欧飞信科技

O2066PN

Wi-Fi Tri-band 2x2 MIMO DBS

802.11ax + Bluetooth 5.2

Module Datasheet

Cover of Approval Sheet

PRODUCT NAME	Part No.	Description
O2066PN	FWAAO2066PND1	QCA2066 PCIE 3.3V 3.85V 2T2R 19.5*21.5*2.3mm WIFI6E 11ax WIFI+BT5.2 Shield CAN

Customer: _____

Customer P/N: _____

Signature: _____

Date: _____

Maker Information:

OFEIXIN TECHNOLOGY LIMITED

Room 503, Building A3, Area B, Songbai Industrial Park, Minghuan East Road,

Shangcun Community, Gongming Street, Guangming District, Shenzhen

Revision History

Version	Date	Description	Draft	Approved
V0.1	2022-09-19	-Preliminary Project version	CCJ	Turbo

CONTENTS

1.Overview

1.1 Introduction

The O2066PN device is a highly integrated module supporting 802.11ax Wi-Fi and Bluetooth (BT) Milan. The O2066PN device supporting simultaneous operation on 2.4 GHz and 5 GHz, or 6 GHz, also known as Dual Band Simultaneous (DBS).

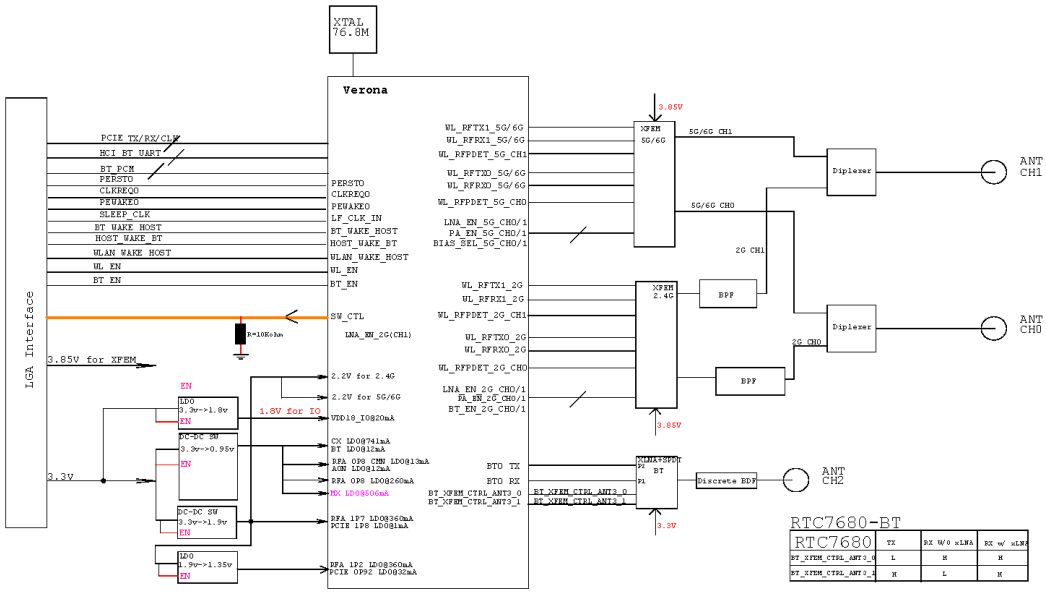
The wireless module complies with IEEE 802.11 a/b/g/n/ac/ax 2x2 MIMO standard and it can achieve up to a speed of 2975.6Mbps (2x2 160MHz 11ax + 2x2 40MHz 11ax DBS). The integrated module provides PCIe interface for Wi-Fi, UART/PCM interface for Bluetooth.

1.2 Features

- Supports 2x2 Multi-User Multiple-Input Multiple-Output (MU-MIMO).
- Dual Band Simultaneous (DBS), up to 3 Gbps data rate (2x2+2x2 11ax DBS).
- Tri-band 2.4 GHz/5 GHz/6 GHz support.
- 20MHz/40MHz channel bandwidth for 2.4 GHz and 20MHz/40MHz/80MHz/160 MHz channel bandwidth for 5 GHz/6 GHz.
- Seamless antenna sharing with Bluetooth, LTE, LTE-U, and 5G.
- Dynamic Frequency Selection (DFS, radar detection) .
- Offloading traffic for minimal host utilization at 802.11ac/ ax speeds.
- Low-power PCIe (with L1 substate) interface.
- Integrated close-loop power detector.
- Supports 2 Mbps Bluetooth Low Energy (BLE), BLE Long Range.
- Split ACL support for A2DP true stereo (earbuds) .
- Dedicated Bluetooth antenna, and concurrent with 5G WLAN.
- Dual eSCO and dual A2DP streams.
- Backward-compatible with previous Bluetooth standards.
- Standard PCIe Golden Finger interface.

1.3 Block Diagram

VER01 Block Diagram



1.4 General Specification

Model Name	O2066PN
Product Description	Support WiFi6E+BT5.2
Dimension	L x W x H: 19.5 x 21.5 x 2.3 (typical) mm
Wi-Fi Interface	PCIe
BT Interface	UART/PCM
Operting temperature	-30°C to 85°C
Storage temperature	-40°C to 125°C

1.5 Recommended Operating Rating

Feature		Minimum	Type	Maximum	Units
Operating Temperature		-30	25	85	°C
VCC		3.20	3.3	3.45	V
VDD RFPA		-	3.85	-	V
Power Consumption (Type VCC/VDD RFPA)	-	3.3V		3.85V	
	TX (2.4G HE40)				
	RX (2.4G HE40)				
	TX (5G HE160)				
	RX (5G HE160)				
	Power Up				
	BT TX（1M@7dBm）				
	BT RX				

2. RF Specification

2.1 Wi-Fi RF Specification

2.4GHz RF Specification			
Feature	Description		
Operating Frequency	2.400～2.4835GHz		
Standards	Wi-Fi: IEEE 802.11b/g/n/ac/ax & Wi-Fi compliant		
Operating Channel	2.4GHz : Ch1~14		
Modulation	802.11b : DQPSK、DBPSK、CCK 802.11 g/n/ac/ax : OFDM /1024-QAM、256-QAM、64-QAM、16-QAM、QPSK、BPSK		
PHY Data rates	Wi-Fi:802.11b:11,5.5,2,1Mbps 802.11g:54,48,36,24,18,12,9,6Mbps 802.11n: up to 300Mbps 802.11ac: up to 400Mbps 802.11ax:up to 3 Gbps data rate (2.4G 2x2+5G or 6G 2x2 11ax DBS)		
Output Power, tolerance ± 1.5 dB			
Protocol Standard	Data Rate	Spec.(dBm)	EVM(dB)
802.11b	@11Mbps		≦-9
802.11g	@54Mbps		≦-25

802.11n	@HT40 MCS 7		≦-28
802.11ac	@vHT40 MCS 9	17	≦-32
802.11ax	@HE40 MCS 11	15.5	≦-35
Receiver Sensitivity, CCK modulation PER≦8%、OFDM modulation PER≦10%			
Protocol Standard	Data Rate	Spec.(dBm)	
802.11b(20MHz)	1Mbps	-83	
	11Mbps	-76	
802.11g(20MHz)	6Mbps	-85	
	54Mbps	-68	
802.11n(20MHz)	MCS 0 NSS1	-85	
	MCS 7 NSS1	-67	
802.11n(40MHz)	MCS 0 NSS1	-82	
	MCS 7 NSS1	-64	
802.11ac(20MHz)	MCS 0 NSS1	-82	
	MCS 9 NSS1	-60	
802.11ac(40MHz)	MCS 0 NSS1	-79	
	MCS 9 NSS1	-55	
802.11ax(20MHz)	MCS 0 NSS1	-74	
	MCS 11 NSS1	-52	
802.11ax(40MHz)	MCS 0 NSS1	-71	
	MCS 11 NSS1	-49	
5GHz RF Specification			
Feature	Description		
Operating Frequency	5G:5.15 GHz ~ 5.845 GHz (5.0 GHz ISM Band)		
Standards	Wi-Fi: IEEE 802.11 a/n/ac/ax 2x2, Wi-Fi compliant		
Modulation	802.11 a/n/ac/ax : OFDM /1024-QAM、256-QAM、64-QAM、16-QAM、QPSK、BPSK		
PHY Data rates	Wi-Fi: 802.11a:54,48,36,24,18,12,9,6Mbps 802.11n: up to 300Mbps 802.11ac: up to 800Mbps 802.11ax:up to 3 Gbps data rate (2.4G 2x2+5G 2x2 11ax DBS)		
Output Power, tolerance ± 1.5 dB			
Protocol Standard	Data Rate	Spec.(dBm)	EVM(dB)
802.11a	@54Mbps		≦-25
802.11n	@HT40 MCS 7		≦-28
802.11ac	@vHT80 MCS 9	17	≦-32
802.11ax	@HE160 MCS 11	13	≦-35
Receiver Sensitivity,OFDM modulation PER≦10%			
Protocol Standard	Data Rate	Spec.(dBm)	
802.11a(20MHz)	6Mbps	-85	
	54Mbps	-68	

802.11n(20MHz)	MCS 0 NSS1	-85	
	MCS 7 NSS1	-67	
802.11n(40MHz)	MCS 0 NSS1	-82	
	MCS 7 NSS1	-64	
802.11ac(20MHz)	MCS 0 NSS1	-82	
	MCS 9 NSS1	-57	
802.11ac(40MHz)	MCS 0 NSS1	-79	
	MCS 9 NSS1	-54	
802.11ac(80MHz)	MCS 0 NSS1	-76	
	MCS 9 NSS1	-51	
802.11ax(20MHz)	MCS 0 NSS1	-82	
	MCS 11 NSS1	-52	
802.11ax(40MHz)	MCS 0 NSS1	-79	
	MCS 11 NSS1	-49	
802.11ax(80MHz)	MCS 0 NSS1	-76	
	MCS 11 NSS1	-46	
802.11ax(160MHz)	MCS 0 NSS1	-73	
	MCS 11 NSS1	-45	
6GHz RF Specification			
Feature	Description		
Operating Frequency	6G: 5.925 GHz ~ 7.125 GHz		
Standards	Wi-Fi: IEEE 802.11 a/n/ac/ax 2x2, Wi-Fi compliant		
Modulation	802.11 a/n/ac/ax : OFDM /1024-QAM、256-QAM、64-QAM、16-QAM、QPSK、BPSK		
PHY Data rates	Wi-Fi: 802.11a:54,48,36,24,18,12,9,6Mbps 802.11n: up to 300Mbps 802.11ac: up to 800Mbps 802.11ax:up to 3 Gbps data rate (2.4G 2x2+6G 2x2 11ax DBS)		
Output Power, tolerance ± 1.5 dB			
Protocol Standard	Data Rate	Spec.(dBm)	EVM(dB)
802.11a	@54Mbps		≦-25
802.11n	@HT40 MCS 7		≦-28
802.11ac	@vHT80 MCS 9		≦-32
802.11ax	@HE160 MCS 11	12.5	≦-35
Receiver Sensitivity,OFDM modulation PER≦10%			
Protocol Standard	Data Rate	Spec.(dBm)	
802.11a(20MHz)	6Mbps	-85	
	54Mbps	-68	
802.11ax(20MHz)	MCS 0 NSS1	-82	
	MCS 11 NSS1	-52	
802.11ax(40MHz)	MCS 0 NSS1	-79	

	MCS 11 NSS1	-49
802.11ax(80MHz)	MCS 0 NSS1	-76
	MCS 11 NSS1	-46
802.11ax(160MHz)	MCS 0 NSS1	-73
	MCS 11 NSS1	-45

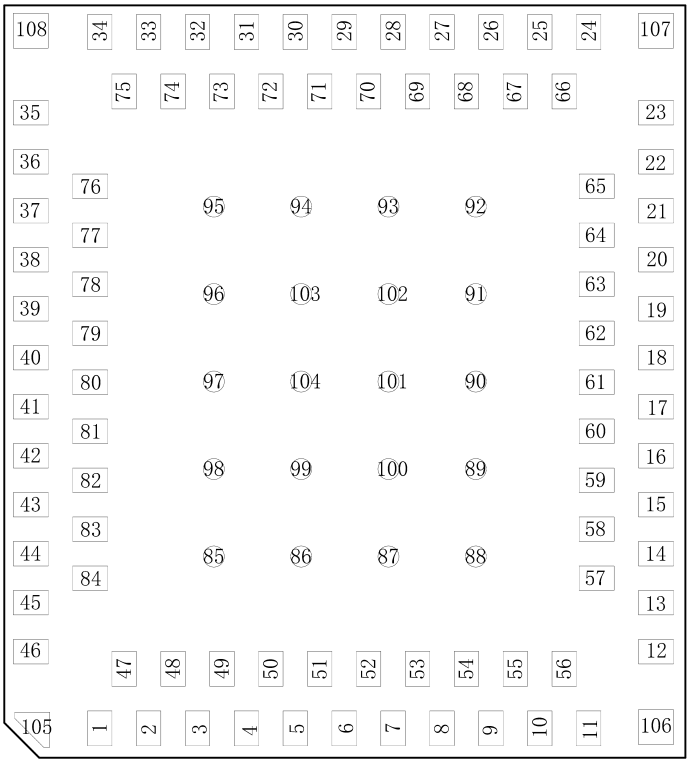
2.2 BT RF Specification

Feature	Description		
Operating Frequency	2.402～2.480GHz		
Number of Channels	79 channels		
Standards	Bluetooth V5.2		
Modulation	8DPSK, π/4 DQPSK, GFSK		
PHY Data rates	1 Mbps for Basic Rate 2,3 Mbps for Enhanced Data Rate		
Output Power	Min(dBm)	Typical(dBm)	Max(dBm)
Sensitivity @ BER=0.1% for GFSK (1Mbps)			
Sensitivity @ BER=0.01% for π/4-DQPSK (2Mbps)			
Sensitivity @ BER=0.01% for 8DPSK (3Mbps)			

3.Pin Assignments

3.1 Pin Outline

< TOP VIEW >



3.2 Pin Definition

NO	Name	Type	Description	Voltage
1	NC			
2	NC			
3	WLAN-LED	O	WLAN LED signal	1.8V
4	HOST_WAKEUP-BT	I	host wakeup BT	1.8V
5	NC			
6	GND		Ground	
7	PCIE_TX_N		PCIe TX differential signals	1.8V
8	NC			
9	PCIE_REFCLK_N		PCIe clock differential input signal	1.8V
10	NC			
11	PCIE_RX_N		PCIe RX differential signals	1.8V
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
15	WLAN_SLP_CLK	I	Sleep clock input	1.8V
16	COEX_RXD	I	LTE coexistence UART RXD	1.8V
17	NC			
18	NC			
19	VCC	P	power supply for the module	3.3V
20	VDD RFPA	P	power supply for the module	3.85V
21	WLAN_DBG_TXD	O	UART TXD 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
24	GND		Ground	
25	ANT_BT		BT antenna	
26	GND		Ground	
27	GND		Ground	
28	ANT_WIFI0		Chain0 RF bidirectional antenna port	
29	GND		Ground	
30	GND		Ground	
31	GND		Ground	
32	GND		Ground	
33	ANT_WIFI1		Chain1 RF bidirectional antenna port	
34	GND		Ground	
35	PCM_SYNC		BT PCM sync	1.8V
36	PCM_DOUT	O	BT PCM data out	1.8V

37	PCM_CLK		BT PCM clock	1.8V
38	BT_CTS	I	BT UART clear to send	1.8V
39	BT_TXD	O	BT UART interface	1.8V
40	NC			
41	NC			
42	NC			
43	NC			
44	GND		Ground	
45	NC			
46	NC			
47	NC			
48	WLAN_WAKE_HOST	O	can be configured as WLAN wakeup host	1.8V
49	BT_WAKEUP_HOST	O	BT wakeup Host	1.8V
50	NC			
51	GND		Ground	
52	PCIE_TX_P		PCIe TX differential signals	1.8V
53	NC			
54	PCIE_REFCLK_P		PCIe clock differential input signal	
55	NC			
56	PCIE_RX_P		PCIe RX differential signals	
57	SW_CTRL	O	switch control	1.8V
58	NC			
59	COEX_TXD	O	LTE coexistence UART TXD	1.8V
60	NC			
61	NC			
62	NC			
63	VCC	P	power supply	3.3V
64	VDD RFPA	P	power supply	3.85V
65	WLAN_DBG_RXD	I	UART RXD for debug	
66	GND		Ground	
67	GND		Ground	
68	NC			
69	GND		Ground	
70	GND		Ground	
71	NC			
72	NC			
73	NC			
74	GND		Ground	
75	GND		Ground	
76	PCM_DIN	I	BT PCM data in	
77	BT_RTS	O	BT UART request to send	1.8V
78	BT_RXD	I	BT UART interface	

79	NC			
80	NC			
81	NC			
82	NC			
83	BT_EN	I	BT enable signal from host	1.8V
84	WLAN _EN	I	WLAN enable signal from Host	1.8V
85	GND		Ground	
86	GND		Ground	
87	GND		Ground	
88	GND		Ground	
89	GND		Ground	
90	GND		Ground	
91	GND		Ground	
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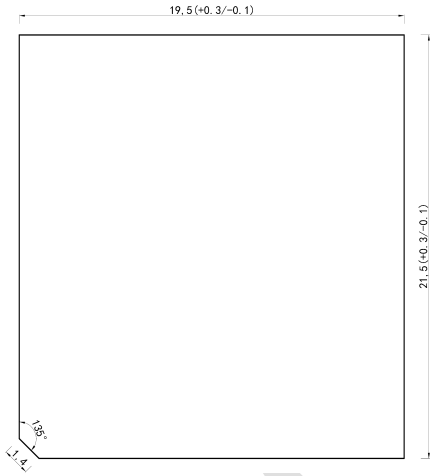
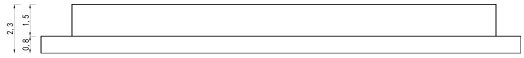
98	GND		Ground	
99	GND		Ground	
100	GND		Ground	
101	GND		Ground	
102	GND		Ground	
103	GND		Ground	
104	GND		Ground	
105	GND		Ground	
106	GND		Ground	
107	GND		Ground	
108	GND		Ground	

4.Dimensions

4.1 Physical Dimensions and Module Photo

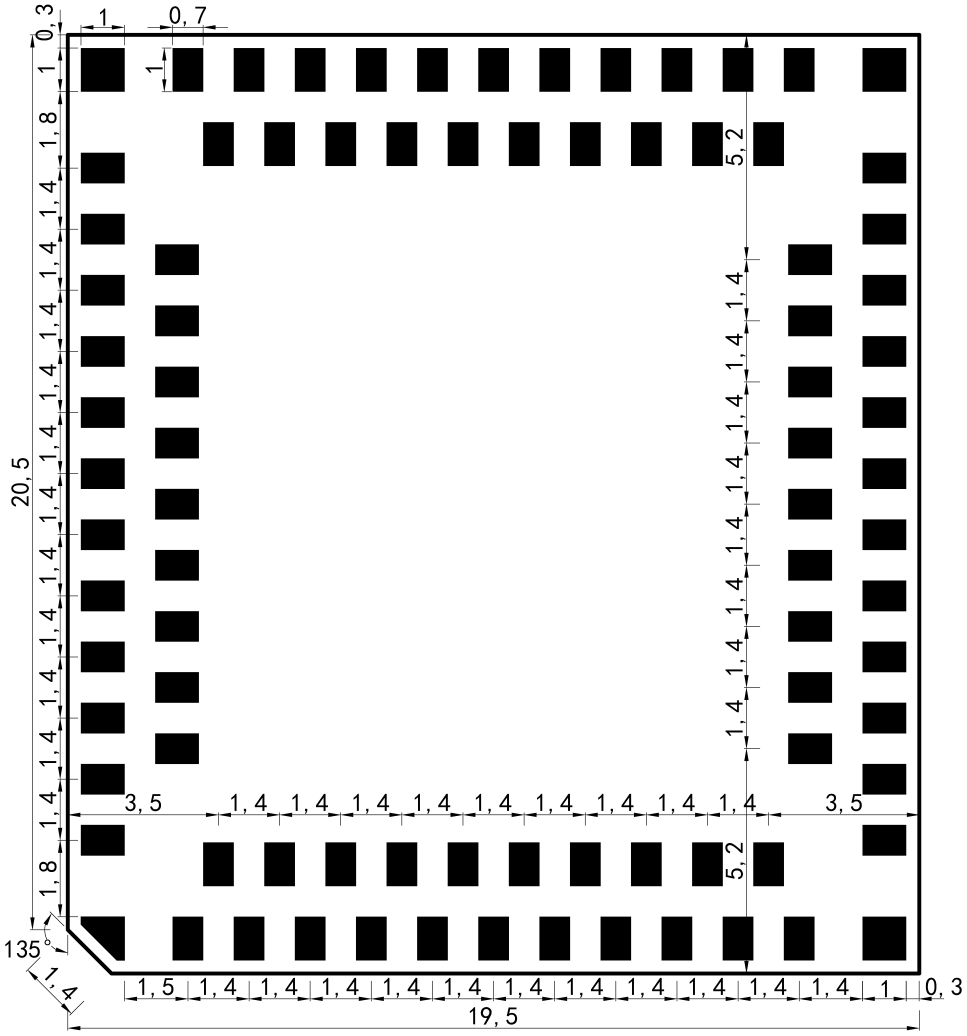
(Unit: mm)

L x W ：21.5 x 19.5(+0.3/-0.1) mm 缺	
H: 2.3(±0.1)mm	
Weight	6.5g

4.2 Module Physical Dimensions

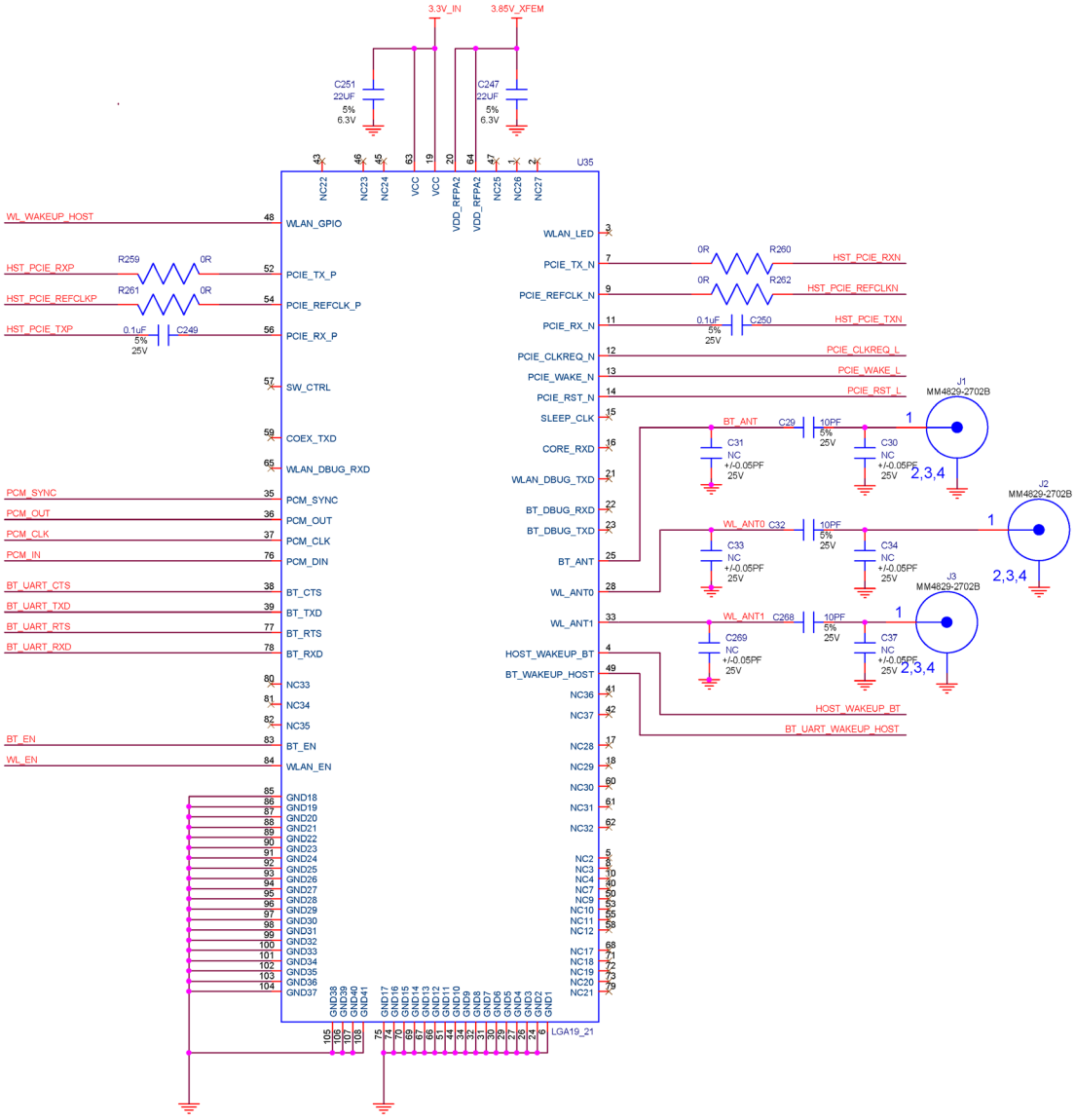
(Unit: mm)

< TOP VIEW >



5 Reference Design

5.1 Reference schematic



Note：

a） C247, C251 should be closed to host.

b） The power supply “3.3V_IN,3.85V_XFEM” switching noise is less than 100mV and the ripple is less than 30 mV.

c） PCIe differential signals should be followed 100 Ohm impedance.

d） For the I/O interface voltage, please refer to chapter 5 pin definition.

e） The power supply is 1.8V of all interface.

5.2 External Antenna

When the customer selects an external antenna, the external antenna selected must meet the parameter requirements specified ,Impedance 50Ω

5.3 Real-world Testing

2.4G Real-world Testing					
Protocol Standard		channel	Power (dBm)	EVM(dB)	Rx Sensitivity (dBm)
802.11g(54Mps)	ANT0	2412			-73
		2437			-73
		2472			-73
	ANT1	2412			-73
		2437			-73
		2472			-73
802.11ax(HE20_MCS11)	ANT0	2412	16	-38.5	-59
		2437	16	-38	-59
		2462	16	-36.9	-59
	ANT1	2412	16	-37.2	-59
		2437	16	-38.1	-59
		2462	16	-37.5	-59
802.11ax(HE40_MCS11)	ANT0	2422	16	-38	-56
		2462	16	-39.5	-56
	ANT1	2422	16	-37	-56
		2462	16	-38	-56
5G Real-world Testing					
Protocol Standard		channel	Power (dBm)	EVM(dB)	Rx Sensitivity (dBm)
802.11a(54Mps)	ANT0	5180			-73
		5500			-73
		5825			-73
	ANT1	5180			-73
		5500			-73
		5825			-73
802.11ax(HE20_MCS11)	ANT0	5180	17	-38	-59
		5500	17	-37	-59
		5825	17	-38	-59
	ANT1	5180	17	-37	-59
		5500	17	-38	-59
		5825	17	-38	-59
802.11ax(HE80_MCS11)	ANT0	5210	15.5	-38.5	-54
		5530	15.5	-38.1	-54
		5775	15.5	-37.8	-54
	ANT1	5210	15.5	-38	-54

		5530	15.5	-38	-54
		5775	15.5	-38.5	-54
802.11ax(HE160_MCS11)	ANT0	5250	13	-38	-51
		5570	13	-38.5	-52
	ANT1	5250	13	-38.5	-51
		5570	13	-38.5	-51
6G Real-world Testing					
Protocol Standard		channel	Power (dBm)	EVM(dB)	Rx Sensitivity (dBm)
802.11a(54Mps)	ANT0	6015			
		6515			
		7115			
	ANT1	6015			
		6515			
		7115			
802.11ax(HE20_MCS11)	ANT0	6015	16.5	-38	-58
		6515	16.5	-39	-58
		7115	16.5	-39.5	-58
	ANT1	6015	16.5	-39	-58
		6515	16.5	-40	-58
		7115	16.5	-48.5	-58
802.11ax(HE80_MCS11)	ANT0	5985	15	-38.5	-54
		6545	15	-38	-54
		7025	15	-37.5	-54
	ANT1	5985	15	-38	-54
		6545	15	-38.5	-54
		7025	15	-38.5	-54
802.11ax(HE160_MCS11)	ANT0	6025	12.5	-37	-51
		6505	12.5	-37	-50
		6985	12.5	-37	-50
	ANT1	6025	12.5	-36	-51
		6505	12.5	-37.5	-50
		6985	12.5	-37.5	-50

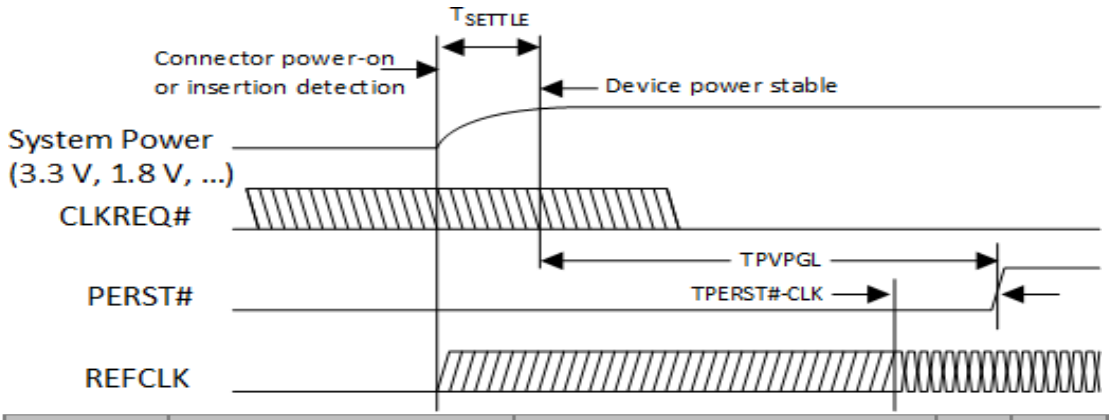
Description: The test environment is: temperature 25 °C humidity 60%

6 Host Interface Timing Diagram

6.1 PCIe powerup sequence timing

Supports PCIe Gen 3 interface for WLAN.

Compliant to PCIe Gen 3 powerup sequence timing.

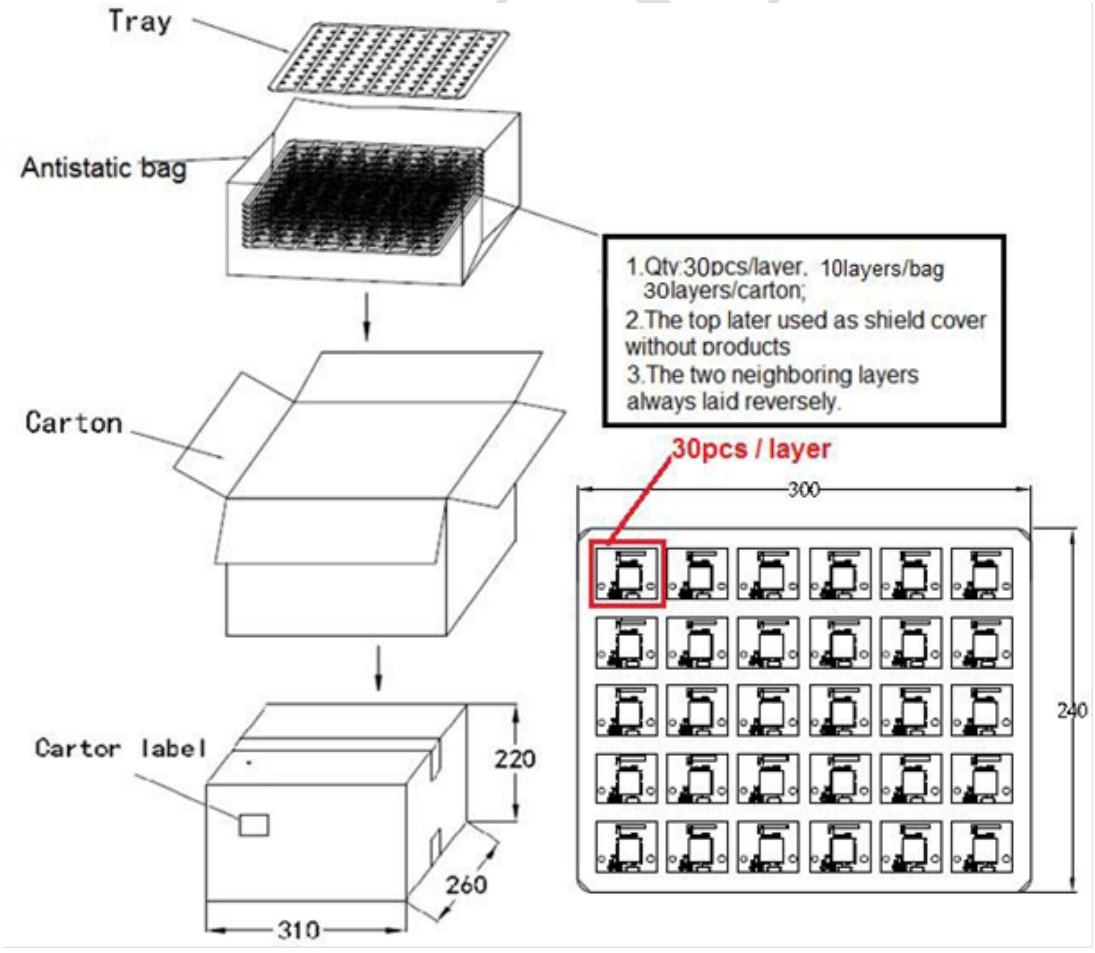


Symbol	Parameter	Min	Max	Units
T_{PVPGL}	Power Valid* to PERST# input inactive	Implementation specific; recommended 50 ms		ms
$T_{PERST\#-CLK}$	REFCLK stable before PERST# inactive	100		µs

Note: *Power Valid when all the voltage supply rails have reached their respective V_{min}.

7 Package

7.1 Reel



7.2 Storage Temperature And Humidity

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.

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.

THE END