



WMX7203

**Wi-Fi 6/6e 802.11ax 2x2 Tri-band
Mini PCIe Module**

Product Datasheet

Version: 1.0.8

2022/11/10



Release Note

Version	Date	Description	Editor
v0.1.0	2021/5/11	Initial draft	Eddie Lin
v0.1.1	2021/6/2	Add RF Tool & Platform support	Eddie Lin
v0.1.2	2021/6/30	Modify mini PCIe Pin define	Eddie Lin
v0.1.3	2021/7/7	Add PIN Define	Eddie Lin
v0.1.4	2021/9/30	Add Tx Power	Eddie Lin
v0.1.5	2021/12/21	Mechanical Outline Drawing	Eddie Lin
v0.1.6	2022/3/11	Add Qualcomm FastConnect Series chip WCN685x and QCA206x	Eddie Lin
v0.1.7	2022/3/24	Add part number for QCA2066	Eddie Lin
v1.0.8	2022/11/10	1. Modify Temperature data 2. Add Module photo 3. Update label & P/N 4. Update Tx power	Eddie Lin

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1 Overview

The WMX7203 module is a highly integrated wireless local area network (WLAN) mini PCIe module, the module based-on Qualcomm FastConnect 6900 series WCN685x/QCA206x and that is supporting 802.11ax Wi-Fi and Bluetooth v5.x.

The WMX7203 supports simultaneous operation on 2.4 GHz and 5 GHz or 2.4GHz and 6 GHz, also known as Dual Band Simultaneous (DBS).

2 Feature

2.1 WLAN

- Compliant with IEEE 802.11a/b/g/n/ac/ax
- Supports 2x2 Multi-User Multiple-Input Multiple-Output (MU-MIMO)
- Dual Band Simultaneous (DBS), up to 3.6 Gbps data rate (2x2+2x2 11ax DBS)
- Tri-band 2.4 GHz/5 GHz/6 GHz support
- 20 MHz/40 MHz channel bandwidth for 2.4 GHz
- 20 MHz/40 MHz/80 MHz/160 MHz channel bandwidth for 5 GHz/6 GHz
- Seamless antenna sharing with Bluetooth, LTE, LTE-U, and 5G
- Dynamic Frequency Selection (DFS, radar detection)
- Offloading traffic for minimal host utilization at 802.11ac/ax speeds
- Low-power PCIe (with L1 substate) interface
- Integrated close-loop power detector
- Monitor mode

2.2 Bluetooth

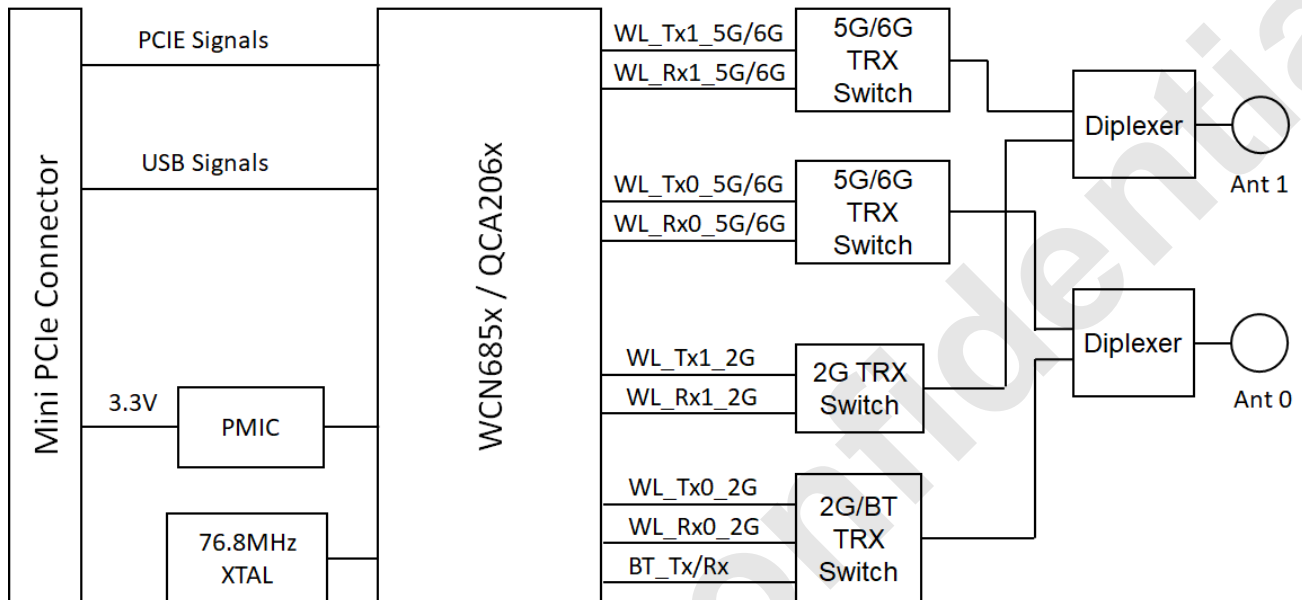
- Bluetooth V5.2, V5.1, V5.0, V4.2, V4.1, V4.0, V3.0, V2.1+EDR
- Compliant with Bluetooth Milan and ANT+

2.3 Security

- AES-CCMP at 128/256 bits
- WEP, TKIP hardware encryption
- WAPI-2 hardware encryption
- WPA/WPA2/WPA3
- FIPS 140-2 support

3 System Specification

3.1 Block Diagram



3.2 Chip Solution

- Qualcomm WCN6856-5/QCA2066-5

3.3 Protocol & Interface

- PCIe Gen 3 interface for WLAN
- USB 1.1 interface for Bluetooth
- Antenna Port: U.FL connector x2 for 2T2R

3.4 Temperature

- Operating Temperature: -30°C to +85°C
- Storage Temperature: -40°C to +135°C

3.5 Humidity

- Operating Humidity (non-condensing): 5% ~ 95%
- Storage Humidity (non-condensing): 5% ~ 90%

4 WLAN Specification

4.1 WLAN Standard

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

4.2 Frequency Range

- Support 2.4GHz frequency range: 2400MHz ~ 2496MHz
- Support 5GHz frequency range: 4900MHz - 5850MHz
- Support 6GHz frequency range: 5925MHz - 7125MHz

4.3 Band Width

- 20 MHz/40 MHz channel bandwidth for 2.4 GHz
- 20 MHz/40 MHz/80 MHz/160 MHz channel bandwidth for 5 GHz/6 GHz

4.4 Data Rate

- 2.4GHz
802.11n HT40 2SS: 300Mbps
802.11ax HE40 2SS: 573Mbps
- 5GHz/6GHz
802.11n HT40 2SS: 300Mbps
802.11ac VHT160 2SS: 1733Mbps
802.11ax HE160 2SS: 2402Mbps

4.5 Modulation

- 802.11n:
OFDM (BPSK, QPSK, 16-QAM, 64-QAM)
- 802.11ac:
OFDM (BPSK, QPSK, 16-QAM, 64-QAM, 256-QAM)
- 802.11ax:
OFDM (BPSK, QPSK, 16-QAM, 64-QAM, 256-QAM, 1024-QAM)

4.6 Features

Category	Description
Wi-Fi Mode	STA Mode AP Mode (Soft AP) STA + AP Mode Wi-Fi Direct Monitor Mode
Wi-Fi Features	160MHz channel support, MU-MIMO Dual-band simultaneous (DBS) OFDMA Target Wake Time
Encryption/Decryption	WEP TKIP AES
Security Modes	Open WEP/Shared Key WPA/WPA2/WPA3
Security Support (WPA3)	WPA3 Easy Connect 256-bit Encryption WPA3-Enhanced Open WPA3-Enterprise WPA3-Personal
Feature Set	Multi SSID P2P DBS

Noted: these features based on Qualcomm driver WCN6855.LEA.1.0

4.7 Output Power & Sensitivity

2.4GHz

2.4GHz 802.11b		
Data Rate	Tx $\pm$ 2dB	Rx Sensitivity $\pm$ 2dB
1M	18.0dBm	-99dBm
11M	18.0dBm	-88dBm

2.4GHz 802.11g		
Data Rate	Tx $\pm$ 2dB	Rx Sensitivity $\pm$ 2dB
6M	18.0dBm	-93dBm
54M	14.5dBm	-75dBm

2.4GHz 802.11n				
Data Rate		Tx $\pm$ 2dB	Tx $\pm$ 2dB(2TX)	Rx Sensitivity $\pm$ 2dB
HT20	MCS 0	18.0dBm	21.0dBm	-94dBm
	MCS 7	16.0dBm	19.0dBm	-76dBm
HT40	MCS 0	16.0dBm	19.0dBm	-91dBm
	MCS 7	14.0dBm	17.0dBm	-73dBm

2.4GHz 802.11ax				
Data Rate		Tx $\pm$ 2dB	Tx $\pm$ 2dB(2TX)	Rx Sensitivity $\pm$ 2dB
HE20	MCS 0	18.0dBm	21.0dBm	-94dBm
	MCS 7	16.0dBm	19.0dBm	-75dBm
	MCS 9	15.5dBm	18.5dBm	-69dBm
	MCS 11	15.0dBm	18.0dBm	-63dBm
	MCS 13	11.5dBm	14.5dBm	-58dBm
HE40	MCS 0	15.5dBm	18.5dBm	-91dBm
	MCS 7	14.5dBm	17.5dBm	-72dBm
	MCS 9	13.5dBm	16.5dBm	-67dBm
	MCS 11	13.0dBm	16.0dBm	-61dBm
	MCS 13	11.0dBm	14.0dBm	-55dBm

5GHz

2.4GHz 802.11g		
Data Rate	Tx $\pm$ 2dB	Rx Sensitivity $\pm$ 2dB
6M	17.5dBm	-86dBm
54M	14.0dBm	-77dBm

5GHz 802.11n			
Data Rate		Tx $\pm$ 2dB	Rx Sensitivity $\pm$ 2dB
HT20	MCS 0	16.0dBm	-94dBm
	MCS 7	13.5dBm	-75dBm
HT40	MCS 0	15.5dBm	-91dBm
	MCS 7	13.0dBm	-72dBm

5GHz 802.11ac			
Data Rate		Tx $\pm$ 2dB	Rx Sensitivity $\pm$ 2dB
VHT20	MCS 0	16.0dBm	-93dBm
	MCS 7	13.5dBm	-75dBm
	MCS 11	13.5dBm	-70dBm
VHT40	MCS 0	15.5dBm	-91dBm
	MCS 7	13.0dBm	-73dBm
	MCS 11	13.0dBm	-68dBm
VHT80	MCS 0	15.5dBm	-87dBm
	MCS 7	12.5dBm	-70dBm
	MCS 11	12.5dBm	-64dBm
VHT160	MCS 0	14.5dBm	-84dBm
	MCS 7	11.0dBm	-66dBm
	MCS 11	11.0dBm	-61dBm

5GHz

5GHz/6GHz 802.11ax			
Data Rate		Tx $\pm$ 2dB	Rx Sensitivity $\pm$ 2dB
HE20	MCS 0	16.0dBm	-93dBm
	MCS 7	13.5dBm	-74dBm
	MCS 9	13.5dBm	-68dBm
	MCS 11	13.0dBm	-64dBm
	MCS 13	9.0dBm	-57dBm

HE40	MCS 0	15.0dBm	18.0dBm	-90dBm
	MCS 7	13.0dBm	16.0dBm	-72dBm
	MCS 9	13.0dBm	16.0dBm	-66dBm
	MCS 11	12.5dBm	15.5dBm	-61dBm
	MCS 13	8.5dBm	11.5dBm	-55dBm
HE80	MCS 0	15.0dBm	18.0dBm	-87dBm
	MCS 7	13.0dBm	16.0dBm	-68dBm
	MCS 9	13.0dBm	16.0dBm	-63dBm
	MCS 11	12.0dBm	15.0dBm	-58dBm
	MCS 13	8.0dBm	11.0dBm	-52dBm
HE160	MCS 0	14.5dBm	17.5dBm	-84dBm
	MCS 7	11.0dBm	14.0dBm	-66dBm
	MCS 9	11.0dBm	14.0dBm	-60dBm
	MCS 11	10.0dBm	13.0dBm	-54dBm
	MCS 13	8.0dBm	11.0dBm	-49dBm

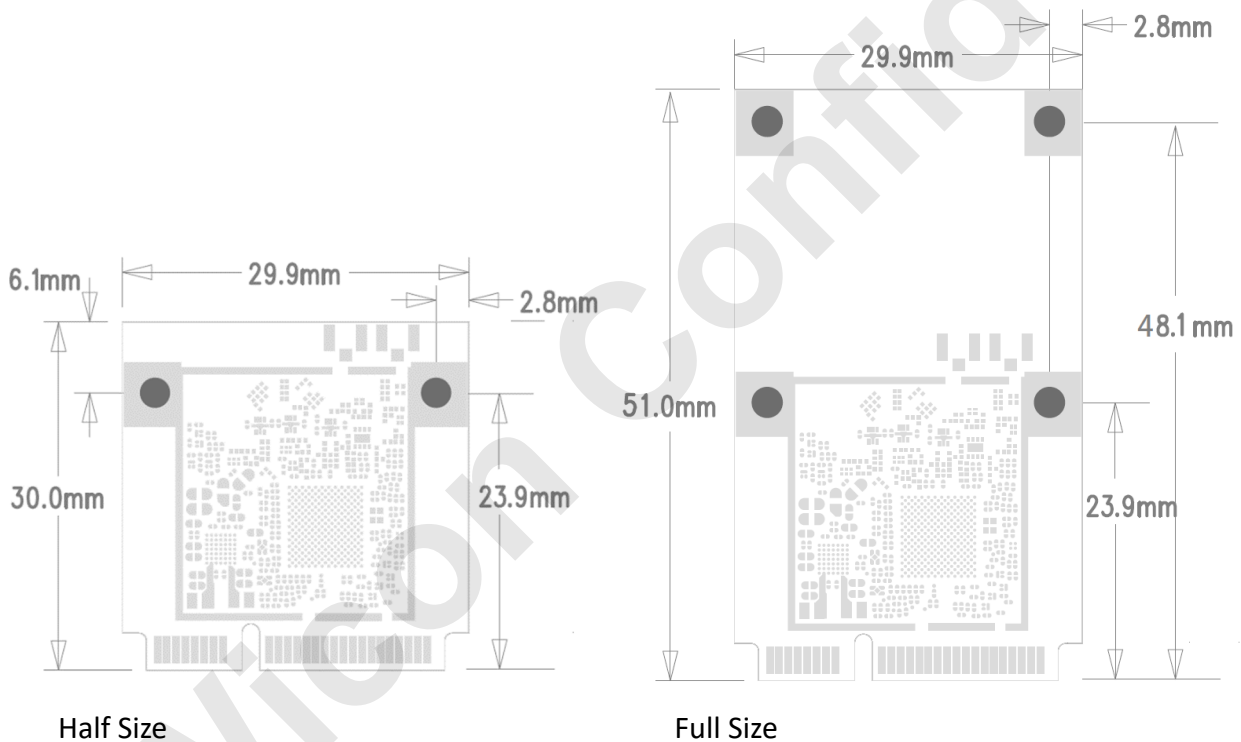
6GHz

5GHz/6GHz 802.11ax				
Data Rate		Tx $\pm$ 2dB	Tx $\pm$ 2dB(2TX)	Rx Sensitivity $\pm$ 2dB
HE20	MCS 0	14.0dBm	17.0dBm	-93dBm
	MCS 7	11.5dBm	14.5dBm	-74dBm
	MCS 9	10.5dBm	13.5dBm	-68dBm
	MCS 11	10.0dBm	13.0dBm	-64dBm
	MCS 13	9.0dBm	11.0dBm	-57dBm
HE40	MCS 0	13.0dBm	16.0dBm	-90dBm
	MCS 7	10.0dBm	13.0dBm	-72dBm
	MCS 9	9.5dBm	12.5dBm	-66dBm
	MCS 11	9.0dBm	12.0dBm	-61dBm
	MCS 13	8.0dBm	11.0dBm	-55dBm
HE80	MCS 0	13.0dBm	16.0dBm	-87dBm
	MCS 7	10.5dBm	13.5dBm	-68dBm
	MCS 9	10.0dBm	13.0dBm	-63dBm
	MCS 11	9.0dBm	12.0dBm	-54dBm
	MCS 13	8.0dBm	11.0dBm	-52dBm

HE160	MCS 0	12.5dBm	15.5dBm	-84dBm
	MCS 7	10.5dBm	10.5dBm	-66dBm
	MCS 9	10.0dBm	13.0dBm	-60dBm
	MCS 11	8.5dBm	11.5dBm	-54dBm
	MCS 13	8.0dBm	11.0dBm	-49dBm

5 Mechanical Specification

5.1 Mechanical Outline Drawing

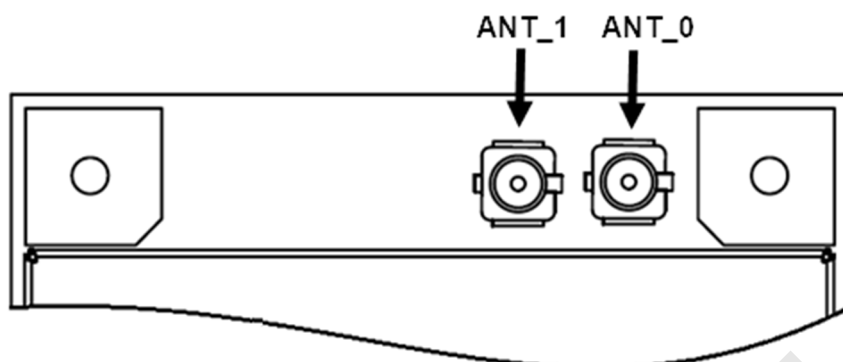


General tolerance: $\pm 0.2\text{mm}$

5.2 Dimension

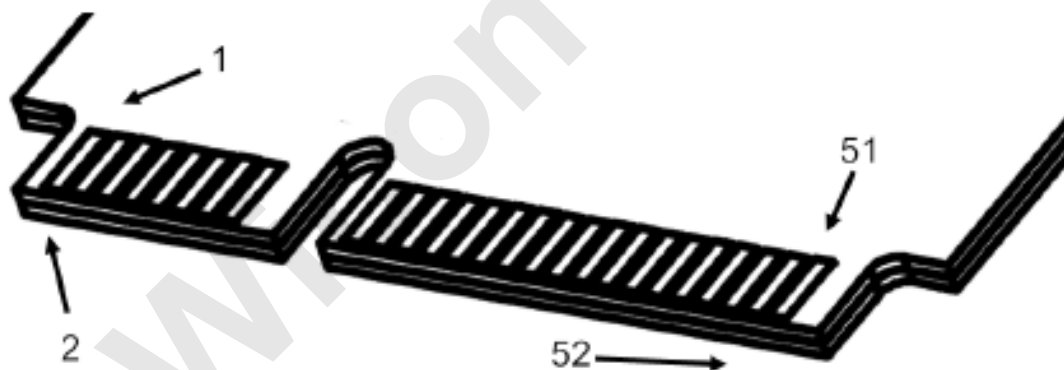
- Mini PCIe half-size/full-size
- Typical Dimension:
 - Half size: (W)29.9mm x (L)30.0mm x (H)2.8mm
 - Full size: (W)29.9mm x (L)51.0mm x (H)2.8mm

5.3 Connector



Pin Name	Description
Ant_0	RF Antenna for WiFi 2.4GHz/5GHz/6GHz and Bluetooth
Ant_1	RF Antenna for WiFi 2.4GHz/5GHz/6GHz

5.4 Pin Assignment



PIN #	Pin Name	Design Status	PIN #	Pin Name	Design Status
1	WAKE#	WL_PCIE_WAKE	2	+3.3Vaux	3V3
3	COEX1	NC	4	GND	GND
5	COEX2	NC	6	+1.5V	NC
7	CLKREQ#	WL_PCIE_CLKREQ	8	UIM_PWR	NC
9	GND	GND	10	UIM_DATA	NC
11	REFCLK-	WL_PCIE_REFCLKN	12	UIM_CLK	NC
13	REFCLK+	WL_PCIE_REFCLKP	14	UIM_RESET	NC
15	GND	GND	16	UIM_VPP	NC
17	Reserved	NC	18	GND	GND
19	Reserved	NC	20	W_DISABLE#	WL_EN
21	GND	GND	22	PERST#	WL_PCIE_RST
23	PERn0	WL_PCIE_RXN	24	+3.3Vaux	3V3
25	PERp0	WL_PCIE_RXP	26	GND	GND
27	GND	GND	28	+1.5V	NC
29	GND	GND	30	SMB_CLK	NC
31	PETn0	WL_PCIE_TXN	32	SMB_DATA	NC
33	PETp0	WL_PCIE_TXP	34	GND	GND
35	GND	GND	36	USB_D-	BT_USB_DM
37	Reserved	NC	38	USB_D+	BT_USB_DP
39	+3.3Vaux	3V3	40	GND	GND
41	+3.3Vaux	3V3	42	LED_WWAN	BT_LED
43	GND	GND	44	LED_WLAN	WL_LED
45	RESERVED	NC	46	LED_WPAN	NC
47	RESERVED	NC	48	+1.5V	NC
49	RESERVED	NC	50	GND	GND
51	RESERVED	NC	52	+3.3Vaux	3V3

5.5 Pin Define

Design Name	I/O	Description
WL_PCIE_RST	I	WLAN PCIe reset signal is an input signal
WL_PCIE_WAKE	O	WLAN PCIe wake-up signal is an output signal
WL_PCIE_CLKREQ	B	WLAN PCIe clock request signal is a bidirection signal
WL_PCIE_REFCLKP	I	WLAN PCIe reference clock input differential signals
WL_PCIE_REFCLKN	I	
WL_PCIE_RXP	I	WLAN PCIe receive input differential signals
WL_PCIE_RXN	I	
WL_PCIE_TXP	O	WLAN PCIe transmit output differential signals
WL_PCIE_TXN	O	
SUSCLK	I	32KHz
BT_USB_DP	A	USB1.1 interface to support full-speed only (no low-speed mode) and peripheral device mode only (no master mode).
BT_USB_DM	A	
BT_EN	I	Bluetooth enable signal. It is an input, active high to enable Bluetooth operation
WL_EN	I	WLAN enable signal. It is an input, active high to enable WLAN operation
BT_LED	O	Bluetooth LED (QCA driver not support)
WL_LED	O	WLAN LED (QCA driver not support)

6 Product Appearance

6.1 Product Picture



6.2 Label Define



Item	Description
Size	17x18mm
Model	Product Model Name
P/N	Product Part Number
Barcode	CODE 128, Value: Mac Address
S/N	Product Serial Number

7 Electrical characteristics

7.1 Power Consumption

- Max power consumption 3W (25°C, DBDC)

7.2 Operating Voltage

- Mini PCIe Interface DC 3.3V $\pm 5\%$

8 Software & Driver

8.1 Driver Support

- Windows:
Windows 10 / Windows 11 (32bit/64bit)
- Linux:
QCA Standard LEA Linux Driver support kernel 4.9.11 & 5.4.0 ~ 5.10.x
Open Driver: ATH11K

8.2 Platform Support List

- Intel x86(Verified)
- ARM/MIPS

8.3 RF Tool

- RF test tool consultant service available

9 Certification

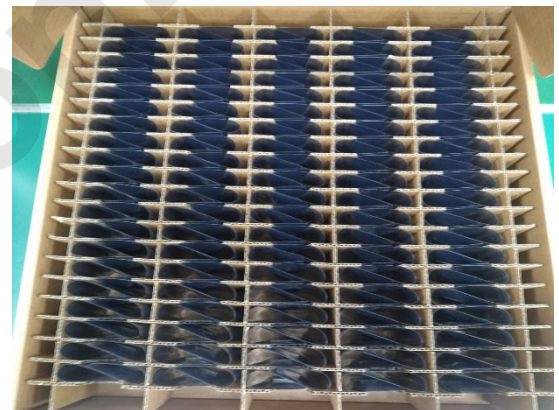
CE/FCC/IC (on going)

10 Package

- One module per one static bag



- Two static bags in one lattice and 200pcs per inner box



- 5 inner boxes per 1 carton and 1000pcs per carton



11 Ordering Information

11.1 Main Parts

Part Number	Description
WMX7203-0	802.11ax, 2x2, Wi-Fi 6/6e Tri-band, Mini PCIe, WCN6856-5 (Half Size)
WMX7203-F	802.11ax, 2x2, Wi-Fi 6/6e Tri-band, Mini PCIe, WCN6856-5 (Full Size)
WMX7203-1	802.11ax, 2x2, Wi-Fi 6/6e Tri-band, Mini PCIe, QCA2066-5 (Half Size)
WMX7203-1F	802.11ax, 2x2, Wi-Fi 6/6e Tri-band, Mini PCIe, QCA2066-5 (Full Size)

11.2 Accessories

Part Number	Description
ATD7251	Monopole Antenna 2.4GHz/5GHz/6GHz
AC12001	Cable U.FL to SMA, 200mm