AW-CM382

IEEE 802.11 a/b/g/n/ac MAC/baseband/radio and Bluetooth 5.0 Module

Datasheet

Version 03

Revision History

Revision	*Date*	*Description*	*Initials*	*Approved*
Version 0.1	2018/07	Initial Version	Steven Jian	Chihhao Liao
Version 0.2	2018/10/24	Updated 1.4 , 2.2 & 3	Steven Jian	Chihhao Liao
Version 0.3	2019/07/09	Updated 1.4	Steven Jian	Chihhao Liao

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1. Introduction

1.1 Product Overview

PRODUCT OVERVIEW AND FUNCTIONAL DESCRIPTION

The AW-CM382 provides the highest level of integration for embedded and IoT wireless systems with integrated single-stream IEEE 802.11a/b/g/n/ac MAC/baseband/radio and Bluetooth 5.0 (Basic Rate, Enhanced Data Rate and Bluetooth Low Energy).

AW-CM382 supports all rates specified in the IEEE 802.11 a/b/g/n/ac specifications. IEEE 802.11ac's 256 QAM is supported for MCS8 in 20 MHz channels and MCS8/MCS9 in 40 MHz & 80 MHz channels to enable data rates of up to 433.3 Mbps. Included on-chip are 2.4 GHz and 5 GHz power amplifiers and low-noise amplifiers.

An on-chip USB 2.0 hub provides a shared single USB connection to both WLAN and Bluetooth target devices. Using advanced design techniques and process technology to reduce active and idle power, the AW-CM382 is designed to address the needs of mobile devices that require minimal power consumption and compact size. It includes a power management unit which

Simplifies the system power topology and allows for direct operation from a mobile platform battery while maximizing battery life.

The AW-CM382 implements highly sophisticated enhanced collaborative coexistence hardware mechanisms and algorithms, which ensure that WLAN and Bluetooth collaboration is optimized for maximum performance. As a result, enhanced overall quality for simultaneous

Voice, video, and data transmission on an embedded and IoT system is achieved.

1.2 Features

- Integrates Cypress solutions of CYW4373 SoC
- Shared Bluetooth and WLAN receive signal path eliminates the need for an external power splitter while maintaining excellent sensitivity for both Bluetooth and WLAN
- 58.5mm(L) x 20mm(W) x 5.55 mm(H)
- Support internal PCB antenna

1.2.1 WLAN

- Dual band 802.11 a/b/g/n/ac/d/r/w/e/h/i/k
- Single-stream spatial multiplexing up to 433.3 Mbps
- Supports 20, 40, and 80 MHz channels with optional SGI (256 QAM modulation).
- Security: WEP, WPA/WPA2 (personal), AES (HW), TKIP (HW), CKIP (software support)

1.2.2 Bluetooth

- Qualified for Bluetooth Core Specification 5.0 with all Bluetooth 4.2 optional features
- Supports extended synchronous connections (eSCO), for enhanced voice quality by allowing for retransmission of dropped packets.
- Adaptive Frequency Hopping (AFH) for reducing radio frequency interference
- Supports multiple simultaneous Advanced Audio Distribution Profiles (A2DP) for stereo sound.

1.3 Specifications Table

1.3.1 General

Features	Description
Product Description	IEEE 802.11 a/b/g/n/ac Wireless LAN and Bluetooth Module
Major Chipset	Cypress CYW4373
Host Interface	USB
Dimension	58.5mm(L) x 20mm(W) x 5.55 mm(H)
Package	PCB+BTB connector
Antenna	Ant 1: WiFi Main (Internal PCB antenna) Ant 2: WIFI AUX (Internal PCB antenna)
Weight	4.44g

1.3.2 WLAN

Features	Description
WLAN Standard	IEEE 802.11a/b/g/n/ac, Wi-Fi compliant
WLAN VID/PID	n/a
WLAN SVID/SPID	n/a
Frequency Rage	WLAN: 2.4 GHz / 5GHz Band
Modulation	DSSS DBPSK(1Mbps), DQPSK(2Mbps), CCK(11/5.5Mbps) OFDM BPSK(9/6Mbps/MCS0), QPSK(18/12Mbps/MCS1~2), 16-QAM(36/24Mbps/MCS3~4), 64-QAM(72.2/54/48Mbps/MCS5~7), 256-QAM(MCS8~9)
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: USA and Canada – 1 ~ 11 Most European Countries – 1 ~ 13

802.11a:
USA – 36, 40, 44, 48, 52, 56, 60, 64, 100, 104, 108, 112, 116, 120, 124, 128, 132, 136, 140, 149, 153, 157, 161, 165

Output Power (Board Level Limit)*

2.4G

	Min	Typ	Max	Unit
11b (11Mbps) @EVM<35%	16	18	20	dBm
11g (54Mbps) @EVM≦-25 dB	14	16	18	dBm
11n (HT20 MCS7) @EVM≦-27 dB	13	15	17	dBm
11n (HT40 MCS7) @EVM≦-27 dB	11	13	15	dBm

5G

	Min	Typ	Max	Unit
11a (54Mbps) @EVM≦-25 dB	13	15	17	dBm
11n (HT20 MCS7) @EVM≦-27 dB	12	14	16	dBm
11n (HT40 MCS7) @EVM≦-27 dB	10	12	14	dBm
11ac (VHT20 MCS8) @EVM≦-30 dB	9	11	13	dBm
11ac (VHT40 MCS9) @EVM≦-32 dB	7	9	11	dBm
11ac (VHT80 MCS9) @EVM≦-32 dB	6	8	10	dBm

Receiver Sensitivity

2.4G(n/ac packets with LDPC)

	Min	Typ	Max	Unit
11b (11Mbps)		-89	-78	dBm
11g (54Mbps)		-76	-65	dBm
11n (HT20 MCS7)		-75	-64	dBm
11n (HT40 MCS7)		-73	-62	dBm

5G(n/ac packets with LDPC)

	Min	Typ	Max	Unit
11a (54Mbps)		-73.5	-65	dBm
11n (HT20 MCS7)		-73	-64	dBm
11n (HT40 MCS7)		-70	-61	dBm
11ac (VHT20 MCS8)		-69	-59	dBm
11ac (VHT40 MCS9)		-64	-54	dBm

	11ac (VHT80 MCS9)		-61	-51	dBm
Data Rate	802.11b: 1, 2, 5.5, 11Mbps 802.11g: 6, 9, 12, 18, 24, 36, 48, 54Mbps 802.11n: MCS0~7 HT20/HT40 802.11a: 6, 9, 12, 18, 24, 36, 48, 54Mbps 802.11ac: MCS0~8 VHT20 802.11ac: MCS0~9 VHT40/VHT80				
Security	◆ WPA™- and WPA2™- (Personal) support for powerful encryption and authentication ◆ AES and TKIP acceleration hardware for faster data encryption and 802.11i compatibility ◆ Wi-Fi Protected Setup (WPS) ◆ WEP ◆ CKIP(Software)				

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

1.3.3 Bluetooth

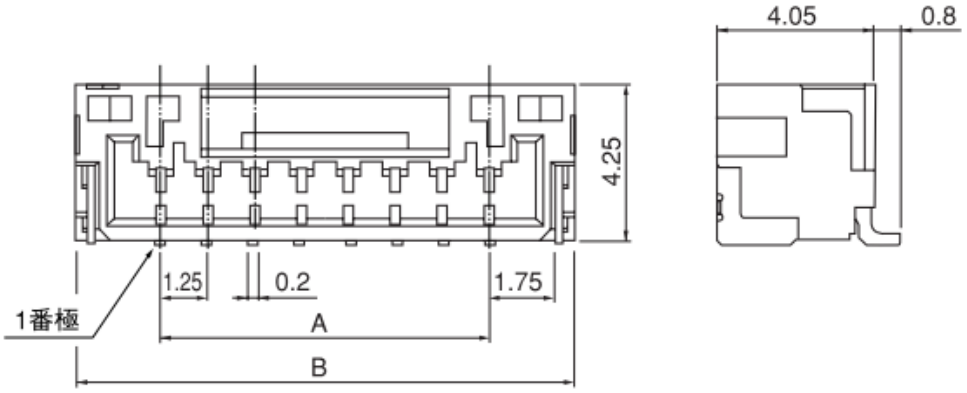
Features	Description
Bluetooth Standard	Bluetooth 2.1+Enhanced Data Rate (EDR)/BT3.0/BT4.2/BT5.0
Bluetooth VID/PID	n/a
Frequency Rage	2400~2483.5MHz
Modulation	GFSK (1Mbps), Π/4DQPSK (2Mbps) and 8DPSK (3Mbps)
Output Power	Basic Rate : 7dBm +/- 3dBm (Max Settings)
Receiver Sensitivity	<table><tr><th></th><th>Min</th><th>Typ</th><th>Max</th><th>Unit</th></tr><tr><td>DH5</td><td></td><td>-91</td><td>-81</td><td>dBm</td></tr><tr><td>2DH5</td><td></td><td>-93</td><td>-83</td><td>dBm</td></tr><tr><td>3DH5</td><td></td><td>-87</td><td>-77</td><td>dBm</td></tr></table> (Dirty Tx:0FF)

1.3.4 Operating Conditions

Features	Description
Operating Conditions	
Voltage	power supply WIFI/BT: 5V+-5%
Operating Temperature	-10~60°C (Functionality is guaranteed.)
Operating Humidity	<85%
Storage Temperature	-40~85°C
Storage Humidity	<60 %
ESD Protection	
Human Body Model	>1.5kV
Changed Device Model	>450V

2. Pin Definition

2.1 Pin Map



2.2 Pin Table

Pin No	Definition	Basic Description	Voltage	Type
1	5V	Power supply (Default 5V.For 3.3V option,please ask Azurewave's FAE for details)	5V	PWR
2	D-	Data minus of shared USB2.0 port	3.3V	I/O
3	D+	Data plus of shared USB2.0 port	3.3V	I/O
4	GND	Ground		GND
5	WL_HOST_WAKE	WLAN HOST_WAKE/GPIO_0	3.3V	O
6	GND	Ground		GND

3. Electrical Characteristics

3.1 Absolute Maximum Ratings

Symbol	Parameter	Min	Max	Units
5V	Power supply for WLAN PMU	0	6	V

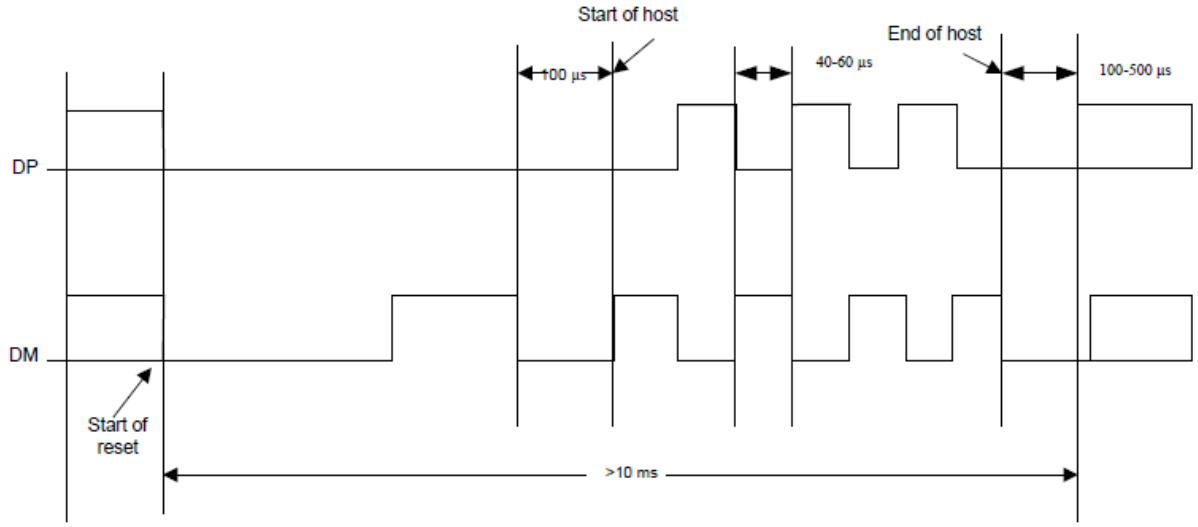
3.2 Recommended Operating Conditions

Symbol	Parameter	Min	Typ	Max	Units
5V	Power supply for WLAN PMU	4.75	5	5.25	V

3.3 Digital IO Pin DC Characteristics

Symbol	Parameter	Condition	Min	Ty	Max	Un
WIFI Digital I/O pins						
V_{IH}	Input high voltage	VDDIO_WL =3.3V	2.0	-	-	V
V_{IL}	Input low voltage (V_{DDIO})	VDDIO_WL =3.3V	-	-	0.8	V
V_{OH}	Output High Voltage @ 2mA	VDDIO_WL =3.3V	VDDIO_WL -0.4	-	-	V
V_{OL}	Output Low Voltage @ 2mA	VDDIO_WL =3.3V	-	-	0.4	V

3.4 WLAN/BT USB Timing

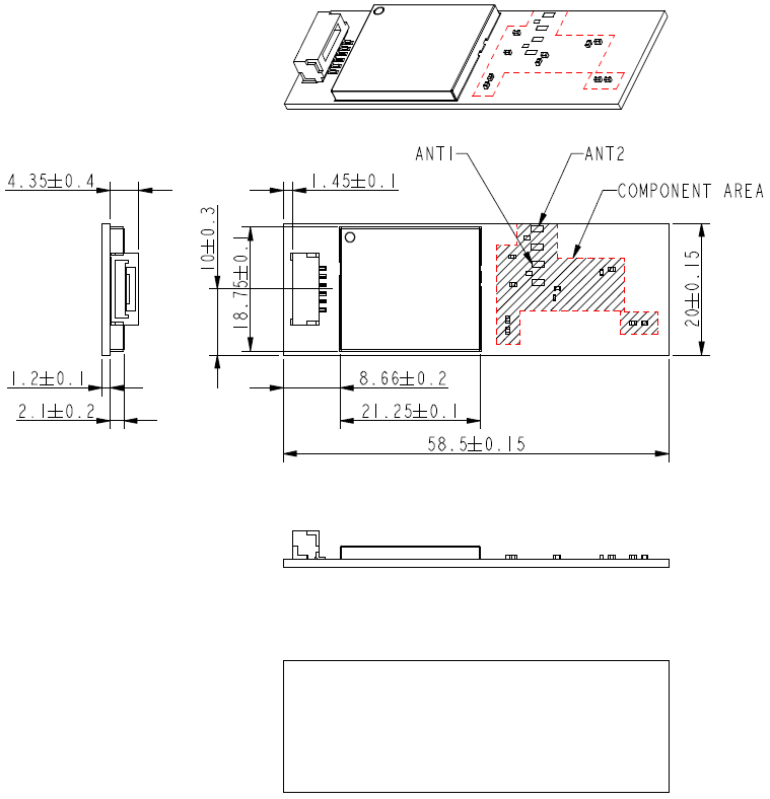


Note: The AW-CM382 has a USB2.0-PHY and HS HUB which can enable shared USB2.0 interface between WLAN and BT.

4. Mechanical Information

4.1 Mechanical Drawing

**Keep out distance of the print antenna is > 20mm for internal antenna option*



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 greater than 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 à plus de 20 cm entre le radiateur 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 and operated with greater than 20cm 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 installé et exploité avec plus de 20 cm 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 and operated with greater than 20cm between the antenna and users. The final end product must be labeled in a visible area with the following: “Contains IC: 6100A-CM382”.

Plaque signalétique du produit final

Ce module émetteur est autorisé uniquement pour une utilisation dans un appareil où l’antenne peut être installée et utilisée à plus de 20 cm entre l’antenne et les utilisateurs. Le produit final doit être étiqueté dans un endroit visible avec l'inscription suivante: "Contient des IC: 6100A-CM382".

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.

Caution :

(i) the device for operation in the band 5150-5250 MHz is only for indoor use to reduce the potential for harmful interference to co-channel mobile satellite systems;

(iv) where applicable, antenna type(s), antenna models(s), and worst-case tilt angle(s) necessary to remain compliant with the e.i.r.p. elevation mask requirement set forth in section 6.2.2.3 shall be clearly indicated.

Avertissement:

Le guide d’utilisation des dispositifs pour réseaux locaux doit inclure des instructions précises sur les restrictions susmentionnées, notamment :

(i) les dispositifs fonctionnant dans la bande 5150-5250 MHz sont réservés uniquement pour une utilisation à l’intérieur afin de réduire les risques de brouillage préjudiciable aux systèmes de satellites mobiles utilisant les mêmes canaux;

(iv) lorsqu’il y a lieu, les types d’antennes (s’il y en a plusieurs), les numéros de modèle de l’antenne et les pires angles d’inclinaison nécessaires pour rester conforme à l’exigence de la p.i.r.e. applicable au masque d’élévation, énoncée à la section 6.2.2.3, doivent être clairement indiqués

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.

The device has been tested for compliance to FCC Part 15.247, 15.407 and is intened 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.2)The transmitter module may not be co-located with any other transmitter or antenna.

3) This transmitter module is tested as a subsystem and its certification does not cover the FCC Part 15 Subpart B (unintentional radiator) rule requirement applicable to the final host. The final host will still need to be reassessed for compliance to this portion of rule requirements if applicable.

4) The following antennas have been certified for use with this module; antennas of the same type with equal or lower gain may also be used with this module.

Ant. Set	Transmitter Circuit	Antenna Gain (dBi)	Frequency range (GHz ~ GHz)	Antenna Type	Connector Type
1	Chain 0 (Main)	1	2.4~2.4835	PIFA	None
		6	5.15~5.85		
	Chain 1 (Aux)	1	2.4~2.4835	PIFA	None
		6	5.15~5.85		

As long as all 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 cannot 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 cannot 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: “FCC ID:TLZ-CM382”. 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.