AzureWave Technologies, Inc.

AW-CU300A V3

IoT Connectivity Module for AWS IoT Core

Datasheet

Rev. A

DF

For Amazon

Features

WLAN

- Support 802.11 b/g/n
- Single stream 802.11n with 20 MHz
  Up to MCS7 data rates (72.2 Mbps)
- Antenna Diversity:
  - Support Printed Antenna for Internal Antenna
  - Support U.FL Connector for External Antenna
- 4M Byte QSPI flash integrated.
- 74 pin LGA Module – 28 mm x 15 mm x 2.35 mm

MCU

- ARM Cortex-M4F, 32-bit, 200MHz main bus clock
- 128KB ROM, 512KB RAM

Certifications

- CE, FCC, IC, NCC

Revision History

Document NO: R2-2496-DST-03

Version	Revision Date	DCN NO.	Description	Initials	Approved
A	2021/01/04	DCN019858	● Draft version	Renton Tao	N.C Chen

Table of Contents

1. Introduction

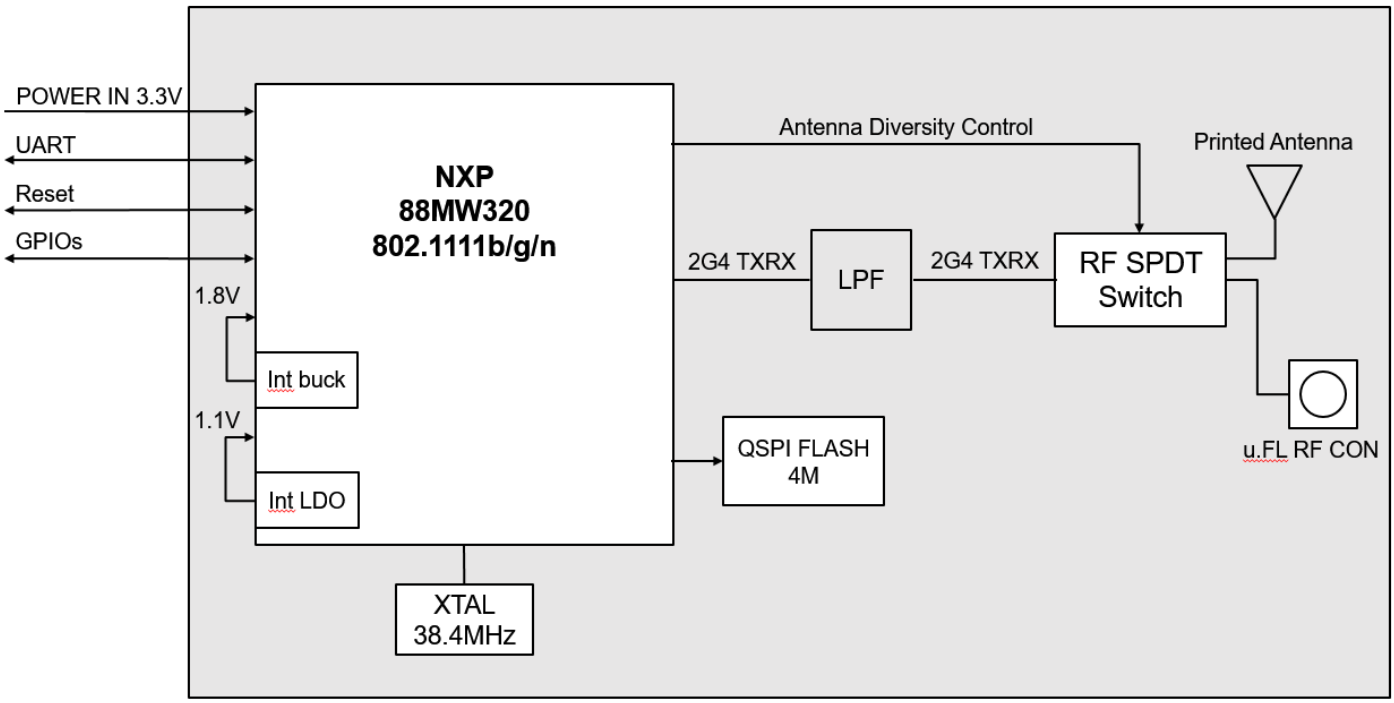
1.1 Product Overview

AzureWave presents **AW-CU300A V3** Wi-Fi Microcontroller Smart Energy Platform Solution provides a highly cost-effective, flexible and easy to-use hardware/software platform to build a new generation of connected, smart devices. These smart-connected devices enable device to deliver a broad-range of services to consumers including energy-management, demand-response, home automation and remote access. This allows a user to manage comfort and convenience, also run diagnostics and receive alerts and notifications, in addition to managing and controlling the device. Developers can leverage the rich connectivity features of these new smart devices to create a new generation of innovative new applications and services

The platform builds upon the success of NXP's first-generation Wi-Fi microcontroller platform using the NXP 88MW320 Wi-Fi System-on-Chip (SoC), a 4MByte QSPI flash memory and NXP Easy Connect software.

The **AW-CU300A V3** is powered by production quality, field-tested NXP Easy Connect software that includes a rich set of software components that work together to support the development of Smart Energy devices, and enable these devices to connect to mobile clients such as smart-phones, Internet-based Cloud and Smart-Grid services. The feature-rich software stack enables OEMs to focus on application-specific software functionality, thus enabling rapid development and reduced software development costs and risks.

1.2 Block Diagram



Block Diagram of AW-CU300A V3

1.3 Specifications Table

1.3.1 General

Features	Description
Product Description	IoT Connectivity Module for AWS IoT Core
Major Chipset	NXP 88MW320 + 4MB QSPI flash
Host Interface	UART
Dimension	28 mm x 15 mm x 2.35 mm
Package	74-pin LGA
Weight	TBD

1.3.2 WLAN

<table>
<tr><th>Features</th><th>Description</th></tr>
<tr><td>WLAN Standard</td><td>IEEE802.11 b/g/n</td></tr>
<tr><td>Frequency Rage</td><td>2.4 GHz ISM Bands 2.412-2.472 GHz</td></tr>
<tr><td>Modulation</td><td>DSSS, OFDM, DBPSK, DQPSK, CCK, 16-QAM, 64-QAM</td></tr>
<tr><td>Number of Channels</td><td>2.4GHz:
■ USA, NORTH AMERICA, Canada and Taiwan - 1 ~ 11
■ China, Australia, Most European Countries - 1 ~ 13
■ Japan, 1 ~ 13</td></tr>
<tr><td>Output Power
(Board Level Limit)*</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)
@EVM<35%</td><td>15.5</td><td>17</td><td>18.5</td><td>dBm</td></tr>
<tr><td>11g (54Mbps)
@EVM≦-27 dB</td><td>12.5</td><td>14</td><td>15.5</td><td>dBm</td></tr>
<tr><td>11n (HT20 MCS7)
@EVM≦-28 dB</td><td>11.5</td><td>13</td><td>14.5</td><td>dBm</td></tr>
</table>
* FCC/CE output power limit spec:
- Refer to “2.4 CERTIFICATIONS FCC/ETSI WIFI 2.4GHZ POWER TABLE”</td></tr>
</table>

<table>
<tr><td>Receiver Sensitivity</td><td>2.4G
<table>
<tr><td></td><td>Min</td><td>Typ</td><td>Max</td><td>Unit</td></tr>
<tr><td>11b (11Mbps)</td><td>-</td><td>-84</td><td></td><td>dBm</td></tr>
<tr><td>11g (54Mbps)</td><td>-</td><td>-69</td><td></td><td>dBm</td></tr>
<tr><td>11n (HT20 MCS7)</td><td>-</td><td>-66</td><td></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 : Maximum data rates up to 72.2 Mbps (20 MHz channel)</td></tr>
<tr><td>Security</td><td>WPA/WPA3</td></tr>
</table>

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

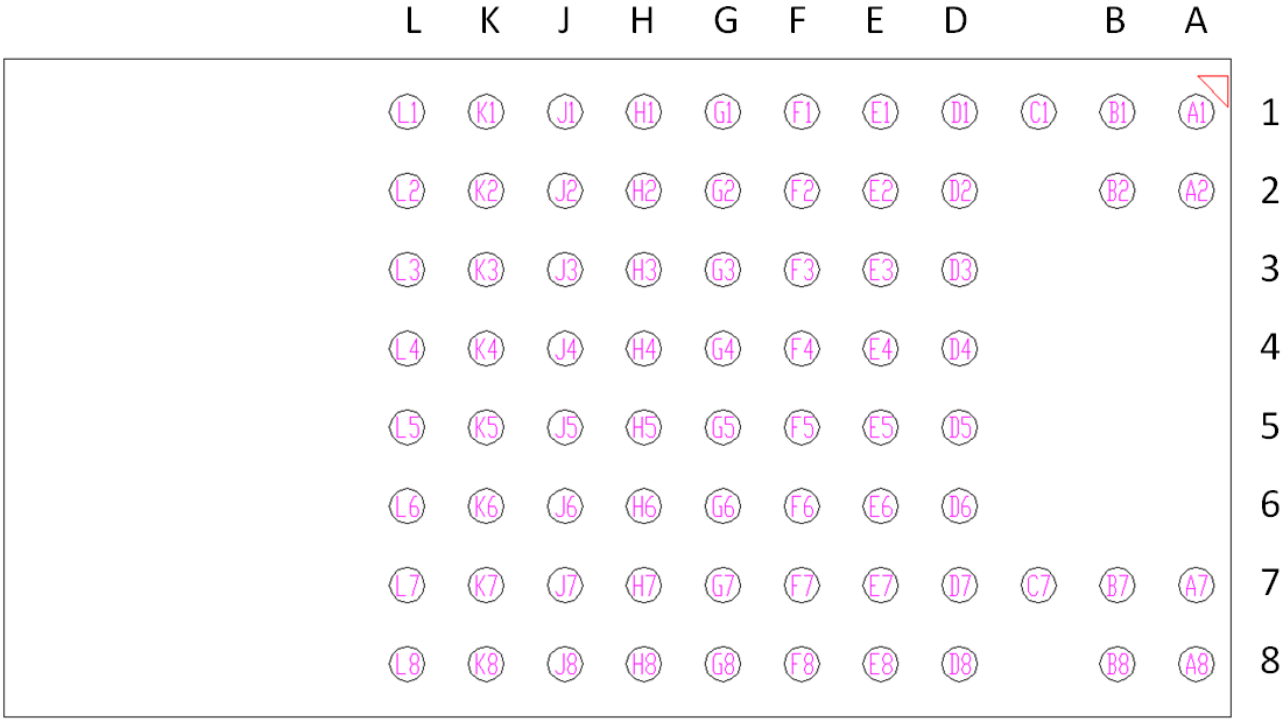
1.3.3 Operating Conditions

Features	Description
Operating Conditions	
Voltage	3.3V +-5%
Operating Temperature	-30 ~ 85℃
Operating Humidity	<85% (non condensing)
Storage Temperature	-40 to +85 °C
Storage Humidity	<60% (non condensing)
ESD Protection	
Human Body Model	TBD
Changed Device Model	TBD

2. Pin Definition

2.1 Pin Map

AW-CU300A V3 pin out drawing (top view).



TOP VIEW

2.2 Pin Table

2.2.1 Power

Pin No	Definition	Basic Description	Type	Level
E7	B_3V3	3.3V Power input	PWR	3.3V
D7	M_3V3	3.3V Power input	PWR	3.3V

2.2.2 GPIO

Pin No	Definition	Basic Description	Type	Level
K1	GPIO_4	EN pin	I/O	3.3V
K2	GPIO_5	INT pin	I/O	3.3V
J7	GPIO_10	MSG pin	I/O	3.3V
G8	GPIO_26	32KHzCLK_OUT	I/O	3.3V
G1	GPIO_48	UART TXD	I/O	3.3V
G2	GPIO_49	UART RXD	I/O	3.3V
G7	GPIO_25	32KHz_CLK_IN	I/O	3.3V
K7	RESETN	RESETN	I/O	3.3V (internal pull high 51k ohm)
E4(1)	GPIO_28		I/O	3.3V
E5(1)	GPIO_29		I/O	3.3V
D6(1)	GPIO_30		I/O	3.3V
D4(1)	GPIO_31		I/O	3.3V
E3(1)	GPIO_32		I/O	3.3V
D5(1)	GPIO_33		I/O	3.3V

NOTE (1): Dummy pin E4, E5, D6, D4, E3, and D5.

2.2.3 GND

Pin No	Basic Description
A1	GND
A2	
A7	
A8	
B1	
B2	

Pin No	Basic Description
H4	GND
H5	
H6	
J3	
J4	
J5	

B7		J6	
B8		K3	
C1		K4	
C7		K5	
D1		K6	
D8		L1	
F4		L2	
F5		L3	
G3		L4	
G4		L5	
G5		L6	
G6		L8	
H3			

2.2.4 NC

Pin No	Basic Description	Remark
L7	DNS(Don't connect)	
H1		
H2		
J1		
J2		
E2		
K8		
H8		
H7		
J8		
E6		
F6		
F8		
F7		
F3		
G8		
D2		
D3		
E1		
E8		
F1		
F2		

3. Electrical Characteristics

3.1 Absolute Maximum Ratings

Symbol	Parameter	Pin No	Min	Typ	Max	Units
B_3V3	3.3V power supply	E7		3.3	3.6	V
M_3V3	3.3V power supply	D7		3.3	3.6	V

3.2 Recommended Operating Conditions

Symbol	Parameter	Pin No	Min	Typ	Max	Units
B_3V3	3.3V power supply	E7	3.0	3.3	3.6	V
M_3V3	3.3V power supply	D7	3.0	3.3	3.6	V

3.3 Digital IO Pin DC Characteristics

3.3.1 3.3V Operation (M_3V3)

Symbol	Parameter	Minimum	Typical	Maximum	Unit
V_{IH}	Input high voltage	0.7* M_3V3	-	M_3V3+0.4	V
V_{IL}	Input low voltage	-0.4	-	0.3* M_3V3	
V_{OH}	Output High Voltage	M_3V3-0.4	-	-	
V_{OL}	Output Low Voltage	-	-	0.4	
V_{HYS}	Input Hysteresis	100			mV

3.4 Power Consumption

- CURRENT consumption (normal/POWER SAVING MODES)

Power Supply=3.3V				
MCU Status	WiFi Deep Sleep	WiFi STA Connected	WiFi IEEE Power Saving	WiFi Power Down
	200Mhz	200Mhz	200Mhz	200Mhz
PM0(Active)	36.7	77.2	37.8	N/A*(1)
PM1(Idle)	27.6	67.9	28.8	N/A*(1)
PM2(Standby)	1.25	43.0	DTIM1=2.5 DTIM10=1.4	1.2
PM3(Sleep)	0.98	42.6	DTIM1=2.3 DTIM10=1.2	0.93
PM4(Shutdown)	0.95	42.5	DTIM1=2.1 DTIM10=1.1	0.90

Current Unit: mA

(1) The MCU gets its clock from the WiFi subsection. When WiFi is powered down, the MCU is forced to run off of the internal RC32M clock. NXP does not recommend this and hence this mode is not supported. Customers can instead put the WiFi in Deep Sleep to save power.

- CURRENT consumption (MFG WLAN TX /RX)

Item				Power Supply=3.3V			
Band (GHz)	Mode	BW (MHz)	RF Power (dBm)	Transmit		Receive	
				Max.	Avg.	Max.	Avg.
2.4	11b@1M	20	17	315.3	310.8	78.3	78.2
	11b@11M	20	17	301.7	295.9	78.5	78.4
	11g@54M	20	14	243.5	241.2	80.2	80.1
	11n@MCS7	20	13	233.8	230.6	80.3	80.1

*Current Unit: mA

Note: DUT set Adjust Packet gap with Sifs. Ext: Enter option: 35 1 1

3.5 Internal QSPI Flash

A QSPI Flash is used in AW-CU300A V3. The size of the internal QSPI Flash is 32Mbit (4MByte).

Manufacturer	Manufacturer's part number
GigaDevice	GD25Q series

3.6 External 32.768KHZ Crystal Requirement

An external 32.768kHz crystal can be used for low-power consumption. Below are the specifications for this crystal.

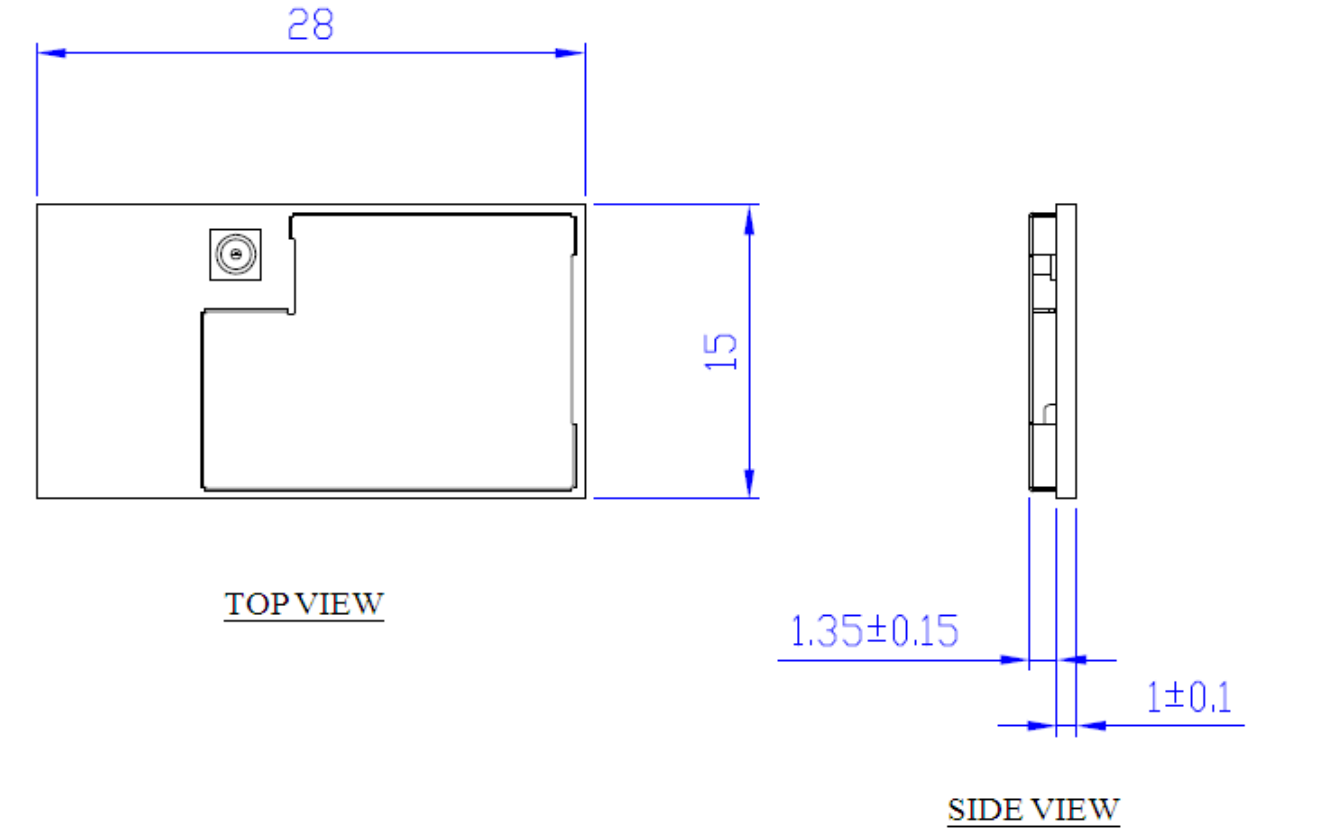
Parameter	Min	Typ	Max	Unit
Crystal Frequency		32.768		kHz
Frequency accuracy tolerance	-40		40	ppm
Startup time			600	ms
Duty cycle tolerance		50		%
Crystal load capacitance		12.5		pF
Crystal shunt capacitance			7	pF
ESR (Equivalent series resistance)			100	kOhm

4. Mechanical Information

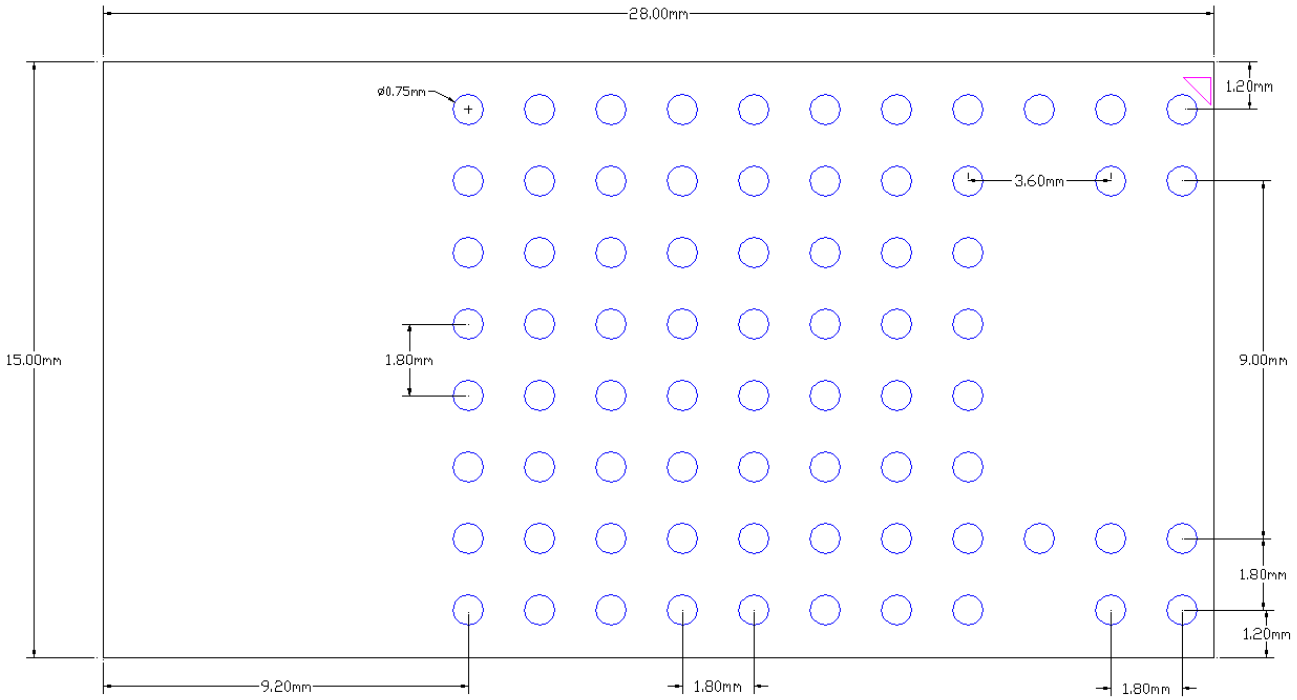
4.1 Mechanical Drawing

The size and thickness of the AW-CU300A V3 LGA package module is listed below:

- **AW-CU300A V3 Drawing**



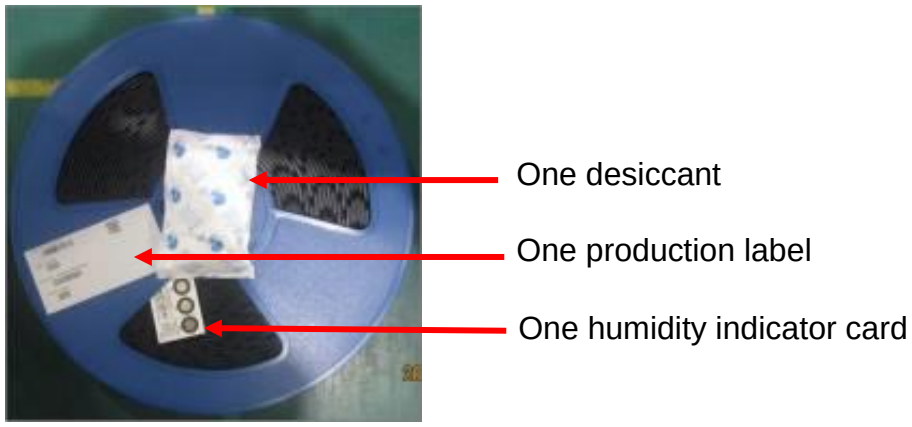
- AW-CU300A V3 TOP View PCB Layout Footprint



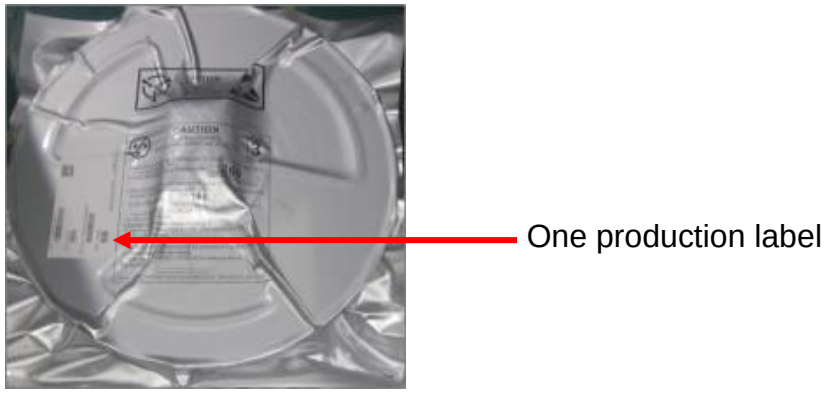
TOP VIEW

5. Packing Information

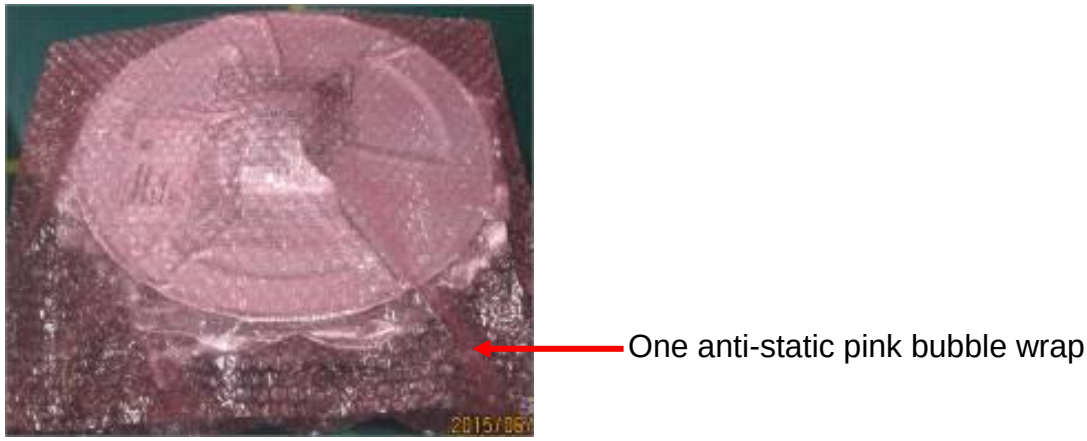
1. One reel can pack 3,000pcs modules
2. One production label is pasted on the reel, one desiccant and one humidity indicator card are put on the reel



3. One reel is put into the anti-static moisture barrier bag, and then one label is pasted on the bag



4. A bag is put into the anti-static pink bubble wrap



5. A bubble wrap is put into the inner box and then one label is pasted on the inner box

One production label

6. 5 inner boxes could be put into one carton

7. Sealing the carton by AzureWave tape

8. One carton label and one box label are pasted on the carton. If one carton is not full, one balance label pasted on the carton

Example of carton label	AzureWave Technologies Inc. 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: 1200 pcs C/N N.W. G.W. RoHS COMPLIANT
Example of box label	
Example of production label	
Example of balance label	

Note:

- **1 reel = 1 inner box = 1,000pcs**
- **1 carton = 3 inner boxes = 3 * 1,000pcs = 3,000pcs**

Appendix(for reference only)

A. FCC WIFI 2.4GHz power table:

PCB ANT(5.12dBi)/PIFA ANT(4dBi)/Dipole ANT(3dBi)/Monopole ANT(3dBi)

Peak: Peak power is for certification, which follow FCC KDB 558074 D01 DTS Meas Guidance v03r01

AVG: Average power measured by the power meter

AVG: Average power measured by the power meter

Test condition: Under limit 2.5dB

Mode:	11b		Data Rate:	1Mbps	Directional Gain (dBi):					
Channel	Frequency (MHz)	Power Setting	Chain0							
			Gain:	0.00						
			Avg (dBm)	Peak (dBm)						
1	2412	15	16.01	18.37						
6	2437	17	17.64	20.01						
11	2462	16	16.56	19.10						
Mode:	11g		Data Rate:	6Mbps						
1	2412	11	12.24	21.89						
6	2437	14	14.94	23.11						
11	2462	12	12.86	22.37						
Mode:	11n20 2.4G		Data Rate:	MCS0 6.5Mbps						
1	2412	9	10.31	19.01						
6	2437	13	13.58	22.11						
11	2462	11	11.68	20.67						

(a) ETSI WIFI 2.4GHz power table:

Mode:		Tx 11b					Data Rate:	1Mbps			Gain(dBi) :		5.12
Channel	Freq. (MHz)	Power Setting	Conducted AVG Power (dBm)					EIRP					
								Tnorm	Tmin		Tmax		Limit (dBm)
			Chain0				Total	Vnorm	Vnorm		Vnorm		
1	2412	12	13.40				13.40	18.52	18.99		18.02		20.00
7	2442	12	13.35				13.35	18.47	18.88		17.96		20.00
13	2472	13	13.68				13.68	18.80	19.14		18.26		20.00
Mode:		Tx 11g					Data Rate:	6Mbps			Gain(dBi) :		5.12
1	2412	13	14.19				14.19	19.31	19.78		18.81		20.00
7	2442	13	14.16				14.16	19.28	19.69		18.77		20.00
13	2472	13	13.97				13.97	19.09	19.43		18.55		20.00
Mode:		Tx 11n20 2.4G					Data Rate:	MCS0 6.5Mbps			Gain(dBi) :		5.12
1	2412	13	14.21				14.21	19.33	19.80		18.83		20.00
7	2442	13	14.19				14.19	19.31	19.72		18.80		20.00
13	2472	13	13.95				13.95	19.07	19.41		18.53		20.00

B. ANTENNA SPEC (FCC/CE CERTIFICATIONS)

Internal antenna with certifications FCC/CE:

- Printed antenna
  - Peak Gain 5.12dBi (2.4GHz~2.5GHz)

External antennas with certifications FCC/CE:

- Monopole antenna[FXP73.07.0100A, TAOGLAS]
  - Peak Gain 3dBi (2.4GHz~2.5GHz)
- Dipole antenna[PC11.07.0100A, TAOGLAS]
  - Peak Gain 3dBi (2.4GHz~2.5GHz)
- PIFA antenna[FXP74.07.0100A, TAOGLAS]
  - Peak Gain 4dBi (2.4GHz~2.5GHz)