

# **AW-CU507**

## **Bluetooth 5.0 IoT Stamp LGA Module**

### **Datasheet**

**Rev. B**

**DF**

**(For Standard)**

## Features

### MCU

- CPU:16MHz ARM Cortex M0 processor, programmable interrupt router
- Memory: 1 MB embedded Flash, 256 KB ROM, 128 KB RAM, and 4 KB OTP
- Retention RAM configuration:16KB to 128KB in 16KB step sizes
- Interface:I2C,SPI,UART,PWM,GPIO
- Quadrature decoder for mouse input (QDEC)
- 10bit application ADC
- Digital microphone Input (PDM)
- SWD for interactive debugging
- AES 128 hardware
- True random number generator(TRNG)

- Sensor Hub
- RF Wakeup Receiver
- Keyboard matrix controller (KSM)

### Bluetooth

- Compliant with Bluetooth 5.0 standard
- Support 1Mbps, 2Mbps, 500Kbps, 125Kbps
- Fully integrated RF front-end

### Antenna

- Internal Printed Antenna

## Revision History

Document NO: R2-2507-DST-01

Version	Revision Date	DCN NO.	Description	Initials	Approved
A	2021/01/29	DCN020205	<ul style="list-style-type: none"> <li>● Initial Version</li> </ul>	Steven Jian	Chihhao Liao
B	2022/02/22	DCN025448	<ul style="list-style-type: none"> <li>● Updated 1.1 Product Overview</li> <li>● Updated 1.3.2 Bluetooth</li> <li>● Updated 1.3.3 Wake-Up Receiver</li> </ul>	Steven Jian	Chihhao Liao

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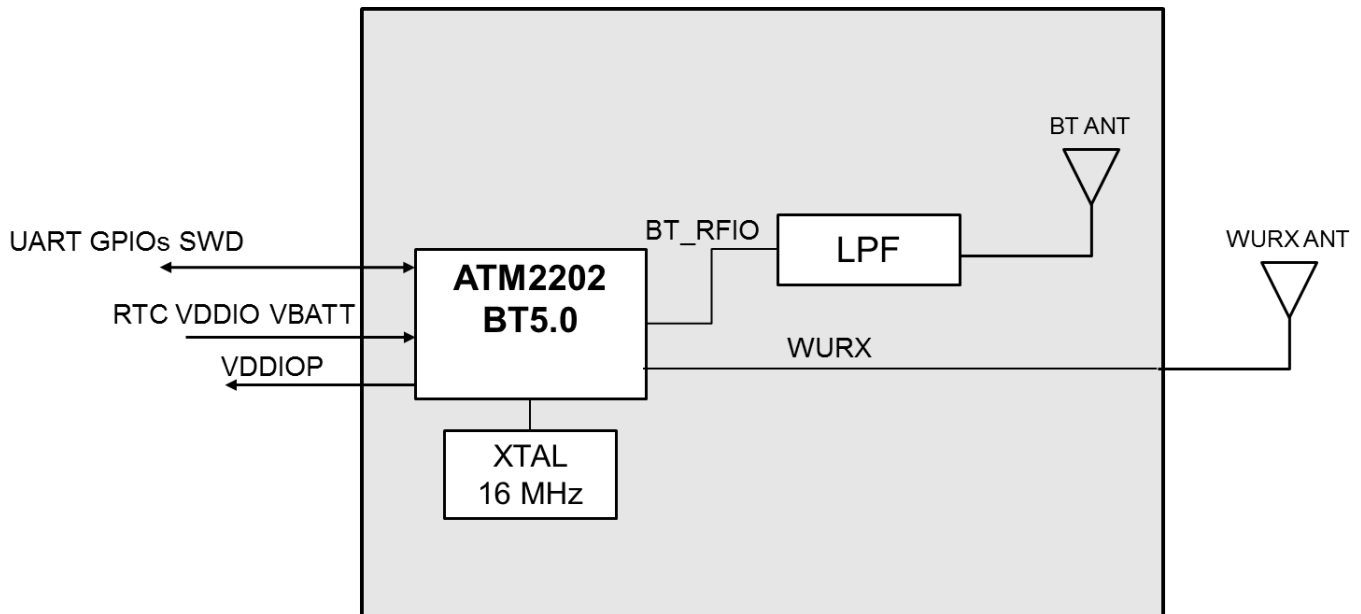
## 1. Introduction

### 1.1 Product Overview

AzureWave presents AW-CU507 Bluetooth with Microcontroller solution which 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 AW-CU507 is Bluetooth 5.0 compliant. The basic 1Mbps PHY is compatible with Bluetooth 4.0, while the 2Mbps rate provide 2X speed and the long range rates provide up to 4X range. The additional Wake-Up Receiver (WURX) is designed to decode the incoming RF signal to wake up the MCU

## 1.2 Block Diagram



**\*VDDIOP can be configured as 1.8V output by software (MAX current<20mA)**

## 1.3 Specifications Table

### 1.3.1 General

Features	Description
<b>Product Description</b>	Bluetooth 5.0 IoT Stamp LGA Module
<b>Major Chipset</b>	ATMOSIC ATM2202SR-001
<b>Host Interface</b>	Bluetooth: UART
<b>Dimension</b>	20.2 mm(L) x 10.5 mm(W) x 2.4 mm(H)
<b>Form factor</b>	27 pin Stamp LGA Module
<b>Antenna</b>	Bluetooth: Internal Printed Antenna Wakeup Receiver: External Antenna
<b>Weight</b>	2.00 g

### 1.3.2 Bluetooth

Features	Description				
<b>Bluetooth Standard</b>	Bluetooth 5.0				
<b>Bluetooth VID/PID</b>	N/A				
<b>Frequency Range</b>	2400~2483.5MHz				
<b>Modulation</b>	GFSK				
<b>Output Power</b>	BLE : 3.5dBm +/- 3dBm (Max Settings)				
<b>Receiver Sensitivity</b>		Min	Typ	Max	Unit
	125Kbps (LE 1M,S=8)		-101	-91	dBm
	500Kbps(LE 1M,S=2)		-98.5	-88	dBm
	1Mbps		-94	-76	dBm
	2Mbps		-92	-75	dBm

### 1.3.3 Wake-Up Receiver

Features	Description				
Frequency Range	2400~2483.5MHz				
Receiver Sensitivity		Min	Typ	Max	Unit
	BLE 1Mbps		-45.5	-38	dBm

### 1.3.4 Operating Conditions

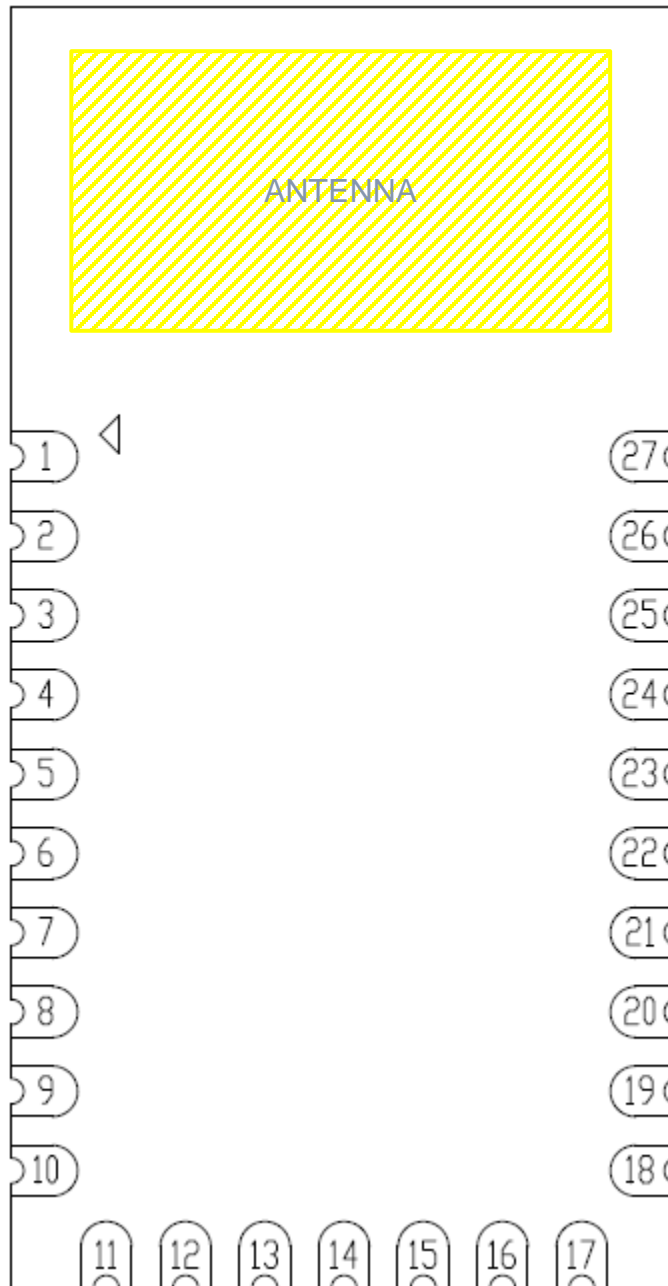
Features	Description
<b>Operating Conditions</b>	
Voltage	VBAT:1.1V~3.3V (3.3V Typical)
Operating Temperature	-40°C to 85 °C (Functionality is guaranteed,)
Operating Humidity	less than 85% R.H.
Storage Temperature	-40°C to 90 °C
Storage Humidity	less than 60% R.H.
<b>ESD Protection</b>	
Human Body Model	± 500V per MIL-STD-883H Method 3015.8
Changed Device Model	± 500V per JEDEC EIA/JESD22-C101E



## 2. Pin Definition

### 2.1 Pin Map

**AW-CU507 Top View Pin Map**



## 2.2 Pin Table

Pin No	Definition	Basic Description	Voltage	Type
1	GND	Ground reference.		GND
2	WURX	Wakeup Receiver RF Input		RF
3	VBATT	Battery supply.	1.1V~3.3V	PWR
4	P11	Programmable Digital I/O. ADC Input. The default definition is UART0_CTS.	VDDIO	I/O
5	P10	Programmable Digital I/O. ADC Input. The default definition is SPIO_CS.	VDDIO	I/O
6	P9	Programmable Digital I/O. ADC Input. The default definition is I2C0_SCK.	VDDIO	I/O
7	PWD	Power Down Input (Active High). Must connect to a 1Mohm pull-down resistor.	VDDIO	I/O
8	SWD_CLK	Serial wire debug clock.	VDDIO	I/O
9	SWD_IO	Serial wire debug data.	VDDIO	I/O
10	GND	Ground reference.		GND
11	VDDIO	Digital I/O power supply input.	1.7V~3.3V	PWR
12	VDDIOP	1.8 V I/O power supply output generated by switcher, connected to VAUX if unused.	1.8V	PWR
13	VAUX	Auxiliary supply output of typical value 3.2V. Reserved for switching regulator internal use.	3.2V	PWR
14	XTALO_32k	32.768 kHz crystal oscillator output.		O
15	XTALI_32k	32.768 kHz crystal oscillator input.		I
16	P13	Programmable Digital I/O. The default definition is SPIO_MISO.	VDDIO	I/O
17	P20	Programmable Digital I/O. The default definition is SPIO_CLK.	VDDIO	I/O
18	GND	Ground reference.		GND
19	P22	Programmable Digital I/O. The default definition is SPIO_MOSI.	VDDIO	I/O
20	P23	Programmable Digital I/O. The default definition is UART0_TX.	VDDIO	I/O

21	P24	Programmable Digital I/O. The default definition is UART0_RTS.	VDDIO	I/O
22	P25	Programmable Digital I/O. The default definition is UART0_RX.	VDDIO	I/O
23	P30	Programmable Digital I/O. The default definition is I2C0_SDA.	VDDIO	I/O
24	P32	Programmable Digital I/O. BBoot, must connect to a 1Mohm pull-down resistor.	VDDIO	I/O
25	P33	Programmable Digital I/O. The default definition is UART1_TX, to provide SW debug message output.	VDDIO	I/O
26	GND	Ground reference.		GND
27	NC(RFIO)	No connection. Reserve for 2.4 GHz Single-ended RF I/O for Bluetooth radio external antenna connection (50 Ohm).		NC

### 3. Electrical Characteristics

#### 3.1 Absolute Maximum Ratings

Symbol	Parameter	Minimum	Typical	Maximum	Unit
<b>VBAT</b>	Power supply for Internal PMU*	-0.2		3.4	V
<b>VDDIO</b>	DC supply voltage from internal PMU	-0.2		3.4	V

\*VBAT minimum slew rate is 0.3 V/ms

#### 3.2 Recommended Operating Conditions

Symbol	Parameter	Minimum	Typical	Maximum	Unit
<b>VBAT</b>	Power supply for Internal Regulators	1.1*	3.3	3.3	V
<b>VDDIOP</b>	DC supply voltage from internal PMU		1.8		V
<b>VDDIO</b>	I/O supply*	1.7	1.8	3.3	V

\*VBAT minimum supply after boot is 1.0 V

\*Set VDDIO to 2.3V~2.7V when programming the OTP.

#### 3.3 Digital IO Pin DC Characteristics

Symbol	Parameter	Minimum	Typical	Maximum	Unit
<b>VIH</b>	Input high voltage	VDDIO-0.5	VDDIO	VDDIO	V
<b>VIL</b>	Input low voltage	-0.2	0	0.2	V
<b>VOH</b>	Output High Voltage @ 2mA	-	VDDIO-0.2	-	V
<b>VOL</b>	Output Low Voltage @ 2mA	-	0.2	-	V

### 3.4 Power Consumption\*

#### 3.4.1 Bluetooth

No.	Mode	Packet Type	RF Power (dBm)	VBAT=3.3 V	
				Max.	Avg.
1	PDN	n/a	n/a	0.78uA	0.089uA
2	Transmit <sup>*(1)</sup>	LE	1.45	3.7mA	3.3mA
3	Receive <sup>*(2)</sup>	LE	n/a	2.04mA	1.75mA

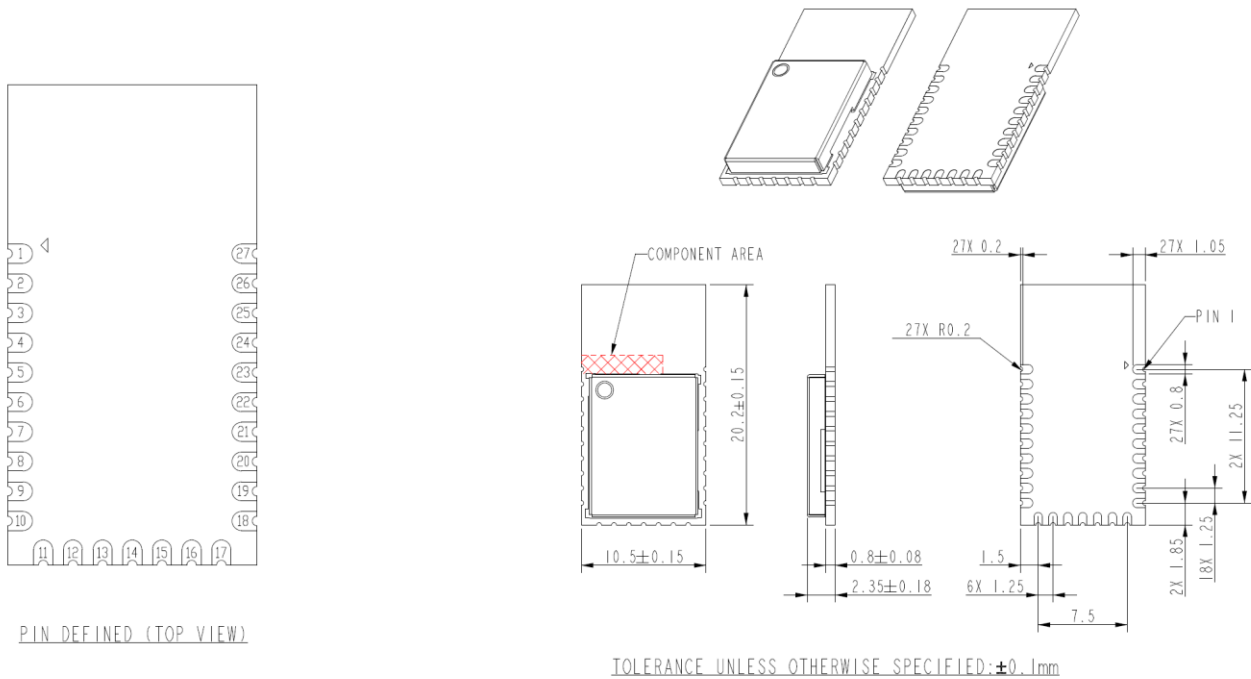
(1) TX @1M

(2) output power at 1Ms/s Payload length 37,Statistic count:1000

## 4. Mechanical Information

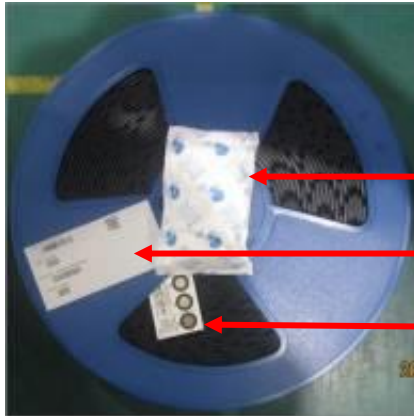
### 4.1 Mechanical Drawing

*\*Keep out distance of the antenna is > 10mm for non-conductive materials & 20mm for conductive materials.  
Do not extend main board PCB outline to the antenna area. Please refer to the layout guide.*



## 5. Packaging Information

1. One reel can pack 1,200pcs AW-CU507 stamp LGA modules
2. One production label is pasted on the reel, one desiccant and one humidity indicator card are put on the reel

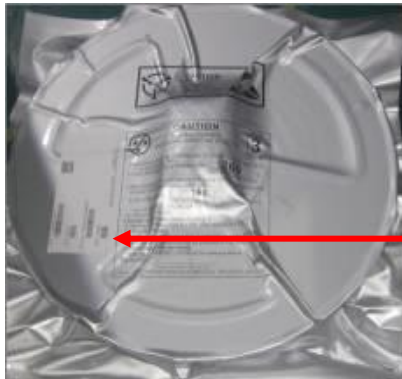


One desiccant

One production label

One humidity indicator card

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



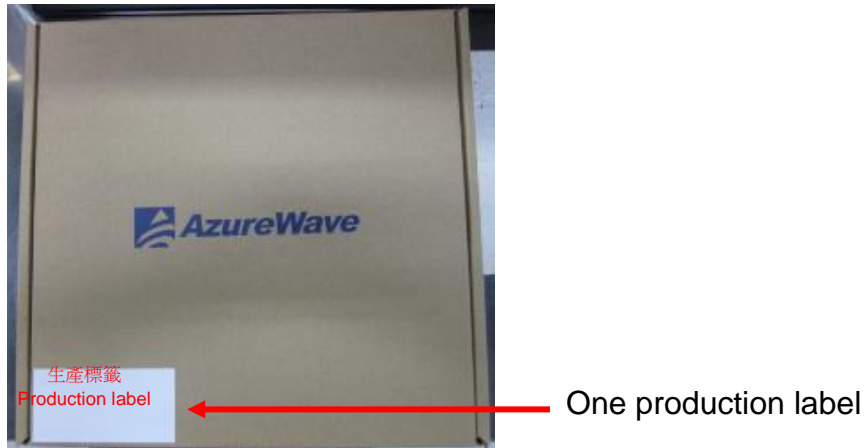
One production label

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



One 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



6. **3 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



<p><b>Example of carton label</b> (出貨標籤的範例)</p>	<table border="1"> <tr> <td colspan="2" style="text-align: center;">  </td> </tr> <tr> <td>AzureWave P/N</td> <td></td> </tr> <tr> <td>Customer</td> <td>由業務提供</td> </tr> <tr> <td>Customer P/N</td> <td>由業務提供</td> </tr> <tr> <td>Customer PO</td> <td>由業務提供</td> </tr> <tr> <td>Description</td> <td>AW-XXXXXX</td> </tr> <tr> <td>QTY</td> <td>1200 pcs</td> </tr> <tr> <td>C/N</td> <td></td> </tr> <tr> <td>N.W.</td> <td>G.W.</td> </tr> <tr> <td colspan="2" style="text-align: center;">  </td> </tr> </table>			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.		
																					
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<p><b>Example of box label</b> (箱號標籤)</p>																					
<p><b>Example of production label</b> (生產標籤)</p>	<table border="1"> <tr> <td>P/N:</td> <td></td> <td></td> </tr> <tr> <td>D/C: 1309</td> <td></td> <td></td> </tr> <tr> <td>PCK NO.: PCKNO0069097</td> <td></td> <td></td> </tr> <tr> <td>QTY: 294</td> <td></td> <td></td> </tr> <tr> <td colspan="3" style="text-align: right;">BAG SEAL DATE: _____</td> </tr> </table>	P/N:			D/C: 1309			PCK NO.: PCKNO0069097			QTY: 294			BAG SEAL DATE: _____							
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