AzureWave Technologies, Inc.

AW-XM455

IEEE 802.11 2X2 WiFi 6 MIMO Wireless LAN + Bluetooth 5.1 Combo LGA Module

Datasheet

Rev. B

DF

For Standard

Features

WLAN

- Support 2x2 802.11 a/b/g/n/ac/ax
- Dual bands: 2.4 GHz and 5 GHz
- Support 20/40/80 MHz channel Bandwidths.
- 5GHz PHY data rates up to 1.2 Gbps
- 2.4 GHz PHY data rates up to 458 Mbps
- Uplink and downlink OFDMA and MU-MIMO
- Support DFS

Bluetooth

- Bluetooth 5.1
- Bluetooth class 2
- PCM interface for voice applications
- 2Mbit/s LE
- Long range
- LTE/MWS coexistence
- 2 x wide band speech (WBS) calls
- Security: AES

Revision History

Document NO: R2-24550-DST-01

Version	Revision Date	DCN NO.	Description	Initials	Approved
A	2020/05/26	DCN017597	● Draft version	Renton Tao	N.C Chen
B	2021/02/08		● Update format ● Update features ● Update operating temperature ● Update pin map ● Update Host configuration table	Renton Tao	N.C Chen

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1. Introduction

1.1 Product Overview

AzureWave Technologies, Inc. introduces the IEEE 802.11a/b/g/n/ac/ax Concurrent Dual WiFi(CDW) and BT, combo module – **AW-XM455.** With High Efficiency Wireless (HEW) and backward compatible with 802.11ac technologies integrated into a module, AW-XM455 provides the best and most convenient SMT process. The module is targeted to mobile devices including**,** Tablet PC, Portable Media Players (PMPs), Portable Navigation Devices (PNDs), Personal Digital Assistants (PDAs), Tracking Devices, Gaming Devices which need convenient SMT process, low power consumption.

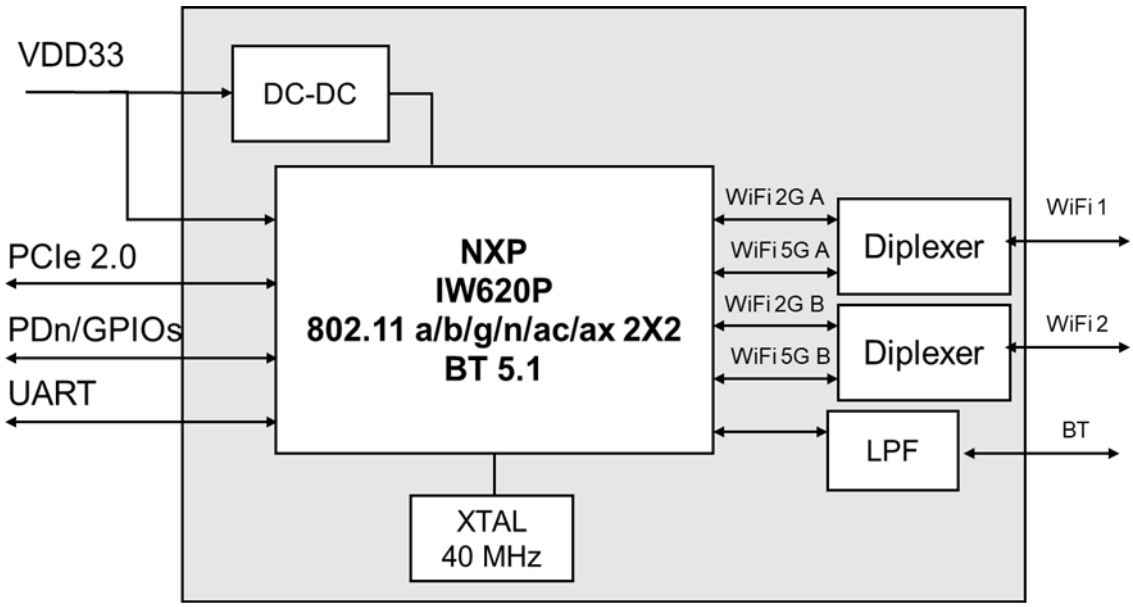
By using AW-XM455, the customers can easily integrate the Wi-Fi, BT, by a combo module with the benefits of **high design flexibility, high success rate on SMT process, short development cycle, and quick time-to-market.**

Compliance with the IEEE 802.11a/b/g/n/ac/ax standard, the AW-XM455 uses **DSSS**, **OFDM**, **DBPSK**, **DQPSK**, **CCK** and **QAM** baseband modulation technologies. A high level of integration and full implementation of the power management functions specified in the IEEE 802.11 standard minimize the system power requirements by using AW-XM455.

The AW-XM455 supports standard interface **PCIe for WLAN** interface connection, High-Speed **UART for BT** interface connection. AW-XM455 is suitable for multiple mobile processors for different applications. With the combo functions and the good performance, the AW-XM455 is the best solution for the consumer electronics and the tablet PC.

1.2 Block Diagram

A simplified block diagram of the AW-XM455 module is depicted in the figure below.



AW-XM455 Block Diagram

1.3 Specifications Table

1.3.1 General

Features	Description
Product Description	IEEE 802.11 2X2 WiFi 6 MIMO Wireless LAN + Bluetooth 5.1 Combo LGA Module
Major Chipset	NXP IW620P
Host Interface	WiFi + BT ● PCIe + UART (For Host configuration interface, please refer to section 2.3)
Dimension	20 mm X 18 mm x 2.85 mm(Max) (Tolerance remarked in mechanical drawing)
Form factor	LGA module, 98 pins
Antenna	2T2R for WiFi, standalone antenna for BT ANT1(Main)：WiFi_A → TX/RX ANT2(Aux)：WiFi_B→ TX/RX ANT3(BT): BT
Weight	TBD

1.3.2 WLAN

Features	Description
WLAN Standard	IEEE 802.11 a/b/g/n/ac/ax 2T2R
WLAN VID/PID	
WLAN SVID/SPID	TBD
Frequency Rage	2.4 GHz ISM Bands 2.412-2.472 GHz 5.15-5.25 GHz (FCC UNII-low band) for US/Canada and Europe 5.25-5.35 GHz (FCC UNII-middle band) for US/Canada and Europe 5.47-5.725 GHz for Europe 5.725-5.825 GHz (FCC UNII-high band) for US/Canada
Modulation	DSSS, OFDM, DBPSK, DQPSK, CCK, 16-QAM, 64-QAM, 256-QAM
Number of Channels	2.4GHz: ■ USA, NORTH AMERICA, Canada and Taiwan - 1 ~ 11 ■ China, Australia, Most European Countries - 1 ~ 13 ■ Japan, 1 ~ 13 5GHz: ■ USA, Canada, Most European Countries -

<table>
<tr><td></td><td>36,40,44,48,52,56,60,64,100,104,108,112,116,120,124,128,132,136,140,149,153,157,161,165
■ Japan - 36,40,44,48,52,56,60,64,100,104,108,112,116,120,124,128,132,136,140
■ China - 36,40,44,48,52,56,60,64, 149,153,157,161,165</td></tr>
<tr><td>Output Power</td><td>2.4G
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<tr><td>11b (11Mbps) @EVM<35%</td><td></td><td>TBD</td><td></td><td>dBm</td></tr>
<tr><td>11g (54Mbps) @EVM≦-27 dB</td><td></td><td>TBD</td><td></td><td>dBm</td></tr>
<tr><td>11n (HT20 MCS7) @EVM≦-28 dB</td><td></td><td>TBD</td><td></td><td>dBm</td></tr>
<tr><td>11n (HT40 MCS7) @EVM≦-28 dB</td><td></td><td>TBD</td><td></td><td>dBm</td></tr>
<tr><td>11n (HE20 MCS11) @EVM≦-35 dB</td><td></td><td>TBD</td><td></td><td>dBm</td></tr>
<tr><td>11n (HE40 MCS11) @EVM≦-35 dB</td><td></td><td>TBD</td><td></td><td>dBm</td></tr>
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5G
<table>
<tr><th></th><th>Min</th><th>Typ</th><th>Max</th><th>Unit</th></tr>
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<tr><td>11ac(VHT40 MCS9) @EVM≦-32 dB</td><td></td><td>TBD</td><td></td><td>dBm</td></tr>
<tr><td>11ac(VHT80 MCS9) @EVM≦-32 dB</td><td></td><td>TBD</td><td></td><td>dBm</td></tr>
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<tr><td>11ax(HE80 MCS11)</td><td></td><td>TBD</td><td></td><td>dBm</td></tr>
</table>
</td></tr>
<tr><td>Data Rate</td><td>■ 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)
■ 802.11ax:2.4GHz up to 458Mbps, 5GHz up to 1.2Gbps</td></tr>
<tr><td>Security</td><td>WiFi: WPA/WPA3</td></tr>
</table>

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

1.3.3 Bluetooth

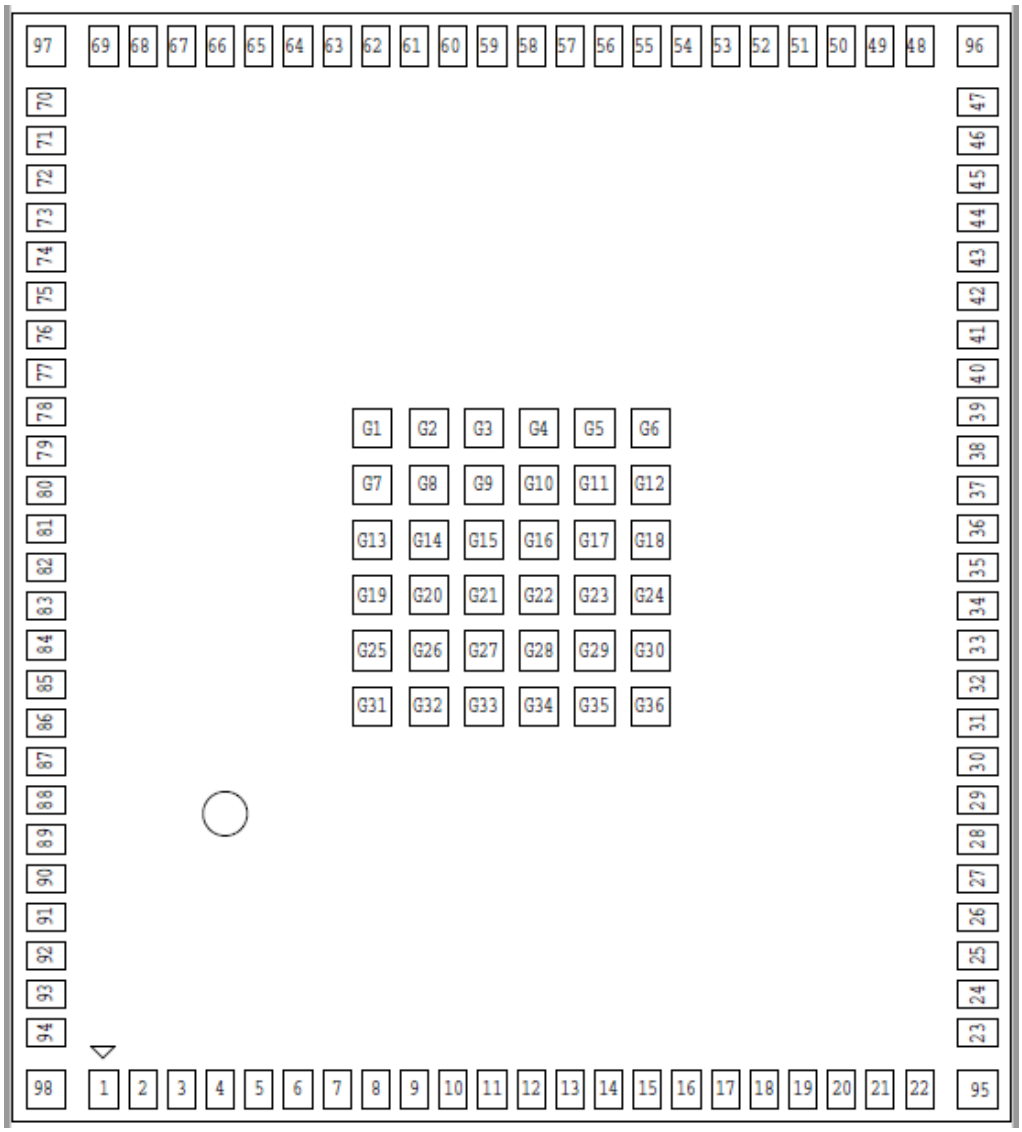
Features	Description
Bluetooth Standard	Bluetooth 5.1
Bluetooth VID/PID	N/A
Frequency Rage	2402MHz~2483MHz
Modulation	Header GFSK Payload 2M: π/4-DQPSK Payload 3M: 8DPSK

Output Power		Min	Typ	Max	Unit
	BDR		2		dBm
	EDR		2		dBm
	Low Energy (2MHz)		2		dBm
Receiver Sensitivity		Min	Typ	Max	Unit
	BDR				dBm
	EDR				dBm
	Low Energy (2MHz)				dBm

1.3.4 Operating Conditions

Features	Description
Operating Conditions	
Voltage	3.3V+-5%
Operating Temperature	-10 ℃~ 85℃
Operating Humidity	less than 85% R.H.
Storage Temperature	-40 ℃~ 85℃
Storage Humidity	less than 60% R.H.
ESD Protection	
Human Body Model	TBD
Changed Device Model	TBD

2.1 Pin Map



AW-XM455 Pin Map (Top View)

2.2 Pin Table

Pin No	Definition	Basic Description	Voltage	Type
1	GPIO[5]	GPIO Mode: GPIO[5]	VDDIO	I/O
2	GPIO[4]	GPIO Mode: GPIO[4]	VDDIO	I/O
3	GPIO[3]	GPIO Mode: GPIO[3]	VDDIO	I/O
4	GND	Ground	---	---
5	PCIE_RCLK_P	PCI Express Differential Clock Input—Positive	1V8	I
6	PCIE_RCLK_N	PCI Express Differential Clock Input—Negative	1V8	I
7	GND	Ground	---	---
8	PCIE_TX_P	PCI Express Transmit Data—Positive	1V8	O
9	PCIE_TX_N	PCI Express Transmit Data—Negative	1V8	O
10	GND	Ground	---	---
11	PCIE_RX_N	PCI Express Receive Data—Negative	1V8	I
12	PCIE_RX_P	PCI Express Receive Data—Positive	1V8	I
13	GND	Ground	---	---
14	USB_DM	USB Serial Differential Data Minus	3V3	I/O
15	USB_DP	USB Serial Differential Data Plus	3V3	I/O
16	GND	Ground	---	---
17	NC	NC	---	floating
18	NC	NC	---	floating
19	NC	NC	---	floating
20	NC	NC	---	floating
21	NC	NC	---	floating
22	NC	NC	---	floating
23	NC	NC	---	floating
24	GND	Ground	---	---
25	PCIE_PERSTn	PCIe host indication to reset the device (active low)	VIO	I
26	PCIE_CLKREQn	PCIe clock request (active low)	VIO	I/O
27	PCIE_WAKEn	PCIe wake signal (active low)	VIO	I/O
28	NC	NC	---	floating
29	GND	Ground	---	---
30	UART_RTSn	UART Mode: UART_RTSn (active low)	VDDIO	O
31	UART_CTSn	UART Mode: UART_CTSn (active low)	VDDIO	I
32	UART_RX	UART SIN pin	VDDIO	I
33	UART_TX	UART SOUT.pin	VDDIO	O
34	NC	NC	---	floating
35	NC	NC	---	floating
36	NC	NC	---	floating
37	NC	NC	---	floating
38	NC	NC	---	floating
39	NC	NC	---	floating
40	NC	NC	---	floating
41	NC	NC	---	floating

42	NC	NC	---	floating
43	NC	NC	---	floating
44	NC	NC	---	floating
45	NC	NC	---	floating
46	NC	NC	---	floating
47	NC	NC	---	floating
48	BT_ANT	RF I/O pad for BT	---	I/O
49	GND	Ground	---	---
50	GND	Ground	---	---
51	GND	Ground	---	---
52	WLAN_ANT_2	RF I/O pad for WLAN ANT 2	---	I/O
53	GND	Ground	---	---
54	GND	Ground	---	---
55	GND	Ground	---	---
56	GND	Ground	---	---
57	GND	Ground	---	---
58	GND	Ground	---	---
59	GND	Ground	---	---
60	GND	Ground	---	---
61	GND	Ground	---	---
62	GND	Ground	---	---
63	GND	Ground	---	---
64	GND	Ground	---	---
65	GND	Ground	---	---
66	GND	Ground	---	---
67	GND	Ground	---	---
68	GND	Ground	---	---
69	WLAN_ANT_1	RF I/O pad for WLAN ANT 1	---	I/O
70	3V3	3.3V DC power supply	3.3V	I
71	3V3	3.3V DC power supply	3.3V	I
72	GND	Ground	---	---
73	CON[0]	Firmware Boot Options. See below table*	VIO	I
74	CON[1]	Firmware Boot Options. See below table*	VIO	I
75	CON[2]	Firmware Boot Options. See below table*	VIO	I
76	NC	NC	---	floating
77	NC	NC	---	floating
78	NC	NC	---	floating
79	NC	NC	---	floating
80	NC	NC	---	floating
81	NC	NC	---	floating
82	NC	NC	---	floating
83	GND	Ground	---	---
84	PDn	Full Power-down input pin (active low) 0 = full power-down mode	3V3	I

		1 = normal mode		
85	GPIO[2]	GPIO Mode: GPIO[2]	VDDIO	I/O
86	GPIO[21]	GPIO Mode: GPIO[21]	VDDIO	I/O
87	GPIO[13]	GPIO Mode: GPIO[13]	VDDIO	I/O
88	GPIO[5]	GPIO Mode: GPIO[5]	VDDIO	I/O
89	GPIO[7]	GPIO Mode: GPIO[7]	VDDIO	I/O
90	VIO	Digital I/O power supply	1.8 or 3.3V	I
91	GND	Ground	---	---
92	1V8	1.8V DC power supply	1.8V	I
93	1V8	1.8V DC power supply	1.8V	I
94	GPIO[6]	GPIO Mode: GPIO[6]	VDDIO	I/O
95	GND	Ground	---	---
96	GND	Ground	---	---
97	GND	Ground	---	---
98	GND	Ground	---	---
G1~36	GND	Ground	---	---

2.3 Host Configuration Interface Table

Strap Value	WLAN	Bluetooth/LE
011	PCIe	UART
others	reserved	reserved

*Firmware Boot options

3. Electrical Characteristics

3.1 Absolute Maximum Ratings

Symbol	Parameter	Minimum	Typical	Maximum	Unit
3V3	DC supply for the 3.3V input	-	3.3	3.63	V
VIO	I/O power supply	-	3.3	3.63	V
		-	1.8	1.98	

3.2 Recommended Operating Conditions

Symbol	Parameter	Minimum	Typical	Maximum	Unit
3V3	DC supply for the 3.3V input	3.14	3.3	3.46	V
VIO	I/O power supply	3.14	3.3	3.46	V
		1.71	1.8	1.89	

3.3 Digital IO Pin DC Characteristics

3.3.1 1.8/3.3V Operation (VIO)

Symbol	Parameter	Minimum	Typical	Maximum	Unit
V_{IH}	Input high voltage	0.7*VIO	-	VIO+0.4	V
V_{IL}	Input low voltage	-0.4	-	0.3*VIO	
V_{OH}	Output high voltage	VIO-0.4	-	-	
V_{OL}	Output low voltage	-	-	0.4	
V_{HYS}	Input Hysteresis	100			

3.4 Host Interface

3.4.1 PCI Express Interface

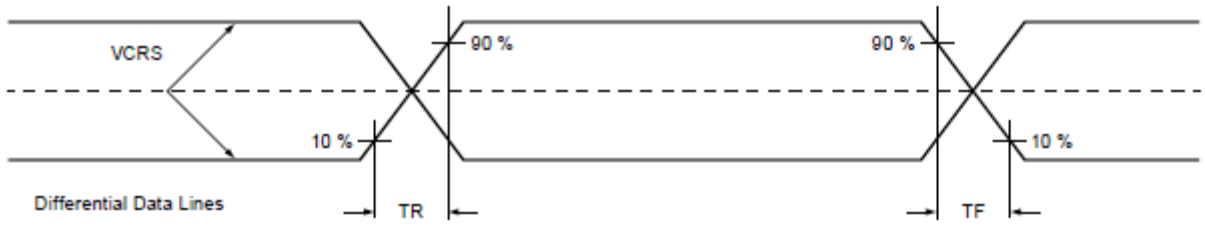
3.4.1.1 Differential Tx Output Electricals

Symbol	Parameter	Min	Typ	Max	Units
UI	Unit interval Each UI is 400 ps ±300 PPM. UI does not account for SSC dictated variations.	399.98	400	400.12	ps
V_{Tx_DIFFpp}	Differential peak-to-peak output voltage $V_{Tx\_DIFFpp} = 2*\|V_{TX-D+} - V_{TX-D-}\|$	0.800	--	1.2	V
$V_{Tx\_DE\_RATIO}$	De-emphasized differential output voltage (ratio)	-3.0	-3.5	-4.0	db
T_{Rx_EYE}	Minimum Tx eye width	0.75	--	--	UI
$T_{Rx\_EYE\_MEDIAN\_MAX\_JIT}$	Maximum time between jitter median and maximum deviation from median	--	--	0.125	UI
T_{Tx_RISE}, T_{Tx_FALL}	D+/D- Tx output rise/fall time	0.125	--	--	UI
$V_{Tx\_CM\_DC\_ACTIVE\_IDLE\_DELTA}$	Absolute delta of DC common mode voltage during L0 and electrical idle	0-	-	100	mV
$V_{Tx\_CM\_DC\_LINE\_DELTA}$	Absolute delta of DC common mode voltage between D+ and D-	0-	-	25	mV
$V_{Tx\_IDLE\_DIFFp}$	Electrical idle differential peak output voltage	0	--	20	mV
$V_{Tx\_RCV\_DETECT}$	Voltage change allowed during receiver detection	--	--	600	mV
$V_{Tx\_DC\_CM}$	Tx DC common mode voltage	--	--	3.6	V
I_{Tx_SHORT}	Tx short circuit current limit	--	--	90	mA
$T_{Tx\_IDLE\_MIN}$	Minimum time spent in electrical idle	50	--	--	UI
$T_{Tx\_IDLE\_SET\_TO\_IDLE}$	Maximum time to transition to a valid electrical idle after sending an electrical idle ordered set	--	--	20	UI
$T_{Tx\_IDLE\_TO\_DIFF\_DATA}$	Maximum time to transition to valid Tx specifications after leaving an electrical idle condition	--	--	20	UI
RL_{Tx_DIFF}	Differential return loss	10	--	--	dB
RL_{Tx_CM}	Common mode return loss	6	--	--	dB
C_{Tx}	AC coupling capacitor	75	--	200	nF
$T_{Crosstalk}$	Crosstalk random timeout	0	--	1	ms

3.4.1.2 Differential Rx input Electricals

Symbol	Parameter	Min	Typ	Max	Units
UI	Unit interval Each UI is 400 ps ±300 ppm. UI does not account for SSC dictated variations.	399.98	400	400.12	ps
V_{Rx_DIFFpp}	Differential peak-to-peak voltage $V_{Rx\_DIFFpp} = 2*\|V_{RX-D+} - V_{RX-D-}\|$	0.175	--	1.2	V
T_{Rx_EYE}	Minimum receiver eye width	0.4	--	--	UI
$T_{Rx\_EYE\_MEDIAN\_MAX\_JIT}$	Maximum time between jitter median and maximum deviation from median	--	--	0.3	UI
$V_{Rx\_CM\_ACp}$	AC peak common mode input voltage	--	--	150	mV
RL_{Rx_DIFF}	Differential return loss	10	--	--	dB
RL_{Rx_CM}	Common mode return loss	6	--	--	dB
$Z_{Rx\_DIFF\_DC}$	DC differential input impedance	80	100	120	Ω
Z_{Rx_DC}	DC input impedance	40	50	60	Ω
$Z_{Rx\_HIGH\_IMP\_DC\_POS}$	Powered down DC input impedance positive	50	--	--	k
$Z_{Rx\_HIGH\_IMP\_DC\_NEG}$	Powered down DC input impedance negative	1	--	--	kΩ
$V_{Rx\_IDLE\_DET\_DIFFpp}$	Electrical idle detect threshold	65	--	175	mV
$T_{Rx\_IDLE\_DET\_DIFF\_ENTERTIME}$	Unexpected electrical idle enter detect threshold integration time	--	--	10	ms
L_{Rx_SKEW}	Total skew	---	-2	0	ns

3.4.2 USB Interface



3.4.2.1 USB LS Driver and Receiver Parameters

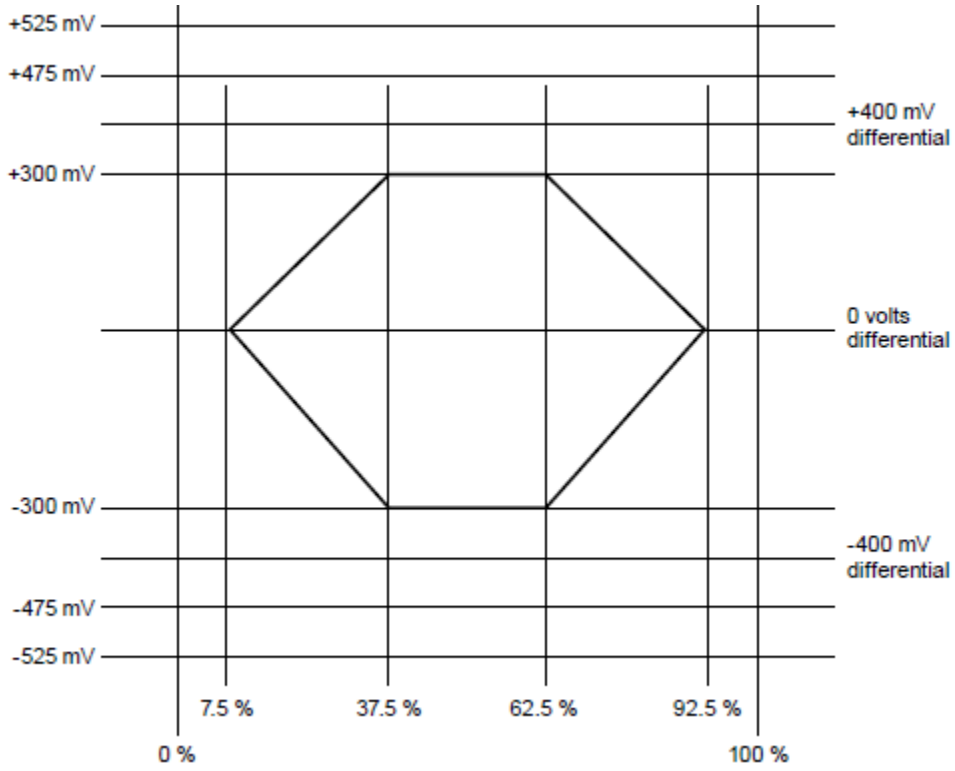
Symbol	Parameter	Min	Typ	Max	Units
BR	Baud rate	-	1.5	-	Mbps
BR_{ppm}	Baud rate tolerance	-15000	-	15000	ppm
Driver specifications					
V_{OH}	Output single ended high Defined with 1.425 kΩ pull-up resistor to 3.6V.	2.8	-	3.6	V
V_{OL}	Output single ended low Defined with 1.425 kΩ pull-down resistor to ground.	0	-	0.3	V
V_{CRS}	Output single crossover voltage	1.3	-	2.0	V
T_{LR}	Data rise time • Defined from 10% to 90% for rise time and 90% to 10% for fall time.	75	-	300	ns
T_{LF}	Data fall time • Defined from 10% to 90% for rise time and 90% to 10% for fall time.	75	-	300	ns
T_{LRFM}	Rise and fall time matching	80	-	125	%
T_{UDJ1}	Source jitter total: to next transition • Including frequency tolerance. Timing difference between the differential data signals. • Defined at crossover point of differential data signals.	-95	-	95	ns
T_{UDJ2}	Source jitter total: for paired transitions • Including frequency tolerance. Timing difference between the differential data signals. • Defined at crossover point of differential data signals.	-150	-	150	ns
Receiver specifications					
V_{IH}	Input single ended high	2.0	-	-	V
V_{IL}	Input single ended low	-	-	0.8	V
V_{DI}	Differential input sensitivity	0.2	-	-	V

3.4.4.2 USB FS Driver and Receiver Parameters

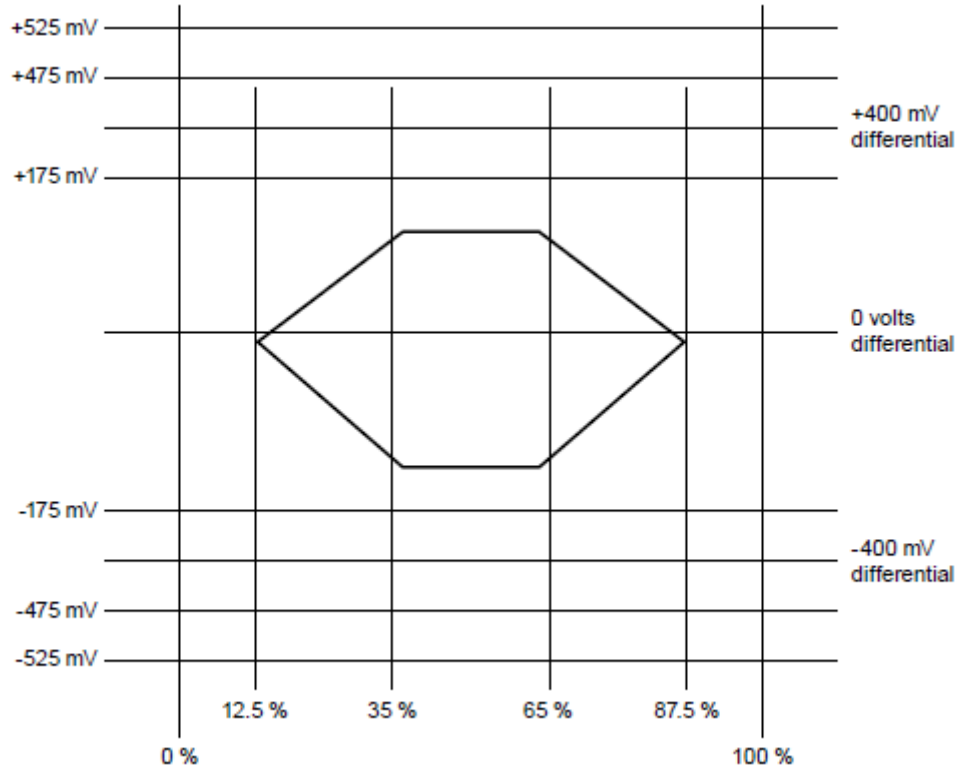
Symbol	Parameter	Min	Typ	Max	Units
BR	Baud rate	-	12	-	Mbps
BR_{ppm}	Baud rate tolerance	-2500	-	2500	ppm
Driver specifications					
V_{OH}	Output single ended high Defined with 1.425 kΩ pull-up resistor to 3.6V.	2.8	-	3.6	V
V_{OL}	Output single ended low Defined with 1.425 kΩ pull-down resistor to ground.	0	-	0.3	V
V_{CRS}	Output single crossover voltage	1.3	-	2.0	V
T_{FF}	Data fall time • Defined from 10% to 90% for rise time and 90% to 10% for fall time.	-4	-	20	ns
T_{FR}	Data rise time • Defined from 10% to 90% for rise time and 90% to 10% for fall time.	-4	-	20	ns
T_{DJ1}	Source jitter total: to next transition • Including frequency tolerance. Timing difference between the differential data signals. • Defined at crossover point of differential data signals.	-3.5	-	3.5	ns
T_{DJ2}	Source jitter total: for paired transitions • Including frequency tolerance. Timing difference between the differential data signals. • Defined at crossover point of differential data signals.	-4	-	4	ns
T_{FDEOP}	Source jitter for differential transition to SE0 transition Defined at crossover point of differential data signals.	-2		5	ns
Receiver specifications					
V_{IH}	Input single ended high	2.0	-	-	V
V_{IL}	Input single ended low	-	-	0.8	V
V_{DI}	Differential input sensitivity	0.2	-	-	V
T_{JR1}	Receiver jitter: to next transition Defined at crossover point of differential data signals.	-18.5	-	18.5	ns
T_{JR2}	Receiver jitter: for paired transitions Defined at crossover point of differential data signals.	-9	-	9	ns

3.4.4.3 USB HS Driver and Receiver Parameters

Symbol	Parameter	Min	Typ	Max	Units
BR	Baud rate	-	480	-	Mbps
BR_{ppm}	Baud rate tolerance	-500	-	500	ppm
Driver specifications					
V_{HSOH}	Data signaling high	360	-	440	mV
V_{HSOL}	Data signaling low	-10	-	10	mV
T_{HSR}	Data rise time • Defined from 10% to 90% for rise time and 90% to 10% for fall time.	500	-	-	ns
T_{HSF}	Data fall time • Defined from 10% to 90% for rise time and 90% to 10% for fall time.	-500	-	-	ns
--	Source jitter See below figure	-	-	-	-
Receiver specifications					
--	Differential input signaling levels See below figure	-	-	-	-
V_{HSCM}	Input single ended low	-50	-	500	mV
--	Receiver jitter tolerance See below figure	-	-	-	-



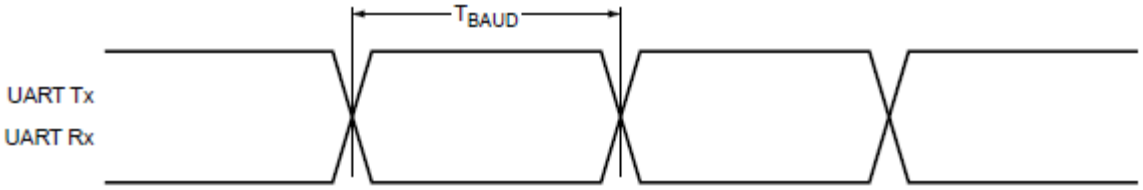
USB HS Tx Eye Diagram Pattern Template Diagram



USB HS Rx Eye Diagram Pattern Template Diagram

3.4.5.High-Speed UART Interface

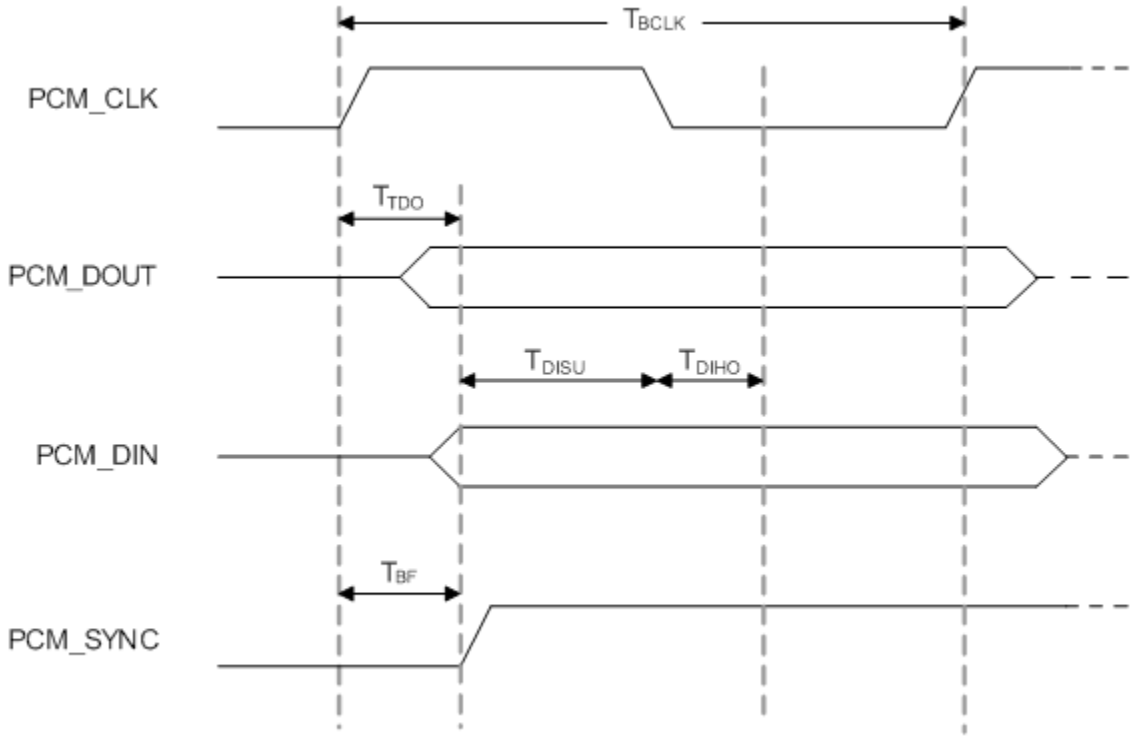
The AW-XM455 supports a high-speed Universal Asynchronous Receiver/Transmitter (UART) interface, compliant to the industry standard 16550 specification. High-speed baud rates are supported to provide the physical transport between the device and the host for exchanging Bluetooth data.



Symbol	Parameter	Condition	Min	Typ	Max	Units
T_{BAUD}	Baud rate	26MHz input clock	250	-	-	ns

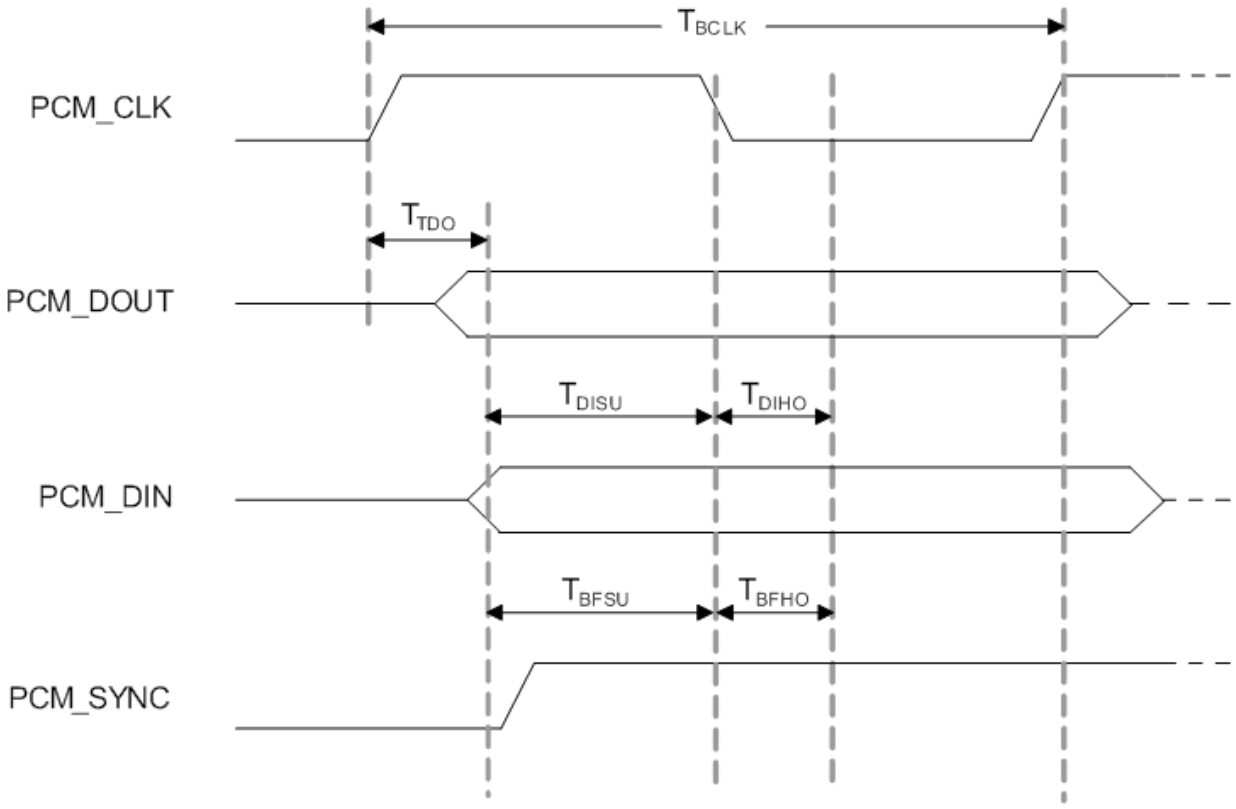
3.4.6 PCM Interface

3.4.6.1 PCM Timing Specification – Master Mode



Symbol	Parameter	Condition	Min	Typ	Max	Units
F_{BCLK}	--	--	--	2/2.048	--	MHz
Duty $Cycle_{BCLK}$	--	--	0.4	0.5	0.6	--
$T_{BCLK\ rise/fall}$	--	--	--	3	--	ns
T_{DO}	--	--	--	--	15	ns
T_{DISU}	--	--	20	--	--	ns
T_{DIHO}	--	--	15	--	--	ns
T_{BF}	--	--	--	--	15	ns

3.4.6.2 PCM Timing Specification – Slave Mode



Symbol	Parameter	Condition	Min	Typ	Max	Units
F_{BCLK}	--	--	--	2/2.048	--	MHz
Duty $Cycle_{BCLK}$	--	--	0.4	0.5	0.6	--
$T_{BCLK\ rise/fall}$	--	--	--	3	--	ns
T_{DO}	--	--	--	--	30	ns
T_{DISU}	--	--	15	--	--	ns
T_{DIHO}	--	--	10	--	--	ns
T_{BFSU}	--	--	15	--	--	ns
T_{BFHO}			10		--	ns

3.5 Timing Sequence

AW-XM455 power up timing sequence.

TBD

3.6 Power Consumption*

3.6.1 WLAN

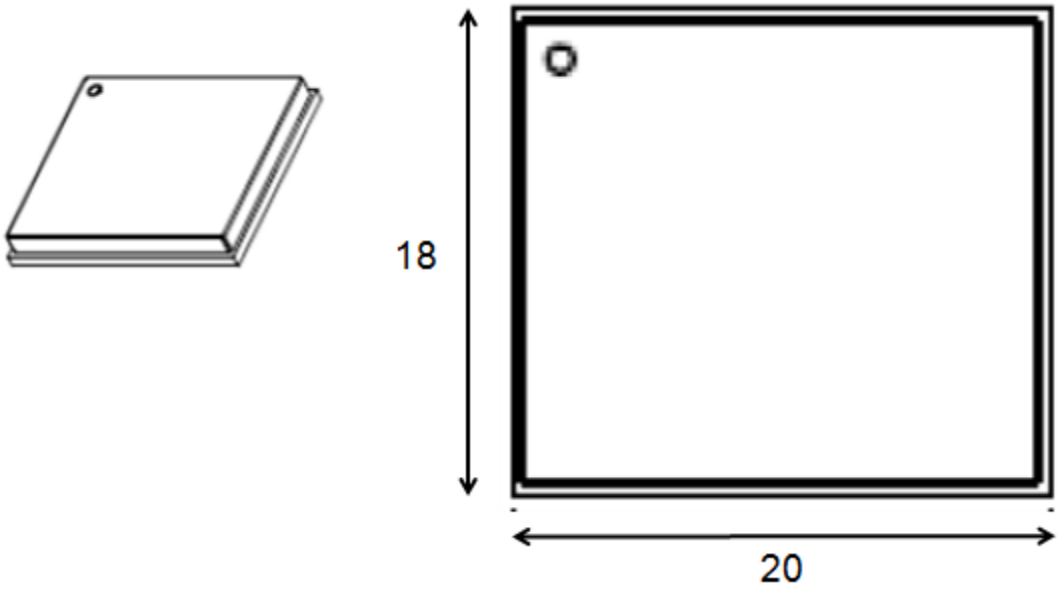
TBD

3.6.2 Bluetooth

TBD

4. Mechanical Information

4.1 Mechanical Drawing

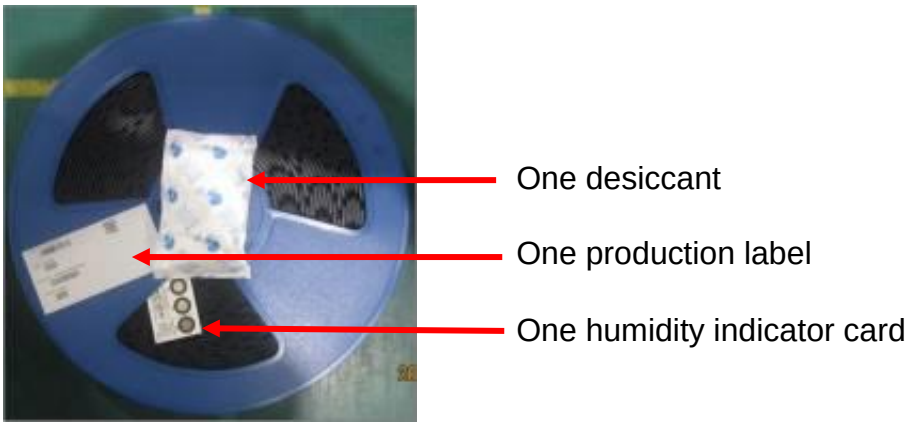


(Draft drawing)

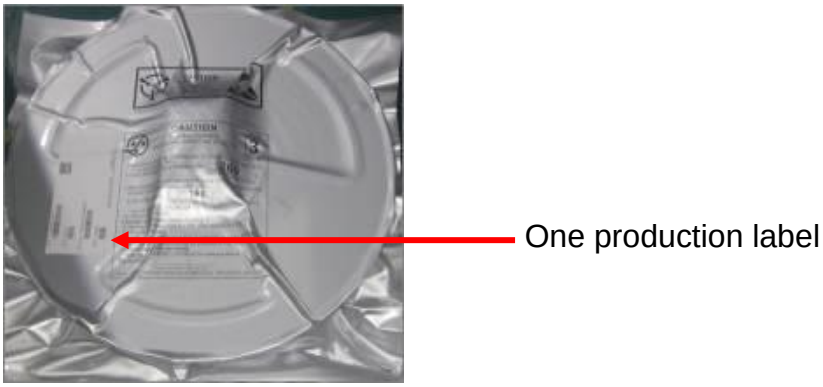
5. Packing Information

1. One reel can pack 650pcs AW-XM455 LGA modules

2. One production label is pasted on the reel, one desiccant and one humidity indicator card are put on the reel



3. One reel is put into the anti-static moisture barrier bag, and then one label is pasted on the bag



4. A bag is put into the anti-static pink bubble wrap

5. A bubble wrap is put into the inner box and then one label is pasted on the inner box

One production label

6. **4 inner boxes** could be put into one carton

7. Sealing the carton by AzureWave tape

8. One carton label and one box label are pasted on the carton. If one carton is not full, one balance label pasted on the carton

Example of carton label (出貨標籤的範例)	AzureWave Technologies Inc. AzureWave P/N Customer: 由業務提供 Customer P/N: 由業務提供 Customer PO: 由業務提供 Description: AW-XXXXXX QTY: 1200 pcs C/N N.W. G.W. RoHS COMPLIANT
Example of box label (箱號標籤)	BOX0012018
Example of production label (生產標籤)	P/N: D/C: 1309 PCK NO.: PCKNO0069097 QTY: 294 BAG SEAL DATE: _____