

WPEB-265AXI(BT) [B33]/[R33] Series

802.11ax/ac/a/b/g/n Industrial Grade

2T2R Wi-Fi+Bluetooth 5.3 Combo

Half mini PCIe Module



Industrial-Grade Wi-Fi+Bluetooth Combo Solution

WPEB-265AXI(BT) series is a WLAN 802.11ax (WiFi 6)+BT 5.3 Module, 802.11ax (WiFi 6) allow efficient allocation of low data-rate connections, improve the battery life of IoT sensors, and extend the range of Wi-Fi signals. The new 802.11ax standard with its unique features such as OFDMA, 1024QAM, Target Wake Time (TWT). WPEB-265AXI(BT) series enables smooth streaming of high-resolution videos, fewer dropped connections and faster connections farther away from the router and in dense environments.

There are two basic types of WPEB-265AXI(BT) Series models, one is USB interface for Bluetooth the other is UART interface for Bluetooth. The Operating Voltage support DC 3.3V. The 802.11ax (WiFi 6) half mini PCIe module can support Multi-User MIMO (MU-MIMO) technology to increase channel capacity when simultaneously servicing multiple devices using the same frequency chunks. Bluetooth 5 provides doubles data rates speed for faster transmissions thereby reducing the overall power consumption. Additionally, Bluetooth 5 adds new enhanced data broadcasting enabling seamless services.

WPEB-265AXI(BT) module can support the Soft AP mode and Station (Client) mode. the product can be connected to a wireless network as a Client, while also creating a separate network as an AP for other devices to connect to it.

Embedded Application

Applications include medical devices, security systems, industrial PC, Point of Sale, digital signs, STB, embedded / tablet PC's, smart devices, thin client devices, Gaming machine, tablets, etc.

Key Feature

- Dual-stream spatial multiplexing up to 1200 Mbps data rate.
- Wi-Fi 6 features including 1024-QAM Modulation, OFDMA, MU-MIMO, and WPA3.
- IEEE 802.11ax beam forming.
- BT 5.3 features including Low-Energy 2 Mbps and Low-Energy Long Range.
- Supports PCIe v3.0 compliant and runs at Gen2 speeds.

Specification

Standards	IEEE 802.11ax/ac/a/b/g/n (2T2R) Bluetooth V5.3, V5.0, V4.2, V4.1, V4.0 LE, V3.0+HS, V2.1+EDR
Chipset	Broadcom
Data Rate	802.11b: 11Mbps 802.11a/g: 54Mbps 802.11n: MCS0~15 802.11ac: MCS0~9 802.11ax: HE0~11 Bluetooth: 1 Mbps, 2Mbps and Up to 3Mbps
Operating Frequency	IEEE 802.11ax/ac/a/b/g/n ISM Band: 2.412GHz~2.4835GHz, 5.150GHz~5.850GHz *Subject to local regulations
Interface	WLAN: PCIe Bluetooth: USB or UART
Form Factor	Half Mini PCIe
Antenna	2 x IPEX MHF1 connectors (ANT1 for WLAN/BT, ANT2 for WLAN)
Modulation	Wi-Fi: 802.11b: DSSS (DBPSK, DQPSK, CCK) 802.11g: OFDM (BPSK, QPSK, 16-QAM, 64-QAM) 802.11n: OFDM (BPSK, QPSK, 16-QAM, 64-QAM) 802.11a: OFDM (BPSK, QPSK, 16-QAM, 64-QAM) 802.11ac: OFDM (BPSK, QPSK, 16-QAM, 64-QAM, 256-QAM) 802.11ax: OFDMA (BPSK, QPSK, 16-QAM, 64-QAM, 256-QAM, 1024-QAM) Bluetooth: Header: GFSK Payload 2M: $\pi/4$ -DQPSK Payload 3M: 8-DPSK
Power Consumption	TX Mode: 937mA (Max.) RX Mode: 94mA (Max.)
Operating Voltage	DC 3.3V
Operating Temperature Range	-40°C~85°C
Storage Temperature Range	-40°C~105°C
Humidity (Non-Condensing)	10%~95% (Operating) 10%~95% (Storing)
Dimension L x W x H (in mm)	29.85mm(± 0.15 mm) x 26.65mm(± 0.15 mm) x 2.5mm(± 0.2 mm)

Weight (g)	4g
Driver Support	Linux, Android
Security	64/128-bits WEP, WPA, WPA2, WPA3, 802.1x

OUTPUT POWER & SENSITIVITY		
802.11b		
Data Rate	Tx \pm 2dBm	Rx Sensitivity
11Mbps	18.5dBm	\leq -88dBm

802.11g		
Data Rate	Tx \pm 2dBm	Rx Sensitivity
54Mbps	12dBm	\leq -77dBm

802.11n / 2.4GHz				
HT20	Data Rate	Tx \pm 2dBm (1TX)	Tx \pm 2dBm (2TX)	Rx Sensitivity
	MCS7	12dBm	15dBm	\leq -75dBm

802.11a		
Data Rate	Tx \pm 2dBm	Rx Sensitivity
54Mbps	14.5 dBm	\leq -76dBm

802.11n / 5GHz				
HT20	Data Rate	Tx \pm 2dBm (1TX)	Tx \pm 2dBm (2TX)	Rx Sensitivity
	MCS7	13.5dBm	16.5dBm	\leq -73dBm
HT40	MCS7	11dBm	14dBm	\leq -70dBm

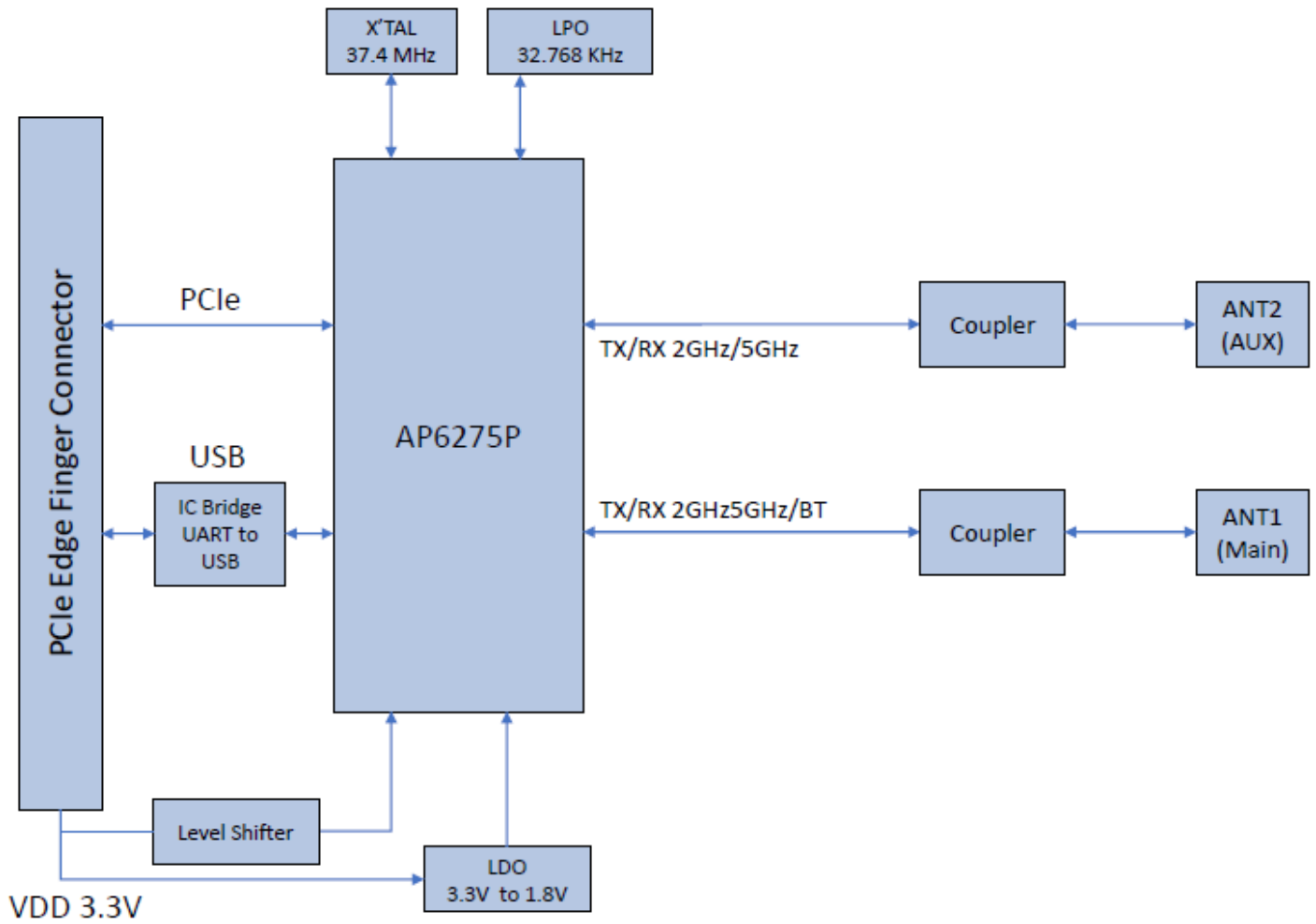
802.11ac				
VHT80	Data Rate	Tx \pm 2dBm (1TX)	Tx \pm 2dBm (2TX)	Rx Sensitivity
	MCS9	9dBm	12dBm	\leq -62dBm

802.11ax / 2.4GHz				
HE20	Data Rate	Tx \pm 2dBm		Rx Sensitivity
	HE7	12dBm		\leq -75dBm

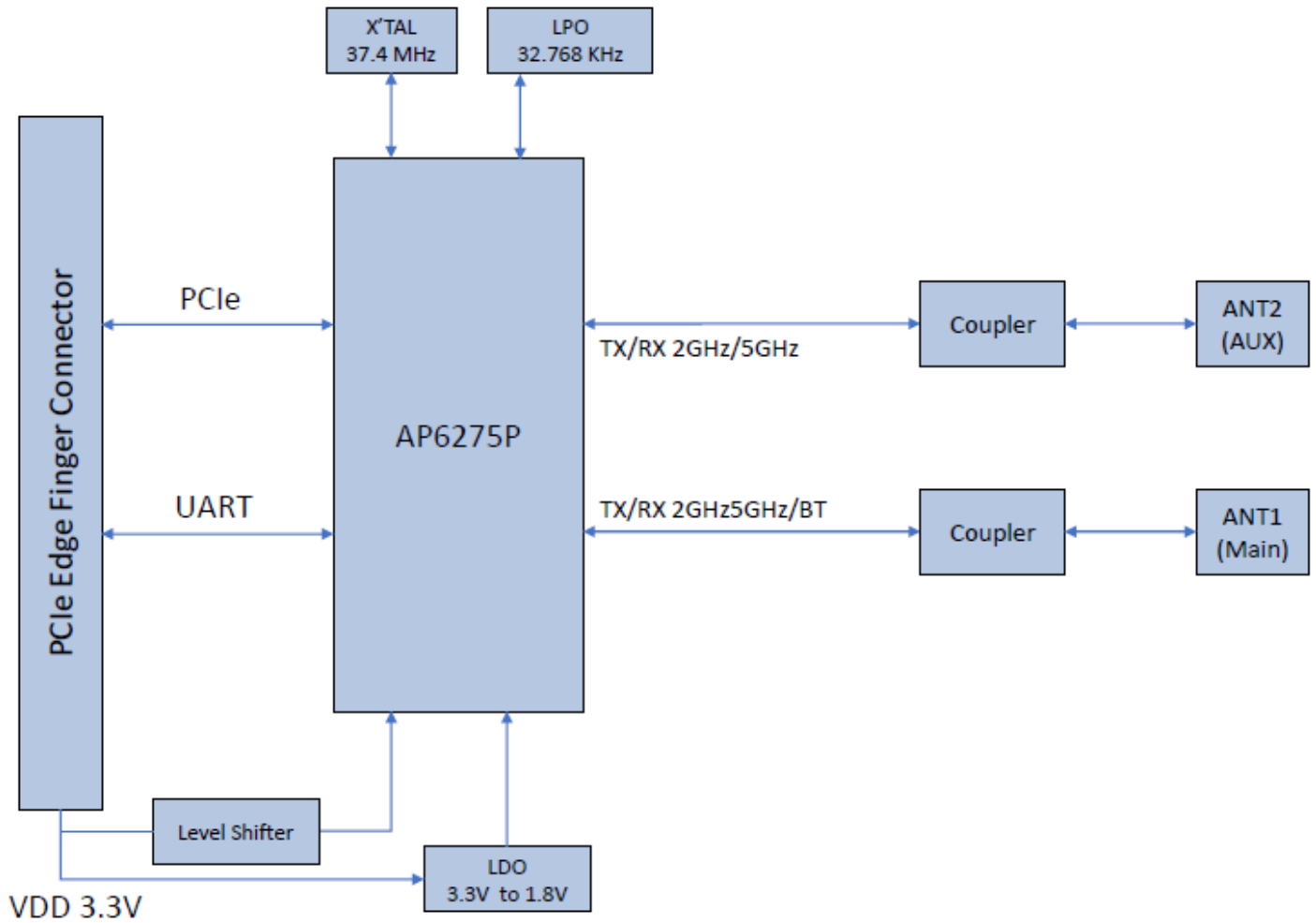
802.11ax / 5GHz				
HE20	Data Rate	Tx \pm 2dBm (1TX)	Tx \pm 2dBm (2TX)	Rx Sensitivity
	HE7	13.5dBm	16.5dBm	\leq -69dBm
HE40	HE7	11dBm	14dBm	\leq -68dBm
HE80	HE9	9dBm	12dBm	\leq -60dBm

Bluetooth		
Data Rate	Tx \pm 2dBm (Class 1 Device)	Rx Sensitivity
3Mbps	$0 \leq$ Output Power \leq 7dBm	<0.01% BER at -83dBm

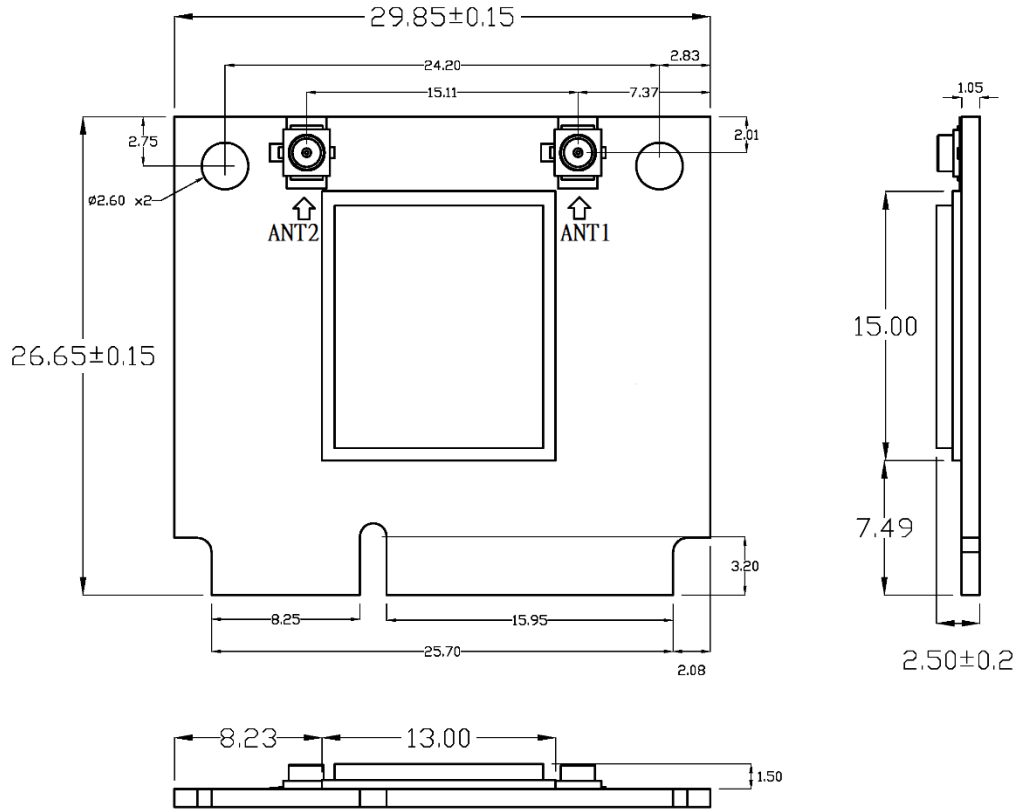
Block Diagram for WPEB-265AXI(BT) [B33]



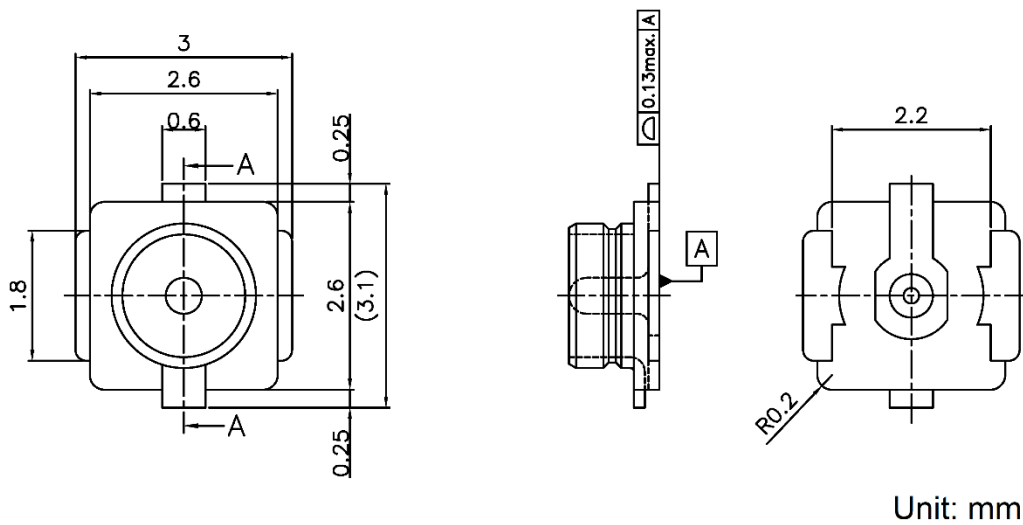
Block Diagram for WPEB-265AXI(BT) [R33]



Mechanical Diagram (mm)



MHF1 Connector spec.



WPEB-265AXI(BT) [B33] Pin Assignment

The following section illustrate signal pin-outs for the module connector.

TOP			
Pin#	Pin Name	Type	Description
1	WAKE#	NC	No connection
3	COEX1	NC	No connection
5	COEX2	NC	No connection
7	CLKREQ#	OD	PCIe clock request signal which indicates when the REFCLK to the PCIe interface can be gated. 1 = the clock can be gated. 0 = the clock is required.
9	GND	G	Ground connections
11	REFCLK-	I	PCIe differential clock input- Negative
13	REFCLK+	I	PCIe differential clock input- Positive
15	GND	G	Ground connections
17	UIM_IC_DM	NC	No connection
19	UIM_IC_DP	NC	No connection
21	GND	G	Ground connections
23	PETn0	O	PCIe Transmit data-Negative
25	PETp0	O	PCIe Transmit data-Positive
27	GND	G	Ground connections
29	GND	G	Ground connections
31	PERn0	I	PCIe receive data-Negative
33	PERp0	I	PCIe receive data-Positive
35	GND	G	Ground connections
37	GND	G	Ground connections
39	+3.3Vaux	P	VDD system power supply input
41	+3.3Vaux	P	VDD system power supply input
43	GND	G	Ground connections
45	ANTCTRL2	NC	No connection
47	ANTCTRL3	NC	No connection
49	Reserved	NC	No connection
51	W_DISABLE2#	I	BT_REG_ON(3.3V) Low asserting reset for Bluetooth core (must be connect to CPU'S GPIO)

Note: 1. power (P), ground (G), open-drain (OD), input (I), output (O), Do Not Connect (DNC), No Connection (NC)

2. +3.3Vaux is 3.3 V input pins, which can connect two sets of power supply together.

WPEB-265AXI(BT) [B33] Pin Assignment

The following section illustrate signal pin-outs for the module connector.

BOTTOM			
Pin#	Pin Name	Type	Description
2	3.3Vaux	P	VDD system power supply input
4	GND	G	Ground connections
6	1.5V/COEX3	NC	No connection
8	UIM_PWR	NC	No connection
10	UIM_DATA	NC	No connection
12	UIM_CLK	NC	No connection
14	UIM_RESET	NC	No connection
16	UIM_SPU	NC	No connection
18	GND	G	Ground connections
20	W_DISABLE1#	I	WL_REG_ON(3.3V) Low asserting reset for WiFi core (must be connect to CPU'S GPIO)
22	PERST#	I	PCIE_PERST_L(3.3V) PCIe host indication to reset the device. Active low. This pin has an internal weak pull-high resistor.
24	+3.3Vaux	NC	No connection
26	GND	G	Ground connections
28	+1.5V/ ANTCTRL0	NC	No connection
30	SMB_CLK	NC	No connection
32	SMB_DATA	NC	No connection
34	GND	G	Ground connections
36	USB_D-	I/O	USB serial differential data Negative
38	USB_D+	I/O	USB serial differential data Positive
40	GND	G	Ground connections
42	LED_WWAN#	NC	No connection
44	LED_WLAN#	NC	No connection
46	LED_WPAN#	NC	No connection
48	+1.5V/ ANTCTRL1	NC	No connection
50	GND	G	Ground connections
52	+3.3Vaux	P	VDD system power supply input

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Pin#	Pin Name	Type	Description
1	WAKE#	NC	No connection
3	COEX1	I	BT_UART_CTS_N(3.3V) UART clear-to-send. Active-low clear-to-send signal for HCI UART interface.
5	COEX2	O	BT_UART_RTS_N(3.3V) UART Request-to-send. Active-low request-to send signal for HCI UART interface.
7	CLKREQ#	OD	PCIE_CLKREQ_L(1.8V) PCIe clock request signal which indicates when the REFCLK to the PCIe interface can be gated. 1 = the clock can be gated. 0 = the clock is required.
9	GND	G	Ground connections
11	REFCLK-	I	PCIe differential clock input- Negative
13	REFCLK+	I	PCIe differential clock input- Positive
15	GND	G	Ground connections
17	UIM_IC_DM	I	BT_UART_RXD(3.3V) UART serial input. Serial data input for the HCI UART interface.
19	UIM_IC_DP	O	BT_UART_TXD(3.3V) UART serial input. Serial data input for the HCI UART interface.
21	GND	G	Ground connections
23	PETn0	O	PCIe Transmit data-Negative
25	PETp0	O	PCIe Transmit data-Positive
27	GND	G	Ground connections
29	GND	G	Ground connections
31	PERn0	I	PCIe receive data-Negative
33	PERp0	I	PCIe receive data-Positive
35	GND	G	Ground connections
37	GND	G	Ground connections
39	+3.3Vaux	P	VDD system power supply input
41	+3.3Vaux	P	VDD system power supply input
43	GND	G	Ground connections
45	ANTCTRL2	NC	No connection
47	ANTCTRL3	NC	No connection
49	Reserved	NC	No connection

TOP			
Pin#	Pin Name	Type	Description
51	W_DISABLE2#	I	BT_REG_ON(3.3V) Low asserting reset for Bluetooth core (must be connect to CPU'S GPIO)

Note: 1. power (P), ground (G), open-drain (OD), input (I), output (O), Do Not Connect (DNC), No Connection (NC)

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12	UIM_CLK	NC	No connection
14	UIM_RESET	NC	No connection
16	UIM_SPU	NC	No connection
18	GND	G	Ground connections
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24	+3.3Vaux	NC	No connection
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28	+1.5V/ ANTCTRL0	NC	No connection
30	SMB_CLK	NC	No connection
32	SMB_DATA	NC	No connection
34	GND	G	Ground connections
36	USB_D-	NC	No connection
38	USB_D+	NC	No connection
40	GND	G	Ground connections
42	LED_WWAN#	NC	No connection
44	LED_WLAN#	NC	No connection
46	LED_WPAN#	NC	No connection

BOTTOM			
Pin#	Pin Name	Type	Description
48	+1.5V/ ANTCTRL1	NC	No connection
50	GND	G	Ground connections
52	+3.3Vaux	P	VDD system power supply input

Note: 1. power (P), ground (G), open-drain (OD), input (I), output (O), Do Not Connect (DNC), No Connection (NC)
 2. +3.3Vaux is 3.3 V input pins, which can connect two sets of power supply together.

Certification

Dipole Ant.

- FCC
- CE (RED EN 300 328 V2.2.2 / EN 301 893 V2.1.1)
- IC
- MIC
- NCC
- ASNZS

Ordering Information

Product Name	Part Number	Description
WPEB-265AXI(BT) [B33]	R9701A90001	802.11ax/ac/a/b/g/n 2T2R+BT5.3 (BT for USB 3.3v) Half Mini PCIe Module
WPEB-265AXI(BT) [R33]	R9701A90003	802.11ax/ac/a/b/g/n 2T2R+BT5.3 (BT for UART 3.3v) Half Mini PCIe Module

Optional Accessory

Product Name	Part Number	Description
AD-103AG	R3410110203	Dipole Antenna, 2dBi 2.4GHz/5GHz, RP-SMA(M) connector
AD-302N	R3410110221	Dipole Antenna, 3dBi/2dBi 2.4G/5GHz, RP-SMA(M) connector
AD-303N	R3410110222	Dipole Antenna, 3dBi/3dBi 2.4G/5GHz, RP-SMA(M) connector
CBIRF-ME150	R3470300023	RF Cable, I-PEX/MHF1 to RP-SMA(F); L:150mm; Coaxial 1.37 Black
CBIRF-ME250	R3470300024	RF Cable, I-PEX/MHF1 to RP-SMA(F); L:250mm; Coaxial 1.37 Black