正基科技股份有限公司

SPECIFICATION

PRODUCT NAME：AP12275_M2P

REVISION：0.1

DATE：Feb 19th , 2020

Customer APPROVED	
Company	
Representative Signature	

PREPARED	REVIEW			APPROVED	DCC ISSUE
	PM	QA	ET		

正基科技股份有限公司

AP12275_M2P

Data Sheet

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Revision

Revision	Date	Description	Revised By
0.1	2020/02/19	- Preliminary	Jason Shen

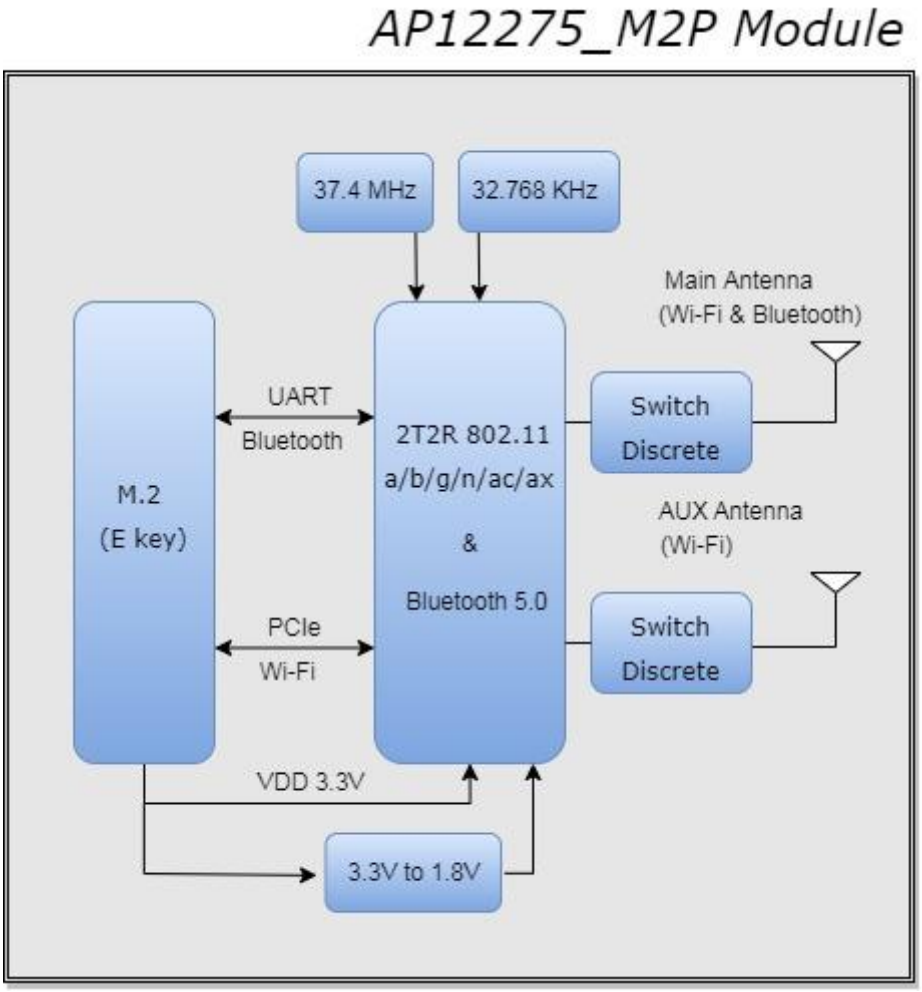
Contents

1. Introduction

1.1 Overview

The AMPAK Technology® AP12275_M2P is a fully Wi-Fi and Bluetooth functionalities module with seamless roaming capabilities and advance security, also it could interact with different vendors' 802.11a/b/g/n/ac/ax 2x2 Access Points with MIMO standard and can accomplish up to speed of 1200Mbps with dual stream in 802.11ax to connect the wireless LAN. Furthermore AP12275_M2P included PCIe interface for Wi-Fi, UART/ PCM interface for Bluetooth

In addition, this compact module is a total solution for a combination of Wi-Fi + BT technologies. The module is specifically developed for tablet, OTT box and portable devices.



1.2 Product Features

IEEE 802.11 Key Feature

- Lead Free design which is compliant with ROHS requirements.
- TX and RX low-density parity check (LDPC) support for improved range and power efficiency.
- Dual-stream spatial multiplexing up to 1200 Mbps data rate.
- 20, 40, 80 MHz channels with optional SGI (1024 QAM modulation)
- IEEE 802.11ax beam forming.
- Client MU-MIMO.
- Supports 2 antennas with two for shared BT and WLAN port.
    - Supports PCI express revision 3.0 and power management running at Gen2 speeds.

Bluetooth Key Feature

- BT host digital interface:
    - HCI UART (up to 4 Mbps)
    - PCM for audio data
- Complies with Bluetooth Core Specification Version 5.0 with provisions for supporting future specifications. With Bluetooth Class 1 or Class2 transmitter operation.
- Supports extended synchronous connections (eSCO), for enhanced voice quality by allowing for retransmission of dropped packets.
- Adaptive frequency hopping (AFH) for reducing radio frequency interference.

A simplified block diagram of the module is depicted in the figure above.

2. General Specification

2.1 General Specification

Model Name	AP12275_M2P
Product Description	2T2R 802.11 ax/ac/a/b/g/n Wi-Fi + BT 5.0 Module
Dimension	L x W : 30 x 22 (typical) mm，H : 2.62 (Maximum) mm
WiFi Interface	Support PCI Express M.2 Card (KEY E)
BT Interface	UART / PCM with M.2 Card (KEY E)
Operating temperature	-30°C to 85°C
Storage temperature	-40°C to 105°C
Humidity	Operating Humidity 10% to 95% Non-Condensing Storage Humidity 5% to 95% Non-Condensing

Note: The optimal RF performance specified in the data sheet, however, is guaranteed only -10 °C to +55 °C and 3.2V < 3.3Vaux < 3.6V without derating performance.

2.2 DC Characteristics

2.2.1 Recommended Operating Rating

Voltage rails	Min.	Typ.	Max.	Unit
3.3Vaux	3.2	3.3	3.6	V

3. Wi-Fi RF Specification

3.1 2.4GHz RF Specification

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

Feature	Description
WLAN Standard	IEEE 802.11b/g/n/ax & Wi-Fi compliant
Frequency Range	2.400 GHz ~ 2.4835 GHz (2.4GHz ISM Band)
Number of Channels	2.4GHz：Ch1 ~ Ch13
Modulation	802.11b : DQPSK、DBPSK、CCK 802.11 g/n : OFDM /64-QAM、16-QAM、QPSK、BPSK

Output Power , tolerance ± 1.5 dB

The transmit EVM quality & spectrum mask are compliant with IEEE 802.11 standard

802.11b	1Mbps	2Mbps	5.5Mbps	11Mbps	
	19.5	19.5	19.5	19.5	
802.11g	6、9Mbps	12、18Mbps	24Mbps	36Mbps	48Mbps
	19.5	19.5	18.5	18.5	18
	54Mbps				
	18				
802.11n 20MHz	MCS0~2	MCS3	MCS4	MCS5	MCS6
	19.5	18.5	18.5	18	18
	MCS7				
	17.5				
802.11ax 20MHz	HE0~2	HE3	HE4	HE5	HE6
	19.5	18.5	18.5	18	18
	HE7	HE8	HE9	HE10	HE11
	17.5	16.5	16.5	15	15

Note: The specifications of RF output power are subject to change to fulfill the safety regulation and requirements in end-user product.

Sensitivity, tolerance ± 2 dB

CCK modulation PER ≦ 8%、OFDM modulation PER ≦ 10%

802.11b	Data Rate	Spec.(dBm)		
	1Mbps	-98		
	2Mbps	-93		
	5.5Mbps	-91		
	11Mbps	-89		
802.11g SISO	Data Rate	Spec.(dBm)	Data Rate	Spec.(dBm)
	6Mbps	-93	24Mbps	-85
	9Mbps	-92	36Mbps	-82

	12Mbps	-91	**48Mbps**	-78
	18Mbps	-88	**54Mbps**	-76
802.11g MIMO	**Data Rate**	**Spec.(dBm)**	**Data Rate**	**Spec.(dBm)**
	6Mbps	-95	**24Mbps**	-87
	9Mbps	-94	**36Mbps**	-84
	12Mbps	-93	**48Mbps**	-81
	18Mbps	-90	**54Mbps**	-78
802.11n_20MHz SISO	**Data Rate**	**Spec.(dBm)**	**Data Rate**	**Spec.(dBm)**
	MCS0	-93	**MCS4**	-81.5
	MCS1	-89	**MCS5**	-79
	MCS2	-87	**MCS6**	-76
	MCS3	-84	**MCS7**	-76
802.11n_20MHz MIMO	**Data Rate**	**Spec.(dBm)**	**Data Rate**	**Spec.(dBm)**
	MCS0	-93	**MCS5**	-80
	MCS1	-92	**MCS6**	-78
	MCS2	-90	**MCS7**	-76
	MCS3	-87	**MCS8**	-72
	MCS4	-83	**MCS15**	-73
802.11ax_20MHz SISO	**Data Rate**	**Spec.(dBm)**	**Data Rate**	**Spec.(dBm)**
	MCS0	-93	**MCS6**	-76
	MCS1	-89	**MCS7**	-76
	MCS2	-87	**MCS8**	-72
	MCS3	-84	**MCS9**	-70
	MCS4	-81.5	**MCS10**	-65
	MCS5	-79	**MCS11**	-61.5
Maximum Input Level	802.11b : -10 dBm			
	802.11g/n/ax : -20 dBm			

4.2 5GHz RF Specification

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

Feature	Description
WLAN Standard	IEEE 802.11a/n/ac/ax & Wi-Fi compliant
Frequency Range	5.15~5.35GHz、5.47~5.725GHz、5.725~5.85GHz (5GHz UNII Band)
Number of Channels	5.15~5.35GHz：Ch36 ~ Ch64 5.47~5.725GHz：Ch100 ~ Ch140 5.725~5.85GHz：Ch149 ~ Ch165
Modulation	802.11a : OFDM /64-QAM、16-QAM、QPSK、BPSK 802.11n : OFDM /64-QAM、16-QAM、QPSK、BPSK 802.11ac : OFDM /256-QAM、OFDM /64-QAM、16-QAM、QPSK、BPSK 802.11ax : OFDMA/ 1024-QAM、 OFDM /256-QAM、OFDM /64-QAM、16-QAM、QPSK、BPSK

Output Power , tolerance ± 2 dB

The transmit EVM quality & spectrum mask are compliant with IEEE 802.11 standard

802.11a	**Frequency (MHz)**	**6~9Mbps**	**12~18Mbps**	**24Mbps**	**36Mbps**
	5150~5350	17	17	16.5	16.5
	5470~5720	17	17	16.5	16.5
	5725~5845	17	17	16.5	16.5
	Frequency (MHz)	**48Mbps**	**54Mbps**		
	5150~5350	16	16		
	5470~5720	16	16		
	5725~5845	16	16		
802.11n 20MHz	**Frequency (MHz)**	**MCS0~2**	**MCS3**	**MCS4**	**MCS5**
	5150~5350	17	16.5	16.5	16
	5470~5720	17	16.5	16.5	16
	5725~5845	17	16.5	16.5	16
	Frequency (MHz)	**MCS6**	**MCS7**		
	5150~5350	16	15.5		
	5470~5720	16	15.5		
	5725~5845	16	15.5		
802.11n 40MHz	**Frequency (MHz)**	**MCS0~2**	**MCS3**	**MCS4**	**MCS5**
	5150~5350	16.5	15.5	15.5	15
	5470~5720	16.5	15.5	15.5	15
	5725~5845	16.5	15.5	15.5	15
	Frequency (MHz)	**MCS6**	**MCS7**		
	5150~5350	15	14.5		

	5470~5720	15	14.5		
	5725~5845	15	14.5		
802.11ac 20MHz	Frequency (MHz)	MCS0~2	MCS3	MCS4	MCS5
	5150~5350	17	16.5	16.5	16
	5470~5720	17	16.5	16.5	16
	5725~5845	17	16.5	16.5	16
	Frequency (MHz)	MCS6	MCS7	MCS8	
	5150~5350	16	14.5	12	
	5470~5720	16	14.5	12	
	5725~5845	16	14.5	12	
802.11ac 40MHz	Frequency (MHz)	MCS0~2	MCS3	MCS4	MCS5
	5150~5350	16.5	15.5	15.5	15
	5470~5720	16.5	15.5	15.5	15
	5725~5845	16.5	15.5	15.5	15
	Frequency (MHz)	MCS6	MCS7	MCS8	MCS9
	5150~5350	14	14	13	10
	5470~5720	14	14	13	10
	5725~5845	14	14	13	10
802.11ac 80MHz	Frequency (MHz)	MCS0~2	MCS3	MCS4	MCS5
	5150~5350	16	15	15	15
	5470~5720	16	15	15	15
	5725~5845	16	15	15	15
	Frequency (MHz)	MCS6	MCS7	MCS8	MCS9
	5150~5350	13	13	11	10
	5470~5720	13	13	11	10
	5725~5845	13	13	11	10
802.11ax 20MHz	Frequency (MHz)	MCS0~2	MCS3	MCS4	MCS5
	5150~5350	17	16.5	16.5	16
	5470~5720	17	16.5	16.5	16
	5725~5845	17	16.5	16.5	16
	Frequency (MHz)	MCS6	MCS7	MCS8	MCS9
	5150~5350	16	14.5	11	11
	5470~5720	16	14.5	11	11
	5725~5845	16	14.5	11	11
	Frequency (MHz)	MCS10	MCS11		
	5150~5350	10	10		
	5470~5720	10	10		

	5725~5845	10	10		
802.11ax 40MHz	Frequency (MHz)	MCS0~2	MCS3	MCS4	MCS5
	5150~5350	16.5	15.5	15.5	15
	5470~5720	16.5	15.5	15.5	15
	5725~5845	16.5	15.5	15.5	15
	Frequency (MHz)	MCS6	MCS7	MCS8	MCS9
	5150~5350	14	13	13	10
	5470~5720	14	13	13	10
	5725~5845	14	13	13	10
	Frequency (MHz)	MCS10	MCS11		
	5150~5350	9	9		
	5470~5720	9	9		
	5725~5845	9	9		
802.11ax 80MHz	Frequency (MHz)	MCS0~2	MCS3	MCS4	MCS5
	5150~5350	16	15	15	15
	5470~5720	16	15	15	15
	5725~5845	16	15	15	15
	Frequency (MHz)	MCS6	MCS7	MCS8	MCS9
	5150~5350	14	13	10	10
	5470~5720	14	13	10	10
	5725~5845	14	13	10	10
	Frequency (MHz)	MCS10	MCS11		
	5150~5350	9	9		
	5470~5720	9	9		
	5725~5845	9	9		

Note: The specifications of RF output power are subject to change to fulfill the safety regulation and requirements in end-user product.

Sensitivity, tolerance ± 2 dB

OFDM modulation PER ≦ 10%

	Data Rate	Spec.(dBm)	Data Rate	Spec.(dBm)
802.11a SISO	6Mbps	-90.5	24Mbps	-83
	9Mbps	-90	36Mbps	-80
	12Mbps	-88	48Mbps	-75
	18Mbps	-86	54Mbps	-73
MIMO802.11a MIMO	Data Rate	Spec.(dBm)	Data Rate	Spec.(dBm)
	6Mbps	-92	24Mbps	-86
	9Mbps	-91	36Mbps	-83
	12Mbps	-90	48Mbps	-78

	18Mbps	-89	54Mbps	-77
802.11n_20MHz SISO	Data Rate	Spec.(dBm)	Data Rate	Spec.(dBm)
	MCS0	-90	MCS4	-79
	MCS1	-88	MCS5	-76
	MCS2	-86	MCS6	-73
	MCS3	-83	MCS7	-72
802.11n_20MHz MIMO	Data Rate	Spec.(dBm)	Data Rate	Spec.(dBm)
	MCS0	-92	MCS5	-78
	MCS1	-91	MCS6	-76
	MCS2	-89	MCS7	-75
	MCS3	-86	MCS8	-89
	MCS4	-82	MCS15	-70
802.11n_40MHz SISO	Data Rate	Spec.(dBm)	Data Rate	Spec.(dBm)
	MCS0	-88	MCS4	-77
	MCS1	-86	MCS5	-72
	MCS2	-83	MCS6	-70
	MCS3	-80	MCS7	-69
802.11n_40MHz MIMO	Data Rate	Spec.(dBm)	Data Rate	Spec.(dBm)
	MCS0	-88	MCS5	-75
	MCS1	-88	MCS6	-73
	MCS2	-86	MCS7	-72
	MCS3	-83	MCS8	-86
	MCS4	-79	MCS15	-67
802.11ac_20MHz SISO	Data Rate	Spec.(dBm)	Data Rate	Spec.(dBm)
	MCS0	-90	MCS5	-75
	MCS1	-88	MCS6	-73
	MCS2	-86	MCS7	-70
	MCS3	-83	MCS8	-68
	MCS4	-79		
802.11ac_20MHz MIMO	Data Rate	Spec.(dBm)	Data Rate	Spec.(dBm)
	MCS0,NSS=1	-92	MCS6,NSS=1	-76
	MCS1,NSS=1	-91	MCS7,NSS=1	-75
	MCS2,NSS=1	-88	MCS8,NSS=1	-72
	MCS3,NSS=1	-85	MCS0,NSS=2	-88
	MCS4,NSS=1	-82	MCS8,NSS=2	-65
	MCS5,NSS=1	-77		

802.11ac_40MHz SISO	Data Rate	Spec.(dBm)	Data Rate	Spec.(dBm)
	MCS0	-88	MCS5	-72
	MCS1	-86	MCS6	-70
	MCS2	-83	MCS7	-69
	MCS3	-80	MCS8	-65
	MCS4	-76	MCS9	-64
802.11ac_40MHz MIMO	Data Rate	Spec.(dBm)	Data Rate	Spec.(dBm)
	MCS0,NSS=1	-90	MCS6,NSS=1	-73
	MCS1,NSS=1	-88	MCS7,NSS=1	-72
	MCS2,NSS=1	-86	MCS8,NSS=1	-68
	MCS3,NSS=1	-82	MCS9,NSS=1	-66
	MCS4,NSS=1	-79	MCS0,NSS=2	-86
	MCS5,NSS=1	-77	MCS9,NSS=2	-60
802.11ac_80MHz SISO	Data Rate	Spec.(dBm)	Data Rate	Spec.(dBm)
	MCS0	-85	MCS5	-68
	MCS1	-82	MCS6	-67
	MCS2	-79	MCS7	-65
	MCS3	-76	MCS8	-62
	MCS4	-73	MCS9	-61
802.11ac_80MHz MIMO	Data Rate	Spec.(dBm)	Data Rate	Spec.(dBm)
	MCS0,NSS=1	-87	MCS6,NSS=1	-70
	MCS1,NSS=1	-85	MCS7,NSS=1	-68
	MCS2,NSS=1	-82	MCS8,NSS=1	-66
	MCS3,NSS=1	-79	MCS9,NSS=1	-63
	MCS4,NSS=1	-76	MCS0,NSS=2	-83
	MCS5,NSS=1	-71	MCS9,NSS=2	-58
802.11ax_20MHz SISO	Data Rate	Spec.(dBm)	Data Rate	Spec.(dBm)
	MCS0	-90	MCS6	-73
	MCS1	-88	MCS7	-70
	MCS2	-86	MCS8	-68
	MCS3	-83	MCS9	-64
	MCS4	-79	MCS10	-59
	MCS5	-75	MCS11	-57
802.11ax_40MHz SISO	Data Rate	Spec.(dBm)	Data Rate	Spec.(dBm)
	MCS0	-90	MCS6	-73
	MCS1	-88	MCS7	-70
	MCS2	-86	MCS8	-68

	MCS3	-83	**MCS9**	-64
	MCS4	-79	**MCS10**	-60
	MCS5	-75	**MCS11**	-55
802.11ax_80MHz SISO	**Data Rate**	**Spec.(dBm)**	**Data Rate**	**Spec.(dBm)**
	MCS0	-90	**MCS6**	-73
	MCS1	-88	**MCS7**	-70
	MCS2	-86	**MCS8**	-68
	MCS3	-83	**MCS9**	-61
	MCS4	-79	**MCS10**	-57
	MCS5	-75	**MCS11**	-53
Maximum Input Level	802.11a/n/ac/ax : -30 dBm			

4. Bluetooth Specification

4.1 Bluetooth Specification

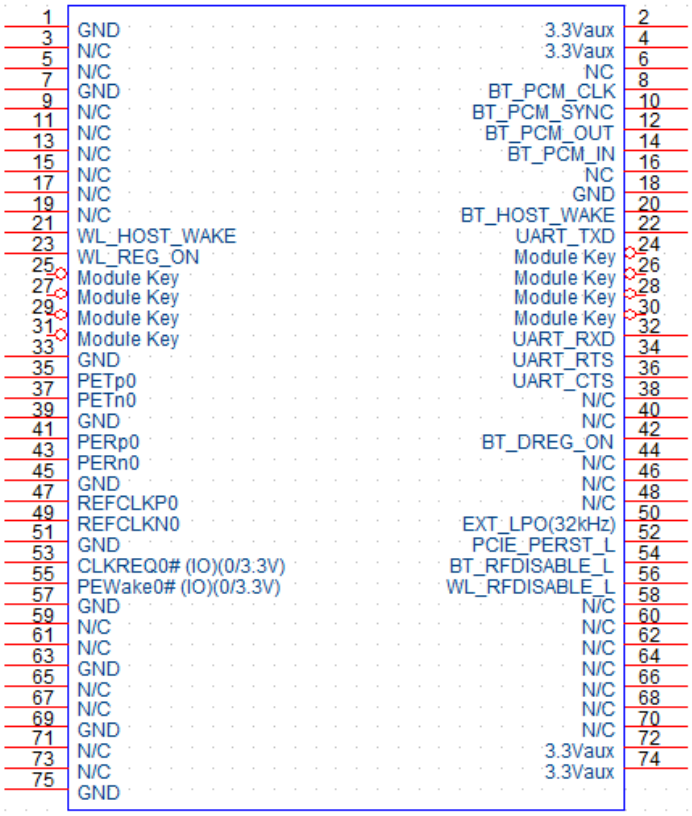
Conditions : VBAT=3.3V ; VDDIO=1.8V ; Temp:25°C

Feature	**Description**
General Specification	
Bluetooth Standard	GFSK、DQPSK、8DPSK、LE(1Mbps)、2LE(2Mbps)
Host Interface	UART
Frequency Band	2402 MHz ~ 2480 MHz
Number of Channels	79 channels for classic、40 channels for BLE
Modulation	FHSS, GFSK, DPSK, DQPSK
RF Specification	
Output Power , tolerance ± 1.5 dB	
	CL1 (dBm)
BDR Output Power	8
EDR Output Power	6
BLE Output Power	7
Sensitivity, tolerance ± 1.5 dB	
Sensitivity @ BER=0.1% for GFSK (1Mbps)	-88 dBm
Sensitivity @ BER=0.01% for π/4-DQPSK (2Mbps)	-91 dBm
Sensitivity @ BER=0.01% for 8DPSK (3Mbps)	-85 dBm
Sensitivity @ BER=0.01% for LE (1Mbps)	-90 dBm
Sensitivity @ BER=0.01% for 2LE (2Mbps)	-91 dBm
Maximum Input Level	GFSK (1Mbps):-20dBm
	π/4-DQPSK (2Mbps) :-20dBm
	8DPSK (3Mbps) :-20dBm

Note*：The Bluetooth BDR output power is able to be configured by firmware (hcd file).

5. Pin Definition

5.1 Pin Outline



5.2 Pin Assignment

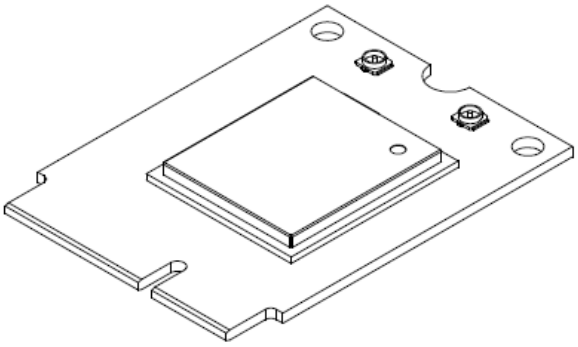
NO	Name	Type	Description
TOP			
1	GND	G	Ground connections
3	NC	—	No connect
5	NC	—	No connect
7	GND	G	Ground connections
9	NC	—	No connect
11	NC	—	No connect
13	NC	—	No connect
15	NC	—	No connect
17	NC	—	No connect
19	NC	—	No connect
21	WL_HOST_WAKE	O	WLAN wake up HOST

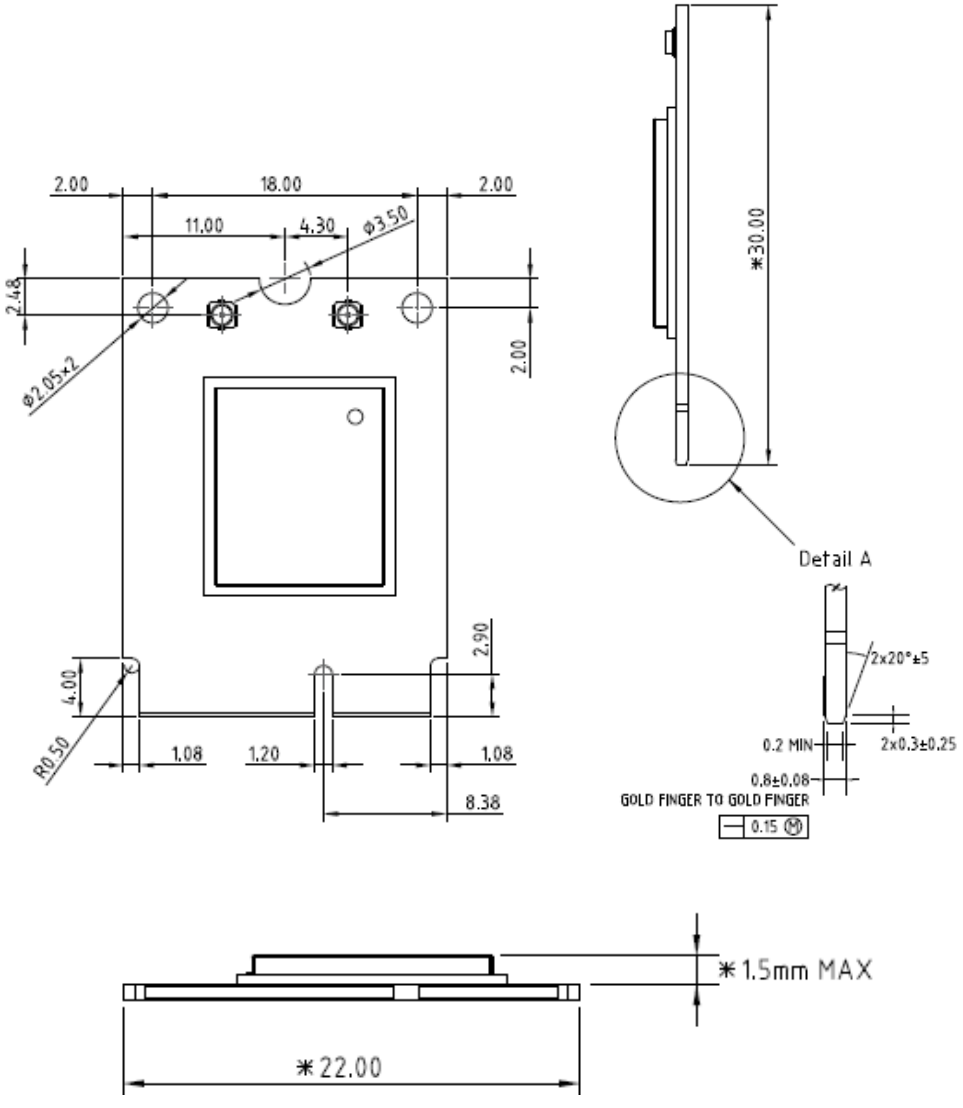
23	WL_REG_ON	I	Used by PMU to power up or power down the internal module regulators used by the WLAN section.
	Module Key	—	Mechanical Key
	Module Key	—	Mechanical Key
	Module Key	—	Mechanical Key
	Module Key	—	Mechanical Key
33	GND	G	Ground connections
35	PERp0	I	PCI Express receive data-Positive
37	PERn0	I	PCI Express receive data-Negative
39	GND	G	Ground connections
41	PETp0	O	PCI Express transmit data-Positive
43	PETn0	O	PCI Express transmit data-Negative
45	GND	G	Ground connections
47	REFCLKP0	I	PCI Express differential clock input-Positive
49	REFCLKN0	I	PCI Express differential clock input-Negative
51	GND	G	Ground connections
53	CLKREQ0#	I/O	PCIe clock request
55	PEWAKE0#	OD	PCIe PME Wake
57	GND	G	Ground connections
59	NC	—	No connect
61	NC	—	No connect
63	GND	G	Ground connections
65	NC	—	No connect
67	NC	—	No connect
69	GND	G	Ground connections
71	NC	—	No connect
73	NC	—	No connect
75	GND	G	Ground connections
		BOTTOM	
2	3.3Vaux	P	VDD system power supply input
4	3.3Vaux	P	VDD system power supply input
6	NC	—	No connect
8	PCM_CLK	I/O	PCM clock
10	PCM_SYNC	I/O	PCM sync signal
12	PCM_OUT	O	PCM Data output
14	PCM_IN	I	PCM data input
16	NC	—	No connect

18	GND	G	Ground connections
20	BT_HOST_WAKE	O	Bluetooth wake up Host
22	UART_TXD	O	Bluetooth UART interface
	Module Key	—	Mechanical Key
	Module Key	—	Mechanical Key
	Module Key	—	Mechanical Key
	Module Key	—	Mechanical Key
32	UART_RXD	I	Bluetooth UART interface
34	UART_RTS_N	O	Bluetooth UART interface
36	UART_CTS_N	I	Bluetooth UART interface
38	NC	—	No connect
40	NC	—	No connect
42	BT_REG_ON	I	Used by PMU to power up or power down the internal module regulators used by the Bluetooth section.
44	NC	—	No connect
46	NC	—	No connect
48	NC	—	No connect
50	EXT_LPO	I	External sleep clock input (32.768KHz)
52	PERST0#	I	PCIe host indication to reset the device
54	BT_DEV_WAKE	I	HOST wake-up Bluetooth device
56	NC	—	No connect
58	NC	—	No connect
60	NC	—	No connect
62	NC	—	No connect
64	NC	—	No connect
66	NC	—	No connect
68	NC	—	No connect
70	NC	—	No connect
72	3.3Vaux	P	VDD system power supply input
74	3.3Vaux	P	VDD system power supply input

6. Dimensions

6.1 Module Dimensions





7. External clock reference

External LPO signal characteristics

Parameter	Specification	Units
Nominal input frequency	32.768	kHz
Frequency accuracy	+/-30	ppm
Duty cycle	30 - 70	%
Input signal amplitude	1600 to 3300	mV, p-p
Signal type	Square-wave or sine-wave	-
Input impedance	>100k <5	Ω pF
Clock jitter (integrated over 300Hz – 15KHz)	<1	Hz
Output high voltage	0.7Vio - Vio	V

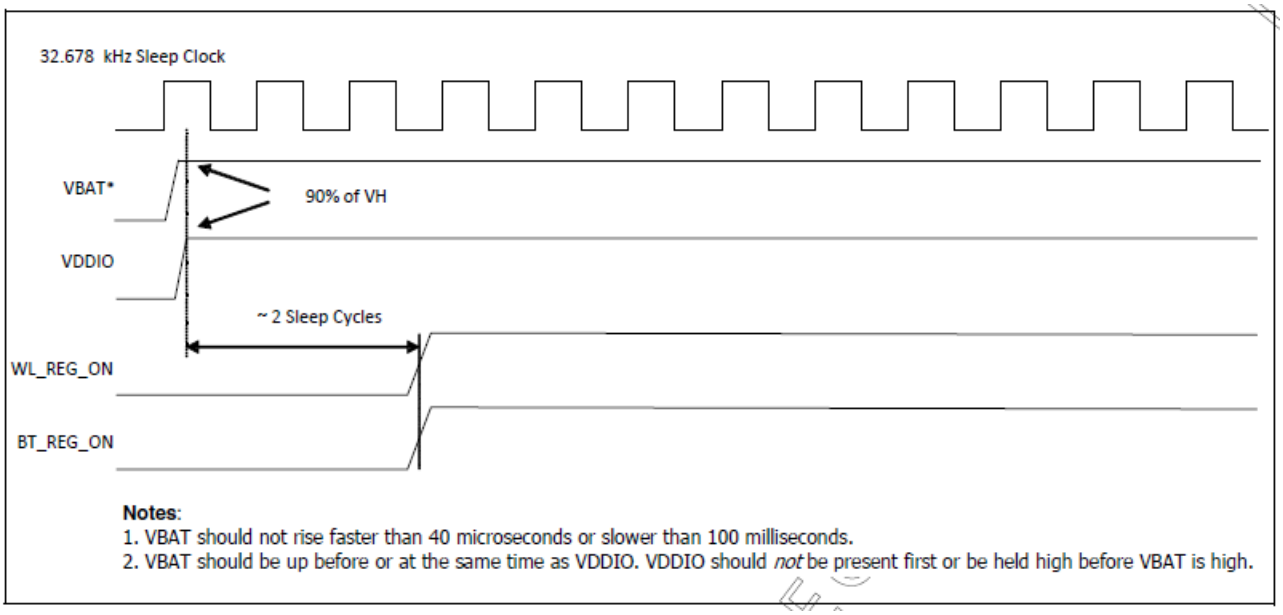
8. Host Interface Timing Diagram

8.1 Power-up Sequence Timing Diagram

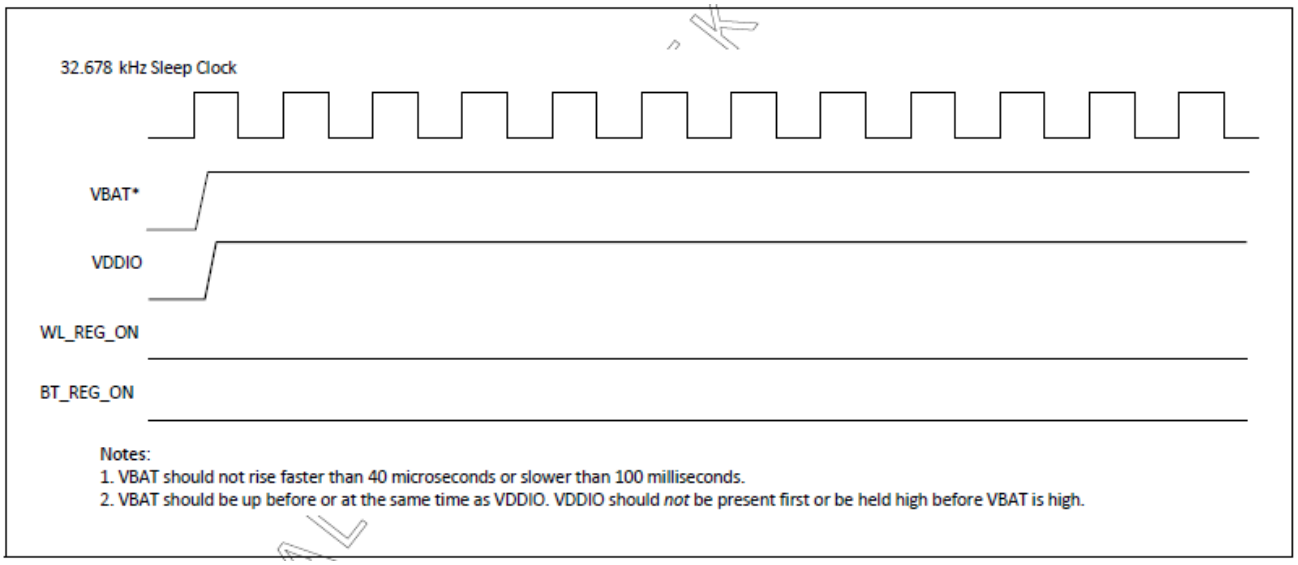
The module has signals that allow the host to control power consumption by enabling or disabling the Bluetooth, WLAN and internal regulator blocks. These signals are described below.

Additionally, diagrams are provided to indicate proper sequencing of the signals for carious operating states. The timing value indicated are minimum required values: longer delays are also acceptable.

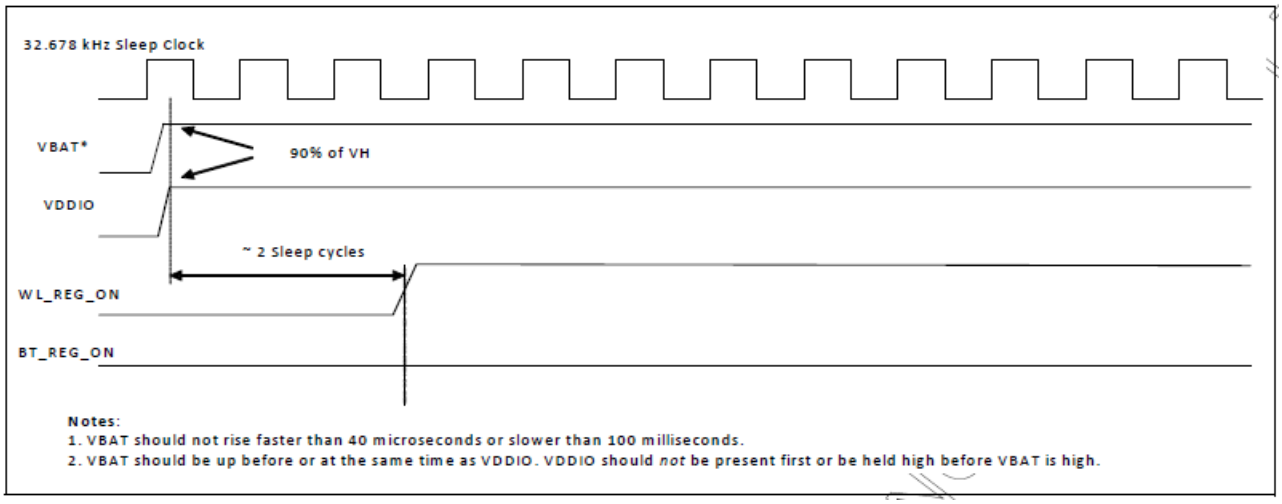
- WL_REG_ON: Used by the PMU to power up or power down the internal regulators used by the WLAN section. When this pin is high, the regulators are enabled and the WLAN section is out of reset. When this pin is low the WLAN section is in reset.
- BT_REG_ON: Used by the PMU to power up or power down the internal regulators used by the BT section. Low asserting reset for Bluetooth. This pin has no effect on WLAN and does not control any PMU functions. This pin must be driven high or low (not left floating).



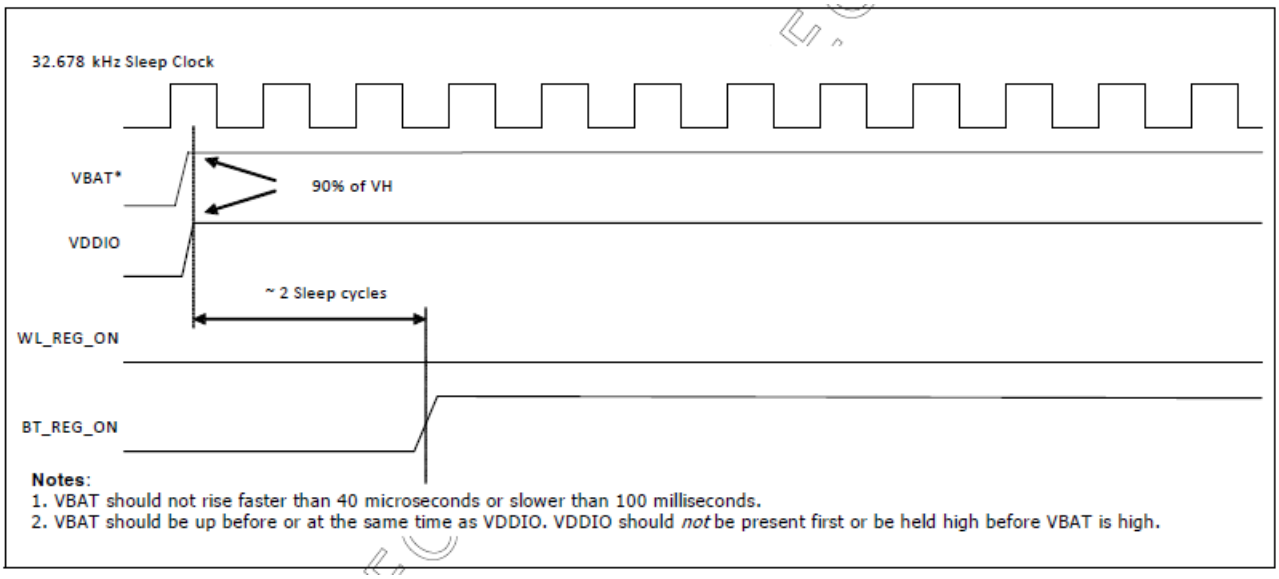
WLAN=ON, Bluetooth=ON



WLAN=OFF, Bluetooth=OFF



WLAN=ON, Bluetooth=OFF



WLAN=OFF, Bluetooth=ON

8.2 PCIe Interface Description

The PCI Express(PCIe) core on the AP6275P is a high-performance serial I/O interconnect that is protocol compliant and electrically compatible with the PCI Express Base Specification v3.0 running at Gen2 speeds.

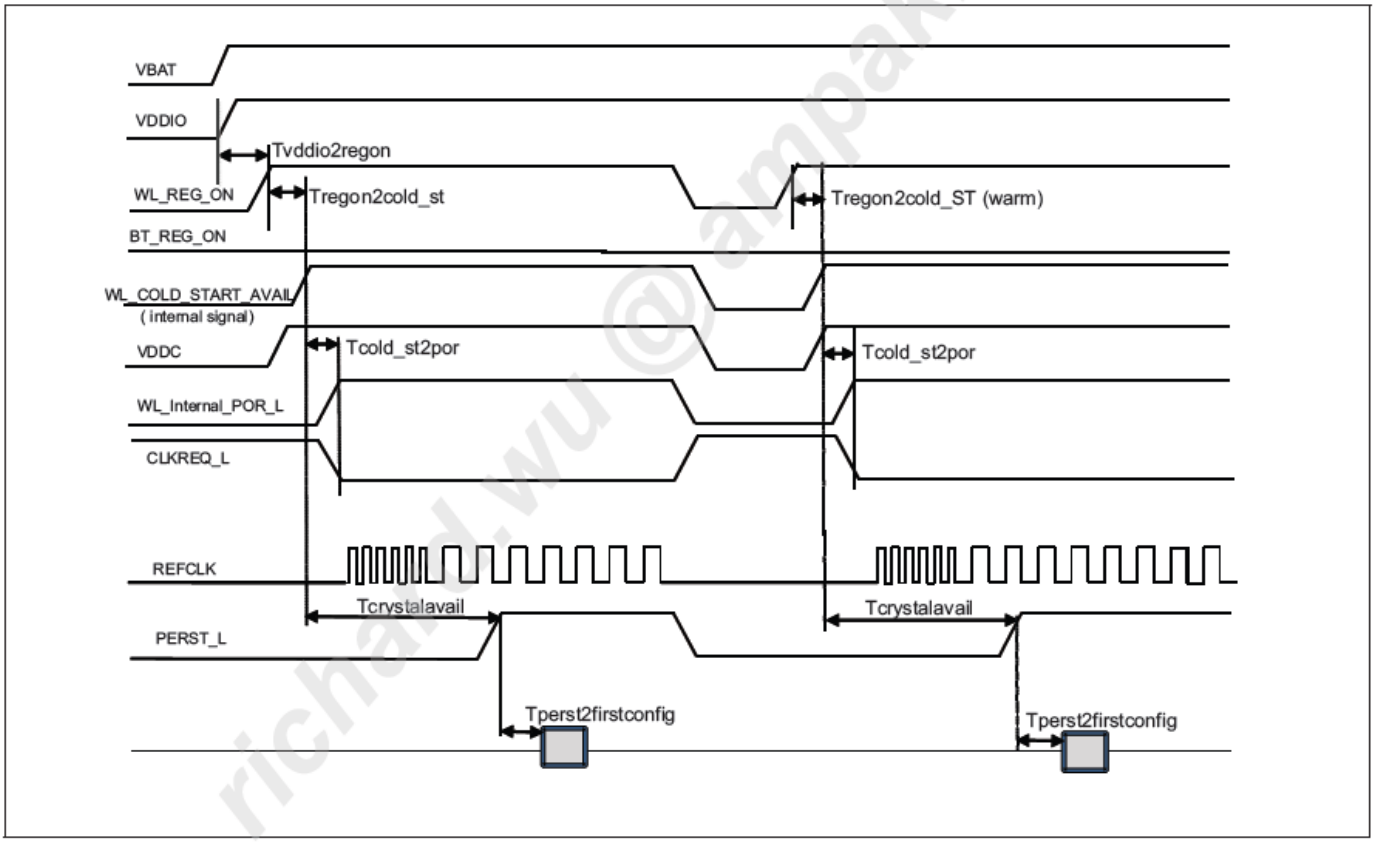
PCI Express Interface Parameters

Parameter	Symbol	Comments	Min.	Typ.	Max.	Unit
General[a]						
Baud rate	BPS	—	—	5	—	Gbaud
Reference clock peak-to-peak differential[b]	Vref	LVPECL, AC coupled	0.95	—	—	V
Receiver						
Differential termination	ZRX-DIFF-DC	Differential termination	80	100	120	Ω
DC impedance	ZRX-DC	DC common-mode impedance	40	50	60	Ω
Powered down termination (POS)	ZRX-HIGH-IMP-DC-POS	Power-down or RESET high impedance	100k	—	—	Ω
Powered down termination (NEG)	ZRX-HIGH-IMP-DC-NEG	Power-down or RESET high impedance	1k	—	—	Ω
Input voltage	VRX-DIFFp-p	AC coupled, differential p-p	175	—	—	mV
Jitter tolerance	TRX-EYE	Minimum receiver eye width	0.4	—	—	UI
Differential return loss	RLRX-DIFF	Differential return loss	10	—	—	dB
Common-mode return loss	RLRX-CM	Common-mode return loss	6	—	—	dB
Unexpected electrical idle enter detect threshold integration time	TRX-IDEL-DET-DIFF-ENTERTIME	An unexpected electrical idle must be recognized no longer than this time to signal an unexpected idle condition.	—	—	10	ms
Signal detect threshold	VRX-IDLE-DET-DIFFp-p	Electrical idle detect threshold	65	—	175	mV
Transmitter						
Output voltage	VTX-DIFFp-p	Differential p-p, programmable in 16 steps	0.8	—	1200	mV
Output voltage rise time	VTX-RISE	20% to 80%	0.125 (2.5 GT/s) 0.15 (5 GT/s)	—	—	UI
Output voltage fall time	VTX-FALL	80% to 20%	0.125 (2.5 GT/s) 0.15 (5 GT/s)	—	—	UI
RX detection voltage swing	VTX-RCV-DETECT	The amount of voltage change allowed during receiver detection.	—	—	600	mV

PCI Express Interface Parameters (Continued)

Parameter	Symbol	Comments	Min.	Typ.	Max.	Unit
TX AC peak common-mode voltage (5 GT/s)	VTX-CM-AC-PP	TX AC common mode voltage (5 GT/s)	—	—	100	mV
TX AC peak common-mode voltage (2.5 GT/s)	VTX-CM-AC-P	TX AC common mode voltage (2.5 GT/s)	—	—	20	mV
Absolute delta of DC common-mode voltage during L0 and electrical idle	VTX-CM-DC-ACTIVE-IDLE-DELTA	Absolute delta of DC common-mode voltage during L0 and electrical idle.	0	—	100	mV
Absolute delta of DC common-mode voltage between D+ and D-	VTX-CM-DC-LINE-DELTA	DC offset between D+ and D-	0	—	25	mV
Electrical idle differential peak output voltage	VTX-IDLE-DIFF-AC-p	Peak-to-peak voltage	0	—	20	mV
TX short circuit current	ITX-SHORT	Current limit when TX output is shorted to ground.	—	—	90	mA
DC differential TX termination	ZTX-DIFF-DC	Low impedance defined during signaling (parameter is captured for 5.0 GHz by RLTX-DIFF)	80	—	120	Ω
Differential return loss	RLTX-DIFF	Differential return loss	10 (min) for 0.05: 1.25 GHz	—	—	dB
Common-mode return loss	RLTX-CM	Common-mode return loss	6	—	—	dB
TX eye width	TTX-EYE	Minimum TX eye width	0.75	—	—	UI

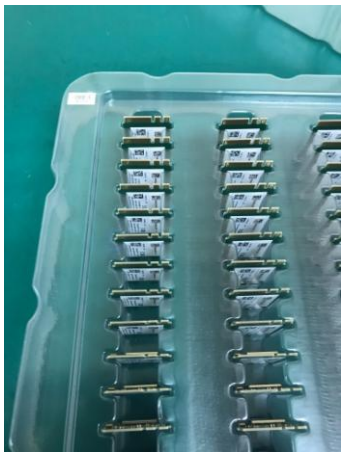
PCIe Power-On Timing

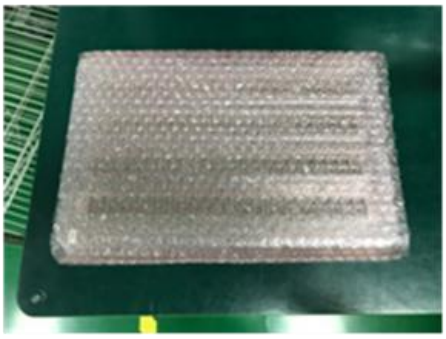


9. Package Information

9.1 Tray box

BOX : 100 PCS (100 PCS/Try)





9.2 Carton

Carton: 400 PCS (Box*4/Carton)