

# 8291N-PR

**Wi-Fi Dual-band 2X2 11ax + Bluetooth 5.1  
Combo Module Datasheet**



## 8291N-PR Module Datasheet

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	_____	Date
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## Revision History

Version	Date	Revision Content	Draft	Approved
1.0	2020/04/16	New version	Lgp	Szs
2.0	2020/05/23	1, Add module picture info; 2, Update ordering part number; 3, Add recommended reflow profile; 4, Update package information	Lgp	Szs
3.0	2020/06/08	Update power sequence timing diagram	Lgp	Szs
4.0	2020/07/01	1, Update RF specification; 2, Update temperature range; 3, Update recommended reflow profile	Lgp	Szs
5.0	2020/08/12	1, Update RF specification and temperature range; 2, Update layout recommendation; 3, Update recommended reflow profile; 4, Update module picture	Lgp	Szs
6.0	2020/09/29	1, Update module picture and label marking description; 2, Update key material list	Lgp	Szs
7.0	2020/11/25	1, Update module picture	Lgp	Szs

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# 1 Overview

## 1.1 Introduction

FN-Link Technology would like to announce a high performance, with small SMT package module, which has all of the Wi-Fi and Bluetooth functionalities. The highly integrated module makes the possibilities of web browsing, VoIP, Video transmission, Bluetooth headsets applications. With seamless roaming capabilities and advanced security, also could interact with different vendors' 802.11a/b/g/n/ac/ax 2x2 Access Points in the wireless LAN.

The wireless module complies with IEEE 802.11 a/b/g/n/ac/ax 2x2 MIMO standard and it can achieve up to a speed of 1774.5Mbps (2x2 80MHz 11ax + 2x2 40MHz 11ax DBS). The integrated module provides PCIe interface for Wi-Fi, UART/PCM interface for Bluetooth.

This compact module is a total solution for a combination of Wi-Fi and Bluetooth V5.1 technology. The module is specifically developed for all portable devices.

## 1.2 Features

- Highly integrated wireless local area network (WLAN) system-on-chip (SOC) for 2.4G/5G 802.11ax WLAN applications.
- Compliant with IEEE 802.11a/b/g/n/ac/ax.
- Supports 2x2 Multi-User Multiple-Input Multiple-Output (MU-MIMO).
- Dual Band Simultaneous (DBS) with dual MAC, up to 1774.5 Mbps data rate (2x2+2x2 11ax DBS) Supports 20/40MHz at 2.4GHz and supports 20/40/80MHz at 5GHz.
- Dynamic Frequency Selection (DFS, radar detection).
- Offloading traffic for minimal host utilization at 11ac/ax speeds.
- Supports low power PCIe (w/L1 sub-state) interface for WLAN and UART/PCM interface for Bluetooth.
- Supports Bluetooth V5.1, BLE, ANT+ and be backwards compatible with Bluetooth 1.2, 2.X+ enhance data rate.
- Supports WLAN-Bluetooth coexistence and LTE-5G/ISM coexistence.
- Supports Bluetooth for class1 and class2 power level transmissions without requiring an external PA.
- BT host digital interface:
  - HCI UART (up to 3.2 Mbps)
  - PCM for audio data
- Small SMT LGA package for placement.

### 1.3 Block Diagram

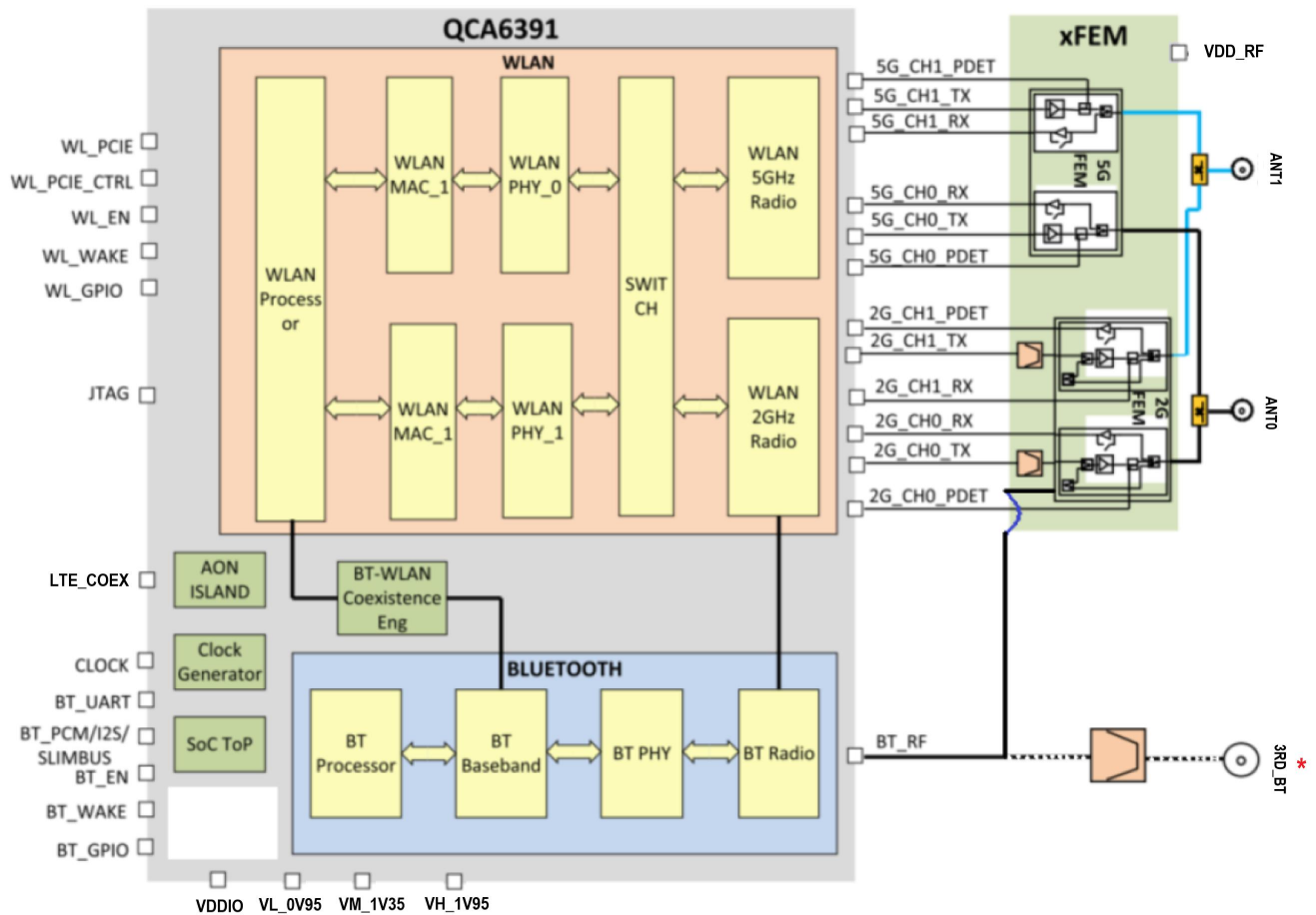


Figure 1-1 Block Diagram

\*Note:

The 3RD\_BT antenna is an optional BT antenna, based on customization requirement. The BT antenna is route through ANT0 default.

## 1.4 General Specification

Model Name	8291N-PR
Product Description	Support Wi-Fi/Bluetooth functionalities
Dimension	L x W x H: 19.5 x 21.5 x 2.3 (typical) mm
Wi-Fi Interface	Support PCIe
BT Interface	UART / PCM
Operating temperature	-30°C to 70°C
Storage temperature	-40°C to 125°C

## 1.5 Recommended Operating Rating

	Min.	Typ.	Max.	Unit	Note
Operating Temperature	-30	25	70	deg.C	
VDD_IO	1.7	1.8	1.9	V	It must be provided with sufficient current up to 0.15A
VDD_CORE_VL	0.9	0.95	1.0	V	It must be provided with sufficient current up to 2.5A
VDD_CORE_VM	1.28	1.35	1.42	V	It must be provided with sufficient current up to 0.4A
VDD_CORE_VH	1.85	1.95	2.05	V	It must be provided with sufficient current up to 0.4A
VDD_RF	3.3	3.85	4.25	V	It must be provided with sufficient current up to 2.0A

**※1.6 EEPROM Information**

## Wi-Fi

Vendor ID	TBD
Device ID	TBD

## BT

Vendor ID	TBD
Device ID	TBD



## 2 Wi-Fi RF Specification

### 2.1 2.4GHz RF Specification

Conditions : VDD\_RF=3.85V ; Temp:25°C

Feature	Description	
WLAN Standard	IEEE 802.11b/g/n/ac/ax Wi-Fi compliant	
Frequency Range	2.400 GHz ~ 2.497 GHz (2.4 GHz ISM Band)	
Number of Channels	2.4GHz : Ch1 ~ Ch14	
Item	Value	Standard Value
Output Power	802.11b /1Mbps: 20 dBm ± 2 dB	EVM ≤ -9dB
	802.11b /11Mbps: 20 dBm ± 2 dB	EVM ≤ -9dB
	802.11g /6Mbps: 20 dBm ± 2 dB	EVM ≤ -5dB
	802.11g /54Mbps: 17 dBm ± 2 dB	EVM ≤ -25dB
	802.11n HT20 /MCS0: 19.5 dBm ± 2 dB	EVM ≤ -5dB
	802.11n HT20 /MCS7: 17dBm ± 2 dB	EVM ≤ -28dB
	802.11n HT40 /MCS0: 19 dBm ± 2 dB	EVM ≤ -5dB
	802.11n HT40 /MCS7: 17 dBm ± 2 dB	EVM ≤ -28dB
	802.11ac vHT20/MCS0: 19.5 dBm ± 2 dB	EVM ≤ -5dB
	802.11ac vHT20/MCS8: 15 dBm ± 2 dB	EVM ≤ -30dB
	802.11ac vHT40/MCS0: 19 dBm ± 2 dB	EVM ≤ -5dB
	802.11ac vHT40/MCS9: 15 dBm ± 2 dB	EVM ≤ -32dB
	802.11ax HE20/MCS0: 19.5 dBm ± 2 dB	EVM ≤ -5dB
	802.11ax HE20/MCS11: 14 dBm ± 2 dB	EVM ≤ -35dB
802.11ax HE40/MCS0: 19 dBm ± 2 dB	EVM ≤ -5dB	
802.11ax/MCS11: 14 dBm ± 2 dB	EVM ≤ -35dB	
SISO Receive Sensitivity (11b,20MHz) @8% PER	- 1Mbps ≤ -92 dBm	≤ -83 dBm
	- 11Mbps ≤ -85 dBm	≤ -76 dBm
SISO Receive Sensitivity (11g,20MHz) @10% PER	- 6Mbps ≤ -87 dBm	≤ -85 dBm
	- 54Mbps ≤ -71 dBm	≤ -68 dBm
SISO Receive Sensitivity (11n,20MHz) @10% PER	- MCS=0 ≤ -86 dBm	≤ -85 dBm
	- MCS=7 ≤ -68 dBm	≤ -67 dBm
SISO Receive Sensitivity	- MCS=0 ≤ -83 dBm	≤ -82 dBm

(11n,40MHz) @10% PER	- MCS=7	$\leq -65$ dBm	$\leq -64$ dBm
SISO Receive Sensitivity (11ac,20MHz) @10% PER	- MCS=0	$\leq -83$ dBm	$\leq -82$ dBm
	- MCS=8	$\leq -63$ dBm	$\leq -60$ dBm
SISO Receive Sensitivity (11ac,40MHz) @10% PER	- MCS=0	$\leq -82$ dBm	$\leq -79$ dBm
	- MCS=9	$\leq -60$ dBm	$\leq -55$ dBm
SISO Receive Sensitivity (11ax,20MHz) @10% PER	- MCS=0	$\cong -81$ dBm	$\leq -74$ dBm
	- MCS=11	$\cong -55$ dBm	$\leq -52$ dBm
SISO Receive Sensitivity (11ax,40MHz) @10% PER	- MCS=0	$\cong -74$ dBm	$\leq -71$ dBm
	- MCS=11	$\cong -52$ dBm	$\leq -49$ dBm
Maximum Input Level	802.11b: -10 dBm		
	802.11g/n/ac/ax: -10 dBm		

## 2.2 5GHz RF Specification

Conditions : VDD\_RF=3.85V ; Temp:25°C

Feature	Description	
WLAN Standard	IEEE 802.11 a/n/ac/ax 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 <sup>1</sup>	
Item	Value	Standard Value
Output Power	802.11a /6Mbps: 20 dBm $\pm$ 2 dB	EVM $\leq -5$ dB
	802.11a /54Mbps: 16 dBm $\pm$ 2 dB	EVM $\leq -25$ dB
	802.11n HT20 /MCS0: 19 dBm $\pm$ 2 dB	EVM $\leq -5$ dB
	802.11n HT20 /MCS7: 16 dBm $\pm$ 2 dB	EVM $\leq -28$ dB
	802.11n HT40 /MCS0: 18.5 dBm $\pm$ 2 dB	EVM $\leq -5$ dB
	802.11n HT40 /MCS7: 16 dBm $\pm$ 2 dB	EVM $\leq -28$ dB
	802.11ac vHT20/MCS0: 19 dBm $\pm$ 2 dB	EVM $\leq -5$ dB
	802.11ac vHT20/MCS8: 15 dBm $\pm$ 2 dB	EVM $\leq -30$ dB
	802.11ac vHT40/MCS0: 18.5 dBm $\pm$ 2 dB	EVM $\leq -5$ dB

	802.11ac vHT40/MCS9: 15 dBm ± 2 dB	EVM ≤ -32dB
	802.11ac vHT80/MCS0: 18.5 dBm ± 2 dB	EVM ≤ -5dB
	802.11ac vHT80/MCS9: 14 dBm ± 2 dB	EVM ≤ -32dB
	802.11ax HE20/MCS0: 19 dBm ± 2 dB	EVM ≤ -5dB
	802.11ax HE20/MCS11: 14 dBm ± 2 dB	EVM ≤ -35dB
	802.11ax HE40/MCS0: 18 dBm ± 2 dB	EVM ≤ -5dB
	802.11ax HE40/MCS11: 14 dBm ± 2 dB	EVM ≤ -35dB
	802.11ax HE80/MCS0: 18 dBm ± 2 dB	EVM ≤ -5dB
	802.11ax HE80/MCS11: 13 dBm ± 2 dB	EVM ≤ -35dB
SISO Receive Sensitivity (11a,20MHz) @10% PER	- 6Mbps PER @ -87 dBm	≤-85
	- 54Mbps PER @ -71 dBm	≤-68
SISO Receive Sensitivity (11n,20MHz) @10% PER	- MCS=0 PER @ -86 dBm	≤-85
	- MCS=7 PER @ -68 dBm	≤-67
SISO Receive Sensitivity (11n,40MHz) @10% PER	- MCS=0 PER @ -83 dBm	≤-82
	- MCS=7 PER @ -65 dBm	≤-64
SISO Receive Sensitivity (11ac,20MHz) @10% PER	- MCS=0, NSS1 PER @ -83 dBm	≤-82
	- MCS=8, NSS1 PER @ -63 dBm	≤-60
SISO Receive Sensitivity (11ac,40MHz) @10% PER	- MCS=0, NSS1 PER @ -82 dBm	≤-79
	- MCS=9, NSS1 PER @ -60 dBm	≤-55
SISO Receive Sensitivity (11ac,80MHz) @10% PER	- MCS=0, NSS1 PER @ -81 dBm	≤-79
	- MCS=9, NSS1 PER @ -57 dBm	≤-54
SISO Receive Sensitivity (11ax, 20MHz) @10% PER	- MCS=0 PER @ -81 dBm	≤-74
	- MCS=11 PER @ -55 dBm	≤-52
SISO Receive Sensitivity (11ax,40MHz) @10% PER	- MCS=0 PER @ -74 dBm	≤-71
	- MCS=11 PER @ -52 dBm	≤-49
SISO Receive Sensitivity (11ax,80MHz) @10% PER	- MCS=0 PER @ -73 dBm	≤-68
	- MCS=11 PER @ -51 dBm	≤-46
Maximum Input Level	802.11a/n/ac/ax : -10 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
<b>General Specification</b>	
Bluetooth Standard	Bluetooth V5.1
Host Interface	UART/PCM
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		
<b>RF Specification</b>			
	<b>Min.</b>	<b>Typical.</b>	<b>Max.</b>
Output Power		7 dBm	
Sensitivity @ BER=0.1% for GFSK (1Mbps)		-92 dBm	
Sensitivity @ BER=0.01% for $\pi/4$ -DQPSK (2Mbps)		-90 dBm	
Sensitivity @ BER=0.01% for 8DPSK (3Mbps)		-85 dBm	
Maximum Input Level	GFSK (1Mbps):-10dBm		
	$\pi/4$ -DQPSK (2Mbps) :-10dBm		
	8DPSK (3Mbps) :-10dBm		

# 4 Pin Assignments

## 4.1 Pin Outline

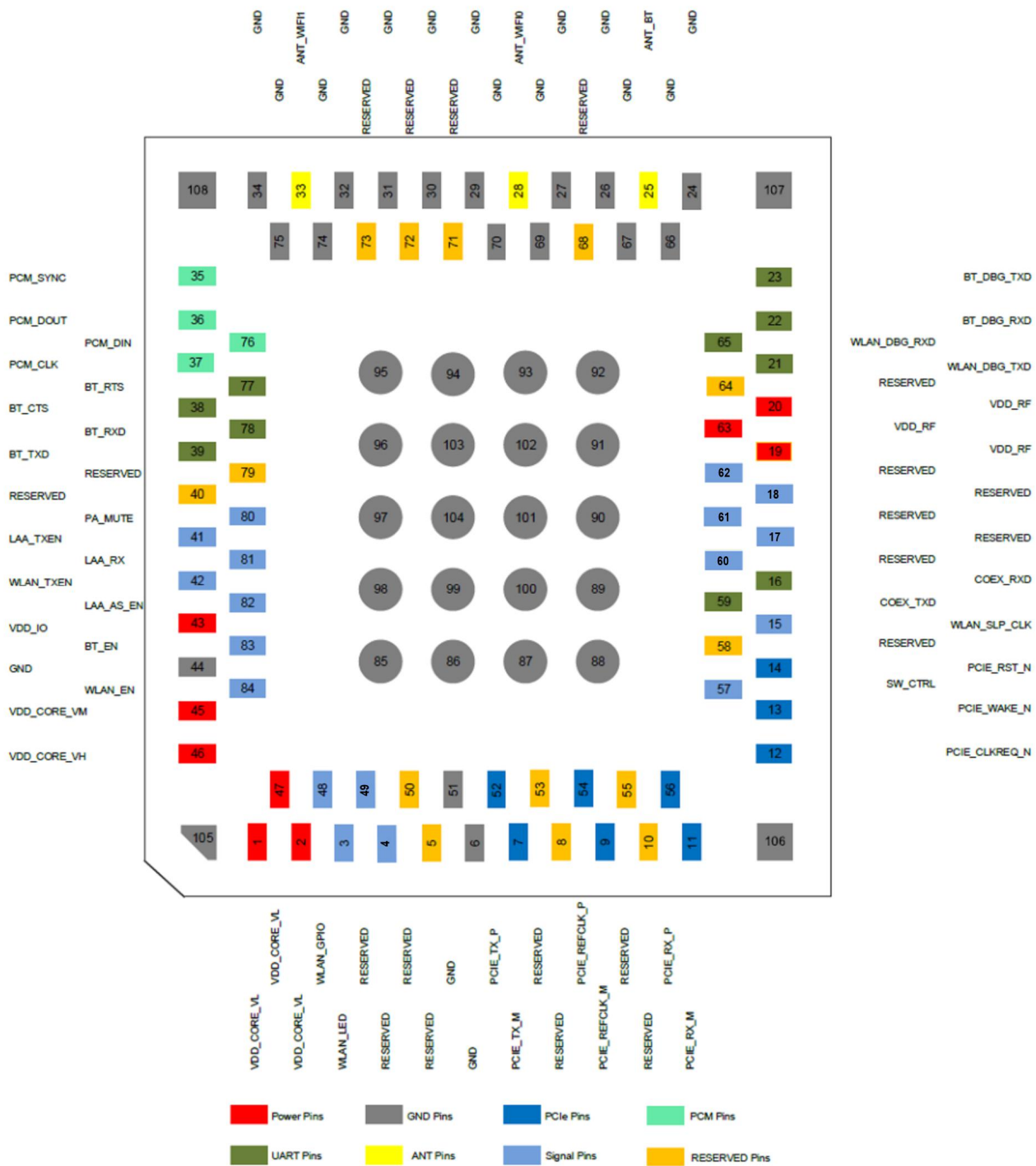


Figure 4-1 Module pin out

## 4.2 Pin Definition

### Power input pins

NO	Name	Type	Description	DC Voltage	Comment
1	VDD_CORE_VL1	P	Voltage for core, low voltage	Vmin=0.9V Vnorm=0.95V Vmax=1.0V	It must be provided with sufficient current up to 2.5A
2	VDD_CORE_VL2	P			
47	VDD_CORE_VL3	P			
45	VDD_CORE_VM	P	Voltage for core, mid voltage	Vmin=1.28V Vnorm=1.35V Vmax=1.42V	It must be provided with sufficient current up to 0.4A
46	VDD_CORE_VH	P	Voltage for core, high voltage	Vmin=1.85V Vnorm=1.95V Vmax=2.05V	It must be provided with sufficient current up to 0.4A
43	VDD_IO	P	Power supply for the module's I/O pins	Vmin=1.7V Vnorm=1.8V Vmax=1.9V	It must be provided with sufficient current up to 0.15A
19	VDD_RF1	P	Power supply for the module's RF part	Vmin=3.3V Vnorm=3.85V Vmax=4.25V	It must be provided with sufficient current up to 2.0A
20	VDD_RF2	P			
63	VDD_RF3	P			

### Ground pins

NO	Name	Type	Description	DC Voltage	Comment
6	GND		Ground		
24	GND		Ground		
26	GND		Ground		
27	GND		Ground		
29	GND		Ground		
30	GND		Ground		
31	GND		Ground		
32	GND		Ground		
34	GND		Ground		
44	GND		Ground		
51	GND		Ground		

66	GND		Ground		
67	GND		Ground		
69	GND		Ground		
70	GND		Ground		
74	GND		Ground		
75	GND		Ground		
85	GND		Ground		
86	GND		Ground		
87	GND		Ground		
88	GND		Ground		
89	GND		Ground		
90	GND		Ground		
91	GND		Ground		
92	GND		Ground		
93	GND		Ground		
94	GND		Ground		
95	GND		Ground		
96	GND		Ground		
97	GND		Ground		
98	GND		Ground		
99	GND		Ground		
100	GND		Ground		
101	GND		Ground		
102	GND		Ground		
103	GND		Ground		
104	GND		Ground		
105	GND		Ground		
106	GND		Ground		
107	GND		Ground		
108	GND		Ground		



**PCIe, PCM, UART**

NO	Name	Type	Description	DC Voltage	Comment
7	PCIE_TX_N		PCIe TX differential signals		
52	PCIE_TX_P				
11	PCIE_RX_N		PCIe RX differential signals		
56	PCIE_RX_P				
9	PCIE_REFCLK_N		PCIe clock differential input signal		
54	PCIE_REFCLK_P				
12	PCIE_CLKREQ_N	O	Reference clock request	1.8V	
13	PCIE_WAKE_N	O	Request to service a function-initiated wake event	1.8V	
14	PCIE_RST_N	I	PCI express reset with weak pull-down	1.8V	
37	PCM_CLK		BT PCM clock	1.8V	
76	PCM_DIN	I	BT PCM data in	1.8V	
36	PCM_DOUT	O	BT PCM data out	1.8V	
35	PCM_SYNC		BT PCM sync	1.8V	
39	BT_TXD	O	BT UART interface	1.8V	
78	BT_RXD	I		1.8V	
77	BT_RTS	O	BT UART request to send	1.8V	
38	BT_CTS	I	BT UART clear to send	1.8V	

**I/O and debug signals**

NO	Name	Type	Description	DC Voltage	Comment
3	WLAN_LED	O	WLAN LED signal	1.8V	
4	WAKEUP_BT	I	Host wakeup BT	1.8V	
49	WAKEUP_HOST	O	BT wakeup Host	1.8V	
15	WLAN_SLP_CLK	I	Sleep clock input	1.8V	
16	COEX_RXD	I	LTE coexistence UART RXD	1.8V	
59	COEX_TXD	O	LTE coexistence UART TXD	1.8V	
21	WLAN_DBG_TXD	O	UART TXD for debug	1.8V	
65	WLAN_DBG_RXD	I	UART RXD for debug	1.8V	
22	BT_DBG_RXD	I	BT UART RXD for debug	1.8V	
23	BT_DBG_TXD	O	BT UART TXD for debug	1.8V	
41	LAA_TXEN	I	WLAN XFEM control LAA TX enable	1.8V	
42	WLAN_TXEN	I	WLAN XFEM control for WLAN Tx enable	1.8V	
48	WLAN_GPIO	O	WLAN GPIO	1.8V	Can be configured as WLAN wakeup host
57	SW_CTRL	O	Switch control	1.8V	
80	PA_MUTE	I	WLAN XFEM control for PA mute	1.8V	
81	LAA_RX	I	WLAN XFEM control for LAA receiver	1.8V	
82	LAA_AS_EN	I	Allow LAA to control WLAN FEM during WLAN sleep mode	1.8V	

83	BT_EN	I	BT enable signal from Host	1.8V	
84	WLAN_EN	I	WLAN enable signal from Host	1.8V	
17	JTAG_TCK		TCK for JTAG. No connect if JTAG is not used		
18	JTAG_TRST_L		TRST for JTAG. No connect if JTAG is not used		
60	JTAG_TMS		TMS for JTAG. No connect if JTAG is not used		
61	JTAG_TDI		TDI for JTAG. No connect if JTAG is not used		
62	JTAG_TDO		TDO for JTAG. No connect if JTAG is not used		

### RF antenna pins

NO	Name	Type	Description	DC Voltage	Comment
25	ANT_BT		BT antenna or NC		Default NC
28	ANT_WIFI0		Chain0 RF bidirectional antenna port		
33	ANT_WIFI1		Chain1 RF bidirectional antenna port		


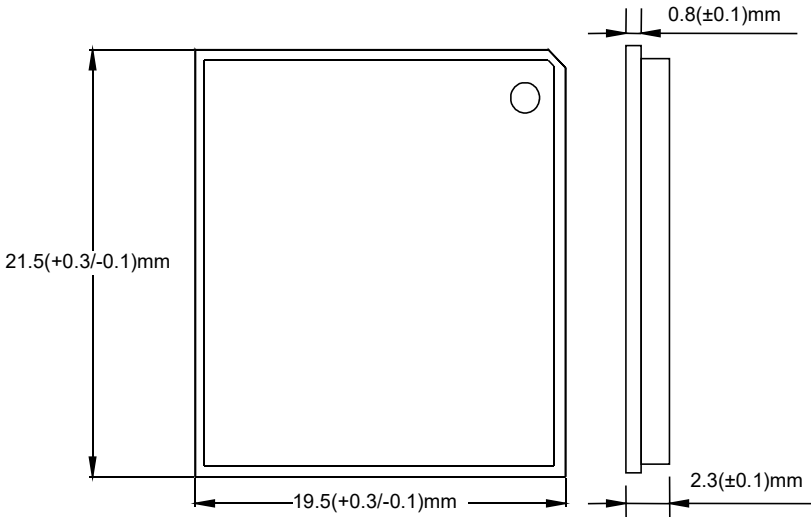
**Reserved pins**

NO	Name	Type	Description	DC Voltage	Comment
5	RESERVED				
8	RESERVED				
10	RESERVED				
40	RESERVED				
50	RESERVED				
53	RESERVED				
55	RESERVED				
58	RESERVED				
64	RESERVED				
68	RESERVED				
71	RESERVED				
72	RESERVED				
73	RESERVED				
79	RESERVED				

P:POWER I:INPUT O:OUTPUT PD: PULL-DOWN

## 5 Dimensions

### 5.1 Module Picture

<p>L x W : 19.5 x 21.5 (+0.3/-0.1) mm</p> 	
<p>H: 2.3 (±0.10) mm</p>	
<p><b>Weight</b></p>	<p>1.9±0.1g</p>

### 5.2 Label Marking Description



Figure 5-1 Label Marking description

### 5.3 Module Physical Dimensions

(Unit: mm)

< TOP VIEW >

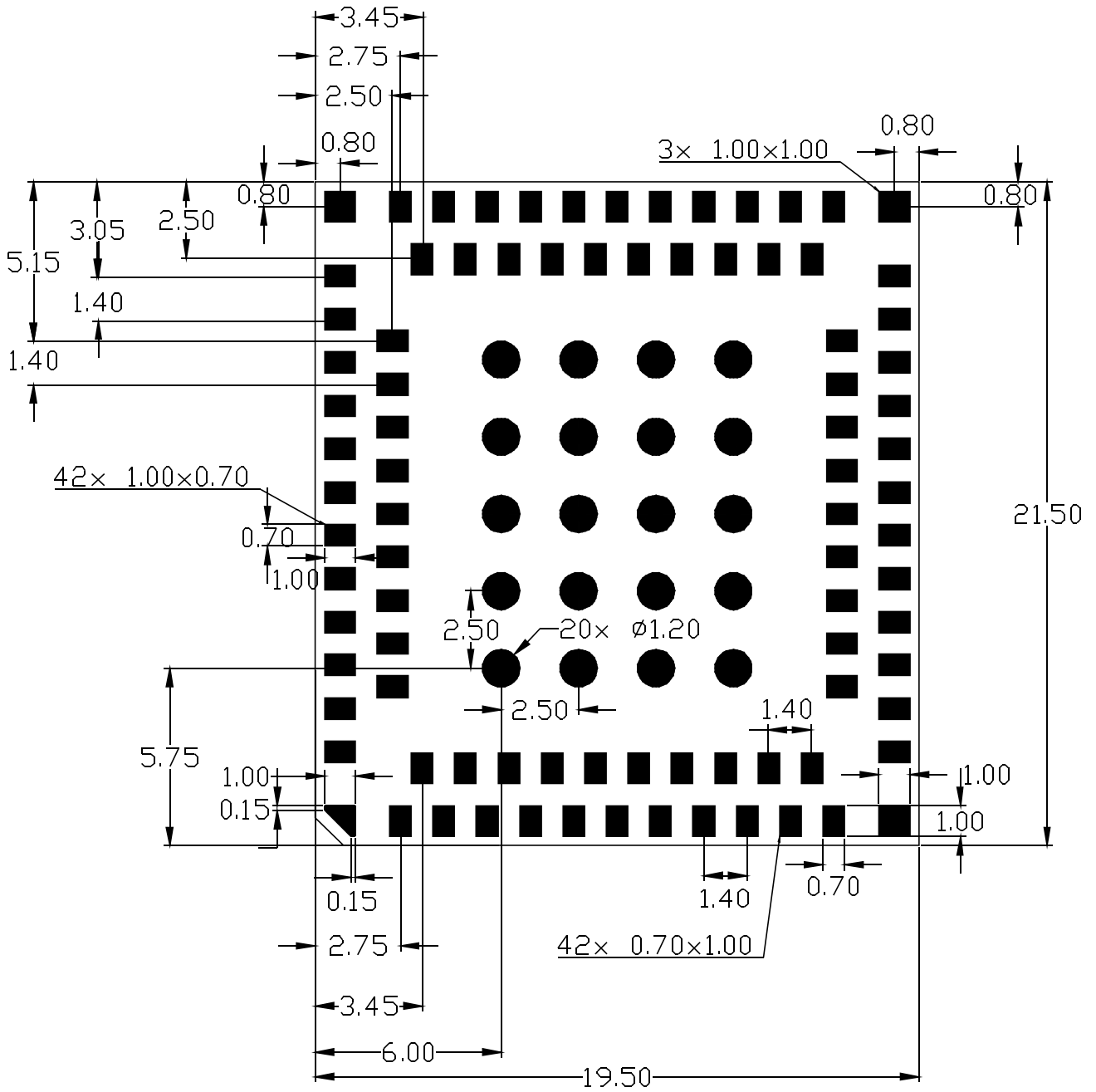


Figure 5-2 Module physical dimensions



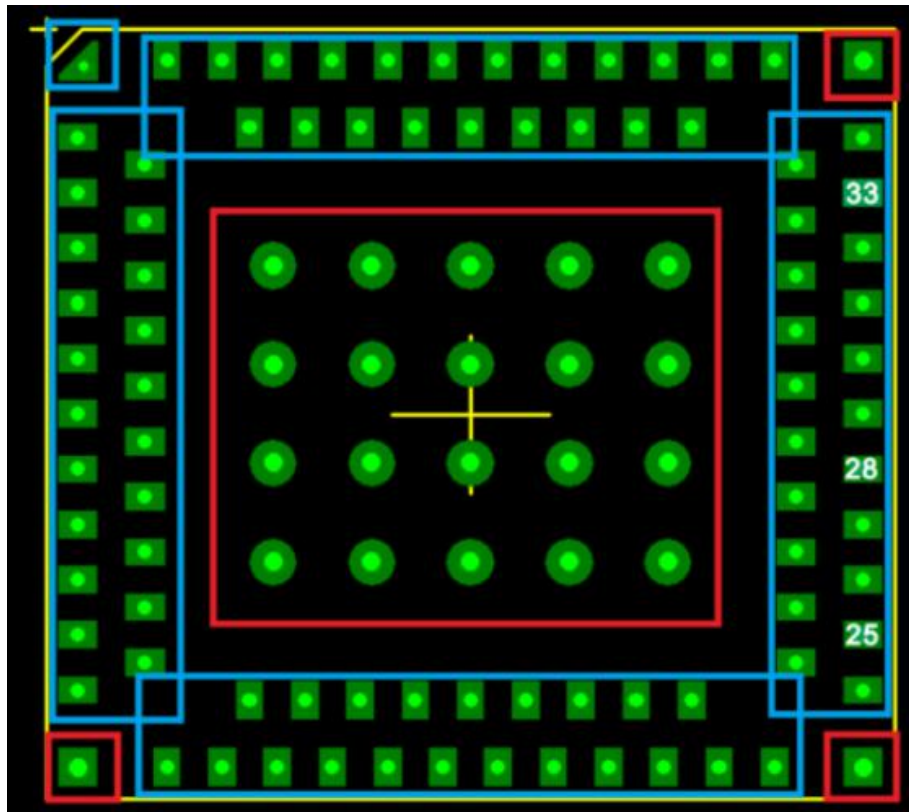


Figure 5-4 Pad Design Recommendation

- a, The circular pads and square pads in red zone, add diameter of 0.4mm via in pad center;
- b, The rectangle pads and located pad in blue zone, add diameter of 0.3mm via in pad center;
- c, The RF pins, pin 25, pin 28, pin 33, no need to add vias



## 6 Power and Host Interface Timing Diagram

### 6.1 Power sequence timing

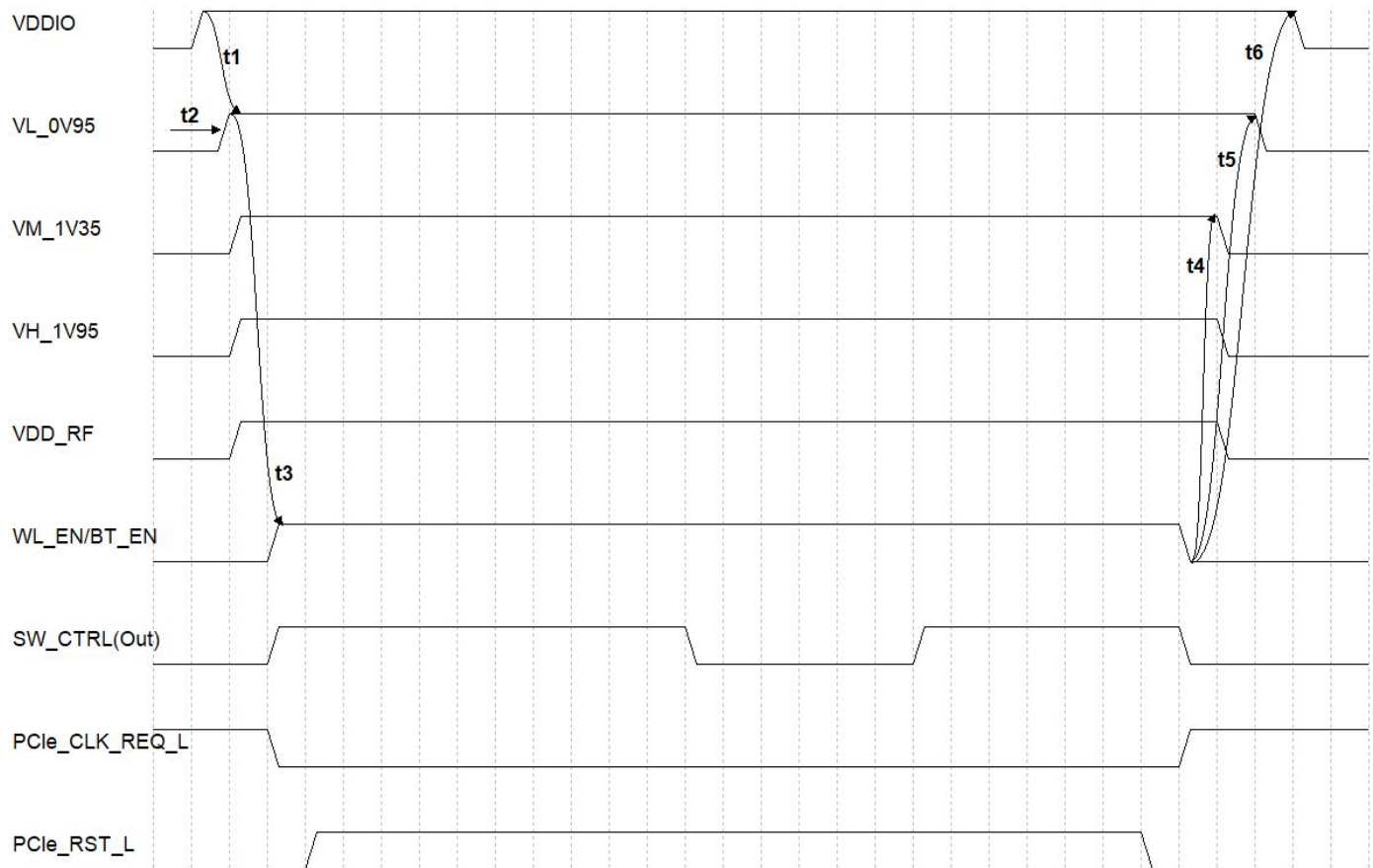


Figure 6-1 Power sequence timing

Symbol	Parameter	Min	Max	Unit
t1	VDDIO 1V8 valid to VDD_CORE_VL 0V95 is asserted	10	-	uS
t2	VDD_CORE_VL 0V95 voltage rising time		200	uS
t3	VDD_CORE_VL 0V95 valid to WLAN_EN or BT_EN input active	4		mS
t4	WLAN_EN and BT_EN de-assert to VCORE_VM/VCORE_VH/VDD_RF ramming down	10		uS
t5	WLAN_EN and BT_EN de-assert to VCORE_VL ramming down	12		uS
t6	WLAN_EN and BT_EN de-assert to VDDIO ramming down	12		uS

## 6.2 PCIe powerup sequence timing

Supports PCIe Gen 2 interface for WLAN.

Compliant to PCIe Gen 2 powerup sequence timing.

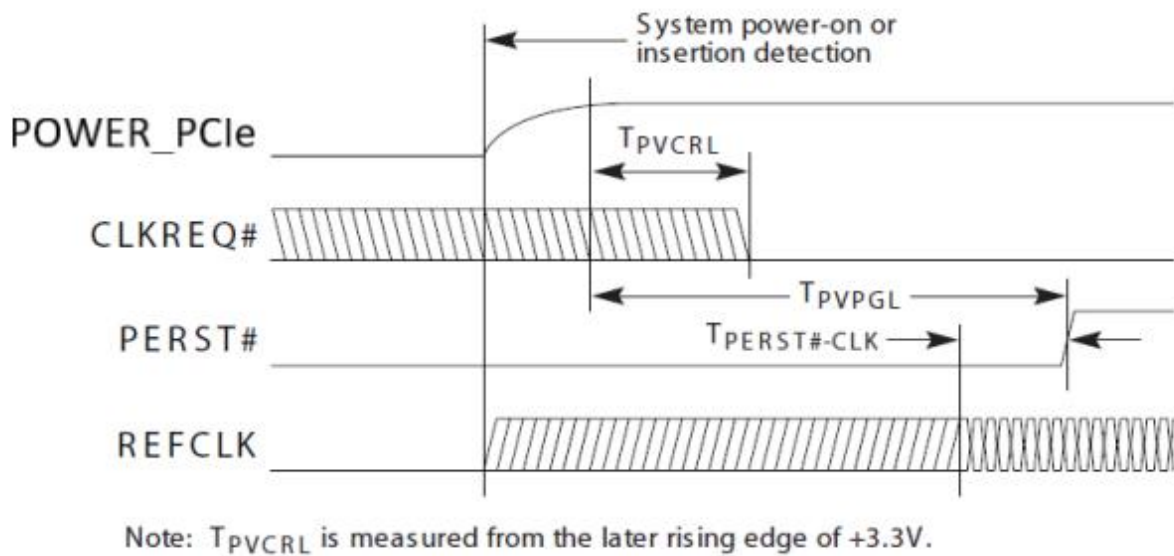


Figure 6-2 PCIe powerup timing requirements

Symbol	Parameter	Min	Max	Units
$T_{PVCRL}$	Power Valid to CLKREQ# Output active		100	$\mu$ S
$T_{PVPGl}$	Power Valid to PERST# Input inactive	1		mS
$T_{PERST\#-CLK}$	REFCLK stable before PERST# inactive	100		$\mu$ S

# 7 Reference Design

## 7.1 Reference design schematic

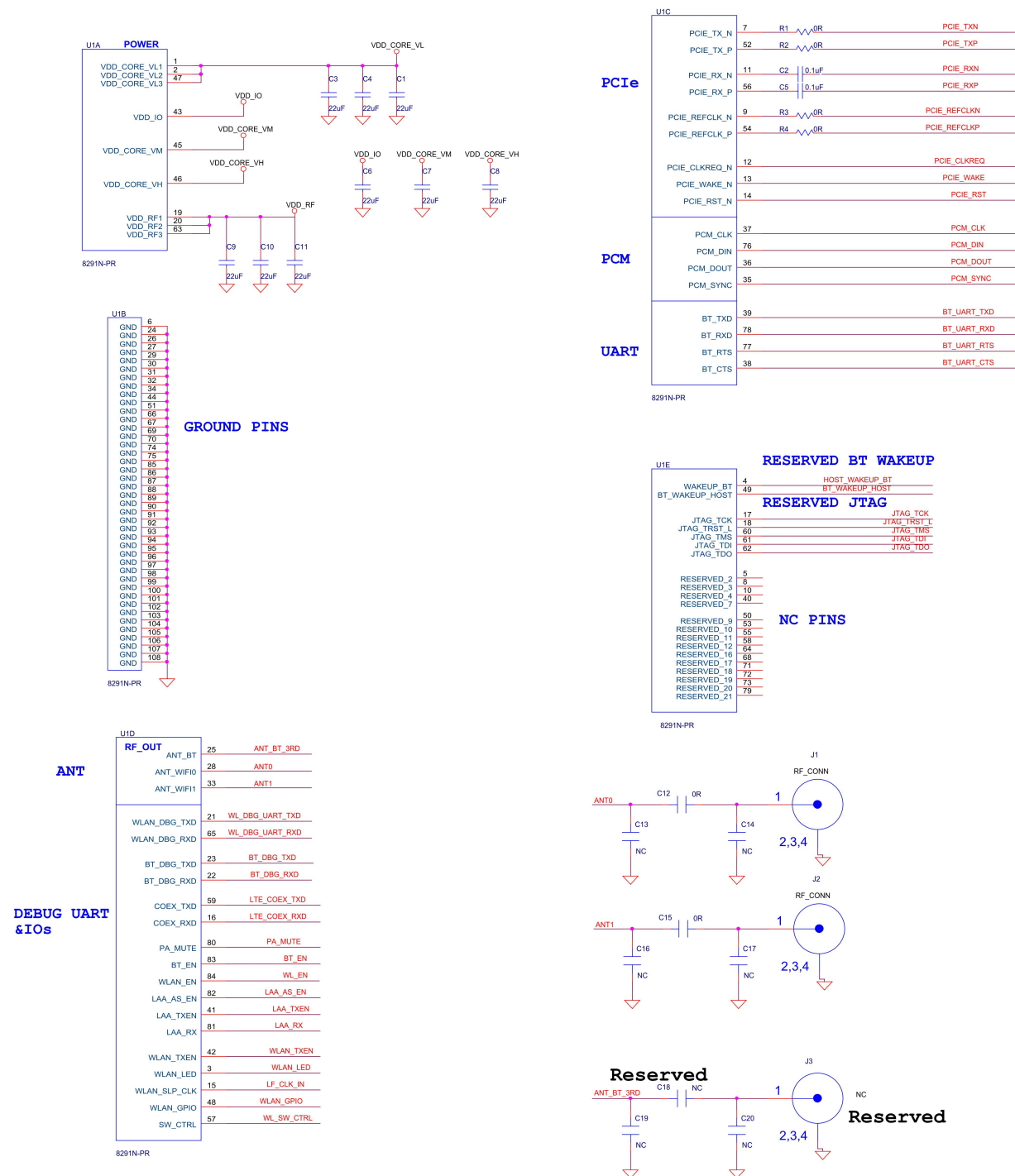


Figure 7-1 Reference schematic

Note: For the 1.8V interface, such as PCM, UART and some I/O, if the host voltage level is 3.3V or 5V, need to add level shift circuit.

## 8 Ordering Information

Part No.	Description
FG8291NPRX-00	QCA6391, 19.5*21.5mm, 2x2, 802.11a/b/g/n/ac/ax BT5.1 DBS 2G&5G, Dual antenna

## 9 The Key Material List

Part No.	Description
QCA6391	Main IC Dual-Band 2x2 MIMO DBS 802.11ax + Bluetooth Milan (Qualcomm)
*QCA1064	*Main IC Dual-Band 2x2 MIMO DBS 802.11ax + Bluetooth Milan (Qualcomm)
QM42391	FEM 2.4GHz WLAN 802.11ax Dual FEM (Qorvo)
QM45391	FEM 5GHz WLAN 802.11ax Dual FEM (Qorvo)
8291N-PRH	PCB 19.5*21.5*0.8mm, 8 layer, HDI, Green (Sunlord/Brain-Power)
SMD/2016	2016 48MHz 9.9pF ±20ppm (EDEC/TKD/TXC)

## 10 Recommended Reflow Profile

Refer to IPC/JEDEC standard.

Peak Temperature: <250°C

Number of Times: ≤2 times

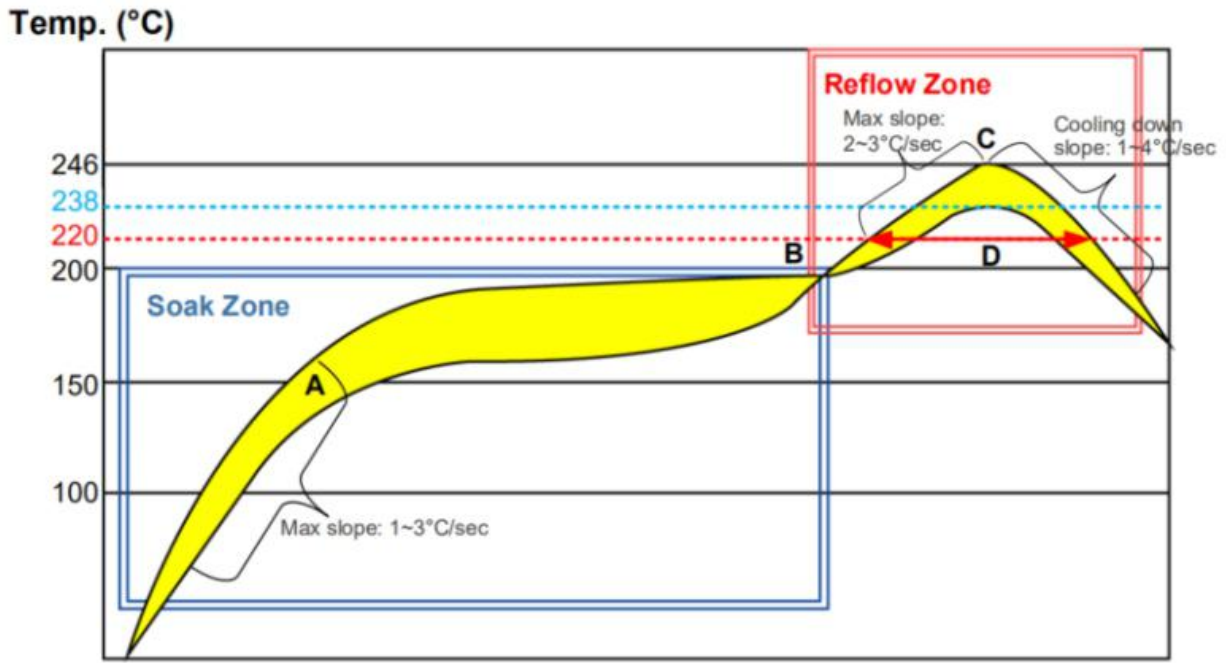


Figure 10-1 Reference reflow profile

Table 10-1 Reference reflow value

Item	Recommended Value
Ramp rate (50~150°C)	1~3°C/sec
Soak Zone (Time zone between A and B: 150~180°C)	70~110sec
Tmax	238~246°C
Reflow Zone (Zone D)	50~70sec
Cooling down slope	-1°C/sec~-4°C/sec

Note: For more information of SMT and reflow, please contact Fn-Link for detail.

## 11 Package Information

### 11.1 Reel

A roll of 500pcs

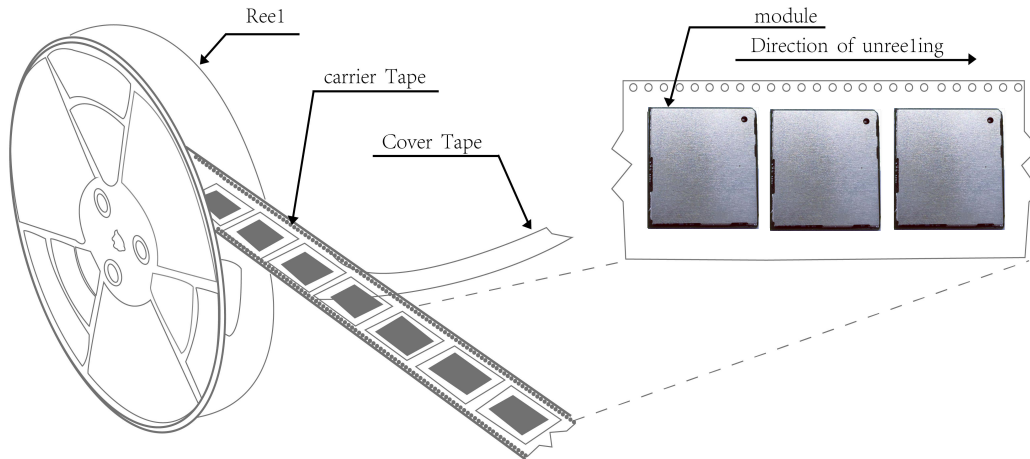


Figure 11-1 Package reel Reference

### 11.2 Carrier Tape Detail

ITEM	W	A0	B0	D	E	F	F1	K0	P0	P2	P	T
DIM	44	20.00	22.00	1.5	1.75	20.2	40.4	2.90	4.0	2.0	28.0	0.30
TOLE	+0.3 -0.3	±0.15	±0.15	+0.1 -0.0	±0.1	±0.15	±0.10	±0.10	±0.1	±0.15	±0.1	±0.05

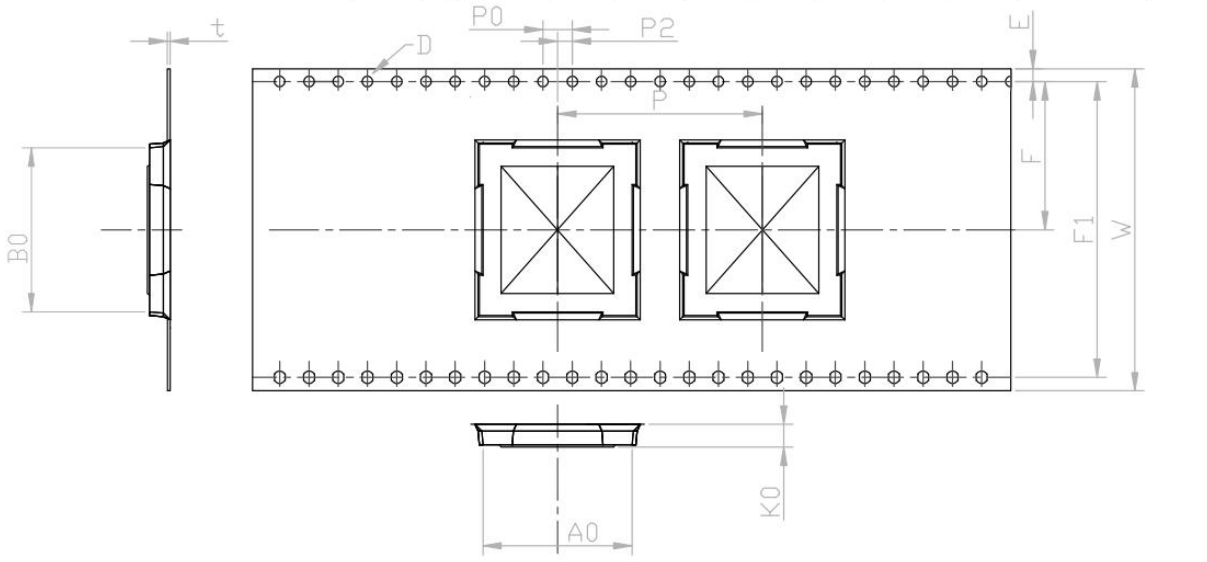


Figure 11-2 Carrier tape detail

### 11.3 Packaging Detail

the take-up package



Using self-adhesive tape

Size of black tape:44mm\*17.3m

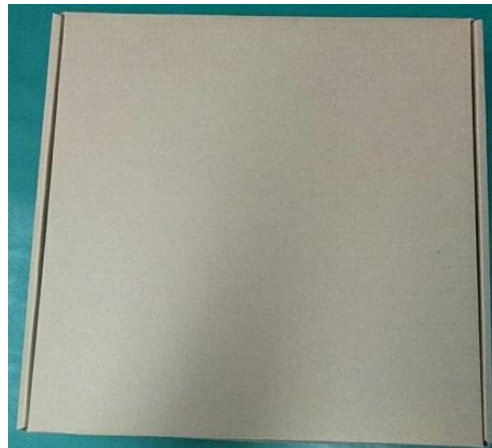
the cover tape :37.5mm\*17.3m

Color of plastic disc: blue

A roll of 500pcs



NY bag size:420mm\*450mm



size : 335\*335\*55mm



The packing case size:335\*255\*360mm

## 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 <math>40^{\circ}\text{C}</math> and <math>90\%</math> relative humidity (RH)
- b) Environmental condition during the production:  $30^{\circ}\text{C}$  / 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
- d) "IPC/JEDEC J-STD-033A paragraph 5.2" is respected
- e) Baking is required if conditions b) or c) are not respected
- f) Baking is required if the humidity indicator inside the bag indicates 10% RH or more