

# AW-XM664-USB

# IEEE 802.11 a/b/g/n/ac/ax

# **Datasheet**

Rev. A

DF

(For Standard)

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 FORM NO.: FR2-015\_A
 Responsible Department : WBU
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#### Features

#### Wi-Fi

- IEEE 802.11a/b/g/n/ac/ax compliant
- Tri-band (2.4/5/6 GHz) device
- 1x1 with 20-MHz channels supporting PHY data rates up to 802.11ax (MCS11 1024-QAM 5/6)
- Transmit (TX) power with internal PA
- Sensitivity with internal LNA
- OFDMA uplink and downlink as STA
- Downlink multi-user MIMO(MU-MIMO) as STA
- Individual target-wake-time (TWT), broadcast TWT
- BSS color
- Support for switched antenna diversity and external PAs and LNAs for improved range
- USB: >100 Mbps throughput, USB suspend/resume
- USB 2.0 high-speed (480 Mbps)
- Security WPA2 (Personal/Enterprise), WPA3 (Personal/Enterprise with 192-bit security)



# **Revision History**

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Version	Revision Date	DCN NO.	Description	Initials	Approved
Α	2024/12/26	DCN033137	Initial Version	JM.Pang	NC.Chen



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#### 1. Introduction

#### 1.1 Product Overview

The Infineon AW-XM664 device for low-power, single-chip devices that support single-stream, triband/dual-band/single-band Wi-Fi 6/6E, IEEE 802.11ax-compliant Wi-Fi MAC/baseband/radio. In 802.11ax mode, the device supports rates up to 1024 QAM MCS11 in 20 MHz channels.

All legacy rates in the 802.11a/b/g/n/ac are also supported. Included on-chip are 2.4 GHz, 5/6 GHz transmit power amplifiers (PA), and low-noise amplifiers (LNA). The device is also capable of operating with external antenna diversity, if an improved range is required. An USB2.0 for interfacing with the host.



#### 1.2 Block Diagram



#### AW-XM664 BLOCK DIAGRAM



#### **1.3 Specifications Table**

#### 1.3.1 General

Features	Description
Product Description	IEEE 802.11 a/b/g/n/ac/ax Wireless LAN Module
Major Chipset	Infineon CYW55533/CYW55532/CYW55531
Host Interface	WiFi :USB
Dimension	12mm(L) x 12mm(W) x 1.65mm(T)
Form Factor	LGA module, 47 pins
Antenna	1T1R ANT1(Main) : WiFi → TX/RX
Weight	TBD

#### 1.3.2 WLAN

Features	Description
WLAN Standard	IEEE 802.11a/b/g/n/ac/ax 1T1R
WLAN VID/PID	N/A
WLAN SVID/SPID	N/A
Frequency Rage	WLAN: 2.4 GHz / 5GHz/ 6GHz 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), 1024-QAM(MCS10~11)
Number of Channels	<ul> <li>2.4GHz</li> <li>■ USA, NORTH AMERICA, Canada and Taiwan – 1 ~ 11</li> <li>■ China, Australia, Most European Countries – 1 ~ 13</li> <li>5GHz</li> <li>■ USA, EUROPE – 36, 40, 44, 48, 52, 56, 60, 64, 100, 104, 108, 112, 116, 120, 124, 128, 132, 136, 140, 149, 153, 157, 161, 165</li> </ul>

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	6GHz ■ CH1~CH233						
	2.4G						
		Min	Тур	Max	Unit		
	11b (11Mbps) @EVM<35%		TBD		dBm		
	11g (54Mbps) @EVM≦-25 dB		TBD		dBm		
	11n (HT20 MCS7) @EVM≦-27 dB		TBD		dBm		
	11ax (HE20 MCS11) @EVM≦-35 dB		TBD		dBm		
	5G	1	1				
		Min	Тур	Max	Unit		
Output Power	11a (54Mbps) @EVM≦-25 dB		TBD		dBm		
	11n (HT20 MCS7) @EVM≦-27 dB		TBD		dBm		
	11ac (VHT20 MCS8) @EVM≦-30 dB		TBD		dBm		
	11ax (HE20 MCS11) @EVM≦-35 dB		TBD		dBm		
	6G						
		Min	Тур	Max	Unit		
	11ax (HE20 MCS11) @EVM≤-35 dB		TBD		dBm		
	2.4G						
		Min	Тур	Max	Unit		
	11b (11Mbps)		TBD		dBm		
	11g (54Mbps)		TBD		dBm		
	11n (HT20 MCS7)		TBD		dBm		
Bassiver Sensitivity	11ax (HE20 MCS11)		TBD		dBm		
Receiver Sensitivity	5G				]		
		Min	Тур	Max	Unit		
	11a (54Mbps)		TBD		dBm		
	11n (HT20 MCS7)		TBD		dBm		
	11ac (VHT20 MCS8)		TBD		dBm		
	11ax (HE20 MCS11)		TBD		dBm		

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	6G				
		Min	Тур	Max	Unit
	11ax (HE20 MCS11)		TBD		dBm
Data Rate	802.11b: 1, 2, 5.5, 11Mb 802.11g: 6, 9, 12, 18, 24 802.11n: MCS0~7 HT20 802.11a: 6, 9, 12, 18, 24 802.11ac: MCS0~8 VHT 802.11ax: MCS10~11 H	ps , 36, 48, 54I , 36, 48, 54I 20 <u>2</u> 0	Mbps Mbps		
Security	<ul> <li>WPA/WPA2/WPA3</li> <li>WPA3 personal-SAI</li> <li>WPA3 Enterprise-SA</li> <li>WPA3 Enterprise with</li> <li>Hardware accelerated</li> </ul>	personal (S E-FT AE-FT(Host ith 192-bit e or (AES)	AE, SAE Tra support) ncryption	ansmission	mode)

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

### 1.3.3 Operating Conditions

Features	Description		
	Operating Conditions		
Voltage	2.97 V– 4.8 V		
Operating Temperature	TBD		
Operating Humidity	less than 85% R.H.		
Storage Temperature	TBD		
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-XM664 Top View Pin Map

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#### 2.2 Pin Table

Pin No	Definition	Basic Description	Voltage	Туре
1	GND	Ground.		GND
2	WL_ANT	WLAN RF TX/RX path.		RF
3	GND	Ground.		GND
4	NC	Floating Pin, No connect to anything.		Floating
5	NC	Floating Pin, No connect to anything.		Floating
6	NC	Floating Pin, No connect to anything.		Floating
7	NC	Floating Pin, No connect to anything.		Floating
8	NC	Floating Pin, No connect to anything		Floating
9	VBAT	3.3V power pin	3.3V	VCC
10	NC	Floating Pin, No connect to anything.		Floating
11	NC	Floating Pin, No connect to anything.		Floating
12	WL_REG_ON	This signal is used by the PMU to power up the WLAN core and the internal CYW55533/CYW55532/CYW55531 regulators. When this pin is HIGH, the regulators are enabled and the WLAN core is out of reset. When this pin is LOW, all the WLAN core is in reset and all the regulators are disabled. This pin has an internal 50 k $\Omega$ pull-down resistor that is enabled by default and disabled upon recognizing HIGH on this pin.	VDDIO	I
13	GPIO0_WL_HOST_ WAKE	WL Host Wake.	VDDIO	0
14	NC	Floating Pin, No connect to anything.		Floating
15	NC	Floating Pin, No connect to anything.		Floating
16	NC	Floating Pin, No connect to anything.		Floating
17	NC	Floating Pin, No connect to anything.		Floating
18	NC	Floating Pin, No connect to anything.		Floating
19	NC	Floating Pin, No connect to anything.		Floating
20	GND	Ground.		GND

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21	VIN_LDO_OUT	Internal Buck 1.2V voltage generation pin.	1.4V	0
22	VDDIO	1.8V VDDIO supply for WLAN.	VDDIO	VCC
23	VIN_LDO	Internal Buck 1.2V voltage generation pin.	1.4V	I
24	LPO	External 32K or RTC clock.	0.2~3.3V	I
25	NC	Floating Pin, No connect to anything.		Floating
26	NC	Floating Pin, No connect to anything.		Floating
27	NC	Floating Pin, No connect to anything.		Floating
28	NC	Floating Pin, No connect to anything.		Floating
29	NC	Floating Pin, No connect to anything.		Floating
30	NC	Floating Pin, No connect to anything.		Floating
31	GND	Ground.		GND
32	NC	Floating Pin, No connect to anything.		Floating
33	GND	Ground.		GND
34	NC	Floating Pin, No connect to anything.		Floating
35	NC	Floating Pin, No connect to anything.		Floating
36	GND	Ground.		GND
37	USB_DM	Data minus of shared USB2.0 port.	3.3V	I/O
38	USB_DP	Data plus of shared USB2.0 port.	3.3V	I/O
39	RF_SW_CTRL_0	Programmable RF switch control lines	3.3V	0
40	GPIO1_WL_DEV_ WAKE	WL_DEV_WAKE	VDDIO	I
41	NC	Floating Pin, No connect to anything.		Floating
42	NC	Floating Pin, No connect to anything.		Floating
43	NC	Floating Pin, No connect to anything.		Floating
44	NC	Floating Pin, No connect to anything.		Floating
45	NC	Floating Pin, No connect to anything.		Floating
46	NC	Floating Pin, No connect to anything.		Floating

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47	NC	Floating Pin, No connect to anything.	Floating
			Ŭ



### 3. Electrical Characteristics

#### 3.1 Absolute Maximum Ratings

Symbol	Parameter	Minimum	Typical	Maximum	Unit
VBAT	DC supply for the VBAT and PA driver supply	-0.5	-	6	V
VDDIO	DC supply voltage for digital I/O	-0.5	-	2.2	V
Тј	Maximum junction temperature	-	-	125	°C

#### **3.2 Recommended Operating Conditions**

Symbol	Parameter	Minimum	Typical	Maximum	Unit
VBAT	Power supply for Internal Regulator	2.97	3.6	4.8	V
VDDIO	DC supply voltage for digital I/O	1.71	1.8	1.89	V

#### 3.3 Digital IO Pin DC Characteristics

Symbol	Parameter	Minimum	Typical	Maximum	Unit
Digital I/O pins, VDDIO=1.8V					
Vін	Input high voltage	0.65 × VDDIO	-	-	V
VIL	Input low voltage	-	-	0.35 × VDDIO	V
V <sub>он</sub>	Output high voltage	VDDIO - 0.40	-	-	V
Vol	Output Low Voltage	-	-	0.45	V



#### 3.4 Host Interface

#### 3.4.1 WLAN USB Timing



Note: The AW-XM664 has a USB2.0-PHY and HS HUB which can enable shared USB2.0 interface between WLAN.



#### 3.5 Power up Timing Sequence

AW-XM664-USB has a signal that allow the host to control power consumption by enabling or disabling WLAN, and internal regulator blocks. Additionally, diagrams are provided to indicate proper sequencing of the signals for various operational states. The timing values indicated are minimum required values; longer delays are also acceptable.

#### **Description of Control Signals**

#### ■ WL\_REG\_ON:

Used by the PMU to power up the WLAN section and control the internal AW-XM664-USB regulators. When this pin is HIGH, the regulators are enabled and the WLAN section is out of reset. When this pin is low the WLAN section is in reset.



\*Notes:

1. VBAT and VDDIO should not rise 10%-90% faster than 40 µs.

VBAT should be up before or at the same time as VDDIO. VDDIO should NOT be present first or be held high before VBAT is HIGH.

#### WLAN = ON



1. VBAT and VDDIO should not rise 10%-90% faster than 40 µs.

2. VBAT should be up before or at the same time as VDDIO. VDDIO should NOT be present first or be held high before VBAT is HIGH.



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#### **3.6 Power Consumption**<sup>\*</sup>

3.6.1 WLAN

TBD



#### 4. Mechanical Information

#### 4.1 Mechanical Drawing



TOLERANCE UNLESS OTHERWISE SPECIFIED: ±0.1mm

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# 5. Packaging Information

TBD