

AW-CU598

Wireless MCU with Integrated Wi Fi 6 and Bluetooth Low Energy 5.3 Module

Datasheet

Rev. C

DF

(For Standard)

Features

WLAN

- ◆ Support 1x1 dual-band 2.4 GHz/5 GHz Wi-Fi a/b/g/n/ac/ax radio
- ◆ 20 MHz channel operation
- ◆ Wi-Fi 6 Target Wake Time(TWT) support
- ◆ Wi-Fi 6 Extended Range (ER) and Dual Carrier Modulation (DCM)
- ◆ Power save features
- ◆ WPA2/WPA3 personal and enterprise

Bluetooth

- ◆ Supports Bluetooth LE 5.3(Class 2) certified and Bluetooth LE 5.2 features supported
- ◆ Wi-Fi/Bluetooth coexistence protocol support
- ◆ Intelligent Adaptive Frequency Hopping (AFH)
- ◆ Bluetooth LE Privacy 1.2
- ◆ Bluetooth LE Long Range
- ◆ Bluetooth LE 2 Mbps
- ◆ Bluetooth LE Isochronous Channels
- ◆ Bluetooth LE Audio with integrated LC3 codec
- ◆ Security: AES

Revision History

Document NO: R2-2598-DST-01

Version	Revision Date	DCN NO.	Description	Initials	Approved
A	2023/02/04	DCN028668	Draft version	Roger Liu	N.C Chen
B	2023/06/27	DCN029399	- Update block diagram - Update pin table	Roger Liu	N.C Chen
C	2023/08/30	DCN029967	- Modify feature and pin table - Update RF specification	Roger Liu	N.C Chen

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1. Introduction

1.1 Product Overview

AzureWave **AW-CU598** is a highly integrated, low-power tri-radio Wireless RW610 MCU with an integrated MCU and Wi-Fi 6 + Bluetooth Low Energy (LE) 5.3 radios designed for a broad array of applications. Applications include connected smart home devices, enterprise and industrial automation, smart accessories, and smart energy.

AW-CU598 includes a 260 MHz Arm Cortex-M33 core with TrustZone-M, 1.2 MB on-chip SRAM and a Quad SPI interface with high bandwidth

AW-CU598 includes a full-featured 1x1 dual-band (2.4 GHz / 5 GHz) 20 MHz Wi-Fi 6 (802.11ax) subsystem bringing higher throughput, better network efficiency, lower latency, and improved range over previous generation Wi-Fi standards. The Bluetooth LE radio supports 2 Mbit/s high-speed data rate, long range and extended advertising as well as LE Audio for a better overall audio experience. In addition, **AW-CU598** can support Matter over Wi-Fi or Matter over Thread offering a common, interoperable application layer across ecosystems and products.

The advanced design of the **AW-CU598** delivers tight integration, low power, and highly secure operation in a space- and cost-efficient wireless MCU requiring only a single 3.3 V power supply



1.2 Block Diagram

TBD

1.3 Specifications Table

1.3.1 General

Features	Description
Product Description	IEEE 802.11 a/b/g/n/ac/ax Wi-Fi 6 with Bluetooth 5.3 Module
Major Chipset	NXP RW610 HVQFN(116 pins)
Host Interface	UART/JTAG
Dimension	28 mm x 15 mm x 2.39 mm
Package	LGA module, 88 pins
Antenna	u.FL Connector Receptacle ANT1 : WiFi → TX/RX Printed antenna ANT2 : WiFi → TX/RX
Weight	1.8 g

1.3.2 WLAN

Features	Description
WLAN Standard	IEEE 802.11 a/b/g/n/ac/ax 1T1R
WLAN VID/PID	NA
WLAN SVID/SPID	NA
Frequency Range	2.4 GHz ISM Bands 2.412-2.472 GHz 5.15-5.25 GHz (FCC UNII-low band) for US/Canada and Europe 5.25-5.35 GHz (FCC UNII-middle band) for US/Canada and Europe 5.47-5.725 GHz for Europe 5.725-5.825 GHz (FCC UNII-high band) for US/Canada 5.825 GHz-5.895 GHz (FCC UNII-IV band) for US
Modulation	DSSS, OFDM, DBPSK, DQPSK, CCK, 16-QAM, 64-QAM, 256-AQM, 1024-QAM, OFDMA
Number of Channels	2.4GHz: ■ USA, NORTH AMERICA, Canada and Taiwan - 1 ~ 11 ■ China, Australia, Most European Countries - 1 ~ 13 ■ Japan, 1 ~ 13 5GHz: ■ USA, Canada, Most European Countries - 36,40,44,48,52,56,60,64,100,104,108,112,116,120,124,128,132,136,140,149,153,157,161,165, 169, 173, 177

	■ Japan - 36,40,44,48,52,56,60,64,100,104,108,112,116,120,124,128,132,136,140 ■ China - 36,40,44,48,52,56,60,64, 149,153,157,161,165				
Output Power (Board Level Limit)*	2.4G				
		Min	Typ	Max	Unit
	11b (11Mbps) @EVM<35%	16.5	18	19.5	dBm
	11g (54Mbps) @EVM≤-25 dB	14.5	16	17.5	dBm
	11n (HT20 MCS7) @EVM≤-27 dB	13.5	15	16.5	dBm
	11ax(HE20 MCS11) @EVM≤-35 dB	12.5	14	15.5	dBm
	5G				
		Min	Typ	Max	Unit
	11a (54Mbps) @EVM≤-25 dB	14	16	18	dBm
	11n (HT20 MCS7) @EVM≤-27 dB	13	15	17	dBm
	11ac(VHT20 MCS8) @EVM≤-30 dB	12	14	16	dBm
	11ax(HE20 MCS11) @EVM≤-35 dB	11	13	15	dBm
Receiver Sensitivity	2.4G				
		Min	Typ	Max	Unit
	11b (11Mbps)	-	-86	-83	dBm
	11g (54Mbps)	-	-72	-69	dBm
	11n (HT20 MCS7)	-	-69	-66	dBm
	11ax (HE20 MCS11)	-	-63	-60	dBm
	5G				
		Min	Typ	Max	Unit
	11a (54Mbps)	-	-72	-69	dBm
	11n (HT20 MCS7)	-	-70	-67	dBm
	11ac(VHT20 MCS8)	-	-66	-63	dBm
	11ax(HE20 MCS11)	-	-65	-62	dBm

Data Rate	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 Mbps (20 MHz channel) 802.11ac: Maximum data rates up to 87 Mbps (20 MHz channel) 802.11ax: Maximum data rates up to 144 Mbps (20 MHz channel)
Security	■ WiFi: WPA2/WPA3 personal and enterprise and AES/CCMP/CMAC/GCMP ■ BT: AES

1.3.3 Bluetooth

Features	Description										
Bluetooth Standard	Full Bluetooth 5.3 features										
Frequency Rage	2402MHz~2483.5MHz										
Modulation	GFSK										
Output Power	<table><tr><td></td><td>Min</td><td>Typ</td><td>Max</td><td>Unit</td></tr><tr><td>Low Energy</td><td>0</td><td>2</td><td>4</td><td>dBm</td></tr></table>		Min	Typ	Max	Unit	Low Energy	0	2	4	dBm
	Min	Typ	Max	Unit							
Low Energy	0	2	4	dBm							
Receiver Sensitivity	BT Sensitivity ((PER<30.8%)) <table><tr><td></td><td>Min</td><td>Typ</td><td>Max</td><td>Unit</td></tr><tr><td>Low Energy</td><td>-</td><td>-95</td><td>-92</td><td>dBm</td></tr></table>		Min	Typ	Max	Unit	Low Energy	-	-95	-92	dBm
	Min	Typ	Max	Unit							
Low Energy	-	-95	-92	dBm							

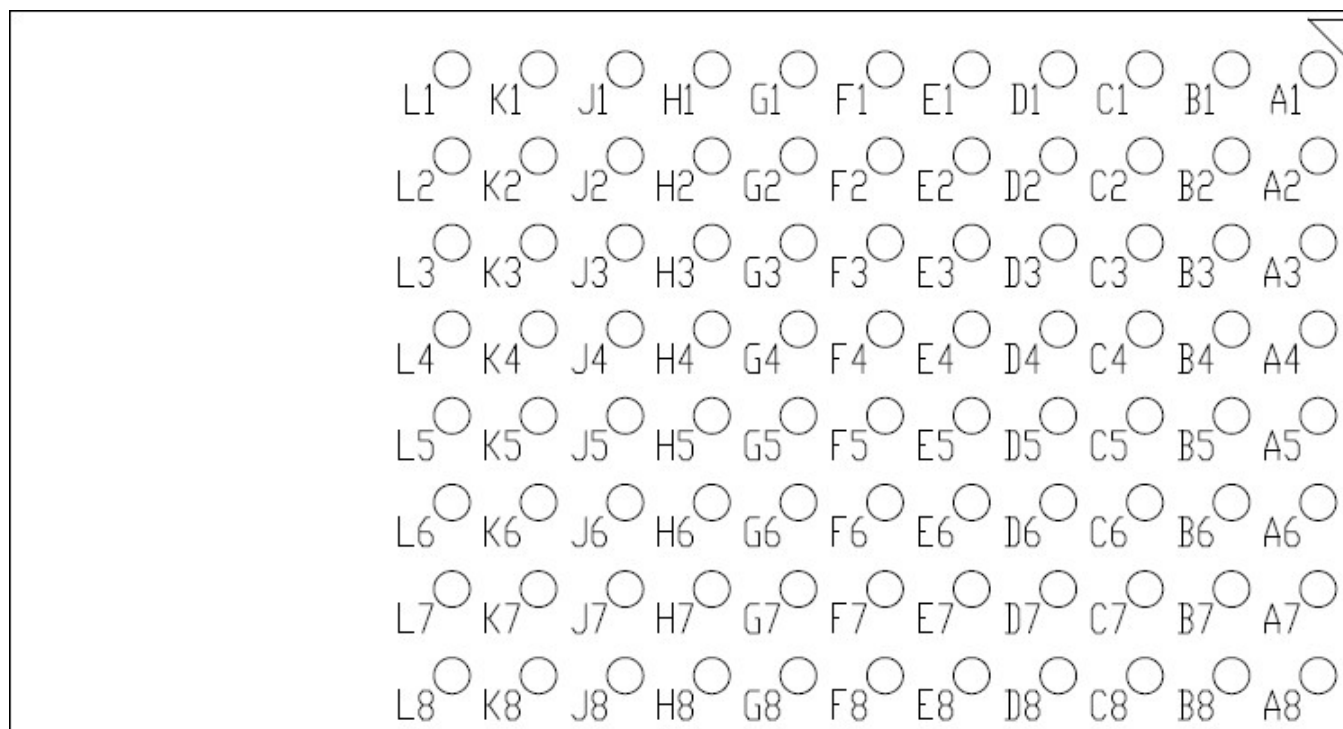
* If you have any certification questions about output power please contact FAE directly.

1.3.4 Operating Conditions

Features	Description
Operating Conditions	
Voltage	3.3V +-5%
Operating Temperature	-40°C ~ 85°C
Operating Humidity	Less than 85% R.H.
Storage Temperature	-40°C to +85°C
Storage Humidity	Less than 60% R.H.
ESD Protection	
Human Body Model	TBD
Changed Device Model	TBD

2. Pin Definition

2.1 Pin Map



AW-CU598 Pin Map (Top View)

2.2 Pin Table

2.2.1 Power

Pin No	Definition	Basic Description	Voltage	Type
A7	3.3V_IN_1	3.3V Power input	3.3V	P
B7	3.3V_IN_2	3.3V Power input	3.3V	P
K1	VIO_1	1.8V/3.3V Digital I/O Power Supply	1.8V/3.3V	P
F1	VIO_2	1.8V/3.3V Digital I/O Power Supply	1.8V/3.3V	P
A2	VIO_3	1.8V/3.3V Digital I/O Power Supply	1.8V/3.3V	P
E1	VIO_4	1.8V/3.3V Digital I/O Power Supply	1.8V/3.3V	P
B8	VIO_6	1.8V/3.3V Digital I/O Power Supply	1.8V/3.3V	P

2.2.2 GPIO

Pin No	Definition	Basic Description	Voltage	Type
A3	GPIO_22	GPIO[22]/AON_XTAL32K_IN/SLP_CLK_32K/ SCT0_PIN_INP2/ENET_RX_DATA0	VIO_3	I/O
A5	USB_DM	USB bus data-	3.3V	I/O
A6	USB_DP	USB bus data+	3.3V	I/O
B1	GPIO_24	GPIO[24]/AON_WAKEUP/CT1_MAT2/CT_INP6/ ENET_TIMER2/FC3_RXD_SDA_MOSI_DATA_USA RT/I2C/I2S/SPI	VIO_3	I/O
B2	GPIO_26	GPIO[26]/AON_CAPT/SCT0_OUT4/SCT0_PIN_INP 4/ENET_TIMER3/FC3_TXD_SCL_MOSI_WS_USA RT/I2C/I2S/SPI	VIO_3	I/O
B3	GPIO_23	GPIO[23]/AON_XTAL32K_OUT/SCT0_PIN_INP3/ NET_RX_DATA1	VIO_3	I/O
B4	GPIO_25	GPIO[25]/AON_WAKEUP/CT1_MAT3/CT_INP7/ ENET_CLK/FC3_SCK_USART/I2S/SPI	VIO_3	I/O
B5	USB_VBUS	VBUS selection, 5 V analog power supply	---	I/O
B6	USB_IDPIN	USB OTG ID pin	3.3V	I
C1	GPIO_28	QSPI flash slave select 0	VIO_4	I/O
C2	GPIO_31	Data bit 1 for QSPI flash	VIO_4	I/O
C3	GPIO_32	Data bit 2 for QSPI flash	VIO_4	I/O
C4	GPIO_29	QSPI flash data strobe input/output	VIO_4	I/O
C5	GPIO_27	GPIO[27]/AON_OUT/SCT0_OUT5/SCT0_PIN_INP5/ ENET_TIMER0	VIO_3	I/O
C6	GPIO_4	GPIO[4]/Coexistence mode /SCT0_OUT1/SCT0_PIN_INP1/CLKIN_FRM_PD/ FC0_SCK_USART/I2S/SPI	VIO_6	I/O
C7	GPIO_3	GPIO[3]/SCT0_OUT0/SCT0_PIN_INP0/FC0_TXD_ SCL_MISO_WS_USART/I2C/I2S/SPI	VIO_6	I/O

C8	RESETn	Full Power-down (input) (active low) 0 = full power-down mode 1 = normal mode This pin has an internal pull high 51k ohm to 3.3V	3.3V	I
D1	GPIO_34	GPIO[34]/ QSPI_flash_CLK0/ SPIO0[2]	VIO_4	I/O
D2	GPIO_33	GPIO[33]/ QSPI_flash_D3/ SPIO0[2]	VIO_4	I/O
D3	GPIO_30	GPIO[30]/ QSPI_flash_D0	VIO_4	I/O
D7	GPIO_2	GPIO[2]/FC0_RXD_SDA_MOSI_DATA_USART/I2C/I2S/SPI	VIO_6	I/O
D8	GPIO_49	GPIO[49]/LCD_D4/LCD SPI interface chip select/ADC0_7/ADC1_7/ACOMP7/SPIO0[17]	VIO_6	I/O
E7	GPIO_48	GPIO[48]/LCD 8080 interface read control /LCD SPI interface clock/ADC0_6/ ADC1_6/ ACOMP6/ SPIO0[16]	VIO_6	I/O
E8	GPIO_47	GPIO[47]/LCD_D3 /LCD SPI interface data/ ADC0_5/ ACOMP5/ SPIO0[15]	VIO_6	I/O
F2	GPIO_13	GPIO[13]/ CT_INP3/CT0_MAT3/ SWDIO/ FC2_RXD_SDA_MOSI_DATA_USART/I2C/I2S/SPI	VIO_2	I/O
F7	GPIO_46	GPIO[46]/ LCD_D2/LCD SPI interface data in_out/ADC0_4/ ACOMP4/ SPIO0[14]	VIO_6	I/O
F8	GPIO_45	GPIO[45]/LCD tearing effect input signal used to synchronize MCU frame writing/ LCD tearing effect input signal used to synchronize MCU frame writing/ ADC0_3/ACOMP3/EXT_VREF_ADC0_DAC/ SPIO0[13]	VIO_6	I/O
G1	GPIO_15	GPIO[15]/SD_CLK/UTICK_CAP0/UCLK/FC2_SCK_USART/I2S/SPI	VIO_2	I/O
G2	GPIO_16	GPIO[16]/SD_D3/UTICK_CAP1/URST/FC2_CTS_SDA_SSELN0_USART/FC2_CTS_SDA_SSELN0_SP I/FC2_CTS_SDA_SSELN0_I2C_COPY	VIO_2	I/O
G7	GPIO_44	GPIO[44]/DAC_A/ADC0_2/ ACOMP2/output signal to reset the LCD device/SPIO0[12]	VIO_6	I/O
G8	GPIO_43	GPIO[43]/LCD_D1/ADC0_1/ACOMP1/DACB/SPIO0 [11]	VIO_6	I/O
H1	GPIO_17	GPIO[17]/SDIO_CMD/UTICK_CAP2/UIO/FC2_RTS_SCL_SSELN1_USART/FC2_RTS_SCL_SSELN1_I 2C_COPY	VIO_2	I/O
H2	GPIO_18	GPIO[18]/SDIO_DAT2/UTICK_CAP3/UVS/ GPIO_INT_BMAT	VIO_2	I/O
H7	GPIO_42	GPIO[42]/ ADC0_0/ACOMP0/LCD_D0/SPIO0[10]	VIO_6	I/O
H8	GPIO_50	GPIO[50]/FREQME_GPIO_CLK/ADC_DAC_TRIGG ER0/ SPIO0[18]	VIO_6	I/O
J1	GPIO_19	GPIO[19]/SDIO_DAT0/FC3_RTS_SCL_SSELN1_U SART/ FC3_RTS_SCL_SSELN1_I2C_COPY	VIO_2	I/O

J2	GPIO_20	GPIO[20]/SDIO_DAT1/FC3_CTS_SDA_SSELN0_U SART/SPI/ I2C_COPY	VIO_2	I/O
J3	RF_CNTL1	RF_CNTL1	3.3V	O
J4	RF_CNTL2	RF_CNTL2	3.3V	O
J5	RF_CNTL3	RF_CNTL3	3.3V	O
J7	EXT_FREQ	External radio frequency input signal (optional) - muxed with WCI-2_SOUT signal of WCI-2 interface.	1.8V	I
J8	EXT_PRI	External radio input priority signal (optional) Priority of the request from the external radio.	1.8V	I
K2	GPIO_14	GPIO[14]/ CT_INP4/CT1_MAT0/ SWCLK/ FC2_TXD_SCL_MISO_WS_USART/I2C/I2S/SPI	VIO_2	I/O
K3	GPIO_7	GPIO[7]/ JTAG_TMS/ FC1_SCK_USART/I2S/SPI	VIO_1	I/O
K4	GPIO_8	GPIO[8]/ JTAG_TDI/ FC1_TXD_SCL_MISO_WS_USART/I2C/I2S/SPI	VIO_1	I/O
K5	GPIO_10	GPIO[10]/ JTAG_TRSTN/ FC1_RTS_SCL_SSELN1_USART	VIO_1	I/O
K7	EXT_GNT	External radio grant output signal	1.8V	O
K8	EXT_REQ	Request from external radio	1.8V	I
L2	GPIO_5	GPIO[5]/ MCLK/FC0_RTS_SCL_SSELN1_USART	VIO_1	I/O
L3	GPIO_6	GPIO[6]/ JTAG_TCK/ FC1_CTS_SDA_SSELN0_USART/SPI	VIO_1	I/O
L4	GPIO_9	GPIO[9]/ JTAG_TDO/ FC1_RXD_SDA_MOSI_DATA_USART/I2C/I2S/SPI	VIO_1	I/O
L5	GPIO_11	GPIO[11]/ SCT0_OUT8:	VIO_1	I/O
L7	GPIO_12	GPIO[12]/UTMI_DRV_VBUS/CT0_MAT2/CT_INP2/ SD_HOST_INT	3.3V	I/O

2.2.3 GND

Pin No	Definition	Basic Description	Voltage	Type
A1	GND_A1	Ground	---	---
A4	GND_A4	Ground	---	---
A8	GND_A8	Ground	---	---
D4	GND_D4	Ground	---	---
D5	GND_D5	Ground	---	---
D6	GND_D6	Ground	---	---
E2	GND_E2	Ground	---	---
E3	GND_E3	Ground	---	---
E4	GND_E4	Ground	---	---
E5	GND_E5	Ground	---	---
E6	GND_E6	Ground	---	---
F3	GND_F3	Ground	---	---
F4	GND_F4	Ground	---	---
F5	GND_F5	Ground	---	---

F6	GND_F6	Ground	---	---
G3	GND_G3	Ground	---	---
G4	GND_G4	Ground	---	---
G5	GND_G5	Ground	---	---
G6	GND_G6	Ground	---	---
H3	GND_H3	Ground	---	---
H4	GND_H4	Ground	---	---
H5	GND_H5	Ground	---	---
H6	GND_H6	Ground	---	---
J6	GND_J6	Ground	---	---
K6	GND_K6	Ground	---	---
L1	GND_L1	Ground	---	---
L6	GND_L6	Ground	---	---
L8	GND_L8	Ground	---	---

3. Electrical Characteristics

3.1 Absolute Maximum Ratings

Symbol	Parameter	Minimum	Typical	Maximum	Unit
V _{BAT}	DC supply for the 3.3V input	-	3.3	3.96	V
V _{IO}	1.8 V/3.3 V digital I/O power supply	-	1.8	2.16	V
			3.3	3.96	V

3.2 Recommended Operating Conditions

Symbol	Parameter	Minimum	Typical	Maximum	Unit
V _{BAT}	DC supply for the 3.3V input	3.14	3.3	3.46	V
V _{IO}	1.8 V/3.3 V digital I/O power supply	1.71	1.8	1.89	V
		3.14	3.3	3.46	V

3.3 Digital IO Pin DC Characteristics

3.3.1 VIO 1.8V Operation

Symbol	Parameter	Minimum	Typical	Maximum	Unit
V _{IO}	I/O pad supply voltage	1.71	1.8	1.89	V
V _{IH}	Input high voltage	0.7*V _{IO}	-	V _{IO} +0.4	V
V _{IL}	Input low voltage	-0.4	-	0.3*V _{IO}	
V _{HYS}	Input Hysteresis	100	-	-	mV

3.3.2 VIO 3.3V Operation

Symbol	Parameter	Minimum	Typical	Maximum	Unit
V _{IO}	I/O pad supply voltage	3.14	3.3	3.46	V
V _{IH}	Input high voltage	0.7*V _{IO}	-	V _{IO} +0.4	V
V _{IL}	Input low voltage	-0.4	-	0.3*V _{IO}	
V _{HYS}	Input Hysteresis	100	-	-	mV

3.4 Power Consumption

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)	TBD			
PM1(Idle)				
PM2(Standby)				
PM3(Sleep)				
PM4(Shutdown)				

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	TBD			
	11b@11M	20	17				
	11g@54M	20	14				
	11n@MCS7	20	13				

*Current Unit: mA

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

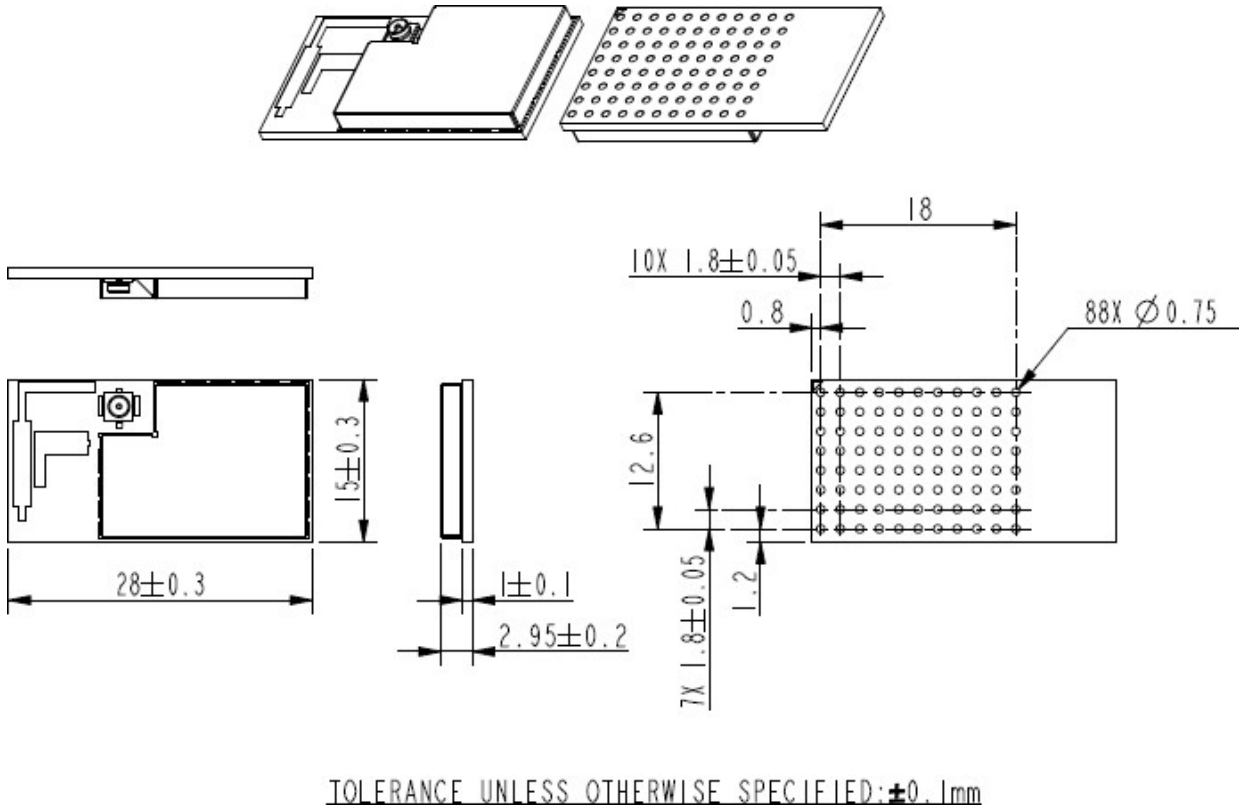
3.5 External 32.768KHZ Crystal Requirement

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

Parameter	Min	Typ	Max	Unit
Output frequency	-	32.768	-	kHz
Frequency accuracy(Over process, voltage, temperature (PVT))	-	-	-22/-192	PPM
Temperature tolerance (From -40° C to 120° C)	-	0.0192	-	%
Start-up time(From power on to CLK_RDY without noise injection)	-	208	380	ms
Start-up time(From power on to CLK_RDY with noise injection)	-	15	170	ms
Duty cycle	46.7	47.4	49.77	%
Crystal ESR resistance		50	80	k Ω

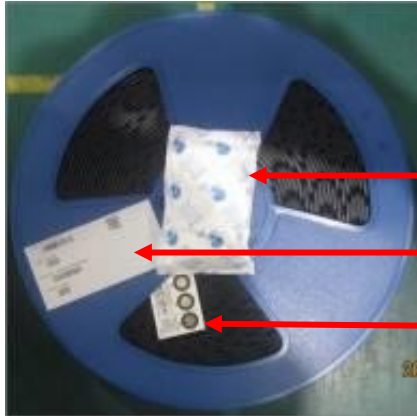
4. Mechanical Information

4.1 Mechanical Drawing



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



← 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



One production label

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

One carton label

One box label



Example of carton label	
Example of box label	



FCC:

Federal Communication Commission Interference Statement

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

FCC Caution: Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.



IMPORTANT NOTE:

This module is intended for OEM integrator. This module is only FCC authorized for the specific rule parts listed on the grant, and that the host product manufacturer is responsible for compliance to any other FCC rules that apply to the host not covered by the modular transmitter grant of certification. The final host product still requires Part 15 Subpart B compliance testing with the modular transmitter installed.

Additional testing and certification may be necessary when multiple modules are used.

OEM integrators that they must use the equivalent antennas or C2PC will be required.

This equipment complies with FCC mobile radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with a minimum distance of 20cm between the radiator & your body. If the module is installed in a portable host, a separate SAR evaluation is required to confirm compliance with relevant FCC portable RF exposure rules.

The host manufacturer should reference KDB Publication 996369 D04 Module Integration Guide.

USERS MANUAL OF THE END PRODUCT:

In the users manual of the end product, the end user has to be informed to keep at least 20cm separation with the antenna while this end product is installed and operated. The end user has to be informed that the FCC radio-frequency exposure guidelines for an uncontrolled environment can be satisfied.

The end user has to also be informed that any changes or modifications not expressly approved by the manufacturer could void the user's authority to operate this equipment.

This device complies with Part 15 of FCC rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference and (2) this device must accept any interference received, including interference that may cause undesired operation.

FCC regulations restrict the operation of this device to indoor use only.

This device cannot operate as a subordinate between separate buildings or structures.

LABEL OF THE END PRODUCT:

The final end product must be labeled in a visible area with the following " Contains TX FCC ID: TLZ-CU5XX".

This device complies with Part 15 of FCC rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference and (2) this device must accept any interference received, including interference that may cause undesired operation.

FCC regulations restrict the operation of this device to indoor use only.

NCC:

取得審驗證明之低功率射頻器材，非經核准，公司、商號或使用者均不得擅自變更頻率、加大功率或變更原設計之特性及功能。低功率射頻器材之使用不得影響飛航安全及干擾合法通信；經發現有干擾現象時，應立即停用，並改善至無干擾時方得繼續使用。

前述合法通信，指依電信管理法規定作業之無線電通信。低功率射頻器材須忍受合法通信或工業、科學及醫療用電波輻射性電機設備之干擾。

應避免影響附近雷達系統之操作。

本模組於取得認證後將依規定於模組本體標示審驗合格標籤，並要求平台廠商於平台上標示「本產品內含射頻模組NCC XX xx LP yyy Z z。」

Ant list

Ant.	Port	Brand	Model Name	Antenna Type	Connector	Gain (dBi)
1	1	ARISTOTLE	RFA-27-C38H1-C198	Dipole Antenna	u.FL	Note1
2	1	Molex	2128600011	Dipole Antenna	u.FL	
3	1	LYNwave	2570	PCB Antenna	N/A	

Note1:

Ant.	Gain (dBi)	
	WLAN 2.4GHz/Bluetooth/Thread	WLAN 5GHz
1	3	5
2	5.3	4.5
3	2.2	4.4

The antenna is limited as the antenna listed.