AW-CM389MA

IEEE 802.11 2X2 MIMO ac/a/b/g/n Wireless LAN + Bluetooth Combo M.2 1216 Module with M.2 2230 Adaptor Board

Datasheet

Version 0.1

Revision History

Document release	Date	Modification	Initials	Approved
Version 0.1	2016/04/29	Initial Version	Peter Chen	Daniel Lee

1. General Description

1-1. Product Overview and Functional Description

AzureWave Technologies, Inc. introduces the advanced **IEEE 802.11 a/b/g/n/ac 2x2 MIMO WLAN and Bluetooth combo** module - **AW-CM389MA.** The module is targeted to mobile and embedded devices which need small footprint package, low power consumption, and multiple OS support. The module supports **2.4GHz/5GHz** IEEE 802.11a/b/g/n/ac MAC/baseband/radio, and Bluetooth 4.2 functionality. It also features an integrated Power Management Unit (PMU), Power Amplifiers (PAs), and a Low Noise Amplifier (LNA) to address the needs of mobile devices that require minimal power consumption and compact size. By using AW-CM389MA, the customers can easily enable the Wi-Fi and BT embedded applications with the benefits of **high design flexibility, short development cycle, and quick time-to-market.** Specified in the IEEE 802.11 standard minimize the system power requirements by using AW-CM389MA. In addition to the support of **WPA/WPA2 (personal)** and **WEP** encryption, the AW-CM389MA also supports the IEEE 802.11i security standard through **AES** and **TKIP** acceleration hardware for faster data encryption. For the video, voice and multimedia applications the AW-CM389MA support 802.11e Quality of Service (QoS). The host interface is **SDIO v3.0** interface.

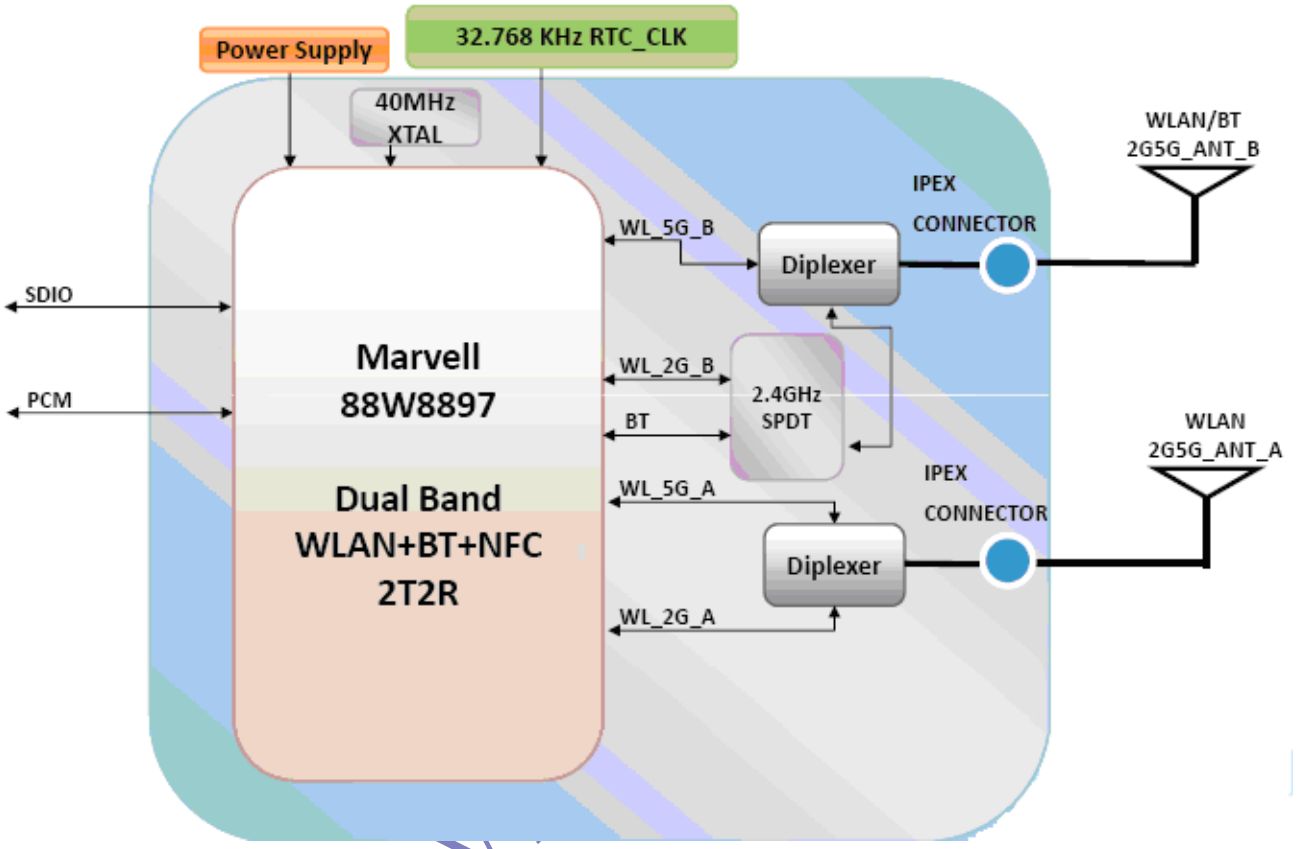
For Bluetooth operation, the AW-CM389MA is **Bluetooth 4.2** compliant. The Bluetooth transmitter also features a Class 2 power amplifier. The AW-CM389MA supports **extended Synchronous Connections (eSCO),** for enhanced voice quality by allowing for retransmission of dropped packets, and **Adaptive Frequency Hopping (AFH)** for reducing radio frequency interference. It also incorporates all Bluetooth 4.1 features including **Secure Simple Pairing**, **Sniff Substrating**, and **Encryption Pause and Resume**. An independent, **SDIO v3.0** is provided for the Bluetooth host interface. The Bluetooth subsystem presents a standard Host Controller Interface (HCI) via a SDIO and PCM for audio.

1-2. Key Features

1 SDIO3.0 interfaces support for WLAN and Bluetooth
2 Bluetooth 4.2 complaint with Bluetooth 2.1 + Enhanced Data Rate (EDR)
3 Audio Codec interface support
4 Multiple power saving modes for low power consumption
5 IEEE 802.11i for advanced security
6 Quality of Service (QoS) support for multimedia applications
7 Drip-in WLAN Linux drivers are Android ready and validated on Android based systems.
8 Support for Linux kernel versions up to 2.6.32.
9 Support for BlueZ v4.47 Bluetooth profiles stack used in Android Éclair
10 Simultaneous AP-STA
11 Support China WAPI
12 Lead-free design

1-3. Block Diagram

A simplified block diagram of the AW-CM389MA module is depicted in the figure below.



1-4. Specifications Table

Model Name	AW-CM389MA
Product Description	IEEE 802.11 2X2 MIMO ac/a/b/g/n Wireless LAN + Bluetooth M.2 Combo Module with HMC Adaptor Board
WLAN Standard	IEEE 802.11 a/b/g/n/ac, Wi-Fi compliant
Bluetooth Standard	Bluetooth 4.2 complaint with Bluetooth 2.1+Enhanced Data Rate (EDR)
Host Interface	WLAN/ Bluetooth: SDIO v3.0
Audio Interface	Digital PCM for Bluetooth
Major Chipset	Marvell 88W8897
Dimension	30mm(L) x 22mm(W) x 2.25mm(H) (with shielding)
Weight	TBD
Form Factor	M.2 2230 E Key
Operating Conditions	
Voltage	Input supply for host I/O : 3.3V+/- 10%
Temperature	Operating: -30 ℃~ 85 ℃ ; Storage: -40 ℃ ~ 85 ℃
Electrical Specifications	
Frequency Range	2.4 GHz ISM radio band / 5 GHz Unlicensed National Information Infrastructure (U-NII) band
Number of Channels	802.11ac: USA-4 802.11a: USA, Taiwan – 12/4 Most European Countries –19 Japan – 4 802.11b: USA, Canada and Taiwan – 11 Most European Countries – 13 France – 4 802.11g: USA, Canada and Taiwan – 11 Most European Countries – 13 Japan – 13 802.11n(HT20): Channel 1~13(2412~2472) 802.11n(HT40): Channel 1~7(2422~2452)
Modulation	DSSS,OFDM,DBPSK,DQPSK,CCK, 16-QAM, 64-QAM 256-QAM for WLAN GFSK (1Mbps), Π/4 DQPSK (2Mbps) and 8DPSK (3Mbps) for Bluetooth

Output Power	WLAN : 11b:16dBm +/- 2dBm(11M) 11g:14dBm +/- 2dBm (54M) 11n HT20:13dBm +/- 2dBm(MCS7) 11n HT40:11dBm +/- 2dBm(MCS7) 11a:13dBm +/- 2dBm(54M) 11n HT20:12dBm +/- 2dBm(MCS7) 11n HT40:10dBm +/- 2dBm(MCS7) 11ac VHT_20:11dBm +/- 2dBm(MCS8) 11ac VHT_40:9dBm +/- 2dBm(MCS9) 11ac VHT_80: 8dBm +/- 2dBm(MCS9) Bluetooth: Class 2 :2dBm +/- 2dBm
Receive Sensitivity	WLAN : 11b(11M): -83dBm (Min.) -84dBm(Typ.) 11g(54M):-72dBm (Min.) -74dBm(Typ.) 11n:HT20(MCS7): -68dBm (Min.) -72dBm(Typ.) HT40(MCS7): -65dBm (Min.) -68dBm(Typ.) 11a(54M): -67dBm (Min.) -72dBm(Typ.) 11n:HT20(MCS7): -67dBm (Min.) -71dBm(Typ.) HT40(MCS7): -64dBm(Min.) -68dBm(Typ.) 11ac(MCS9): -54dBm(Min.) -58dBm(Typ.) Bluetooth: DH1:-70dBm(Min.) 3DH5:-70dBm(Min.)
Data Rates	WLAN 802.11b: 1, 2, 5.5, 11Mbps 802.11a/g: 6, 9, 12, 18, 24, 36, 48, 54Mbps 802.11n: up to 150Mbps-single 802.11n: up to 300Mbps-2x2 MIMO 802.11ac:up to 192.6Mbps (20MHz channel) 802.11ac:up to 400Mbps (40MHz channel) 802.11ac:up to 866.7Mbps (80MHz channel) Bluetooth Bluetooth 2.1+EDR data rates of 1,2, and 3Mbps
Security	◆ WAPI ◆ WEP 64-bit and 128-bit encryption with H/W TKIP processing ◆ WPA/WPA2 (Wi-Fi Protected Access) ◆ AES-CCMP hardware implementation as part of 802.11i security standard
Operating System Compatibility	Linux(Android), More information please contact Azurewave FAE

2. Electrical Characteristics

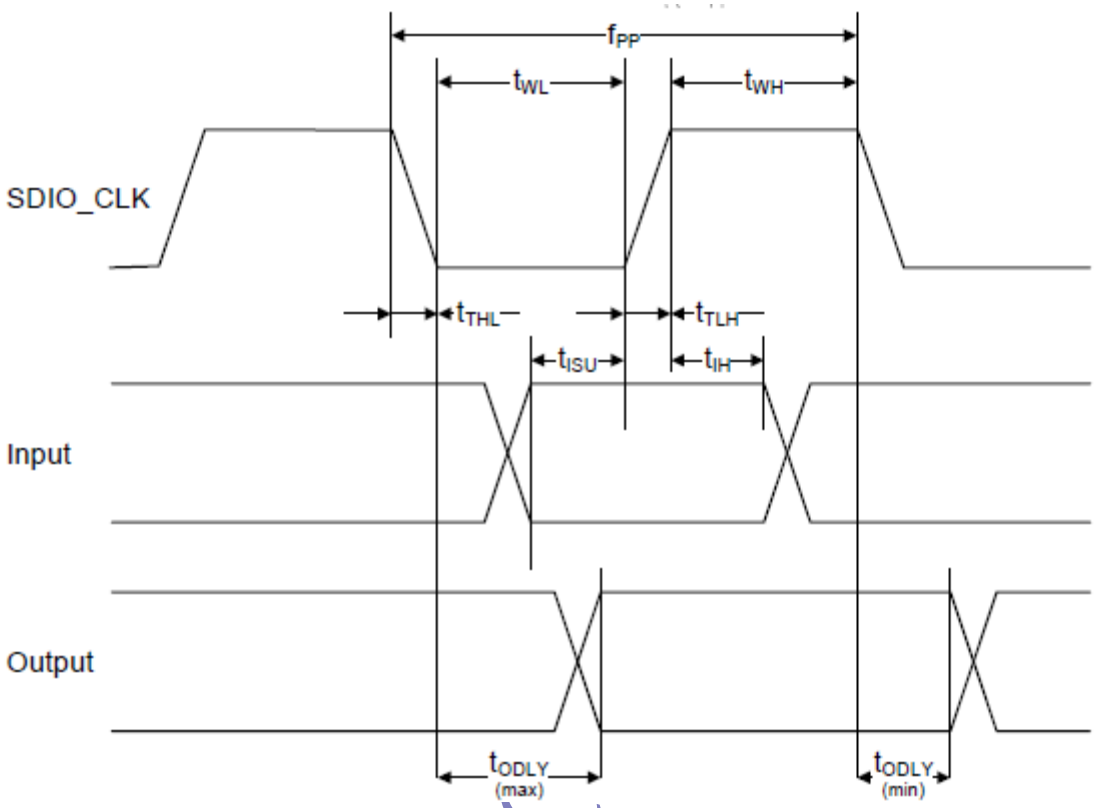
2-1. Recommended Operating Conditions

Symbol	Parameter	Type	Min	Typ	Max	Units
VBAT	Power supply for Internal Regulators and FEM	Input	3.0	3.3	3.6	V

2-2. DC Characteristics for Host I/O

Symbol	Parameter	Condition	Min	Typ	Max	Units
SDIO Interface I/O pins						
V_{IH}	Input high voltage (V_{DDIO})	VDDIO_SD=3.3V	2.06	-	-	V
V_{IL}	Input low voltage (V_{DDIO})	VDDIO_SD=3.3V	-	-	0.82	V
V_{OH}	Output High Voltage @ 2mA	VDDIO_SD=3.3V	2.47	-	-	V
V_{OL}	Output Low Voltage @ 2mA	VDDIO_SD=3.3V	-	-	0.41	V
Other Digital I/O pins						
V_{IH}	Input high voltage (V_{DDIO})	VDDIO=3.3V	2.0	-	-	
V_{IL}	Input low voltage (V_{DDIO})	VDDIO=3.3V	-	-	0.8	
V_{OH}	Output High Voltage @ 2mA	VDDIO=3.3V	2.9	-	-	
V_{OL}	Output Low Voltage @ 2mA	VDDIO=3.3V	-	-	0.4	

2-3. SDIO Host Interface Specification



SDIO Timing Data

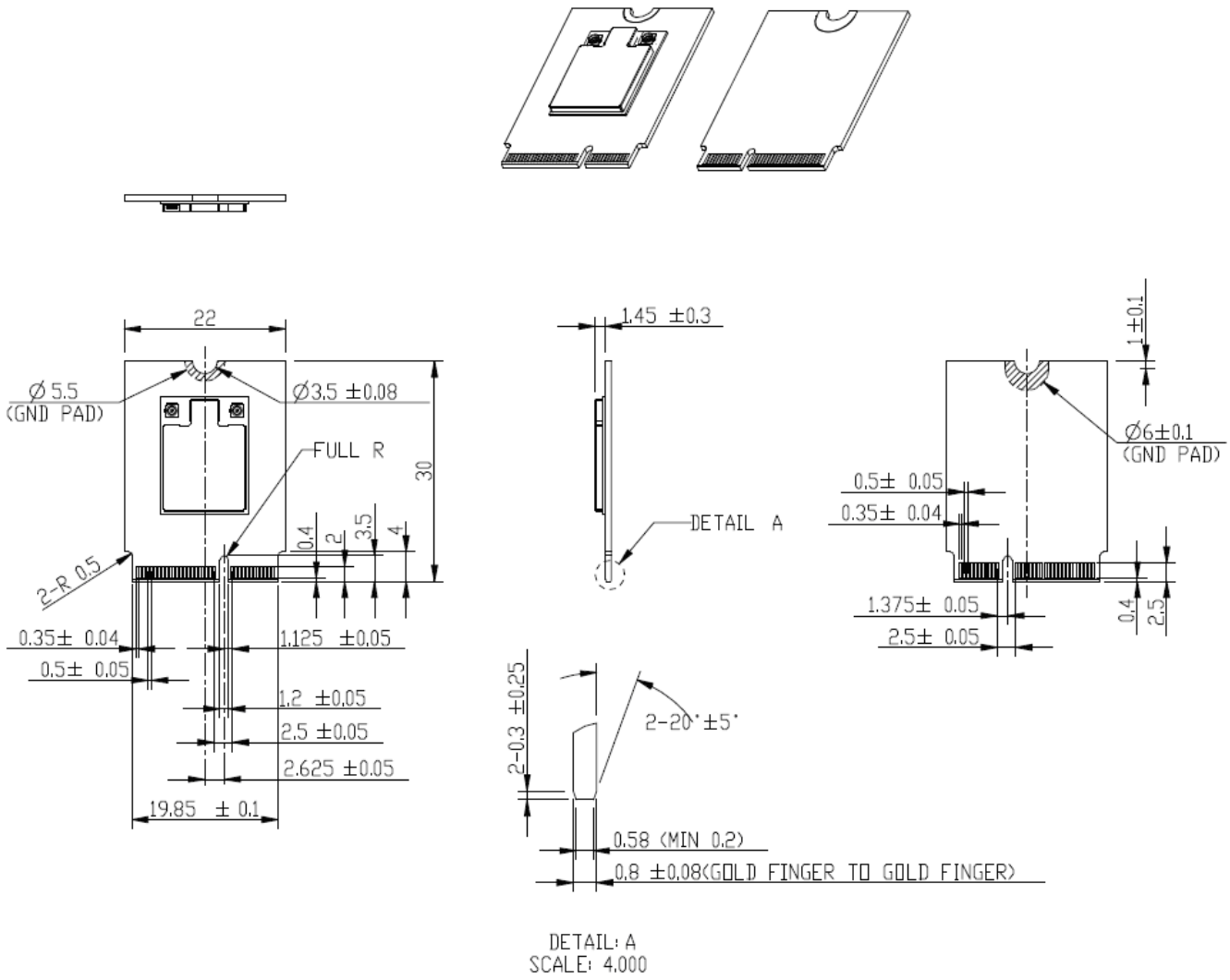
Symbol	Parameter	Condition	Min	Max	Units
f_{pp}	CLK Frequency	Normal	0	25	MHz
		High Speed	0	50	
t_{WH}	CLK High Time	Normal	10	-	ns
		High Speed	7	-	
t_{WL}	CLK Low Time	Normal	10	-	
		High Speed	7	-	
tTLH	CLK rise Time	Normal	-	10	
		High Speed	-	3	
tTHL	CLK fall Time	Normal	-	10	
		High Speed	-	3	
t_{ISU}	Input Setup Time	Normal	5	-	
		High Speed	6	-	
t_{IH}	Input Hold Time	Normal	5	-	
		High Speed	2	-	
t_{ODLY}	Output Delay Time	Normal	-	14	
		High Speed	-	14	

3. Pin Definition

Pin No.	Definition	Basic Description	Type
1	GND	Ground	GND
2	3.3V	3.3V power supply.	VCC
3	NC	No connect to anything	Floating
4	3.3V	3.3V power supply	VCC
5	NC	No connect to anything	Floating
6	LED_WLAN_L	Active low signal. The signal is used to provide status indicators via LED. (in this project is not used, please let it open)	Output
7	GND	Ground	GND
8	PCM_CLK	PCM clock	I/O
9	SDIO CLK	SDIO Clock Input	I
10	PCM_SYNC	PCM Synchronization control	O
11	SDIO CMD	SDIO Command Input	I/O
12	PCM_OUT	PCM data Out	O
13	SDIO DATA0	SDIO Data Line 0	I/O
14	PCM_IN	PCM data Input	I
15	SDIO DATA1	SDIO Data Line 1	I/O
16	LED_BT_L	Active low signal. The signal is used to provide status indicators via LED. (in this project is not used, please let it open)	Floating
17	SDIO DATA2	SDIO Data Line 2	I/O
18	GND	Ground.	GND
19	SDIO DATA3	SDIO Data Line 3	I/O
20	BT_HOST_WAKE	BT Host Wake	O
21	WL_HOST_WAKE	WL Host Wake	O
22	NC	No connect to anything	Floating
23	NC	No connect to anything	Floating
32	NC	No connect to anything	Floating
33	GND	Ground.	GND
34	NC	No connect to anything	Floating
35	NC	No connect to anything	Floating
36	NC	No connect to anything	Floating
37	NC	No connect to anything	Floating
38	VIO	1.8V/2.5V/3.3V Digital I/O Power Supply	P
39	GND	Ground	GND
40	VIO_SD	1.8V/3.3V Digital I/O SDIO Power Supply	P
41	NC	No connect to anything	Floating

42	NC	No connect to anything	Floating
43	NC	No connect to anything	Floating
44	NC	No connect to anything	Floating
45	GND	Ground	GND
46	NC	No connect to anything	Floating
47	NC	No connect to anything	Floating
48	NC	No connect to anything	Floating
49	NC	No connect to anything	Floating
50	CLK_32KHz	External sleep clock input (32.768 kHz).	I
51	GND	Ground	GND
52	NC	No connect to anything	Floating
53	NC	No connect to anything	Floating
54	PDn	Full Power-Down (input) (active low)	I
55	NC	No connect to anything	Floating
56	NC	No connect to anything	Floating
57	GND	Ground	GND
58	NC	No connect to anything	Floating
59	NC	No connect to anything	Floating
60	NC	No connect to anything	Floating
61	NC	No connect to anything	Floating
62	NC	No connect to anything	Floating
63	GND	Ground	GND
64	NC	No connect to anything	Floating
65	NC	No connect to anything	Floating
66	NC	No connect to anything	Floating
67	NC	No connect to anything	Floating
68	NC	No connect to anything	Floating
69	GND	Ground	GND
70	NC	No connect to anything	Floating
71	NC	No connect to anything	Floating
72	3.3V	3.3V power supply	VCC
73	NC	No connect to anything	Floating
74	3.3V	3.3V power supply	VCC
75	GND	Ground	GND
76	GND	Ground	GND

4. Mechanical Information



TOLERANCES UNLESS OTHERWISE SPECIFIED: ±0.15mm