AW-CU277

IEEE 802.11 b/g/n + Bluetooth 4.0 HS Smart Energy Module

User manual

Version 0.1

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1. GENERAL DESCRIPTION

1-1. PRODUCT OVERVIEW AND FUNCTIONAL DESCRIPTION

AzureWave presents **AW-CU277** Wi-Fi & Bluetooth 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 Marvell's first-generation Wi-Fi microcontroller platform using the Marvell Avastar® 88W8777 Wi-Fi & Bluetooth System-on-Chip (SoC) and Marvell Easy Connect software. Adding new enhancements and capabilities, the second-generation Smart Energy hardware platform is built with a new high-performance Marvell Cortex-M3 microcontroller (Marvell 88MC200) optimized to run Marvell's Easy Connect software. It is paired with Marvell's industry leading low-power Wi-Fi & Bluetooth SoCs to provide best-in-class performance and rich features including IEEE 802.11n, Beamforming, Access-Point mode and Wi-Fi Direct.

The **AW-CU277** is powered by production quality, field-tested Marvell 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.

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1-2. KEY FEATURES

High Performance Integrated MCU

- ARM Cortex-M3 running up to 200MHz
- 1MB QSPI Flash in Package
- 512 KB on-chip SRAM; 4KB retention RAM

IO Interfaces

- QSPI (1) SSP/SPI/I2S (3), I2C (2), UART (3)
- USB OTG (FS) with integrated PHY
- ADC, DAC, Analog Comparator, Temp Sensor

MCU Sub-System

- RTC, WDT, GPT, PWM, CRC, AES (128-bit)
- JTAG

Wireless Sub-System

- Wi-Fi 802.11 b/g/n HT20
- Bluetooth 4.0 (Supports Low Energy(LE))
- Integrated Chip-Antenna

High Integration and Low-RBOM

- Single 3.3V Power Input

Certifications

- FCC/CE (others to be done as needed)
- Wi-Fi & Bluetooth (via Marvell)

Package

- LGA Module – 18 mm x 36 mm x 2.5mm 110 pin

Antenna

- Support Chip Antenna for Internal Antenna
- Support U.FL Connector for External Antenna
- Antenna Switching for Internal/External Antenna without diversity

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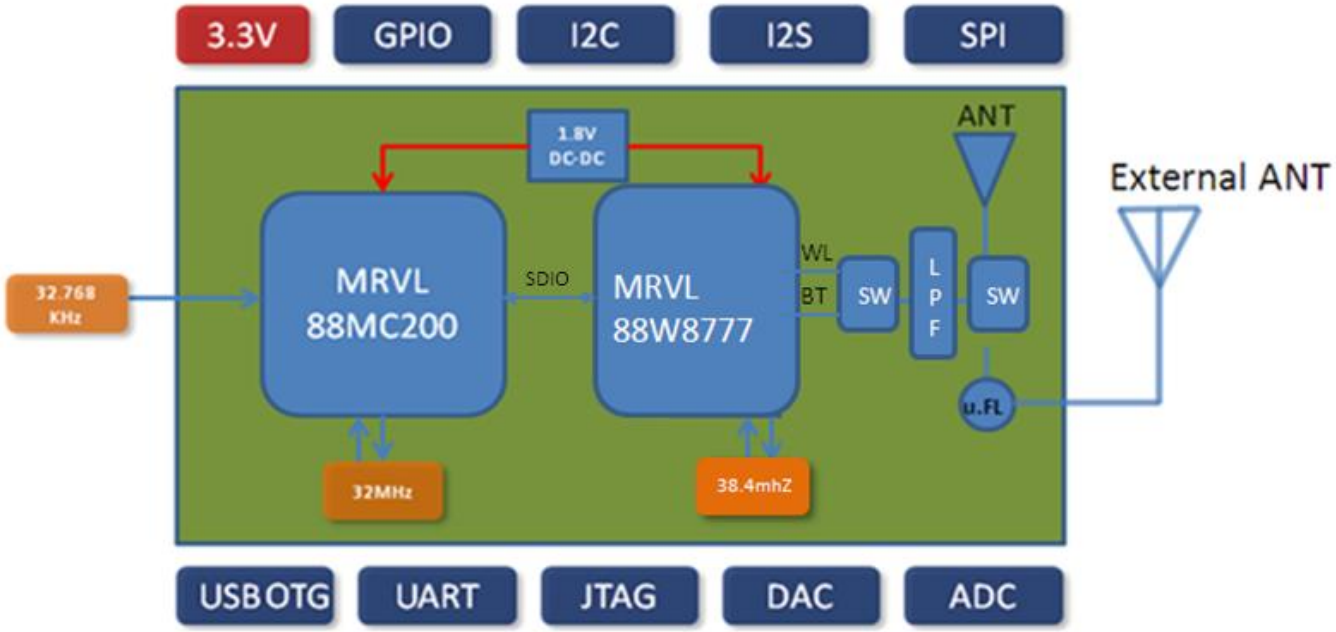
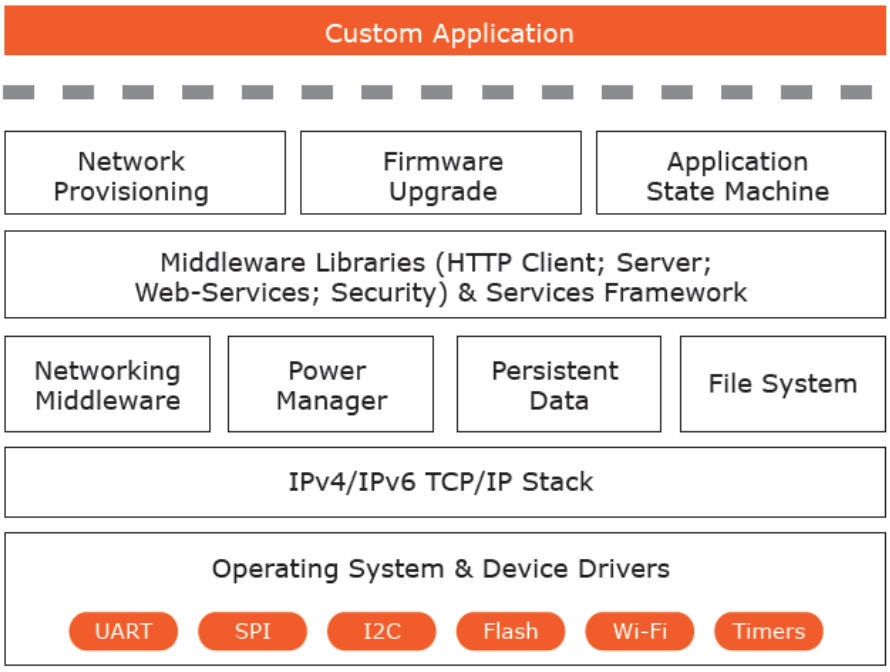
1-3. FUNCTION BLOCK



Block Diagram of AW-CU277



Marvell Easy Connect Software

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1-4. SPECIFICATIONS TABLE

Product Description	AW-CU277 Wireless Smart Energy module
WLAN Standard	IEEE 802.11b/g/n, Wi-Fi compliant
Bluetooth Standard	Bluetooth 4.0 complaint with Bluetooth 2.1+Enhanced Data Rate (EDR)
Host Interface	UART/I2C/SPI/USB(OTG)/I2S/ADC/DAC/JTAG
Major Chipset	Marvell CU200+Marvell 8777
Dimension	18mmx36mmx2.5mm
Package	110-pin LGA
Operating Conditions	
Voltage	3.3V +/- 10%
Temperature	Operating: 0 ~ 70℃ ; Storage: -40 ~ 85℃
Electrical Specifications	
Frequency Range	2.4 GHz ISM radio band
Number of Channels	802.11b: USA, Canada and Taiwan – 11 Most European Countries – 13 France – 4, Japan – 14 802.11g: USA, Canada and Taiwan – 11 Most European Countries – 13 Japan – 13 802.11n(HT20): Channel 1~13(2412~2472)
Modulation	DSSS, OFDM, DBPSK, DQPSK, CCK, 16-QAM, 64-QAM for WLAN GFSK (1Mbps), Π/4 DQPSK (2Mbps) and 8DPSK (3Mbps) for Bluetooth
Output Power (U.FL connector port)	WLAN: Module for IEEE 802.11b/g/n spec: 802.11b 18dBm(+-1.5dBm) for IEEE 802.11b spec 802.11g 14dBm(+-1.5dBm) for IEEE 802.11g spec 802.11n 13dBm(+-1.5dBm) for IEEE 802.11n HT20 spec Bluetooth Class2: 2dBm / LE:1.5dBm
Receive Sensitivity (U.FL connector port)	WLAN: -83dBm for 11M IEEE 802.11b -69dBm for 54M IEEE 802.11g -65dBm for MCS7 IEEE 802.11n HT20 Bluetooth: GFSK: -85dBm π/4-DQPSK: -85dBm 8-DPSK: -75dBm
Antenna Switching Support	Chip Antenna or U.FL Connector for WLAN/BT
Medium Access Protocol	CSMA/CA with ACK

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Data Rates	**WLAN** **802.11b: 1, 2, 5.5, 11Mbps** **802.11g: 6, 9, 12, 18, 24, 36, 48, 54Mbps** **802.11n: up to 150Mbps-SINGLE** **Bluetooth** **Bluetooth 2.1+EDR data rates of 1,2, and 3Mbps**

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2. ELECTRICAL CHARACTERISTICS

2-1. ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Pin No	Min	Typ	Max	Units
VCC_3V3_W	3.3V power supply for WIFI	K10		3.3	3.6	V
VCC_3V3_L	3.3V power supply for DC-DC 1.8V	J9		3.3	3.6	V
VCC_3V3_M	3.3V power supply for MCU	K9		3.3	4.0	V

2-2. RECOMMENDED OPERATING CONDITIONS

Symbol	Parameter	Pin No	Min	Typ	Max	Units
VCC_3V3_W	3.3V power supply for WIFI	K10	3.0	3.3	3.6	V
VCC_3V3_L	3.3V power supply for DC-DC 1.8V	J9	3.0	3.3	3.6	V
VCC_3V3_M	3.3V power supply for MCU	K9	3.0	3.3	3.6	V

2-3. INTERNAL ANTENNA SPEC

Antenna	Chip Antenna		
Frequency (GHz)	2.4	2.45	2.484
S11 (dB)	-9.53	-23.34	-11.36
Max. Gain (dBi)	2.39	3.29	2.49
Avg. Gain (dBi)	-3.05	-2.46	-3.24
Efficiency	52.01	60.16	53.12

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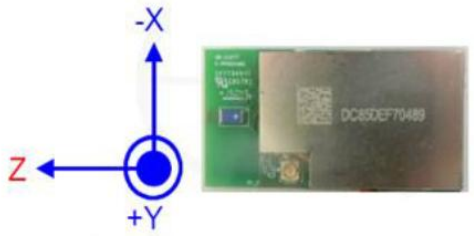
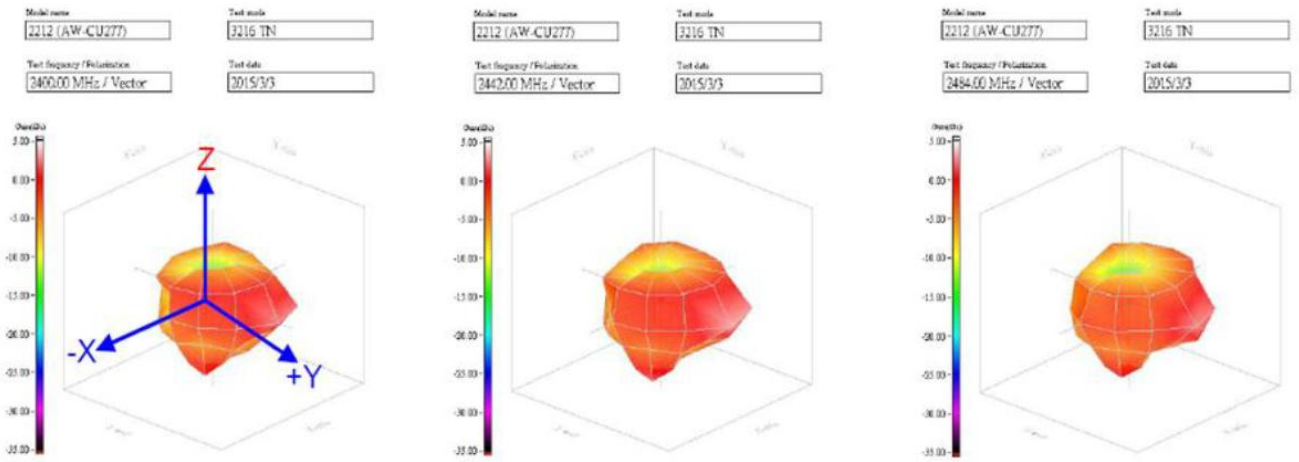
3D Radiation Pattern





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3. PIN DEFINITION

Pin No	Definition	Basic Description	Function 1	Function 2	Function 3	Function 4	Type	Level
K9	VCC_3V3_M	3.3V Power input for MCU					PWR	3.3V
K10	VCC_3V3_W	3.3V Power input for WIFI					PWR	3.3V
J9	VCC_3V3_L	3.3V Power input for DC-DC 1.8V					PWR	3.3V
K8	GPIO_44	GPIO_44	I2C0_SDA	GPT0_CLKIN	GPT3_CH0	adc_trigger	I/O	3.3V
J8	GPIO_45	GPIO_45	I2C0_SCL	usb2_drvvbus	GPT3_CH1	dac_trigger	I/O	3.3V
J3	TDO	JTAG TDO	GPIO 20				O	3.3V
K2	TCK	JTAG TCK	GPIO 21				O	3.3V
J4	TMS	JTAG TMS	GPIO 22				I/O	3.3V
K3	TDI	JTAG TDI	GPIO 23				I	3.3V
K4	TRST_N	JTAG TRST_N	GPIO 24				I	3.3V
B2	USB_VBUS	USB_VBUS					AI/O	
A2	USB_ID	USB_ID					AI	
A3	USB_DPLS	USB_DPLS	GPIO_57	GPT0_CLKIN		UART_SIR_OUT	AI/O	
A4	USB_DMNS	USB_DMNS	GPIO_58	GPT1_CLKIN	AUDIO_CLK	UART_SIR_IN	AI/O	
D1	GPIO_04	GPIO_04	GPT0_CH4	I2C1_SDA	GPT1_CLKIN	ADC0_IN3/ACOMP0_IN3/ACOMP1_IN3/DACA/DBG_P/ADC0_REF	I/O	3.3V
B1	GPIO_05	GPIO_05	GPT0_CH5	I2C1_SCL	GPT3_CLKIN	ADC0_IN2/ACOMP0_IN2/ACOMP1_IN2	I/O	3.3V
E1	GPIO_06	GPIO_06	GPT1_CH0	GPT0_CLKIN	GPT3_CH0	ADC0_IN1/ACOMP0_IN1/ACOMP1_IN1/TEMP0	I/O	3.3V
C1	GPIO_07	GPIO_07	GPT1_CH1	GPT2_CLKIN	GPT3_CH1	ADC0_IN0/ACOMP0_IN0/ACOMP1_IN0/TEMP0	I/O	3.3V
F1	GPIO_08	GPIO_08	GPT1_CH2	I2C1_SDA	GPT3_CH2	ADC1_IN0/TEMP1	I/O	3.3V
G1	GPIO_09	GPIO_09	GPT1_CH3	I2C1_SCL	GPT3_CH3	ADC1_IN1/TEMP1	I/O	3.3V
H1	GPIO_10	GPIO_10	GPT1_CH4	I2C2_SDA	GPT3_CH4	ADC1_IN2/DAC_REF	I/O	3.3V
J1	GPIO_11	GPIO_11	GPT1_CH5	I2C2_SCL	GPT3_CH5	ADC1_IN3/DACB/DBG_NADC1_REF	I/O	3.3V
K6	GPIO_27	acomp0_gpio_out	GPT3_CH2		UART0_DSRn	BOOT	I/O	3.3V
K7	GPIO_28	acomp0_edge_pulse	GPT3_CH3	AUDIO_CLK	UART0_DCDn	SDIO_LED	I/O	3.3V
J6	GPIO_29	acomp1_gpio_out	GPT3_CH4	acomp0_gpio_out	UART0_Rin	SDIO_CDn	I/O	3.3V
J7	GPIO_30	acomp1_edge_pulse	GPT3_CH5	acomp0_edge_pulse	UART0_DTRn	SDIO_WP	I/O	3.3V
B10	GPIO_63	GPIO_63	UART1_CTSn	SSP1_CLK	GPT3_CH2	UART1_DSRn	I/O	3.3V
A9	GPIO_64	GPIO_64	UART1_RTSn	SSP1_FRM	GPT3_CH3	UART1_DCDn	I/O	3.3V
A10	GPIO_65	GPIO_65	UART1_TXD	SSP1_RXD	GPT3_CH4	UART1_TXD	I/O	3.3V
B9	GPIO_66	GPIO_66	UART1_RXD	SSP1_TXD	GPT3_CH5	UART1_RXD	I/O	3.3V
A7	GPIO_72	GPIO_72	UART0_CTSn	GPT2_CLKIN	GPT1_CH2	QSPI_SSn	I/O	3.3V
B7	GPIO_73	GPIO_73	UART0_RTSn	GPT3_CLKIN	GPT1_CH3	QSPI_CLK	I/O	3.3V
B8	GPIO_74	UART0_TXD			GPT1_CH4		I/O	3.3V

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Pin No	Definition	Basic Description					Type	Level
A8	GPIO_75	UART0_RXD			GPT1_CH5		I/O	3.3V
B6	GPIO_76	GPIO_76	UART2_CTSn	SSP0_CLK	I2C0_SDA	AQSPI_D0	I/O	3.3V
A6	GPIO_77	GPIO_77	UART2_RTSn	SSP0_FRM	I2C0_SCL	QSPI_D1	I/O	3.3V
A5	GPIO_78	GPIO_78	UART2_TXD	SSP0_RXD	GPT1_CH0	QSPI_D2	I/O	3.3V
B5	GPIO_79	GPIO_79	UART2_RXD	SSP0_TXD	GPT1_CH1	QSPI_D3	I/O	3.3V
G12	WLAN_ACT	WLAN_GPIO					O	1.8V
J2	RTC_XIN	External reference clock	GPIO_18				I	3.3V
K5	MCU_RSTn	Host reset					I	3.3V
J5	Wake_UP_0	External wake up	GPIO_25	acomp0_gpio_out	acomp1_gpio_out	UART0_SIR_IN	I	3.3V

Pin No Definition			Basic Description	Remark
A1	D11	J12	GND	
A11	D12	J13		
A12	D13	J14		
A13	D14	J15		
A14	D15	K1		
A15	E2	K11		
B3	E3	K12		
B4	E4	K13		
B11	E6	K14		
B12	E10	K15		
B13	E12			
B14	E13			
B15	E15*			
C2	F5			
C3	F10			
C4	F15			
C10	G3			
C11	G4			
C12	G10			
C13	G13			
C14	G14			
C15	G15			
D2	H2			
D3	H12			
D4	H13			
D5	H14			
D8	H15			
D9	J10			
D10	J11			

- * Pin E15 is a dummy PIN, can be connected to ground.

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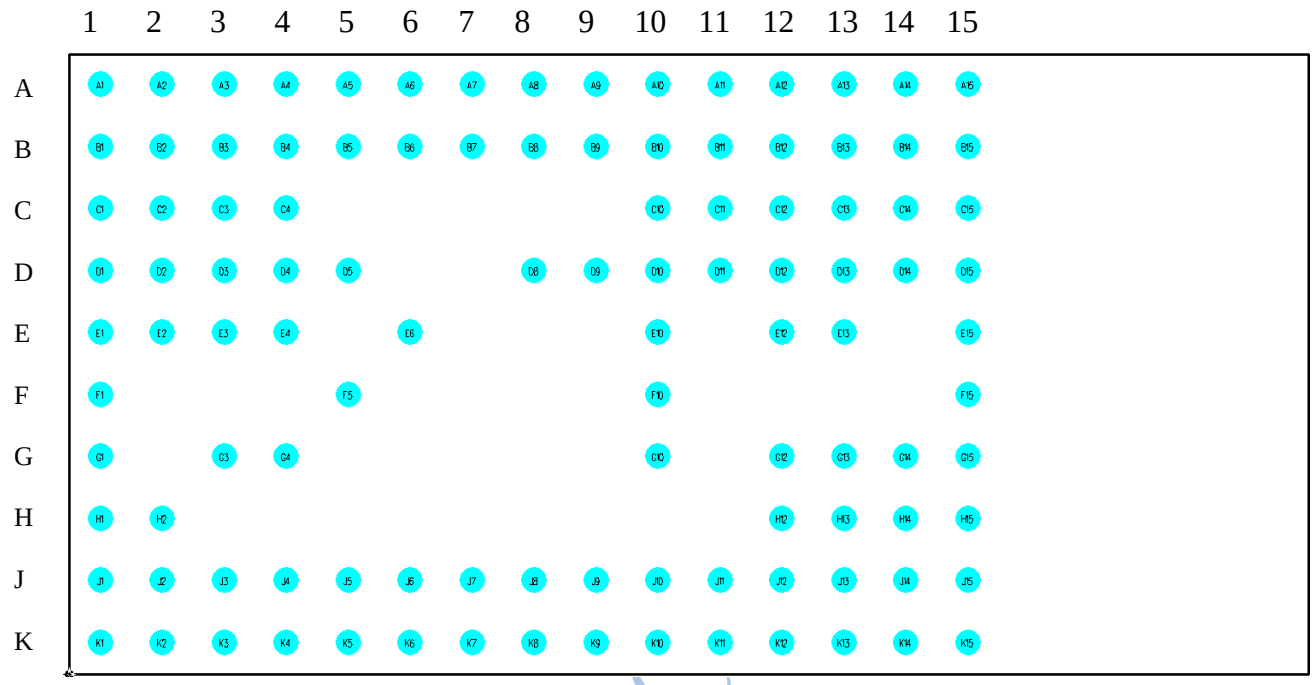
4. MECHANICAL CHARACTERISTICS

The size and thickness of the AW-CU277 LGA package module is listed below:

AW-CU277 TOP View PCB Layout Footprint



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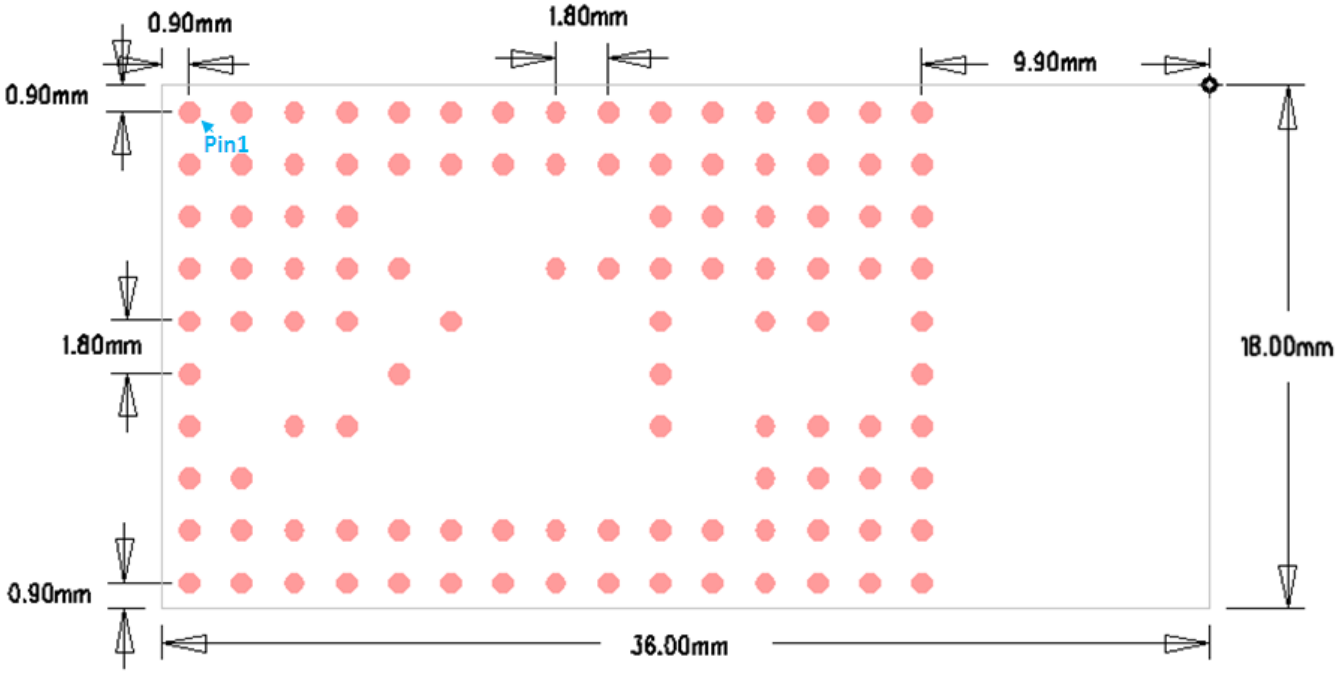
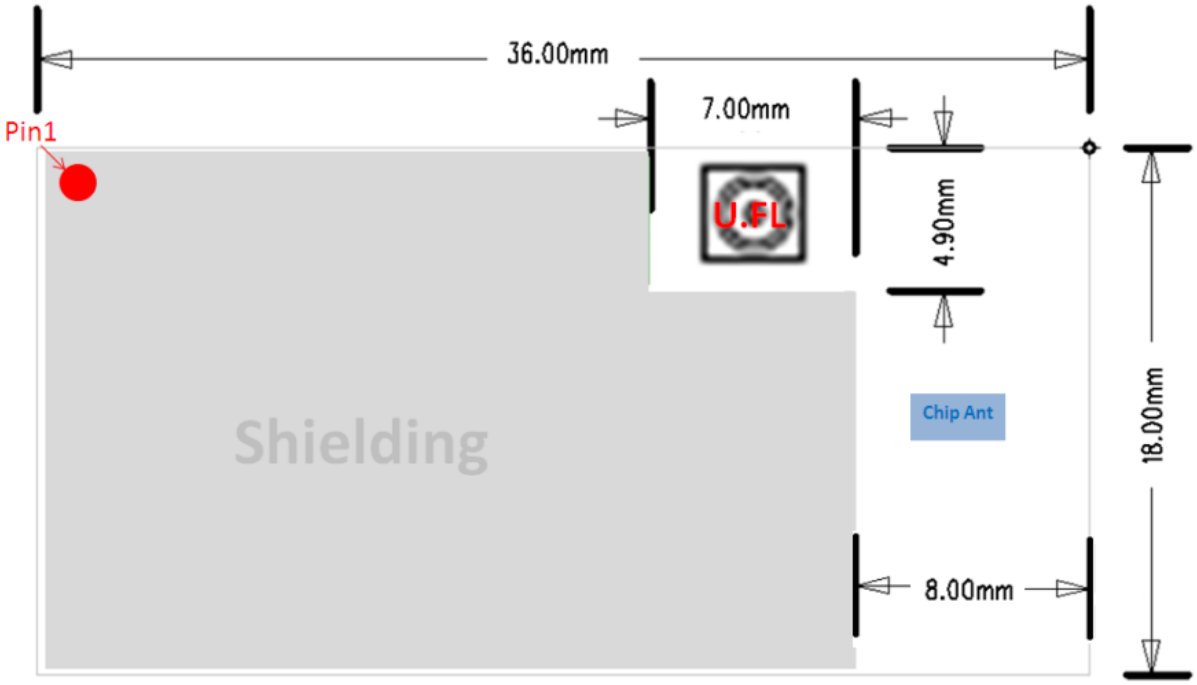
5. MECHANIC DRAWING



TOP VIEW (Bottom Pads)

* Pad Φ=0.75mm.



TOP VIEW

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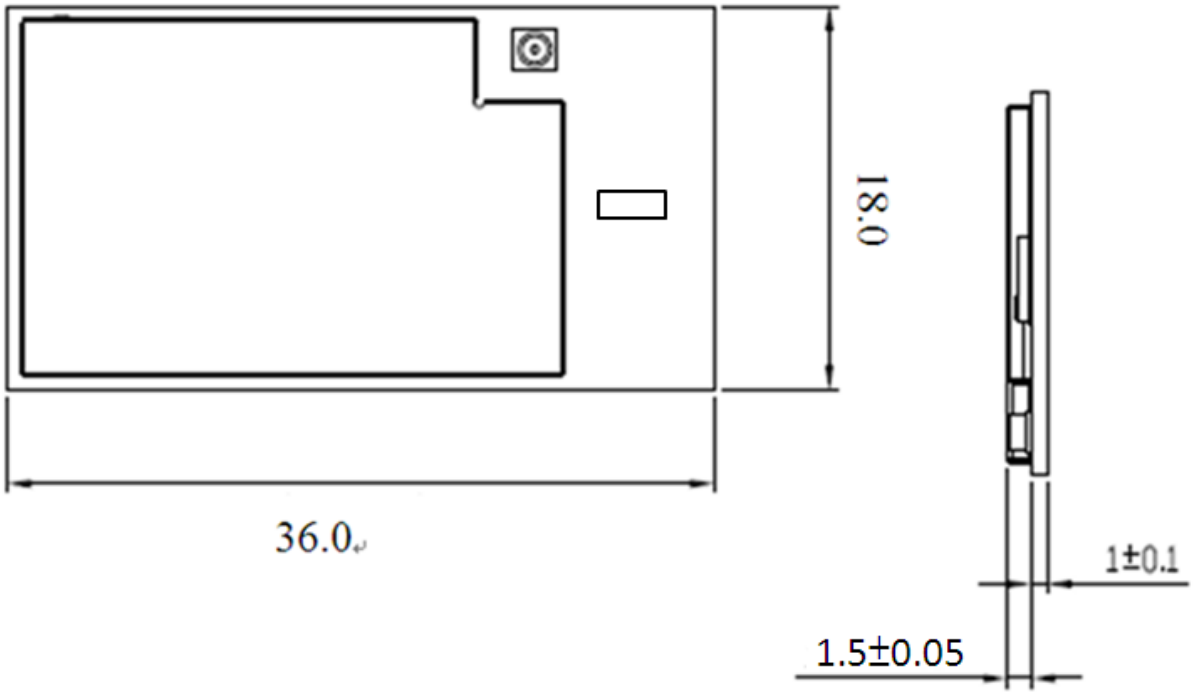

Tolerances unless otherwise specified : ±0.15

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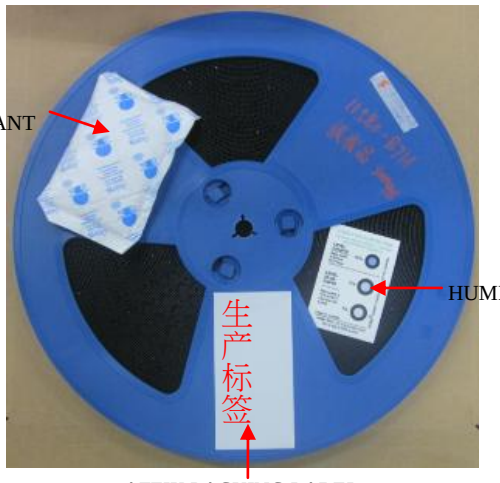
6. SHIPPING INFORMATION

6-1



6-2

6-3

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6-4

AFFIX PACKING LABEL

6-5

1 Carton= 3 Boxes

AFFIX PACKING LABEL

6-6

AFFIX PACKING LABEL

Note: 1 tape reel = 1 box = 600pcs
1 carton = 3 boxes = 3 * 600pcs=1,800pcs

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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:
Radiation Exposure Statement:
This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20cm between the radiator & your body.

This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

Country Code selection feature to be disabled for products marketed to the US/CANADA

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This device is intended only for OEM integrators under the following conditions:

1) The antenna must be installed such that 20 cm is maintained between the antenna and users, and
2) The transmitter module may not be co-located with any other transmitter or antenna,
3) For all products market in US, OEM has to limit the operation channels in CH1 to CH11 for 2.4G band by supplied firmware programming tool. OEM shall not supply any tool or info to the end-user regarding to Regulatory Domain change.

As long as 3 conditions above are met, further transmitter test will not be required. However, the OEM integrator is still responsible for testing their end-product for any additional compliance requirements required with this module installed

IMPORTANT NOTE

In the event that these conditions can not be met (for example certain laptop configurations or co-location with another transmitter), then the FCC authorization is no longer considered valid and the FCC ID can not be used on the final product. In these circumstances, the OEM integrator will be responsible for re-evaluating the end product (including the transmitter) and obtaining a separate FCC authorization.

End Product Labeling

This transmitter module is authorized only for use in device where the antenna may be installed such that 20 cm may be maintained between the antenna and users. The final end product must be labeled in a visible area with the following: “Contains FCC ID: TLZ-CU277”.

Manual Information to the End User

The OEM integrator has to be aware not to provide information to the end user regarding how to install or remove this RF module in the user’s manual of the end product which integrates this module.

The end user manual shall include all required regulatory information/warning as show in this manual.

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Industry Canada statement:

This device complies with Industry Canada's licence-exempt RSSs. Operation is subject to the following two conditions:

(1) This device may not cause interference; and (2) This device must accept any interference, including interference that may cause undesired operation of the device.

Cet appareil est conforme aux CNR exemptes de licence d'Industrie Canada. Son fonctionnement est soumis aux deux conditions suivantes:
(1) Ce dispositif ne peut causer d'interférences; et(2) Ce dispositif doit accepter toute interférence, y compris les interférences qui peuvent causer un mauvais fonctionnement de l'appareil.

Radiation Exposure Statement:
This equipment complies with IC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20cm between the radiator & your body.

Déclaration d'exposition aux radiations:
Cet équipement est conforme aux limites d'exposition aux rayonnements IC établies pour un environnement non contrôlé. Cet équipement doit être installé et utilisé avec un minimum de 20 cm de distance entre la source de rayonnement et votre corps.

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This device is intended only for OEM integrators under the following conditions:

1) The antenna must be installed such that 20 cm is maintained between the antenna and users, and
2) The transmitter module may not be co-located with any other transmitter or antenna.

As long as 2 conditions above are met, further transmitter test will not be required. However, the OEM integrator is still responsible for testing their end-product for any additional compliance requirements required with this module installed.

Cet appareil est conçu uniquement pour les intégrateurs OEM dans les conditions suivantes:

1) L'antenne doit être installée de telle sorte qu'une distance de 20 cm est respectée entre l'antenne et les utilisateurs, et
2) Le module émetteur peut ne pas être coïmplanté avec un autre émetteur ou antenne.

Tant que les 2 conditions ci-dessus sont remplies, des essais supplémentaires sur l'émetteur ne seront pas nécessaires. Toutefois, l'intégrateur OEM est toujours responsable des essais sur son produit final pour toutes exigences de conformité supplémentaires requis pour ce module installé.

IMPORTANT NOTE:

In the event that these conditions can not be met (for example certain laptop configurations or co-location with another transmitter), then the Canada authorization is no longer considered valid and the IC ID can not be used on the final product. In these circumstances, the OEM integrator will be responsible for re-evaluating the end product (including the transmitter) and obtaining a separate Canada authorization.

NOTE IMPORTANTE:

Dans le cas où ces conditions ne peuvent être satisfaites (par exemple pour certaines configurations d'ordinateur portable ou de certaines co-localisation avec un autre émetteur), l'autorisation du Canada n'est plus considéré comme valide et l'ID IC ne peut pas être utilisé sur le produit final. Dans ces circonstances, l'intégrateur OEM sera chargé de réévaluer le produit final (y compris l'émetteur) et l'obtention d'une autorisation distincte au Canada.

End Product Labeling

This transmitter module is authorized only for use in device where the antenna may be installed such that 20 cm may be maintained between the antenna and users. The final end product must be labeled in a visible area with the following: “Contains IC: 6100A-CU277”.

Plaque signalétique du produit final

Ce module émetteur est autorisé uniquement pour une utilisation dans un dispositif où l'antenne peut être installée de telle sorte qu'une distance de 20cm peut être maintenue entre l'antenne et les utilisateurs. Le produit final doit être étiqueté dans un endroit visible avec l'inscription suivante: "Contient des IC: 6100A-CU277".

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Manual Information To the End User

The OEM integrator has to be aware not to provide information to the end user regarding how to install or remove this RF module in the user's manual of the end product which integrates this module.
The end user manual shall include all required regulatory information/warning as show in this manual.

Manuel d'information à l'utilisateur final

L'intégrateur OEM doit être conscient de ne pas fournir des informations à l'utilisateur final quant à la façon d'installer ou de supprimer ce module RF dans le manuel de l'utilisateur du produit final qui intègre ce module.
Le manuel de l'utilisateur final doit inclure toutes les informations réglementaires requises et avertissements comme indiqué dans ce manuel.

This radio transmitter (IC: 6100A-CU277) has been approved by Industry Canada to operate with the antenna types listed below with the maximum permissible gain indicated. Antenna types not included in this list, having a gain greater than the maximum gain indicated for that type, are strictly prohibited for use with this device

Cet émetteur radio (IC: 6100A-CU277) a été approuvé par Industrie Canada pour fonctionner avec les types d'antenne énumérés ci-dessous avec le gain maximal admissible indiqué. Types d'antennes ne figurent pas dans cette liste, ayant un gain supérieur au gain maximum indiqué pour ce type, sont strictement interdits pour une utilisation avec cet appareil

Model	Type	Connector	Gain (dBi)
ANT3216	Chip	UFL	3.29
FXP73.07.0100A	Monopole	UFL	3
NanoBlue	Monopole	UFL	2
PC11.07.0100A	Dipole	UFL	3
GW.17.07.0250E	Dipole	UFL	2.7
EDA-1313-2G4C1-A16	Dipole	UFL	2.39
FXP74.07.0100A	PIFA	UFL	4
MSA-4008-25GC1-A1	PIFA	UFL	2.98

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Taiwan 警語：

第十二條→經型式認證合格之低功率射頻電機，非經許可，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。

第十四條→低功率射頻電機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。

前項合法通信，指依電信法規定作業之無線電通信。 低功率射頻電機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。

1. 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
2. 系統廠商應於平台上標示「本產品內含射頻模組: CC XX xx YY yyy Z z W」字樣

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