.85GHz

Freq (MHz)	Effi (%)	Effi (dB)	Gain (dBi)
5150	45.35	-4.52	1.29
5160	45.97	-4.44	1.46
5170	48.22	-4.18	1.56
5180	44.5	-4.62	1.41
5190	41.11	-5.07	1.55
5200	43.7	-4.72	1.17
5210	45.95	-4.44	1.12
5220	49.46	-4.04	1.55
5230	47.61	-4.25	1.26
5240	44.74	-4.59	1.09
5250	43.25	-4.78	1.21
5260	44.62	-4.61	1.23
5270	49.71	-4.01	1.67
5280	47.84	-4.22	1.48
5290	47.87	-4.22	1.58
5300	43.76	-4.72	1.19
5310	42.91	-4.83	1.11
5320	49.02	-4.09	1.05
5330	48.92	-4.1	1.17
5340	49.25	-4.06	1.3
5350	47.64	-4.24	1.29
5360	44.33	-4.64	1.87
5380	39.52	-4.03	1.69
5390	40.41	-3.93	1.88
5400	43.63	-3.6	2.26
5410	40.2	-3.96	1.95
5420	41.62	-3.81	2.19
5430	42.65	-3.7	2.34
5440	45.97	-3.38	2.64
5450	44.26	-3.54	2.51
5460	42.71	-3.69	2.28
5470	42.11	-3.76	2.28
5480	41.56	-3.81	2.21
5490	47.58	-3.23	2.89
5500	46.8	-3.3	2.82
5510	45	-3.47	2.54
5520	42.84	-3.68	2.35
5530	41.39	-3.83	2.19
5540	45.51	-3.42	2.56
5550	48.49	-3.14	2.66
5560	47.63	-3.22	2.77
5570	44.93	-3.47	2.42
5580	42.91	-3.67	2.2
5590	44.48	-3.52	2.33
5600	46.5	-3.33	2.39
5610	45.52	-3.42	2.28
5620	43.77	-3.59	2.07
5630	42.17	-3.75	1.91
5640	43.31	-3.63	2.09
5650	46.75	-3.3	2.42
5660	48.1	-3.18	2.48
5670	46.61	-3.31	2.11
5680	43.88	-3.58	1.88
5690	42.45	-3.72	1.6
5700	44.22	-3.54	1.78
5710	47.77	-3.21	2.09
5720	49.33	-3.07	2.29
5730	46.31	-3.34	1.73
5740	41.38	-3.83	1.52
5750	40.92	-3.88	1.25
5760	44.37	-3.53	1.51
5770	46.85	-3.29	1.8
5780	45.37	-3.43	1.61
5790	39.09	-4.08	0.92
5800	34.9	-4.57	0.77
5810	37.56	-4.25	0.87
5820	41.71	-3.8	1.23
5830	45.11	-3.46	1.41
5840	37.81	-4.22	0.72
5850	32.38	-4.9	0.66

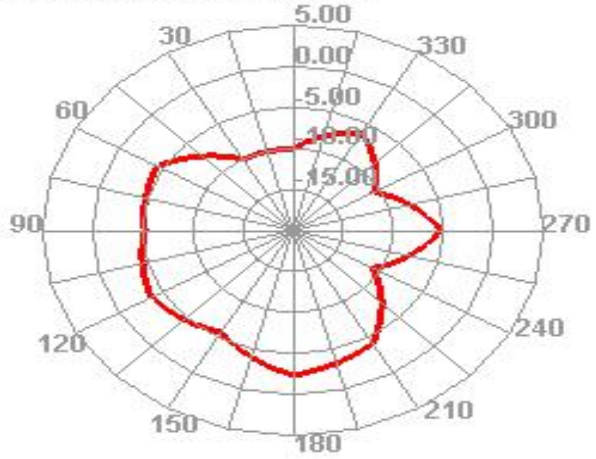
5180.000MHz H

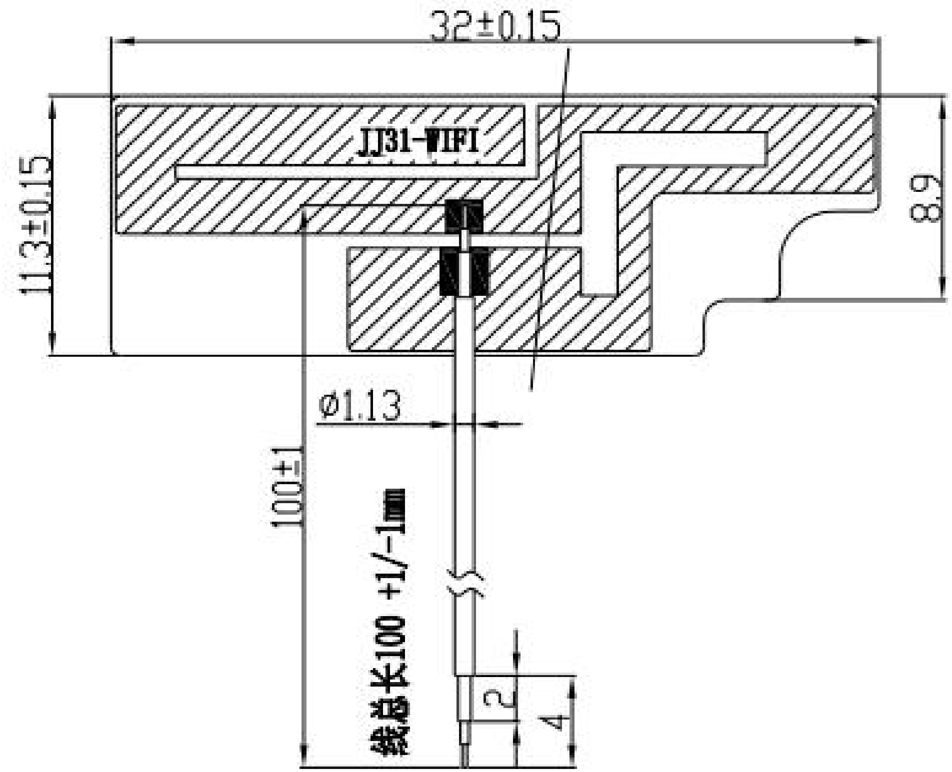


5180.000MHz E1



5180.000MHz E2





注:
1. 材料:FPC 基材:18/25, 表面颜色为哑光黑。
2. 反面整体背胶类型:3M-9471LE.
3. 表面不可以有污染物、损伤、黑点。
4. 镀镍厚度2~5um，不可有镀镍后刮断裂及脱落，导通不良，电路部分断裂等不良现象。
5. 背胶需要做冷热冲击实验，实验条件：-40~+85摄氏度 10个周期（一周期为30分钟）。
6. 该图为原尺寸比例图，*为重点管控尺寸

注：所有孔均为通孔，红色线为打断线。

GENERAL TOLERANCE TABLE				深圳市勤新科技有限公司			
LINEAR(mm)		ANGULAR					
DIVISION	TOLERANCE	DIVISION	TOLERANCE				
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]			[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]			[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]			SCALE	1:1 mm	SIZE A4	SHEET 1 of 1

FCC Statement

FCC standards: FCC CFR Title 47 Part 15 Subpart C Section 15.247

FPC Antenna , Antenna gain 2dBi

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.Any 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.FCC Radiation Exposure Statement This modular complies with FCC RF radiation exposure limits set forth for an uncontrolled environment. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter. If the FCC identification number is not visible when the module is installed inside another device, then the outside of the device into which the module is installed must also display a label referring to the enclosed module. This exterior label can use wording such as the following: “Contains Transmitter Module FCC ID: 2AATL-L287B-SR Or Contains FCC ID: 2AATL-L287B-SR ” When the module is installed inside another device, the user manual of the host must contain below warning statements;

1. This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

2. (1)This device may not cause harmful interference;(2)This device must accept any interference received, including interference that may cause undesiredoperation.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 againstharmful interference in a residential installation. This

equipment generates, uses and can radiate radiofrequency energy and, if not installed and used in accordance with the instructions, may cause harmfulinterference to radio communications.However, there is no guarantee that interference will not occur in a particular installation. If this equipmentdoes cause harmful interference to radio or television reception, which can be determined by turning theequipment off and on, the user is encouraged to try to correct the interference by one or more of thefollowing 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. 2.Changes or modifications not expressly approved by the party responsible for compliance could void theuser's authority to operate the equipment.The devices must be installed and used in strict accordance with the manufacturer's instructions as describedin the user documentation that comes with the product.Any company of the host device which install this modular with modular approval should perform the test ofradiated & conducted emission and spurious emission, etc. according to FCC part 15C : 15.247 and 15.209& 15.207 ,15B Class B requirement, Only if the test result comply with FCC part 15C : 15.247 and 15.209& 15.207 ,15B Class B requirement，then the host can be sold legally.