AW-CU302

IEEE 802.11 b/g/n + Bluetooth 4.2 LE WLAN/BT Microcontroller Module

Datasheet

Version 0.7

Document release	Date	Modification	Initials	Approved
Version0.4	2016/11/23	Initial (New Solution)	Kai Wu	Daniel Lee
Version0.5	2017/3/15	Redesign: - Support external ANT for WLAN - Only 3.3V power supply	Kai Wu	Daniel Lee
Version0.6	2017/4/1	Redesign: - RF DPDT switch - 32.768KHz(Oscillator)	Kai Wu	Daniel Lee
Version0.7	2017/8/1	Redesign: - 32.768KHz(Crystal +Oscillator) - Added Debug pins	Alex Yu	Daniel Lee

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1. GENERAL DESCRIPTION

1.1 PRODUCT OVERVIEW AND FUNCTIONAL DESCRIPTION

AzureWave presents **AW-CU302** Wi-Fi/BT 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/BT microcontroller platforms using the Marvell/Dialog 88MW300/DA14580 Wi-Fi/BT System-on-Chip (SoC), a 4MByte QSPI flash memory and Marvell Easy Connect software.

1.2 KEY FEATURES

MCUs of AW-CU302

- 88MW300 (Marvell 88MW300 is a WLAN IEEE 802.11 b/g/n standalone SoC)
  - Processor
    - ARM Cortex-M4F, 32bit
    - 200MHz main bus clock
  - Memory
    - 128KB ROM
    - 512KB RAM
  - Flash Controller
    - 32KB SRAM cache to support XIP
    - Memory-mapped access to QSPI Flash devices
  - Wireless
    - IEEE 802.11 b/g/n HT20
    - Low-power with deep sleep and standby modes
    - Fully supports clients (stations) implementing IEEE Power Save mode
    - Wi-Fi direct connectivity
- DA14580 (Dialog DA14580 is a Bluetooth Low Energy 4.2 SoC)
  - Processor
    - ARM Cortex-M0, 32bit, 16MHz
    - Dedicated Link Layer Processor
    - AES-128 bit encryption Processor
  - Memory
    - 42 KB System SRAM
    - 84 KB ROM
    - 8 KB Retention SRAM
  - Wireless
    - Bluetooth V4.2

Memory of AW-CU302

- 4M Byte QSPI flash

IO Interfaces

- UART
- SWD(JTAG)
- SSP(SPI)
- GPT(PWM)
- I2C
- ADC
- GPIO

Wireless

- Wi-Fi 802.11 b/g/n only HT20
- Bluetooth V4.2

Package

- LGA Module – 36 mm x 18 mm x 2.5 mm 111 pin

Antenna

- Internal Chip Antenna for WLAN/BT coexistence or BT only
- External U.FL connector for WLAN only

Certifications

- TBD

1.4 SPECIFICATIONS TABLE

2.4G SPEC

Modulation Type	CCK, DQPSK, DBPSK for DSSS 64QAM, 16QAM, QPSK, BPSK for OFDM
Modulation Technology	DSSS,OFDM
Transfer Rate	802.11b: up to 11Mbps 802.11g: up to 54Mbps 802.11n: up to 72.2Mbps
Operating Frequency	2.412 ~ 2.462GHz
Number of Channel	11 for 802.11b, 802.11g, 802.11n (HT20)
Output Power	290.402mW

BT SPEC

Modulation Type	GFSK
Modulation Technology	DTS
Transfer Rate	Up to 1Mbps
Operating Frequency	2402MHz ~ 2480MHz
Number of Channel	40
Output Power	0.9183mW

4. BELOW ARE THE SPECIFICATIONS FOR THIS CRYSTAL.

Parameter	Description	Conditions	Min	Typ	Max	Unit
$V_{CLK(EXT)}$(32K)	external clock voltage	peak-peak voltage of external clock at XTAL32Kp, pin XTAL32Km floating. note: XTAL32Kp is internally AC coupled	0.1	0.2	1.5	V
f_{XTAL}(32k)	crystal oscillator frequency	frequency range for an external clock (for a crystal, use either 32.000 kHz or 32.768 kHz)	10	32.768	100	kHz
ESR(32k)	equivalent series resistance				100	kΩ
C_L(32k)	load capacitance	no external capacitors are required for a 6 pF or 7 pF crystal	6	7	9	pF
C_0(32k)	shunt capacitance			1	2	pF
Δf_{XTAL}(32k)	crystal frequency tolerance (including aging)	Timing accuracy is dominated by crystal accuracy. A much smaller value is preferred	-250		250	ppm
$P_{DRV(MAX)}$(32k)	maximum drive power	**(Note)**	0.1			µW

Note : Select a crystal that can handle a drive-level of at least this specification.

5. PIN DEFINITION

5.1 POWER PIN

Pin No	Definition	Basic Description	Type	Level
A10	VBAT_WL_3V3	88MW300/FLASH power supply. (Pin A10 with Pin B10 configuration)	A, I	3.3V
B10	VBAT_WL_3V3	88MW300/FLASH power supply. (Pin A10 with Pin B10 configuration)	A, I	3.3V
A11	VBAT_BT_3V3	DA14580 power supply. (Pin A11 with B11 configuration)	A, I	3.3V
B11	VBAT_BT_3V3	DA14580 power supply. (Pin A11 with B11 configuration)	A, I	3.3V
A13	VPP_BT_6V8	This pin is used while DA14580 OTP programming and testing. OTP programming: VPP = 6.7 V ± 0.1 V OTP Normal operation: leave VPP floating	A, I	6.8V

5.2 GPIO [88MW300] PIN

Pin No	Definition	Function 0	Function 1	Function 2	Function 3	Function 4	Function 5	Type	Level
J4	GPIO_0	GPIO_0	GPT0_CH0	UART0_CTS	SSP0_CLK			I/O	3.3V
J6	GPIO_1	GPIO_1	GPT0_CH1	UART0_RTS	SSP0_FRM			I/O	3.3V
K7	GPIO_2(4)	GPIO_2	GPT0_CH2	UART0_TXD	SSP0_TXD			I/O	3.3V
K6	GPIO_3(4)	GPIO_3	GPT0_CH3	UART0_RXD	SSP0_RXD			I/O	3.3V
B7	GPIO_4	GPIO_4	GPT0_CH4	I2C0_SDA	AUDIO_CLK			I/O	3.3V
A4	GPIO_5	GPIO_5	GPT0_CH5	I2C0_SCL				I/O	3.3V
B5	GPIO_7(2)	JTAG TCK	GPIO_7	UART2_CTS	SSP2_CLK	I2C0_SDA		I/O	3.3V
A5	GPIO_8(2)	JTAG TMS	GPIO_8	UART2_RTS	SSP2_FRM	I2C0_SDL		I/O	3.3V
A6	GPIO_10	JTAG TRST	GPIO_10	UART2_RXD	SSP2_RXD	I2C1_SDL		I/O	3.3V
E1	GPIO_16(1)	GPIO_16	CON[5]		AUDIO_CLK			I/O	3.3V
A3	GPIO_23	WAKE_UP_1	GPIO_23	UART0_CTS			COMP_IN_P	I/O	3.3V
B1	GPIO_24(3)	OCS32K	GPIO_24	UART0_RXD	GPT1_CH5		COMP_IN_N	I/O	3.3V
C1/J9	GPIO_25(3)	XTAL32K_IN	GPIO_25	I2C1_SDA				I/O	3.3V
D1	GPIO_26(3)	XTAL32K_OUT	GPIO_26	I2C1_SCL				I/O	3.3V
F1	GPIO_27(1)	GPIO_27	CON[4]	UART0_TXD				I/O	3.3V
H1	GPIO_40	GPIO_40	ADC_DAC_TRIGGER0	ACOMP0_GPIO_OUT	ACOMP1_GPIO_OUT			I/O	3.3V
G1	GPIO_41	GPIO_41	ADC_DAC_TRIGGER1	ACOMP0_EDGE_PULSE	ACOMP1_EDGE_PULSE			I/O	3.3V
K4	GPIO_46	GPIO_46	ADC_4/ ACOMP4	UART2_CTS	SSP2_CLK			I/O	3.3V

K2	GPIO_47	GPIO_47	ADC_5/ ACOMP5	UART2_RTS	SSP2_FRM			I/O	3.3V
K3	GPIO_48	GPIO_48	ADC_6/ ACOMP6	UART2_TXD	SSP2_TXD			I/O	3.3V
K5	GPIO_49	GPIO_49	ADC_7/ ACOMP7	UART2_RXD	SSP2_RXD			I/O	3.3V
A2	RESETN_WL	RESETn	Host reset					I	3.3V(internal pull high 51k ohm)

*(1) Configuration Pins Table:

	Pin No	Definition	Function 1 Description (Configuration Bits)
AW-CU302	F1	GPIO_27	88MW300 Boot Options with CON[4], CON[5] 00 = boot from UART 11 = boot from internal QSPI Flash (default)
	E1	GPIO_16	

*(2) 32k clock reference (sleep clock)
- External crystal-oscillator driving 32.768 KHz clock to GPIO_25
- External crystal connected to GPIO_25 & GPIO_26 at 32.768 KHz
- Connect GPIO_24 to GPIO_25 for calibration reference to RC32K

*(3) SWD support on GPIO_7 (SWDCLK) and GPIO_8 (SWDIO)
*(4) Console UART0 on GPIO_2 (TXD) and GPIO_3 (RXD)

5.3 GPIO [DA14580] PIN

Pin No	Definition	Function	Type	Level
J11	GPIO_0_0_BT	Support ADC[0]. Pull-down enabled during and after reset. General purpose I/O port bit or alternate function nodes.	AIO	3.3V
J10	GPIO_0_1_BT	Support ADC[1]. Pull-down enabled during and after reset. General purpose I/O port bit or alternate function nodes.	AIO	3.3V
J8	GPIO_0_6_BT	Pull-down enabled during and after reset. General purpose I/O port bit or alternate function nodes.	I/O	3.3V
H12	GPIO_1_0_BT	Pull-down enabled during and after reset. General purpose I/O port bit or alternate function nodes.	I/O	3.3V
K9	GPIO_1_1_BT	Pull-down enabled during and after reset. General purpose I/O port bit or alternate function nodes.	I/O	3.3V
K13	GPIO_2_3_BT	Pull-down enabled during and after reset. General purpose I/O port bit or alternate function nodes.	I/O	3.3V
J13	GPIO_2_4_BT	Pull-down enabled during and after reset. General purpose I/O port bit or alternate function nodes.	I/O	3.3V
B13	GPIO_2_5_BT	Pull-down enabled during and after reset. General purpose I/O port bit or alternate function nodes.	I/O	3.3V
B9	GPIO_2_6_BT	Pull-down enabled during and after reset. General purpose I/O port bit or alternate function nodes.	I/O	3.3V
A8	GPIO_2_7_BT	Pull-down enabled during and after reset. General purpose I/O port bit or alternate function nodes.	I/O	3.3V
B8	GPIO_2_8_BT	Pull-down enabled during and after reset. General purpose I/O port bit or alternate function nodes.	I/O	3.3V
A7	GPIO_2_9_BT	Pull-down enabled during and after reset. General purpose I/O port bit or alternate function nodes.	I/O	3.3V
K8	RESET_BT	Reset signal (active high). Must be connected to GND if not used.	I	3.3V(internal pull low 2.2k ohm)
J12	SWCLK_BT	JTAG Data input/output. Bidirectional data and control communication. Can also be used as a GPIO.	I/O	3.3V
K12	SWDIO_BT	INPUT JTAG clock signal. Can also be used as a GPIO.	I/O	3.3V
K10	XTAL32Kp	INPUT. Crystal input for the 32.768kHz XTAL.	I	3.3V
K11	XTAL32Km	OUTPUT. Crystal output for the 32.768kHz XTAL.	O	3.3V

5.4 GROUND PIN

AW-CU302 Pin No				Basic Description
A1	C13	E13	G12	GND(CONFIGURATION PINS)
A9	C14	E14	G13	
A12	C15	E15	G15	
A14	D3	F5	H3	
A15	D7	F6	H8	
B2	D11	F7	H13	
B12	D12	F8	J2	
B14	D13	F15	J15	
B15	D14	G3	K1	
C5	D15	G4	K14	
C8	E6	G5	K15	
C9	E7	G7		
C11	E8	G8		
C12	E11	G9		

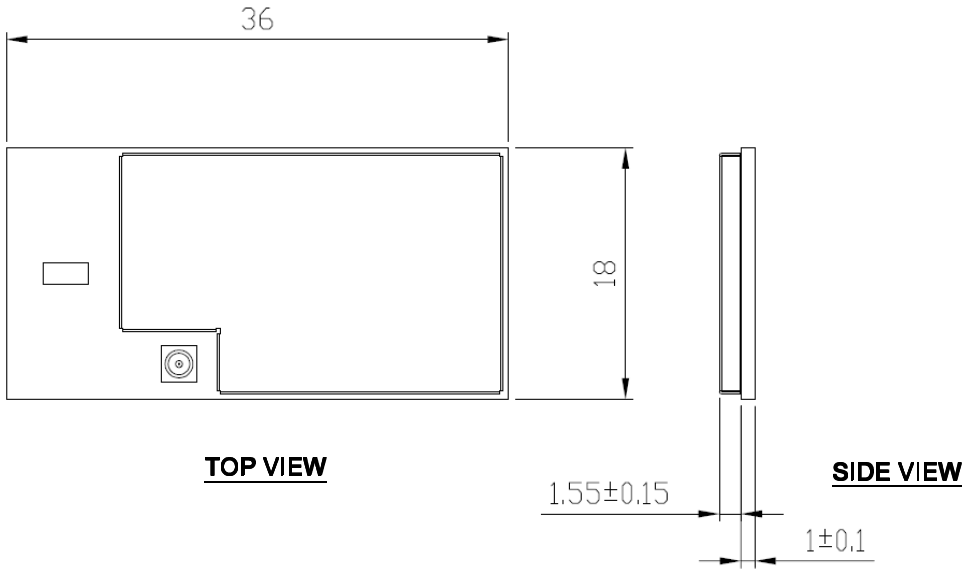
5.5 FLOATING PIN

AW-CU302 Pin No				Basic Description
B4	G2	H2		FLOATING PIN (FLOATING)
C2	F2	J1		
D2				
E2				

5.6 DEBUG PIN

AW-CU302 Pin No	Basic Description
F14	DNS(Don’t connect)
F3	
J5	
E3	
G14	

- **AW-CU302 Drawing**



Tolerances unless otherwise specified : ±0.15mm

Host integration instructions
Install module through golden finger.

Federal Communication Commission Interference Statement

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.

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

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

The antenna must be installed such that 20 cm is maintained between the antenna and users, and
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

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-CU302**". The grantee's FCC ID can be used only when all FCC compliance requirements are met.

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.

Industry Canada statement:

This device complies with ISED's licence-exempt RSSs. 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.

Le présent appareil est conforme aux CNR d' ISED applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes : (1) le dispositif ne doit pas produire de brouillage préjudiciable, et (2) ce dispositif doit accepter tout brouillage reçu, y compris un brouillage susceptible de provoquer un fonctionnement indésirable.

Radiation Exposure Statement:

This equipment complies with ISED 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 ISED 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.

This device is intended only for OEM integrators under the following conditions: (For module device use)

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: (Pour utilisation de dispositif module)

1) L'antenne doit être installée de telle sorte qu'une distance de 20 cm est respectée entre l'antenne et les utilisateurs,
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-CU302**”.

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-CU302**".

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.

低功率電波輻射性電機管理辦法

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：

 XXXyyyLPDzzzz-x」字樣。