AW-XB547NF

IEEE 802.11a/b/g/n/ac/ax Wireless LAN 2T2R and Bluetooth 5.3 Combo Module (M.2 2230)

Datasheet

Rev. D

B4

(For STD)

Features

WLAN

General

- CMOS MAC, Baseband PHY and RF in a single chip for IEEE 802.11a/b/g/n/ac/ax compatible WLAN
- Support 802.11 ac/ax 2x2, Wave-2 compliant with MU-MIMO
- Complete 802.11n MIMO solution for 2.4GHz and 5GHz band
- Maximum PHY data rate up to 286.8 Mbps using 20MHz bandwidth, 573.5Mbps using 40MHz bandwidth, and 1201Mbps using 80MHz bandwidth.
- Backward compatible with 802.11a/b/g devices while operating at 802.11n data rates
- Backward compatible with 802.11a/n devices while operating at 802.11ax data rates.
- Support 802.11ax, with OFDMA and MU-MIMO, by types PPDU format, such as HE-SU-PPDU, HE-ER-SU-PPDU, HE-MU-PPDU, and HE-TB-PPDU.

Host interface

- Complies with PCI Express Base Specification Revision 1.1.
- Complies with USB2.0 FS-mode Specification for Bluetooth.
- PCIe LTR/L1.Off state supported.
- USB Selective Suspend supported.

Standards Supported

- IEEE 802.11a/b/g/n/ac/ax compatible WLAN
- IEEE 802.11e QoS Enhancement (WMM)
- IEEE 802.11i (WPA, WPA2, WPA3). Open, shared key, and pair-wise key authentication services
- IEEE 802.11h DFS, TPC, Spectrum Measurement
- IEEE 802.11k Radio Resource Measurement
- WAPI (Wireless Authentication Privacy Infrastructure) certified.

MAC Features

- Frame aggregation for increased MAC efficiency (A-MSDU, A-MPDU)
- Low latency immediate Block Acknowledgement (BA)
- PHY-level spoofing to enhance legacy compatibility
- MIMO power saving mechanism
- Support TWT function for power saving
- Channel management and co-existence
- Transmit Opportunity (TXOP) Short Inter-Frame Space (SIFS) bursting for higher multimedia bandwidth
- WiFi Direct supports wireless peer to peer applications. Support BSR and queue size of Qos.
- Support MU EDCA feature.
- Support DFS, Channel info, PPDU state by Rx path.

Other Features

- Supports Wake-On-WLAN via Magic Packet and Wake-up frame
- Transmit Beamforming
- Support S3/S4 AES/TKIP group key update
- FTM support distance measurement

- Support Network List Offload
- CCA on secondary through RTS/CTS handshake.
- Support TCP/UDP/IP checksum offload

Peripheral Interfaces

- Up to 15 General Purpose Input/ Output pins.
- Two configurable LED pins.
- Generates 40MHz clock for peripheral chip.
- Single external power source 3.3V only.
- Crystal frequency support 40MHz

PHY Features

- IEEE 802.11ax MIMO OFDM/OFDMA
- IEEE 802.11ac MIMO OFDM
- IEEE 802.11n MIMO OFDM
- Two Transmit and Two Receive paths
- 20MHz / 40MHz/ 80MHz bandwidth transmission
- Support 2.4GHz and 5GHz band channels
- Short Guard Interval (0.4us) for non-HE. 1xLTF and 0.8us guard interval for HE SU/ERSU. 4x LTF and 0.8us guard interval for HE MU
- DSSS with DBPSK and DQPSK, CCK modulation with long and short preamble
- OFDM with BPSK, QPSK, 16QAM, 64QAM and 256QAM modulation. Convolutional Coding Rate: 1/2, 2/3, 3/4, and5/6.
- Maximum data rate 54Mbps in 802.11g, 300Mbps in 11n and 866.7Mbps in 802.11ac, 1201Mbps in 802.11ax.
- OFDM / DSSS receive diversity with MRC using up to 2 receive paths.
- Support STBC.
- Support LDPC.
- Hardware antenna diversity.
- Maximum-Likelihood Detection (MLD)
- Fast receiver Automatic Gain Control (AGC)
- On-chip ADC and DAC.
- Build-in both 2.4GHz and 5GHz PA.
- Build-in both 2.4GHz and 5GHz LNA.

Bluetooth

Bluetooth Controller

- Support BT5.3 HCI Encryption Key Size Control
- Support Bluetooth 5 system
- Compatible with Bluetooth v2.1+EDR
- Integrated MCU to execute Bluetooth protocol stack
- Supports all packet types in basic rate and enhanced data rate
- Supports Secure Simple Pairing
- Enhanced BT/WIFI Coexistence Control to improve transmission quality in different profiles
- Dual Mode support: Simultaneous LE and BR/EDR
- Supports multiple Low Energy states

Bluetooth Transceiver

- Fast AGC control to improve receiving dynamic range
- Integrated internal Class 1, Class 2, and Class 3 PA
- Supports Enhanced Power Control
- Supports Bluetooth Low Energy
- Integrated 32K oscillator for power management

AzureWave Technologies, Inc.

Revision History

Document NO: R2-2547NF-DST-02

Version	Revision Date	DCN NO.	Description	Initials	Approved
A	2021/10/22	DCN024034	● Initial Version	Shihhua Huang	NC Chen
B	2021/12/28	DCN025038	● Modify Features Info	Shihhua Huang	NC Chen
C	2022/6/9	DCN026439	● Updated block diagram	Shihhua Huang	NC Chen
D	2023/1/19	DCN028587	● Modify chapter 1.3.2 TX power tolerance to +-1.5	Shihhua Huang	NC Chen
E	2023/3/23	DCN028907	● Corrected chapter 1.3.2 power table ● Updated chapter 3.3 info	Shihhua Huang	NC Chen

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1. Introduction

1.1 Product Overview

AzureWave Technologies, Inc. introduces the pioneer of the IEEE 802.11 a/b/g/n/ac/ax WIFI with Bluetooth 5.3 combo M.2 module --- AW-XB547NF. The AW-XB547NF is a highly integrated single-chip that support 2-stream 802.11ax solutions with Multi-user MIMO (Multiple-Input, Multiple-Output) with Wireless LAN (WLAN) PCI Express network interface controller with integrated Bluetooth 5 USB interface controller. It combines a WLAN MAC, a 2T2R capable WLAN baseband, and RF in single chip.

The AW-XB547NF baseband implements Multi-user Multiple Input, Multiple Output (MU-MIMO)Orthogonal Frequency Division Multiplexing (OFDM) with two transmit and two receive paths (2T2R).Features include two spatial stream transmissions, short Guard Interval (GI) of 400ns, spatial spreading, and support for variant channel bandwidth. Moreover, AW-XB547NF provides one spatial stream space-time block code (STBC), Transmit Beamforming (TxBF) and Low Density Parity Check (LDPC) to extend the range of transmission. At the receiver, extended range and good minimum sensitivity is achieved by having receiver diversity up to 2 antennas. As the recipient, the AW-XB547NF also supports explicit sounding packet feedback that helps senders with beamforming capability.

For legacy compatibility, Direct Sequence Spread Spectrum (DSSS), Complementary Code Keying (CCK) and OFDM baseband processing are included to support all IEEE 802.11b, 802.11g and 802.11a data rates. Differential phase shift keying modulation schemes, DBPSK and DQPSK with data scrambling capability are available, and CCK provides support for legacy data rates, with long or short preamble. The high speed FFT/IFFT paths, combined with BPSK, QPSK, 16QAM, 64QAM and 256QAM, and 1024QAM modulation of the individual subcarriers, and rate compatible coding rate of 1/2, 2/3, 3/4, and 5/6, provide up to 1201Mbps for IEEE 802.11ax MIMO OFDM.

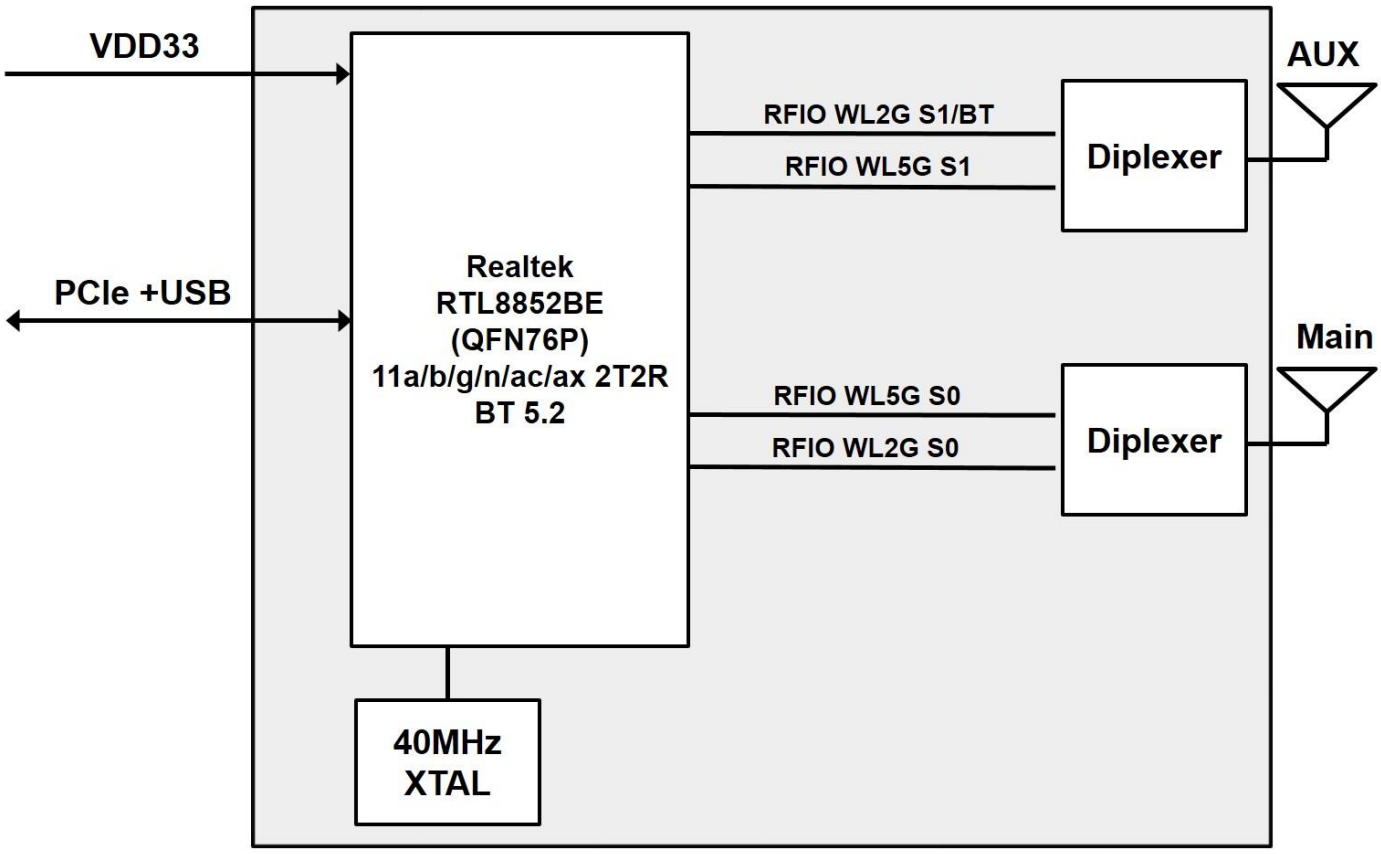
The RTL8852BE builds in an enhanced signal detector, an adaptive frequency domain equalizer, and a soft-decision Viterbi decoder to alleviate severe multi-path effects and mutual interference in the reception of multiple streams. For better detection quality, receive diversity with Maximal-Ratio-Combine (MRC) applying up to two receive paths, and Maximum-Likelihood Detection (MLD) are implemented. Robust interference detection and suppression are provided to protect against Bluetooth, cordless phone, and microwave oven interference. Receive vector

diversity for multi-stream application is implemented for efficient utilization of the MIMO channel. Efficient IQ-imbalance, DC offset, phase noise, frequency offset, and timing offset compensations are provided for the radio frequency front-end.

The RTL8852BE supports fast receiver Automatic Gain Control (AGC) with synchronous and asynchronous control loops among antennas, antenna diversity functions, and adaptive transmit power control functions to obtain better performance in the analog portions of the transceiver.

The RTL8852BE MAC supports 802.11e for multimedia applications, 802.11i and WAPI for security, and 802.11n/802.11ac for enhanced MAC protocol efficiency. Using packet aggregation techniques such as A-MPDU with BA and A-MSDU, protocol efficiency is significantly improved. Power saving mechanisms such as Legacy Power Save, U-APSD, and MIMO power saving reduce the power wasted during idle time, and compensate for the extra power required to transmit MIMO OFDM. The RTL8852BE provides simple legacy, 20MHz/40MHz/80MHz co-existence mechanisms to ensure backward and network compatibility.

1.2 Block Diagram



AW-XB547NF BLOCK DIAGRAM

1.3 Specifications Table

1.3.1 General

Features	Description
Product Description	IEEE 802.11a/b/g/n/ac/ax Wireless LAN 2T2R and Bluetooth 5.3 Combo Module (M.2 2230)
Major Chipset	RTL8852BE
Host Interface	Wi-Fi +BT ● PCI-E + USB
Dimension	22mm x 30mm x 2.25mm (Tolerance remarked in mechanical drawing)
Form factor	M.2 2230 A-E Key
Antenna	I-PEX MHF4 Connector Receptacle (20449) ANT1(AUX)：WiFi/Bluetooth → TX/RX ANT2(Main)：WiFi → TX/RX
Weight	3g

1.3.2 WLAN

Features	Description
WLAN Standard	IEEE 802.11 a/b/g/n/ac/ax 2T2R
WLAN VID/PID	10EC/ B852
WLAN SVID/SPID	1A3B/ 5470
Frequency Rage	2.4 GHz：2.412 ~ 2.484 GHz 5 GHz：4.915 ~5.925GHz
Modulation	DSSS, OFDM, DBPSK, DQPSK, CCK, 16-QAM, 64-QAM, 256-QAM, 1024-QAM
Number of Channels	**2.4GHz** ■ USA, NORTH AMERICA, Canada and Taiwan – 1 ~ 11 ■ China, Australia, Most European Countries – 1 ~ 13 ■ Japan, 1 ~ 14 (CH14 only for 802.11b) **5GHz** ■ USA, EUROPE – 36, 40, 44, 48, 52, 56, 60, 64, 100, 104, 108, 112, 116, 120, 124, 128, 132, 136, 140, 149, 153, 157, 161, 165

Output Power
(Board Level Limit)*

2.4G

	Min	Typ	Max	Unit
11b (11Mbps) @EVM<8%	17.5	19	20.5	dBm
11g (54Mbps) @EVM≦-25 dB	16.5	18	19.5	dBm
11n (HT20 MCS7) @EVM≦-28 dB	15.5	17	18.5	dBm
11n (HT40 MCS7) @EVM≦-28 dB	15.5	17	18.5	dBm
11ax (HE20 MCS11) @EVM≦-35 dB	15.5	17	18.5	dBm
11ax (HE40 MCS11) @EVM≦-35 dB	13.5	15	16.5	dBm

5G

	Min	Typ	Max	Unit
11a (54Mbps) @EVM<-25 dB	16.5	18	19.5	dBm
11n (HT20 MCS7) @EVM≦-28 dB	15.5	17	18.5	dBm
11n (HT40 MCS7) @EVM≦-28 dB	15.5	17	18.5	dBm
11ac (VHT20 MCS8) @EVM≦-30 dB	14.5	16	17.5	dBm
11ac (VHT40 MCS9) @EVM≦-32 dB	13.5	15	16.5	dBm
11ac (VHT80 MCS9) @EVM≦-32 dB	13.5	15	16.5	dBm
11ax (HE20 MCS11) @EVM≦-35 dB	11.5	13	14.5	dBm
11ax (HE40 MCS11) @EVM≦-35 dB	11.5	13	14.5	dBm
11ax (HE80 MCS11) @EVM≦-35 dB	11.5	13	14.5	dBm

<table>
<tr><td>Receiver Sensitivity</td><td>
2.4G
<table>
<tr><th></th><th>Min</th><th>Typ</th><th>Max</th><th>Unit</th></tr>
<tr><td>11b (11Mbps)</td><td></td><td>-88</td><td>-85</td><td>dBm</td></tr>
<tr><td>11g (54Mbps)</td><td></td><td>-74</td><td>-71</td><td>dBm</td></tr>
<tr><td>11n (HT20 MCS7)</td><td></td><td>-72.5</td><td>-69.5</td><td>dBm</td></tr>
<tr><td>11n (HT40 MCS7)</td><td></td><td>-69.5</td><td>-66.5</td><td>dBm</td></tr>
<tr><td>11ax (HE20 MCS11)</td><td></td><td>-63</td><td>-60</td><td>dBm</td></tr>
<tr><td>11ax (HE40 MCS11)</td><td></td><td>-60</td><td>-57</td><td>dBm</td></tr>
</table>
5G
<table>
<tr><th></th><th>Min</th><th>Typ</th><th>Max</th><th>Unit</th></tr>
<tr><td>11a (54Mbps)</td><td></td><td>-74</td><td>-71</td><td>dBm</td></tr>
<tr><td>11n (HT20 MCS7)</td><td></td><td>-72.5</td><td>-69.5</td><td>dBm</td></tr>
<tr><td>11n (HT40 MCS7)</td><td></td><td>-69.5</td><td>-66.5</td><td>dBm</td></tr>
<tr><td>11ac(VHT20 MCS8)</td><td></td><td>-67.5</td><td>-64.5</td><td>dBm</td></tr>
<tr><td>11ac(VHT40 MCS9)</td><td></td><td>-62.5</td><td>-59.5</td><td>dBm</td></tr>
<tr><td>11ac(VHT80 MCS9)</td><td></td><td>-59.5</td><td>-56.5</td><td>dBm</td></tr>
<tr><td>11ax (HE20 MCS11)</td><td></td><td>-63</td><td>-60</td><td>dBm</td></tr>
<tr><td>11ax (HE40 MCS11)</td><td></td><td>-60</td><td>-57</td><td>dBm</td></tr>
<tr><td>11ax(HE80 MCS11)</td><td></td><td>-57</td><td>-54</td><td>dBm</td></tr>
</table>
</td></tr>
<tr><td>Data Rate</td><td>WLAN:
802.11b: 1, 2, 5.5, 11Mbps
802.11a/g: 6, 9, 12, 18, 24, 36, 48, 54Mbps
802.11n: up to 150Mbps-single
802.11n: up to 300Mbps-2x2 MIMO
802.11ac:up to 173.3Mbps (20MHz channel)
802.11ac:up to 400Mbps (40MHz channel)
802.11ac:up to 866.7Mbps (80MHz channel)
802.11ax:up to 1.2Gbps (80MHz channel)</td></tr>
<tr><td>Security</td><td>WAPI
WEP 64-bit and 128-bit encryption with H/W TKIP processing
WPA/WPA2/WPA3 (Wi-Fi Protected Access)
AES-CCMP hardware implementation as part of 802.11i security standard</td></tr>
</table>

* If you have any certification questions about output power please contact FAE directly.

1.3.3 Bluetooth

Features	Description
Bluetooth Standard	Bluetooth 5.3
Bluetooth VID/PID	13D3/ 3570

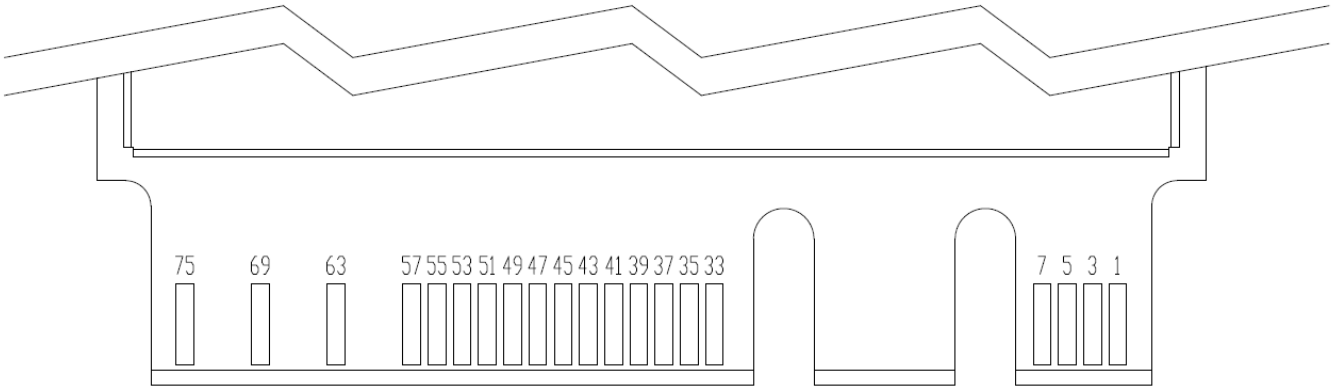
<table>
<tr><td>Frequency Rage</td><td>2402~2480MHz</td></tr>
<tr><td>Modulation</td><td>GFSK (1Mbps), Π/4 DQPSK (2Mbps) and 8DPSK (3Mbps)</td></tr>
<tr><td>Output Power</td><td>
<table>
<tr><th></th><th>Min</th><th>Typ</th><th>Max</th><th>Unit</th></tr>
<tr><td>BDR</td><td>2</td><td>4</td><td>6</td><td>dBm</td></tr>
<tr><td>EDR</td><td>2</td><td>4</td><td>6</td><td>dBm</td></tr>
<tr><td>Low Energy (1MHz)</td><td>2</td><td>4</td><td>6</td><td>dBm</td></tr>
<tr><td>Low Energy (2MHz)</td><td>2</td><td>4</td><td>6</td><td>dBm</td></tr>
</table>
</td></tr>
<tr><td>Receiver Sensitivity</td><td>
<table>
<tr><th></th><th>Min</th><th>Typ</th><th>Max</th><th>Unit</th></tr>
<tr><td>BDR
(BER<0.1%)</td><td></td><td>-82</td><td>-79</td><td>dBm</td></tr>
<tr><td>EDR (π/4 DQPSK)
(BER<0.07%)</td><td></td><td>-82</td><td>-79</td><td>dBm</td></tr>
<tr><td>EDR (8PSK)
(BER<0.07%)</td><td></td><td>-80</td><td>-77</td><td>dBm</td></tr>
<tr><td>BLE(1M)
(PER<-30.8%)</td><td></td><td>-85</td><td>-82</td><td>dBm</td></tr>
<tr><td>BLE(S=2)
(PER<-30.8%)</td><td></td><td>-88</td><td>-85</td><td>dBm</td></tr>
<tr><td>BLE(S=8)
(PER<-30.8%)</td><td></td><td>-88</td><td>-85</td><td>dBm</td></tr>
<tr><td>BLE(2M)
(PER<-30.8%)</td><td></td><td>-85</td><td>-82</td><td>dBm</td></tr>
</table>
</td></tr>
</table>

1.3.4 Operating Conditions

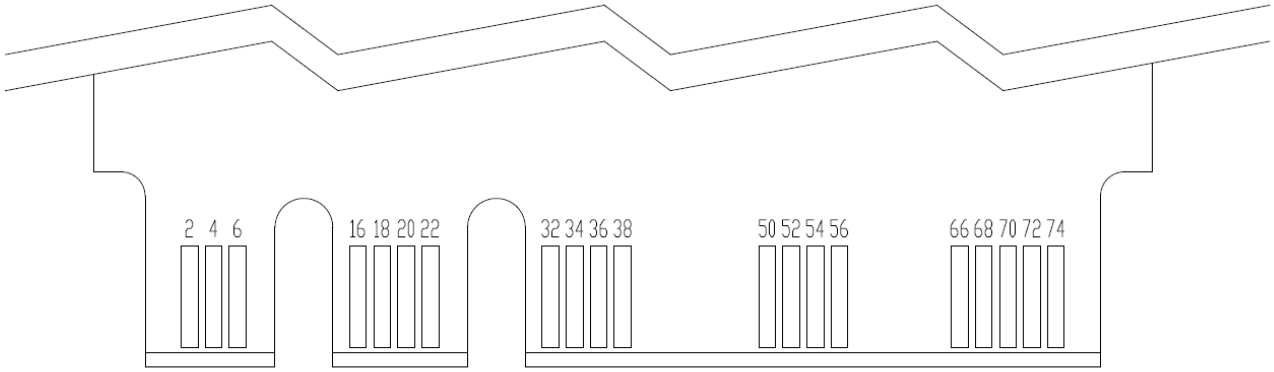
Features	Description
Operating Conditions	
Voltage	Power supply for host:3.3V
Operating Temperature	0℃~70℃
Operating Humidity	less than 85%R.H.
Storage Temperature	-30℃~ 85℃
Storage Humidity	less than 60%R.H.
ESD Protection	
Human Body Model	N/A
Changed Device Model	N/A

2. Pin Definition

2.1 Pin Map



AW-XB547NF Pin Map (Top View)



AW-XB547NF Pin Map (Bottom View)

2.2 Pin Table

Pin No	Definition	Basic Description	Voltage	Type
1	GND	Ground.		GND
2	3.3V	3.3V power supply	3.3V	VCC
3	USB_D_P	USB Differential signal		I/O
4	3.3V	3.3V power supply	3.3V	VCC
5	USB_D_N	USB Differential signal		I/O
6	LED_WLAN_L	Active low signal. The signal is used to provide status indicators via LED.		Output
7	GND	Ground.		GND
16	LED_BT_L	Active low signal. The signal is used to provide status indicators via LED.		Output
18	GND	Ground.		GND
20	BT_WAKE_HOST	BT wake Host. No function, please don't connect to this pin. We suggest configuring the control pin in in platform side as open-drain.		N/A
22	RESERVED	Please don't connect to this pin.		N/A
32	RESERVED	Please don't connect to this pin.		N/A
33	GND	Ground.		GND
34	RESERVED	Please don't connect to this pin.		N/A
35	PERp0	Differential receive.		Input
36	RESERVED	Please don't connect to this pin.		N/A
37	PERn0	Differential receive.		Input
38	BT_WAKE	Host wake BT. No function, please don't connect to this pin.		N/A

		We suggest configuring the control pin in in platform side as open-drain.		
39	GND	Ground.		GND
41	PETp0	Differential transmit.		Output
43	PETn0	Differential transmit.		Output
45	GND	Ground.		GND
47	REFCLKP	Differential reference clock.		Input
49	REFCLKN	Differential reference clock.		Input
50	SUSCLK	External 32K or RTC clock input. (RTK didn't use the external clock, recommend disabled)		input
51	GND	Ground.		GND
52	PERST0	PCI Express Reset Signal: active low. When the PERST# is asserted at power-on state, the RTL8852BE returns to a pre-defined reset state and is ready for initialization and configuration after the de-assertion of the PERST#		Input
53	CLKREQ0	Reference clock request	3.3V	Output
54	BT_DISABLE	BT disable control.	3.3V	Input
55	PEWAKE#	Open Drain active Low signal. This signal is used to request that the system return from a sleep/suspended state to service a function initiated wake event.		OUT
56	W_DISABLE1#	This pin can be defined as the WLAN Radio-off function with host interface remaining connected. When this pin is pulled low, WLAN function will be Radio-off. When this function is not required, external pull high is not required. We suggest configuring the control pin in in platform side as open-drain.		IN
57	GND	Ground.		GND
63	GND	Ground.		GND

66	NC	Floating Pin, No connect to anything.		Floating
68	NC	Floating Pin, No connect to anything.		Floating
69	GND	Ground.		GND
70	NC	Floating Pin, No connect to anything.		Floating
72	3.3V	3.3V power supply	3.3V	VCC
74	3.3V	3.3V power supply	3.3V	VCC
75	GND	Ground.		GND

3. Electrical Characteristics

3.1 Recommended Operating Conditions

Symbol	Parameter	Minimum	Typical	Maximum	Unit	Peak Current
VD33	I/O voltage	3.0	3.3	3.6	V	2A

3.2 Digital IO Pin DC Characteristics

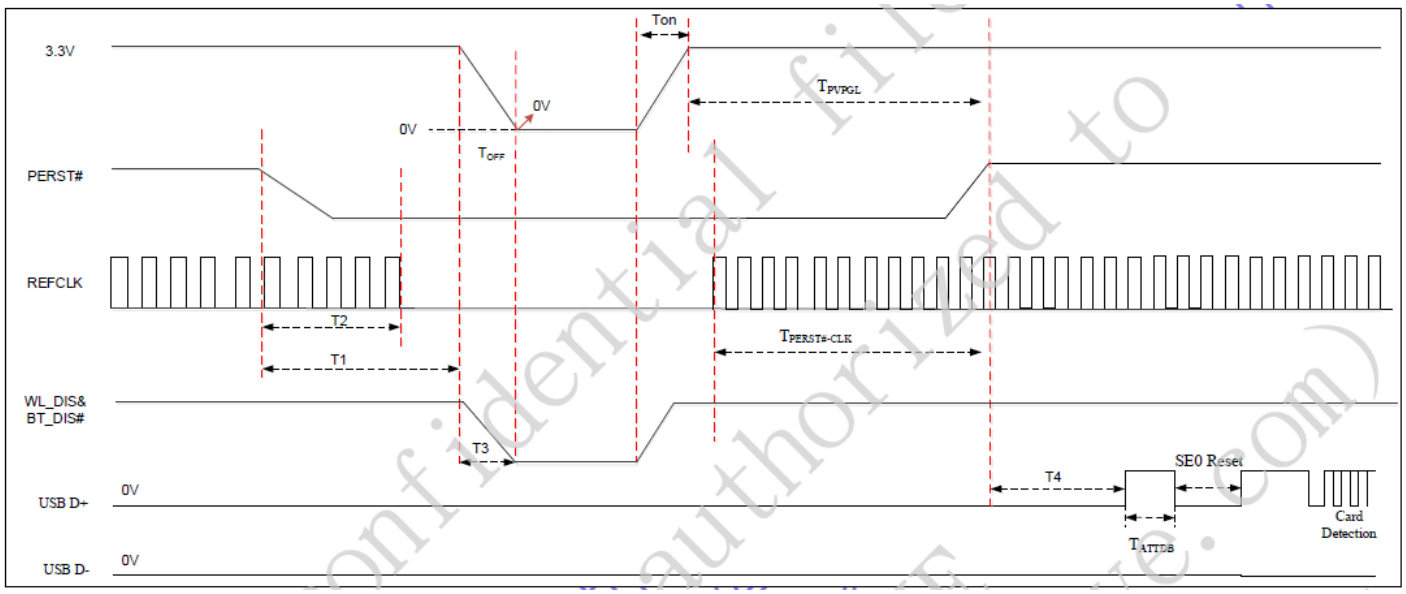
Table 1. 3.3V IO DC Characteristics

Symbol	Parameter	Minimum	Typical	Maximum	Unit
V_{IH}	Input high voltage	2.0	3.3	3.6	V
V_{IL}	Input low voltage	--	0	0.9	V
V_{OH}	Output high voltage	2.97	--	3.3	V
V_{OL}	Output low voltage	0	--	0.33	V

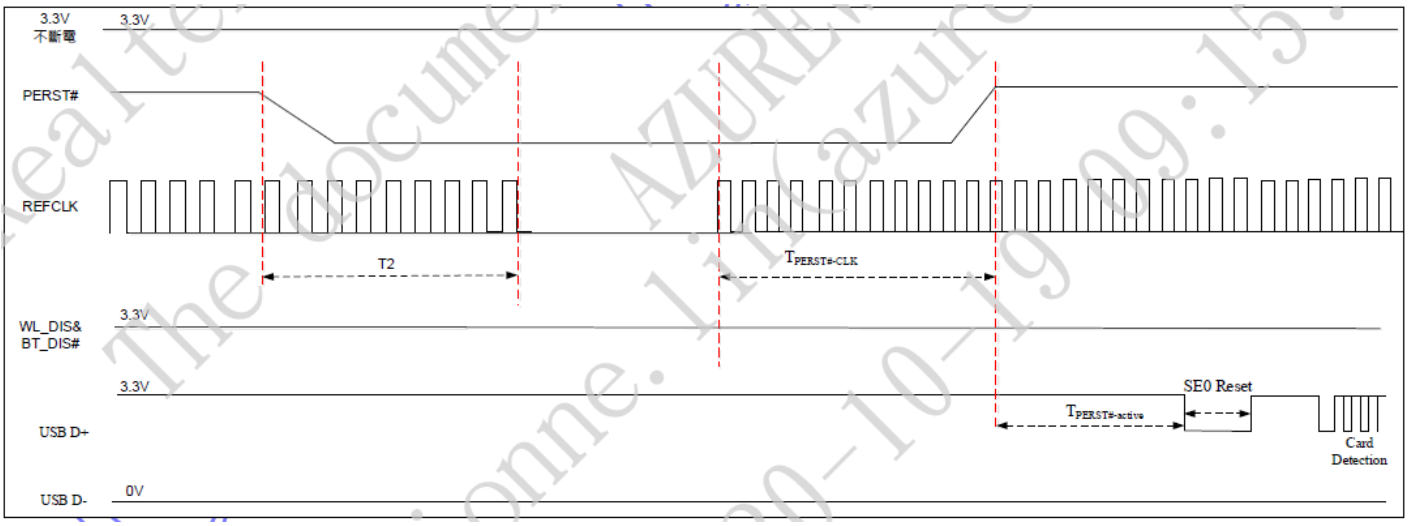
3.3 PCIE Interface

3.3.1 Power up Timing Sequence

3.3.1.1 When WLAN is power off



3.3.1.2 When WLAN is NOT power off



T_{on}: The main power ramp up duration

T_{off}: The main power off duration

T_{PVPGL}: Power valid PERST# input inactive

$T_{PERST\#-CLK}$: Reference clock stable before PERST# inactive

T_{ATTDB}: The debounce interval with a minimal duration of 100ms that provided by the USB system

software

$T_{SE0\ Reset}$: USB host send SE0 Reset duration

$T_{PERST\#-active}$: PCI-e initial duration after PERST# inactive

Note:

1. T1: PERST# goes active before the power on the connector is removed.
2. T2: Clock to inactive after PERST# goes active.
3. T3: WL_DIS# and BT_DIS# goes asserted when the power on the connector is removed.
4. T4: USB D+ go active after PERST# goes inactive.
5. T1/T2/T3/T4 timing value should large than 0.

Table 3. The typical timing range

Symbol	Unit	Min	Typical	Max
T_{on}	ms	0.5	1.5	5
T_{off}	ms	1.5	--	--
T_{PVPGL}	ms	Implementation specific; recommended 50ms	--	--
$T_{PERST\#-CLK}$	us	100		--
T_{ATTDB}	ms	100	--	--
$T_{SE0\ Reset}$	ms	10	--	--
$T_{PERST\#-active}$	ms	10	--	--

3.3.2 PCIE PERST# Timing Sequence

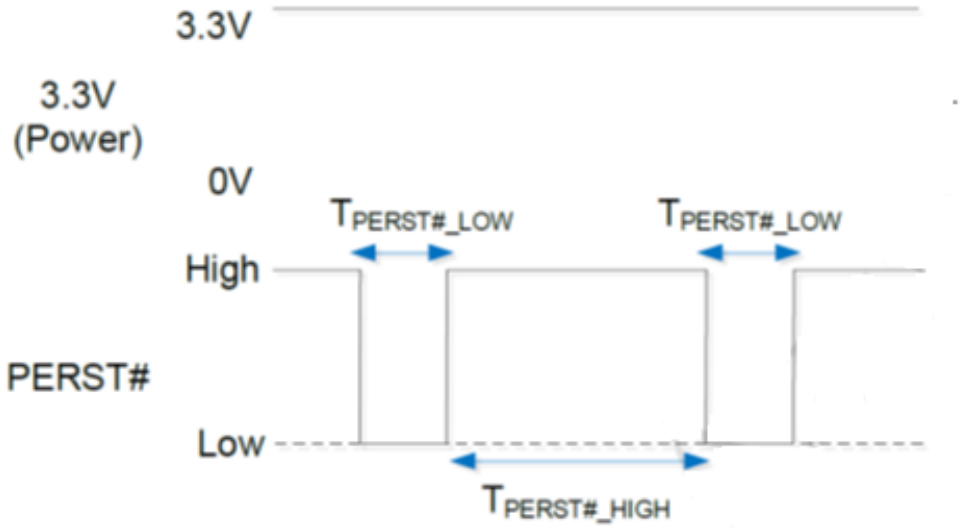


Table 4. PERST# Timing Parameters

	Min	Typical	Max	Unit	Description
$T_{PERST\#\_LOW}$	6	10	X	ms	PERST# low duration
$T_{PERST\#\_HIGH}$	400	500	X	ms	PERST# high duration

3.3.3 PCIE Power Off Sequence

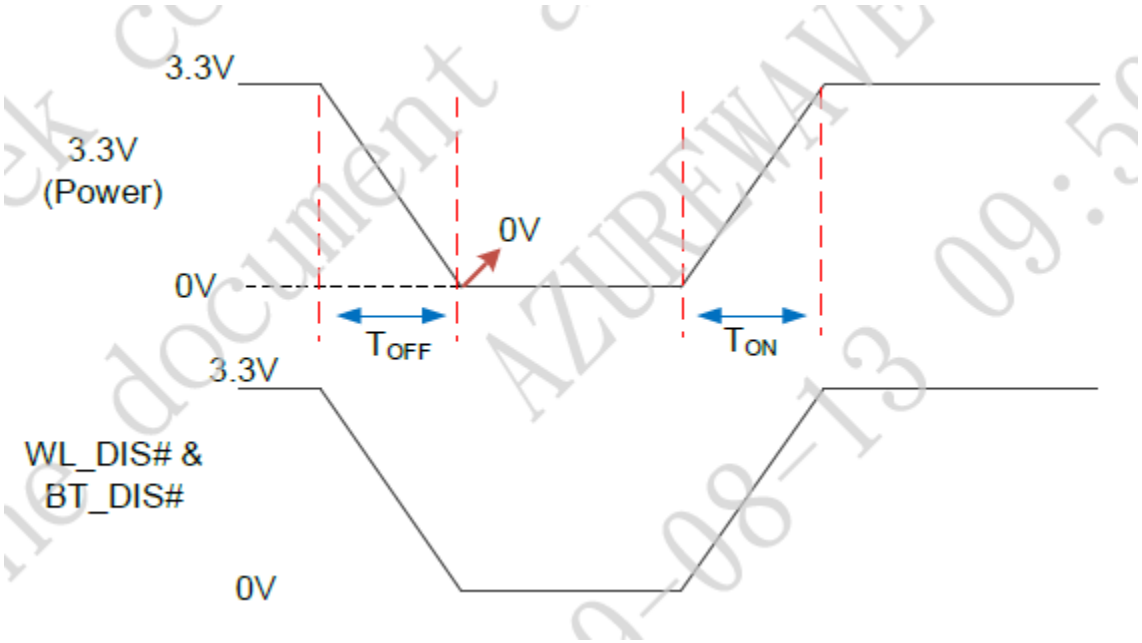
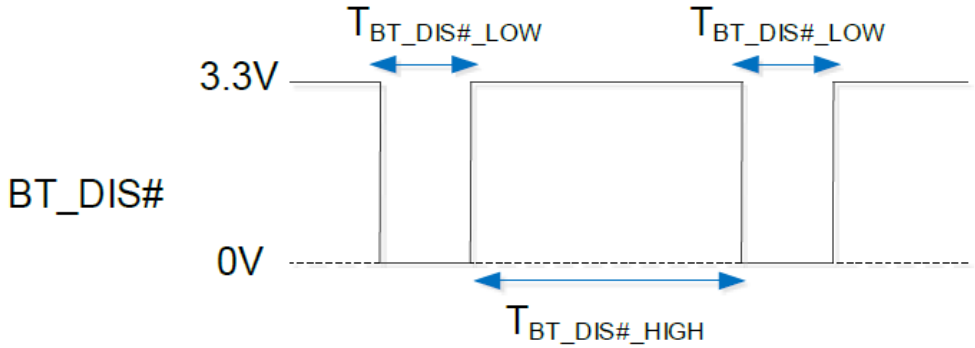


Table 5. PCIE Power Off Timing Parameters

	Min	Typical	Max	Unit	Description
T_{OFF}	1.5	--	--	ms	Measure point start on 100% Measure point end on 0% (must be 0V)
T_{ON}	0.5	1.5	5	ms	Measure point start on 0%(must be 0V) Measure point end on 100%

Note: If BT_DIS# can't connect to the same power source with 3.3V, it need to be de-asserted before PERST# with 100ms in power on sequence.

3.3.4 BT_DIS Timing Sequence



	Min	Typical	Max	Unit	Description
BT_DIS#_LOW	200	--	--	ms	BT_DIS# low duration
BT_DIS#_HIGH	500	--	--	ms	BT_DIS# high duration

3.4 Power Consumption*

3.4.1 WLAN

Band (GHz)	Mode	BW (MHz)	Link Speed (Mbps)	Voltage=3.3V			
				Transmit		Receive	
				Max.	Avg.	Max.	Avg.
2.4	802.11b	20	11	577.3	524.4	376.1	227.9
	802.11g	20	54	460.8	524.7	199.5	191.0
	802.11n	20	144.4	554.5	534.9	186.1	182.4
		40	300	596.9	563.3	217.3	193.3
	802.11ax	20	286.5	567.4	537.6	190.1	178.8
		40	573.5	617.6	532.4	217.9	208.1
5	802.11a	20	54	680.1	653.5	226.0	219.3
	802.11n	20	144.4	863.4	822.3	198.0	188.6
		40	300	864.7	824.1	210.6	202.7
	802.11ac	20	173.3	870.6	772.1	199.9	192.5
		40	400	817.4	776.8	220.1	208.2
		80	866.7	769.5	711.2	259.3	251.8
	802.11ax	20	286.5	770.4	695.3	190.6	182.9
		40	573.5	749.4	699.3	221.5	190.4
		80	1201	678.3	645.7	292.7	251.22

* The power consumption is based on AzureWave test environment, these data for reference only.

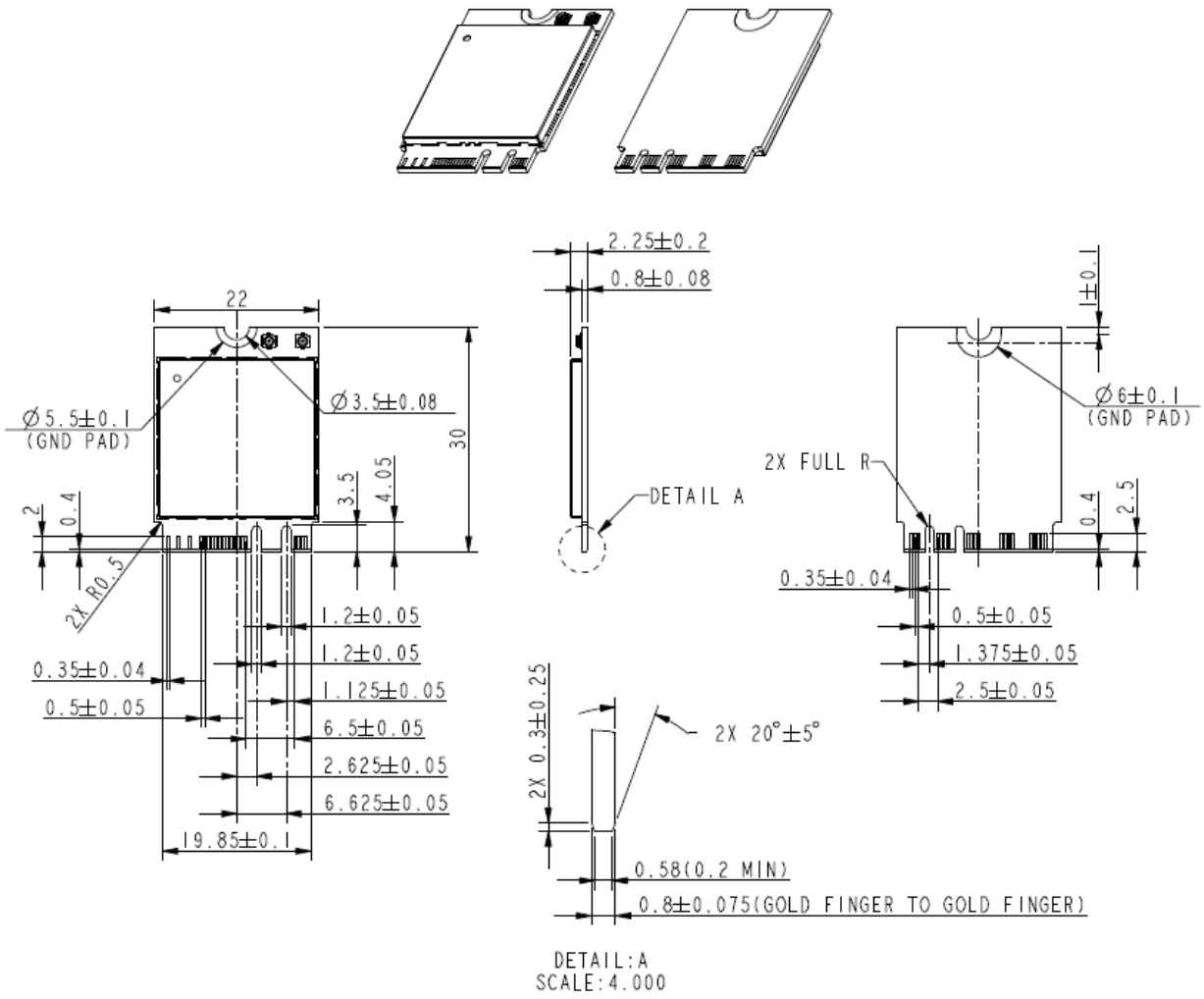
3.4.2 Bluetooth

No.	Mode	Voltage=3.3 V	
		Max.	Avg.
1	Bluetooth RF Off	8.9	1.3
2	No Connection with any BT device	32.7	8.9
3	Connect BT Device	38.1	26.1
4	Transmit by BER 2.1	67.3	54.5
5	Receiver by BER 2.1	43.9	36.4

* The power consumption is based on AzureWave test environment, these data for reference only.

4. Mechanical Information

4.1 Mechanical Drawing



TOLERANCES UNLESS OTHERWISE SPECIFIED:±0.15mm

5. Packaging Information

5.1 160pcs M.2 2230 modules put in the one bottom tray

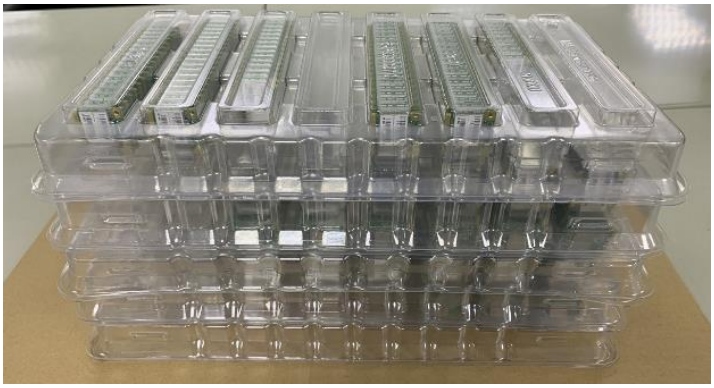
(將產品插入 Tray 盤內，金手指端在右側處，天線端在左側處，遮罩蓋面向 Tray 盤上面右下角的箭頭，按照順序（1~160）將產品放入 Tray 盤內，整盤 Tray 可放 160 片產品)

5.2 One cover tray put on bottom tray

(將 Tray 盤的上蓋蓋上，注意 Cover 的箭頭要與 Tray 盤的箭頭對應)

5.3 **5pcs tray** (cover + bottom) stacked together

重複步驟 1 和步驟 2，將 **5 盤**產品疊加起來，注意 **5 盤**產品的 Tray 及 Cover 的箭頭對應在同一個位置



5.4 Use P.P Strap to pack 5 trays

(**5 盤**為一疊，用打帶機將 **5 盤**產品打上束線帶)

備註：1pcs Tray 可以裝的產品數量為 160pcs，1pcs 內箱可以裝 5pcs Tray，所以可以裝的產品數量為 800pcs，1 整箱內有 2 內箱共 1600pcs

5.5 Put packed trays into inner box
(將捆綁好的產品放入內箱)

5.6 Seal the inner box by AzureWave tape
(使用海華 Logo 膠帶將內箱進行工字型封箱)

5.7 One package label pasted in side of inner box
(在內箱的側邊位置處 (如圖) 貼上**包裝單號標籤**)

Example:

5.8 Two inner boxes put into one carton; If only one inner box has modules, “Empty” label pasted on the other one inner box
(將兩個內箱裝入外箱，內箱開口處一面朝外箱有標識的一面；若只有 1 個內箱產品，需放 1 個空箱做填充並在空內箱上貼附**空箱標籤**)

Example:

5.9 Seal the carton by AzureWave tape
(使用海華 Logo 膠帶將外箱進行工字型封箱)

5.10 One carton label and box label pasted on the carton. If the carton is not full, one balance label pasted on the carton
(外箱上貼附**出貨標籤**和**箱號標籤**；如不滿箱，需貼附**尾數標籤**)

Example of carton label (出貨標籤的範例)	AzureWave AzureWave P/N Customer 由業務提供 Customer P/N 由業務提供 Customer PO 由業務提供 Description AW-XXXXXX QTY pcs C/N N.W. G.W. RoHS
Example of box label (箱號標籤)	BOX0012018
Example of balance label (尾數標籤)	尾 数 Balance