AW-CU427-P

IoT Connectivity Module for AWS IoT Core

Datasheet

Rev. A

DF

(Amazon)

Features

Wi-Fi

- Single band 2.4 GHz 802.11 b/g/n
- SDIO v2.0, including DS and HS modes
- Security–WEP, WPA/WPA2 (personal), AES (HW), TKIP (HW), CKIP (SW), WMM/WMM-PS/WMM-SA
- Dara Rate up to 72.2Mbps

MCU

- 150-MHz Arm Cortex-M4F CPU with single-cycle multiply (Floating Point and Memory Protection Unit)
- 100-MHz Cortex M0+ CPU
- 1 MB Application Flash with 32-KB auxiliary flash (AUXflash), and 32-KB Supervisory Flash
- 288 KB integrated SRAM
- OTP E-Fuse memory for validation and security
- Backup domain with 64 bytes of memory and Real-time Clock(RTC)
- 8 MHz Internal Main Oscillator (IMO) with 2% accuracy
- USB Full-Speed Dual-role Host and Device interface
- I2S Interface; up to 192 ksps Word Clock
- Two PDM channels for stereo digital microphones
- Execute-In-Place (XIP) from external Quad SPI Flash
- Supports 1, 2, 4, and Dual-Quad interfaces
- 12-bit 1 Msps SAR ADC with differential and single-ended modes
- Cypress CapSense Sigma Delta (CSD) provides best-in-class SNR, liquid tolerance, and proximity sensing
- Mutual Capacitance sensing (Cypress CSX) with dynamic usage of both Self and Mutual sensing
- Automatic hardware tuning (SmartSense™)
- Hardware acceleration for Symmetric and Asymmetric cryptographic methods (AES, 3DES, RSA, and ECC) and Hash functions (SHA-512, SHA-256)

Revision History

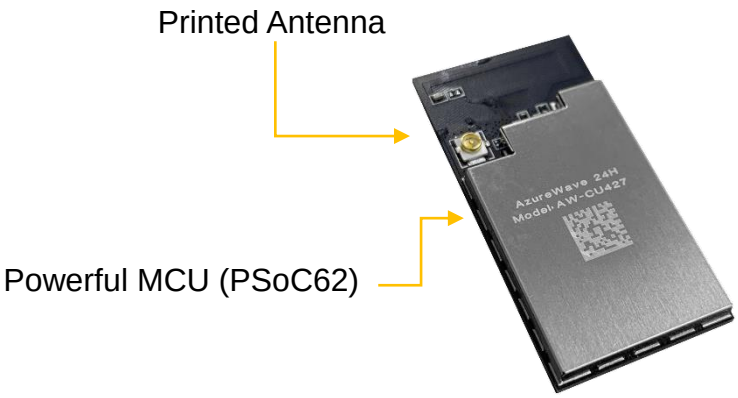
Document NO: R2-2427-DST-03

Version	Revision Date	DCN NO.	Description	Initials	Approved
A	2021/02/04		Initial Version	Steven Jian	Chihhao Liao

Table of Contents

1. Introduction

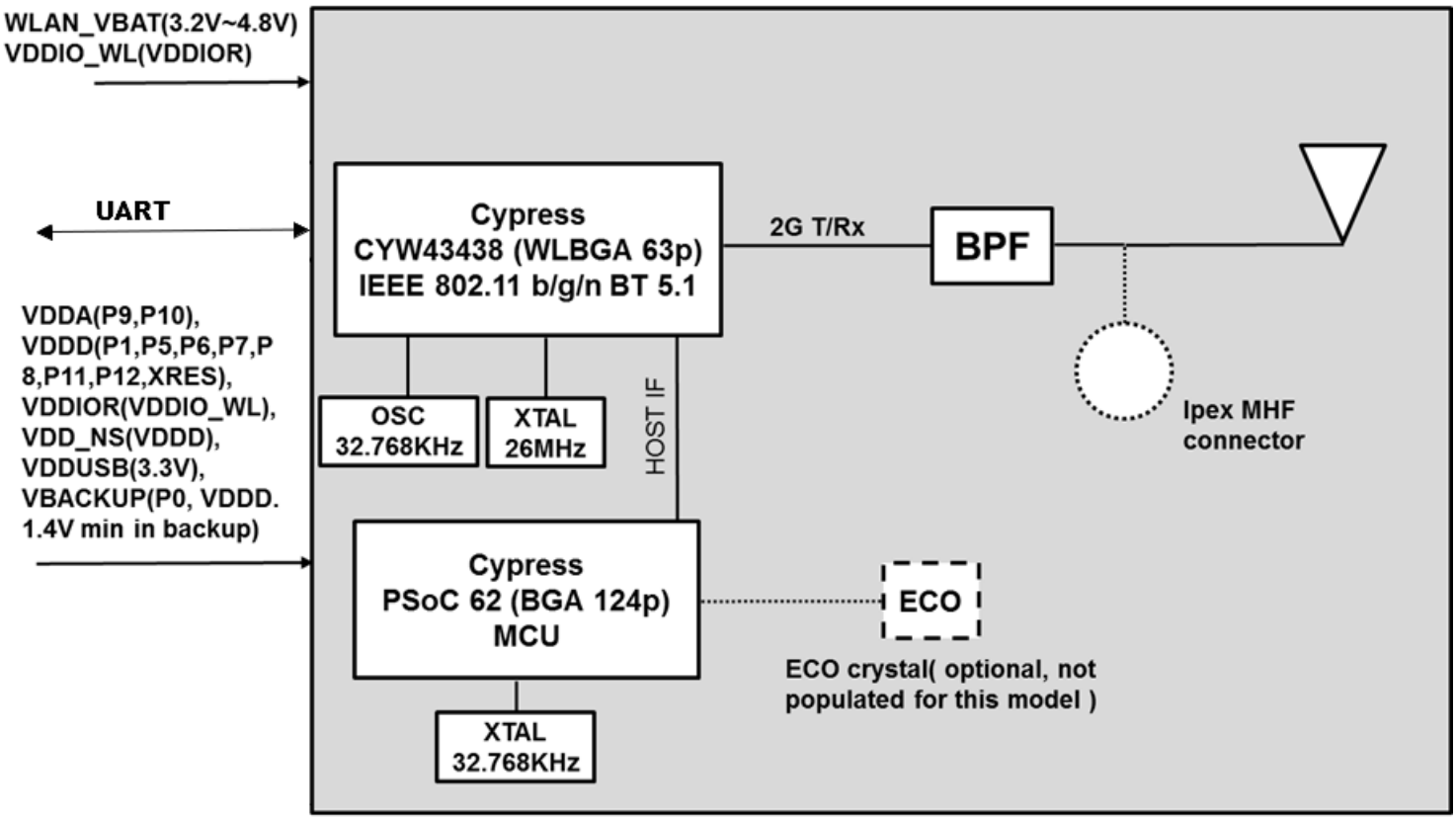
1.1 Product Overview



AW-CU427-P is a Wi-Fi Module with FreeRTOS qualified MCU that uses AT commands to securely and efficiently communicate with AWS IoT Core

- Hardware specification defined by Amazon and AzureWave
- With AICM, end-device become AWS IoT Device
- UART interface for end-device to connect with
- Rich AT commands for end-device to communicate with AWS IoT Core

1.2 Block Diagram



**Support different HW configurations. Please contact AzureWave for the details.*

1.3 Specifications Table

1.3.1 General

Features	Description
Product Description	IoT Connectivity Module for AWS IoT Core
Major Chipset	Cypress CYW43438, PSoC 62 (CY8C6247, 1MB Flash)
Host Interface	UART
Dimension	36.0mm(L) x 18mm(W) x 2.8mm(H)
Package	LGA Module
Antenna	Internal PCB antenna
Weight	2.3g

1.3.2 WLAN

Features	Description
WLAN Standard	IEEE 802.11b/g/n, Wi-Fi compliant
WLAN VID/PID	n/a
WLAN SVID/SPID	n/a
Frequency Rage	WLAN: 2.4 GHz Band
Modulation	DSSS DBPSK(1Mbps), DQPSK(2Mbps), CCK(11/5.5Mbps) OFDM BPSK(9/6Mbps), QPSK(18/12Mbps), DBPSK(1Mbps), DQPSK(2Mbps), CCK(11/5.5Mbps), 16-QAM(36/24Mbps), 64-QAM (72.2/54/48Mbps)
Number of Channels	802.11b: USA, Canada and Taiwan – 1 ~ 11 Most European Countries – 1 ~ 13 Japan – 1 ~ 13 802.11g: USA and Canada – 1 ~ 11 Most European Countries – 1 ~ 13 802.11n:

<table>
<tr><td></td><td>USA and Canada – 1 ~ 11
Most European Countries – 1 ~ 13</td></tr>
<tr><td>Output Power
(Board Level Limit)*</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)
@EVM<35%</td><td>17</td><td>19</td><td>21</td><td>dBm</td></tr>
<tr><td>11g (54Mbps)
@EVM≦-25 dB</td><td>16</td><td>18</td><td>20</td><td>dBm</td></tr>
<tr><td>11n (HT20 MCS7)
@EVM≦-27 dB</td><td>15.5</td><td>17.5</td><td>19.5</td><td>dBm</td></tr>
</table></td></tr>
<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 (1Mbps)</td><td></td><td>-97</td><td>-93</td><td>dBm</td></tr>
<tr><td>11g (6Mbps)</td><td></td><td>-91</td><td>-87</td><td>dBm</td></tr>
<tr><td>11b (11Mbps)</td><td></td><td>-89</td><td>-85</td><td>dBm</td></tr>
<tr><td>11g (54Mbps)</td><td></td><td>-76</td><td>-72</td><td>dBm</td></tr>
<tr><td>11n (HT20 MCS0)</td><td></td><td>-91</td><td>-87</td><td>dBm</td></tr>
<tr><td>11n (HT20 MCS7)</td><td></td><td>-73</td><td>-69</td><td>dBm</td></tr>
</table></td></tr>
<tr><td>Data Rate</td><td>802.11b: 1, 2, 5.5, 11Mbps
802.11g: 6, 9, 12, 18, 24, 36, 48, 54Mbps
802.11n: MCS0~7 HT20</td></tr>
<tr><td>Security</td><td>◆ WPA™- and WPA2™- (Personal) support for powerful encryption and authentication
◆ AES and TKIP acceleration hardware for faster data encryption and 802.11i compatibility
◆ Cisco® Compatible Extension- (CCX, CCX 2.0, CCX 3.0, CCX 4.0, CCX5.0) certified
◆ Wi-Fi Protected Setup (WPS)
◆ WEP
◆ WMM / WMM-SA
◆ CKIP(Software)</td></tr>
</table>

1.3.3 Operating Conditions

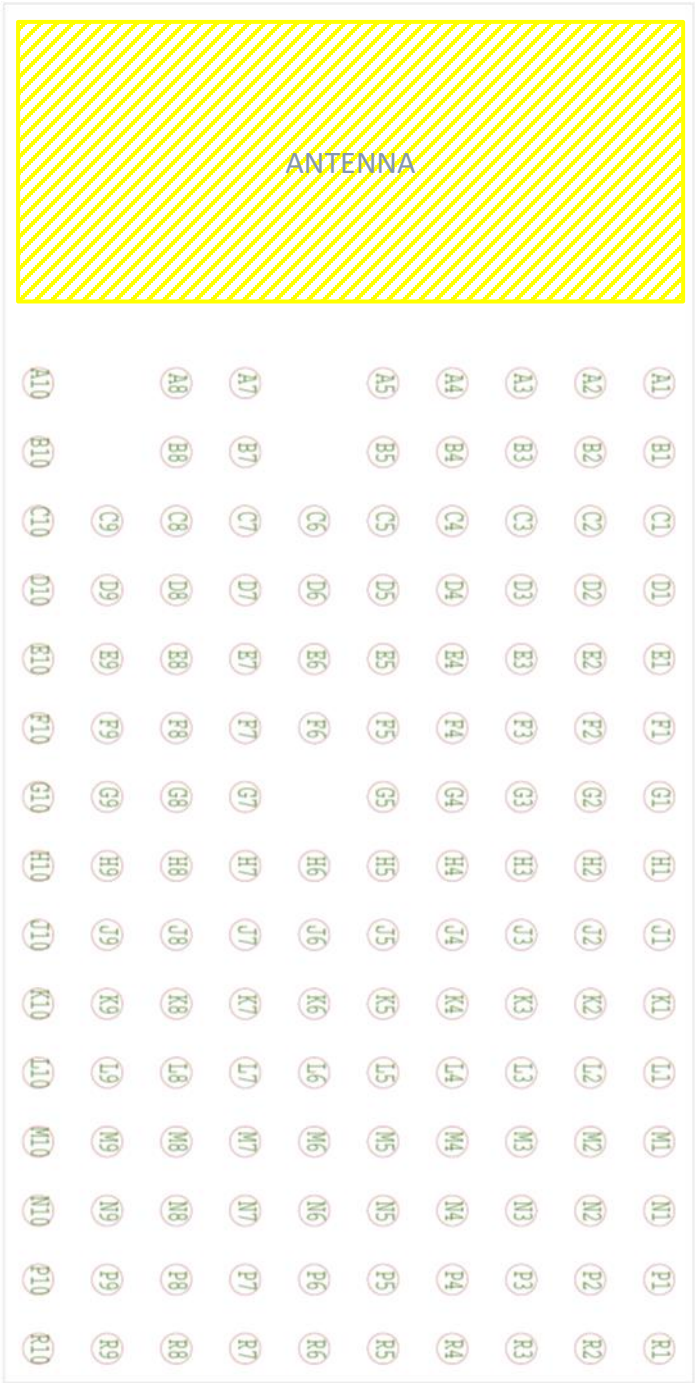
Features	Description
Operating Conditions	
Voltage	WIFI VBAT:3.2V~4.8V (3.6V Typical) VDD for MCU(except for USB):1.7V~3.6V
Operating Temperature	-30~85 °C (Optimal RF performance guarantee -30~80 °C)
Operating Humidity	less than 85% R.H.

Storage Temperature	-40~90°C
Storage Humidity	less than 60% R.H.
ESD Protection	
Human Body Model	±1KV
Changed Device Model	±300V

2. Pin Definition

2.1 Pin Map

AW-CU427-P Top View Pin Map



2.2 Pin Table

Pin No	Definition	Basic Description	Voltage	Type
A1	GND_A1	Ground.		GND
A10	GND_A10	Ground.		GND
A2	GND_A2	Ground.		GND
A3	GND_A3	Ground.		GND
A4	GND_A4	Ground.		GND
A5	GND_A5	Ground.		GND
A7	GND_A7	Ground.		GND
A8	GND_A8	Ground.		GND
B10	GND_B10	Ground.		GND
B3	GND_B3	Ground.		GND
B7	GND_B7	Ground.		GND
B8	GND_B8	Ground.		GND
C10	GND_C10	Ground.		GND
C3	GND_C3	Ground.		GND
C6	GND_C6	Ground.		GND
C7	GND_C7	Ground.		GND
C8	GND_C8	Ground.		GND
C9	GND_C9	Ground.		GND
D1	GND_D1	Ground.		GND
D7	GND_D7	Ground.		GND
D8	GND_D8	Ground.		GND
D9	GND_D9	Ground.		GND
E2	GND_E2	Ground.		GND
E5	GND_E5	Ground.		GND
F2	GND_F2	Ground.		GND
F6	GND_F6	Ground.		GND
F9	GND_F9	Ground.		GND
G1	GND_G1	Ground.		GND
G2	GND_G2	Ground.		GND
G7	GND_G7	Ground.		GND
H10	GND_H10	Ground.		GND
H3	GND_H3	Ground.		GND
H8	GND_H8	Ground.		GND
J8	GND_J8	Ground.		GND
J9	GND_J9	Ground.		GND
K2	GND_K2	Ground.		GND
K4	GND_K4	Ground.		GND
K5	GND_K5	Ground.		GND
K8	GND_K8	Ground.		GND
L1	GND_L1	Ground.		GND
L5	GND_L5	Ground.		GND
L7	GND_L7	Ground.		GND
N3	GND_N3	Ground.		GND
P3	GND_P3	Ground.		GND
P6	GND_P6	Ground.		GND

P8	GND_P8	Ground.		GND
R9	GND_R9	Ground.		GND
K6	P0_2	UART RXD	VDD_33	I
J7	P0_3	UART TXD	VDD_33	O
J6	P0_5	EN pin	VDD_33	I
M2	P1_0	INT pin	VDD_33	O
M3	P1_1	MSG pin	VDD_33	I
R5	P11_2	QSPI_CS*	VDDD	I/O
N6	P11_3	QSPI_IO3	VDDD	I/O
M4	P11_4	QSPI_IO2	VDDD	I/O
P4	P11_5	QSPI_IO1	VDDD	I/O
P5	P11_6	QSPI_IO0	VDDD	I/O
M5	P11_7	QSPI_SCK	VDDD	I/O
M1	VBACKUP	VBACKUP is the supply to the backup domain. The backup domain includes the 32-kHz WCO, RTC, and backup registers. It can generate a wake-up interrupt to the chip via the RTC timers or an external input. It can also generate an output to wakeup external circuitry. It is connected to VDDD when not used as a separate battery backup domain. VBACKUP provides the supply for Port 0. Min. is 1.4 V in Backup Mode		PWR
K1	VDD_NS	Power Supply for PSoC 62 Buck regulator	VDDD	PWR
H2	VDD_USB	Power Supply for PSoC 62 USB	3.3V	PWR
R8	VDDA	Power Supply for PSoC 62 P9,P10 (analog peripherals)	1.7~3.6V	PWR
R3	VDDD	Power Supply for PSoC 62 P1,P5,P6,P7,P8,P11,P12,XRES	1.7~3.6V	PWR
H1	VDDIO_WL	Power Supply for CYW43438 Digital I/O. Connect it to VDDIOR.	VDDIOR	PWR
J1	VDDIOR	Power Supply for PSoC 62 P2, P3, P4. Connect it to VDDIO_WL	1.8V	PWR
F1	WLAN_VBAT	Main Power Supply for CYW43438	3.2~4.8V	PWR
E1	WLAN_VBAT	Main Power Supply for CYW43438	3.2~4.8V	PWR
J2	XRES_L	External reset I/O pin(pulled up by a 4.7K ohms resistor internally)	VDDD	I

* Note: recommend to use Cypress S25FL512SAGMFIR10 (64MB SPI Flash), it is qualified by AzureWave

3. Electrical Characteristics

3.1 Absolute Maximum Ratings

Symbol	Parameter	Minimum	Typical	Maximum	Unit
WLAN_VBAT	Power supply for CYW43438 PMU	-0.5		6	V
VDDD,VDDIOR,VDD_NS,VDDA,VDD_USB,VBACKUP	Power Supply for PSoC 62	-0.5		4	V
VDDIO_WL	Power supply for CYW43438 digital I/O	-0.5		3.9	V

3.2 Recommended Operating Conditions

Symbol	Parameter	Minimum	Typical	Maximum	Unit
WLAN_VBAT	Power supply for CYW43438 PMU	3.2	3.6	4.8	V
VDDD,VDD_NS,VDDA	Power Supply for PSoC 62	1.7		3.6	V
VDDIO_WL, VDDIOR	IO Voltage for WLAN/BT & PSoC 62*	1.7	1.8	1.9	V
VDD_USB	Power Supply for PSoC 62 USB	3.15	3.3	3.6	V
VBACKUP	Power supply to the PSoC 62 backup domain	1.4		3.6	V

***Performance not guarantee if VDDIO_WL, VDDIOR >1.9V**

3.3 GPIO DC Characteristics

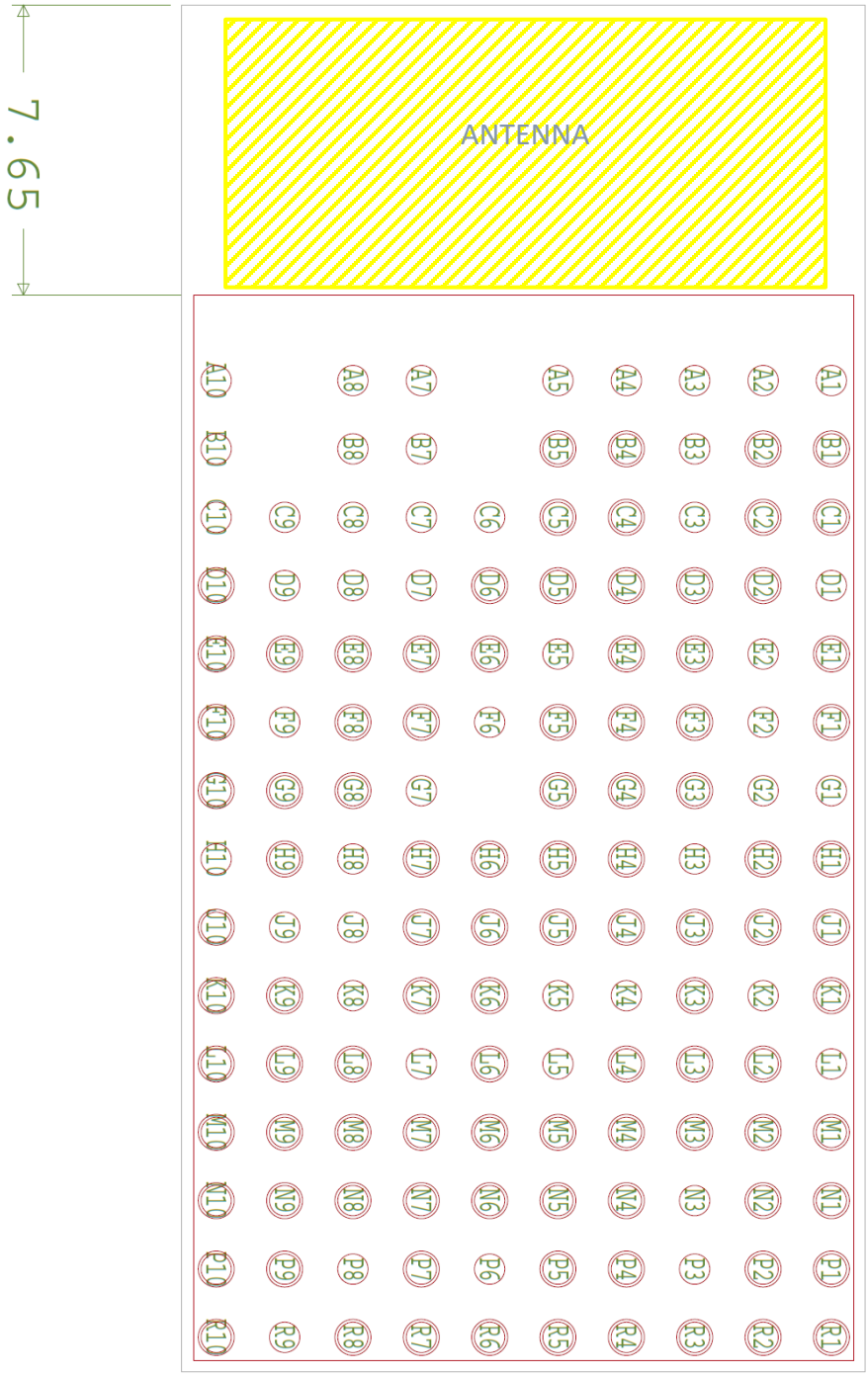
Symbol	Parameter	Condition	Min	Typ	Max	Units
V_{IH}	Input high voltage	CMOS Input	0.7*VDD			V
V_{IL}	Input low voltage	CMOS Input			0.3*VDD	V
V_{IH}	Input high voltage	LVTTL input, VDD < 2.7 V	0.7*VDD			V
V_{IL}	Input low voltage	LVTTL input, VDD < 2.7 V			0.3*VDD	V
V_{IH}	Input high voltage	LVTTL input, VDD >=2.7 V	2			V
V_{IL}	Input low voltage	LVTTL input, VDD >= 2.7 V			0.8	V
V_{OH}	Output High Voltage	IOH = 8 mA	VDD-0.5			V
V_{OL}	Output Low Voltage	IOL = 8 mA			0.4	V
*please find the details @ https://www.cypress.com/products/32-bit-arm-cortex-m4-cortex-m0-psoc-62-performance-line						

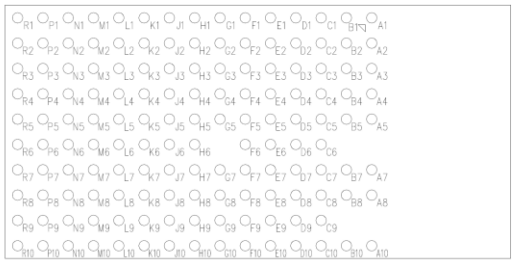
4. Mechanical Information

4.1 Mechanical Drawing

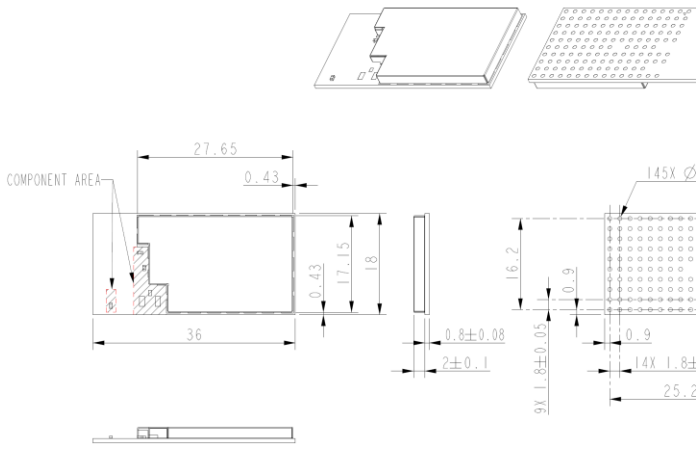
AW-CU427-P TOP View PCB Layout Footprint (Unit in mm Dia=0.75mm Solder Mask Defined)

**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.





PIN DEFINED (BOTTOM VIEW)



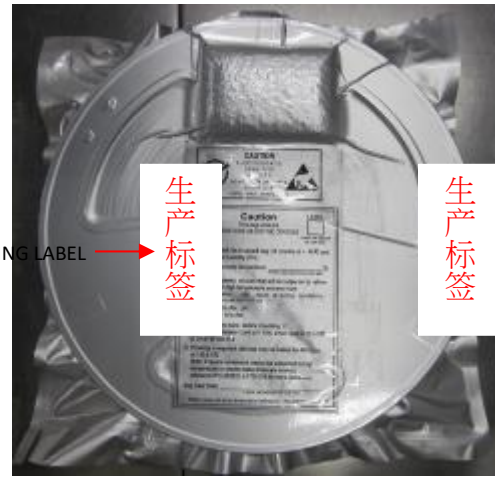
TOLERANCE UNLESS OTHERWISE SPECIFIED:±0.15mm

5. Packaging Information

5.1

600pcs/reel, 1800 pcs/carton

5.2



5.3

PINK BUBBLE WRAP

5.4

5.5

1 Carton= 3 Boxes

5.6