

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

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

2T2R Wi-Fi+Bluetooth 5.0 Combo

Half mini PCIe Module



### Industrial-Grade Wi-Fi+Bluetooth Combo Solution

WPEB-265AXI(BT) series is a WLAN 802.11ax (WiFi 6)+Bluetooth 5.0 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.

#### 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 5.0 features including Low-Energy 2 Mbps and Low-Energy Long Range.

## Specification

<b>Standards</b>	IEEE 802.11ax/ac/a/b/g/n (2T2R) Bluetooth V5.0, V4.2, V4.1, V4.0 LE, V3.0+HS, V2.1+EDR
<b>Chipset</b>	Broadcom
<b>Data Rate</b>	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
<b>Operating Frequency</b>	IEEE 802.11ax/ac/a/b/g/n ISM Band: 2.400GHz~2.4835GHz, 5.15GHz~5.35GHz, 5.47GHz~5.725GHz, 5.725GHz~5.85GHz *Subject to local regulations
<b>Interface</b>	WLAN: PCIe ; Bluetooth: USB or UART
<b>Form Factor</b>	Half Mini PCIe
<b>Antenna</b>	2 x IPEX MHF1 connectors (ANT1 for WLAN/BT, ANT2 for WLAN)
<b>Modulation</b>	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: GFSK, $\pi/4$ -DQPSK, 8-DPSK
<b>Power Consumption</b>	<b>TBD</b>
<b>Operating Voltage</b>	DC 3.3V
<b>Operating Temperature Range</b>	-40°C~85°C
<b>Storage Temperature Range</b>	-40°C~105°C
<b>Humidity (Non-Condensing)</b>	10%~90% (Operating) 5%~90% (Storing)
<b>Dimension L x W x H (in mm)</b>	29.85mm( $\pm$ 0.15mm) x 26.65mm( $\pm$ 0.15mm) x 2.8mm( $\pm$ 0.2mm)
<b>Weight (g)</b>	$\leq$ 4g
<b>Driver Support</b>	Linux, Android
<b>Security</b>	64/128-bits WEP, WPA, WPA2, WPA3, 802.1x

OUTPUT POWER & SENSITIVITY		
802.11b		
Data Rate	Tx ± 2dBm	Rx Sensitivity
11Mbps	18.5dBm	≤-89dBm

802.11g		
Data Rate	Tx ± 2dBm	Rx Sensitivity
54Mbps	17dBm	≤-77dBm

802.11n / 2.4GHz				
HT20	Data Rate	Tx ± 2dBm (1TX)	Tx ± 2dBm (2TX)	Rx Sensitivity
	MCS7	16.5dBm	19.5dBm	≤-75dBm

802.11n / 5GHz				
HT20	Data Rate	Tx ± 2dBm (1TX)	Tx ± 2dBm (2TX)	Rx Sensitivity
	MCS7	13.5dBm	16.5dBm	≤-74dBm
HT40	MCS7	13.5dBm	16.5dBm	≤-71dBm

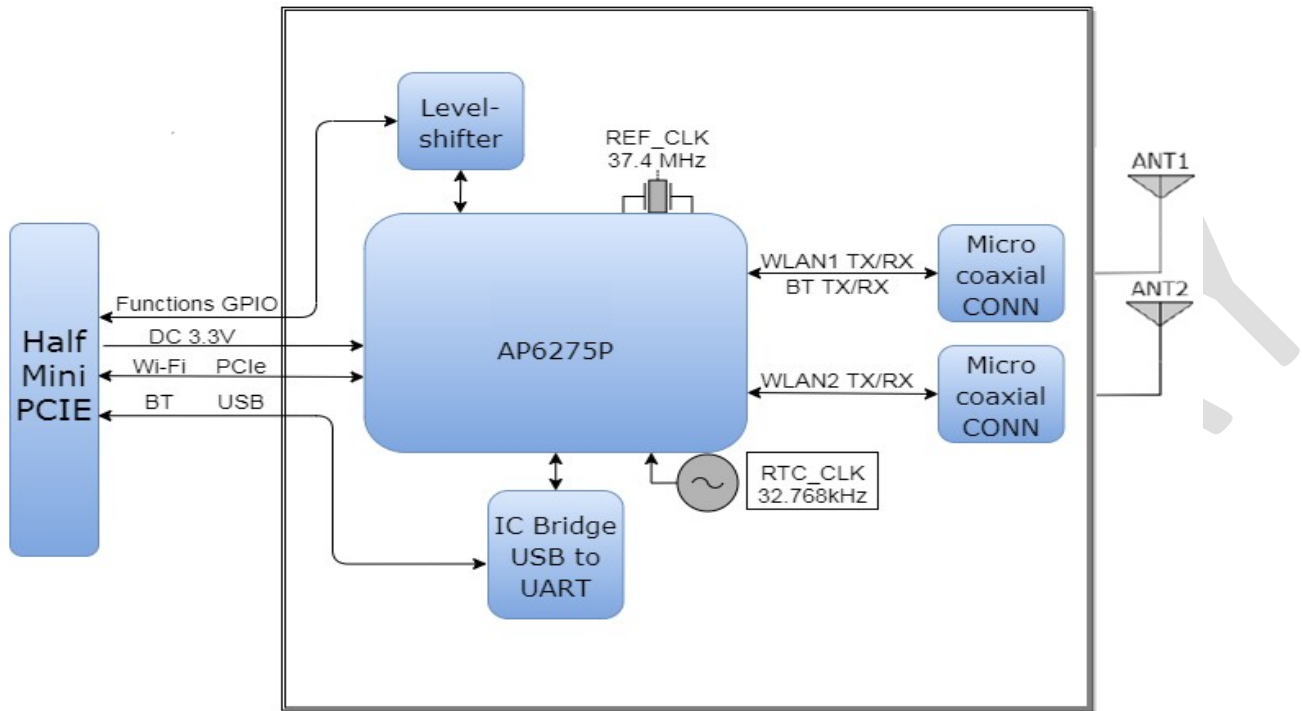
802.11ac				
VHT80	Data Rate	Tx ± 2dBm (1TX)	Tx ± 2dBm (2TX)	Rx Sensitivity
	MCS9	9dBm	12dBm	≤-62dBm

802.11ax / 2.4GHz				
HT20	Data Rate	Tx ± 2dBm		Rx Sensitivity
	HE7		16.5dBm	

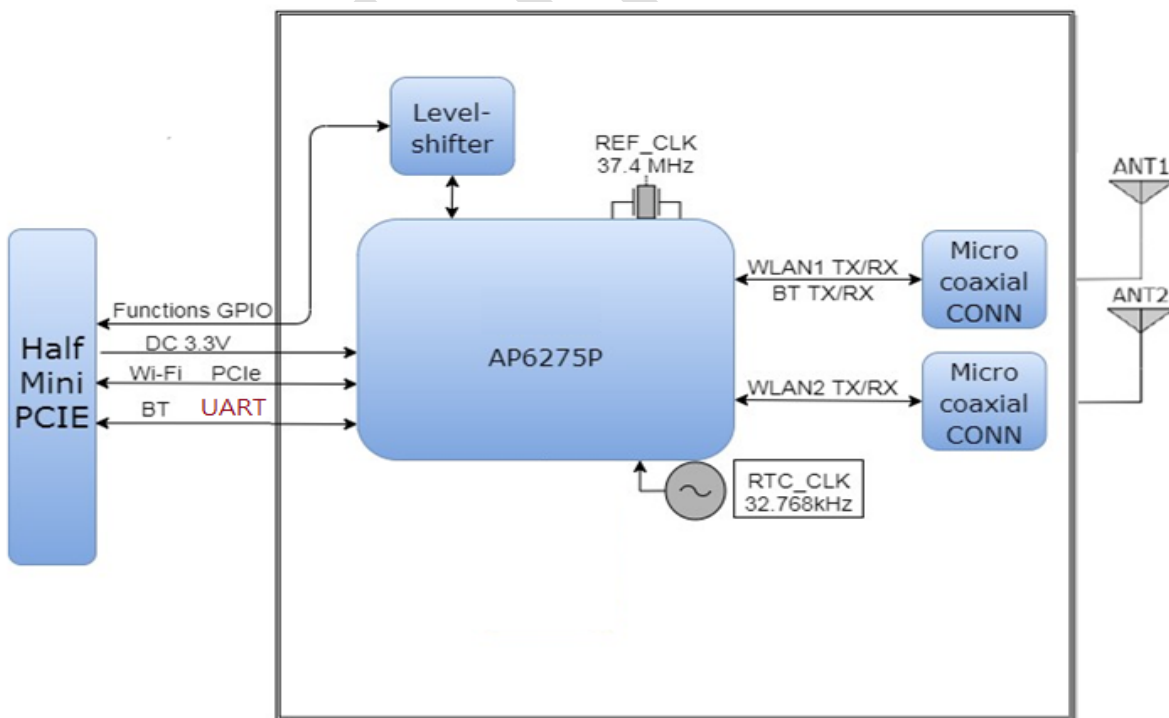
802.11ax / 5GHz				
HE20	Data Rate	Tx ± 2dBm (1TX)	Tx ± 2dBm (2TX)	Rx Sensitivity
	HE7		13.5dBm	16.5dBm
HE40	HE7	13.5dBm	16.5dBm	≤-69dBm
HE80	HE9	9dBm	12dBm	≤-60dBm

Bluetooth		
Data Rate	Tx ± 2dBm (Class 1 Device)	Rx Sensitivity
1Mbps	0 ≤ Output Power ≤ 8dBm	<0.1% BR, BER at -88dBm
3Mbps	0 ≤ Output Power ≤ 7dBm	<0.1% BER at -85dBm

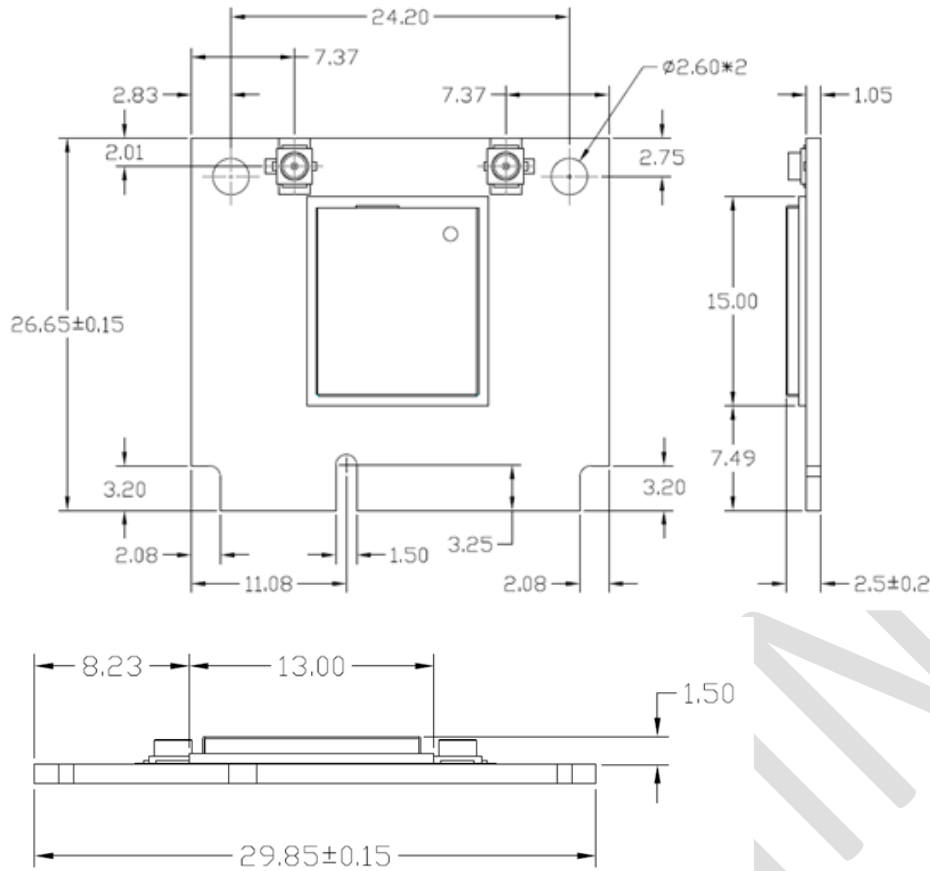
**Block Diagram for WPEB-265AXI(BT) [B33]**



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



## Mechanical Diagram (mm)



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

J3		TOP	BOT		
PCIE_PME_L	1	PCIE_WAKEn	VDD3V3	2	VDD3V3
NC	3	COEX1	GND	4	GND
NC	5	COEX2	1.5V	6	
PCIE_CLKREQ_L	7	CLKREQ#	UIM_PWR	10	X
GND	9	GND	UIM_DATA	12	X
PCIE_REFCLK_N	11	REFCLK-	UIM_CLK	14	X
PCIE_REFCLK_P	13	REFCLK+	UIM_RESET	16	X
GND	15	GND	UIM_VPP	18	X
NC	17	Reserved/UIM C4	GND	20	GND
NC	19	Reserved/UIM C8	W_DISABLE	22	WL_REG_ON_3V3
GND	21	GND	PCIE_PERST_L	24	PCIE_PERST_L
PCIE_TDN	23	PCIE_RDN	VDD3V3	26	GND
PCIE_TDP	25	PCIE_RDP	GND	28	
GND	27	GND	1.5V	30	
GND	29	GND	SMB_CLK	32	X
PCIE_RDN	31	PCIE_TDN	SMB_DATA	34	X
PCIE_RDP	33	PCIE_TDP	GND	36	GND
GND	35	GND	USB_D-	38	USB_D-
GND	37	GND	USB_D+	40	USB_D+
VDD3V3_SIP	39	GND	USB_D+	40	GND
VDD3V3_SIP	41	VDD3V3	GND	42	
GND	43	VDD3V3	LED_WWAN#	44	X
	45	GND	LED_WLAN#	46	X
BT_HOST_WAKE_3V3	X 47	ANTCTRL2	LED_WPAN#	48	X
WL_HOST_WAKE_3V3	49	ANTCTRL3	1.5V	50	GND
BT_REG_ON_3V3	51	Reserved	GND	52	VDD3V3_SIP
		W_DISABLE#	VDD3V3		

Half-Mini Card V2.1

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

TOP			
Pin#	Pin Name	Type	Description
1	PCIE_PME_L	OD	PCI power management event output.
3	NC	—	No connect
5	NC	—	No connect
7	PCIE_CLKREQ_L	OD	PCIe clock request
9	GND	G	Ground connections
11	PCIE_RCLK_N	I	PCIe differential clock input- Negative
13	PCIE_RCLK_P	I	PCIe differential clock input- Positive
15	GND	G	Ground connections
17	NC	—	No connect
19	NC	—	No connect
21	GND	G	Ground connections
23	PCIE_TDN	O	PCIe Transmit data-Negative
25	PCIE_TDP	O	PCIe Transmit data-Positive
27	GND	G	Ground connections
29	GND	G	Ground connections
31	PCIE_RDN	I	PCIe receive data-Negative
33	PCIE_RDP	I	PCIe receive data-Positive
35	GND	G	Ground connections
37	GND	G	Ground connections
39	VDD_3V3_SIP	P	VDD system power supply input
41	VDD_3V3_SIP	P	VDD system power supply input
43	GND	G	Ground connections
45	NC	—	No connect
47	BT_HOST_WAKE_3V3	O	Bluetooth device to wake-up HOST
49	WL_HOST_WAKE_3V3	O	WLAN to wake-up HOST
51	BT_REG_ON_3V3	I	Low asserting reset for Bluetooth core

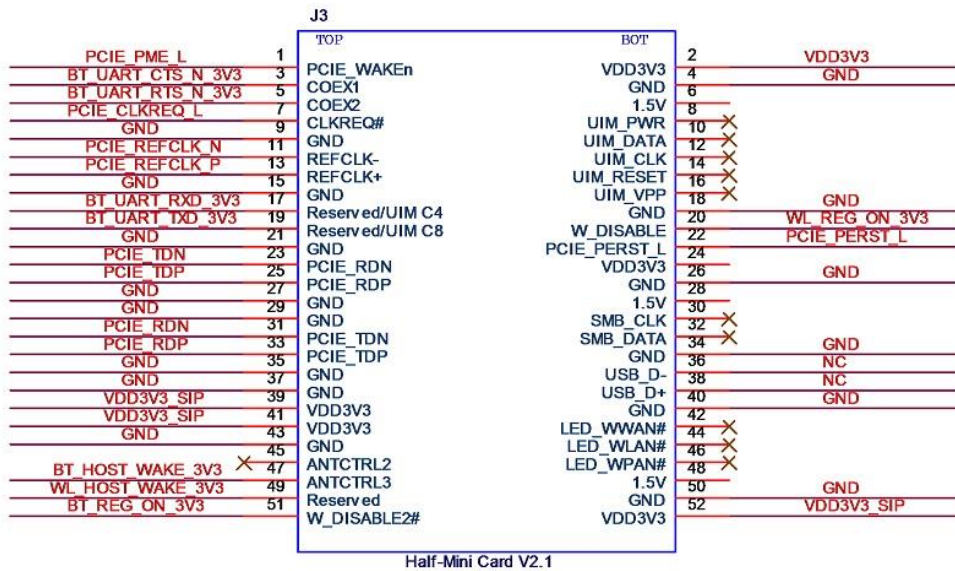
Note: 1. Each pin has a type, that power (P), ground (G), open-drain (OD), input (I), and output (O).

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

BOTTOM			
Pin#	Pin Name	Type	Description
2	VDD_3V3	P	VDD system power supply input
4	GND	G	Ground connections
6	NC	—	No connect
8	NC	—	No connect
10	NC	—	No connect
12	NC	—	No connect
14	NC	—	No connect
16	NC	—	No connect
18	GND	G	Ground connections
20	WL_REG_ON_3V3	I	Low asserting reset for WiFi core
22	PCIE_PERST_L	I	PCIe host indication to reset the device. Active low.
24	NC	—	No connect
26	GND	G	Ground connections
28	NC	—	No connect
30	NC	—	No connect
32	NC	—	No connect
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	NC	—	No connect
44	NC	—	No connect
46	NC	—	No connect
48	NC	—	No connect
50	GND	G	Ground connections
52	VDD_3V3_SIP	P	VDD system power supply input

Note: 1. Each pin has a type, that power (P), ground (G), open-drain (OD), input (I), and output (O).

### Pin Assignment for WPEB-265AXI(BT) [R33]



### WPEB-265AXI(BT) [R33] Pin Assignment

TOP			
Pin#	Pin Name	Type	Description
1	PCIE_PME_L	OD	PCI power management event output.
3	BT_UART_CTS_N_3V3	I	Bluetooth UART clear to send
5	BT_UART_RTS_N_3V3	O	Bluetooth UART request to send
7	PCIE_CLKREQ_L	OD	PCIe clock request
9	GND	G	Ground connections
11	PCIE_RCLK_N	I	PCIe differential clock input- Negative
13	PCIE_RCLK_P	I	PCIe differential clock input- Positive
15	GND	G	Ground connections
17	BT_UART_RXD_3V3	I	Bluetooth UART serial data input
19	BT_UART_TXD_3V3	O	Bluetooth UART serial data input
21	GND	G	Ground connections
23	PCIE_TDN	O	PCIe Transmit data-Negative
25	PCIE_TDP	O	PCIe Transmit data-Positive
27	GND	G	Ground connections
29	GND	G	Ground connections
31	PCIE_RDN	I	PCIe receive data-Negative
33	PCIE_RDP	I	PCIe receive data-Positive
35	GND	G	Ground connections
37	GND	G	Ground connections



**WPEB-265AXI(BT) [R33] Pin Assignment**

TOP			
Pin#	Pin Name	Type	Description
39	VDD_3V3_SIP	P	VDD system power supply input
41	VDD_3V3_SIP	P	VDD system power supply input
43	GND	G	Ground connections
45	NC	—	No connect
47	BT_HOST_WAKE_3V3	O	Bluetooth device to wake-up HOST
49	WL_HOST_WAKE_3V3	O	WLAN to wake-up HOST
51	BT_REG_ON_3V3	I	Low asserting reset for Bluetooth core

Note: 1. Each pin has a type, that power (P), ground (G), open-drain (OD), input (I), and output (O).

BOTTOM			
Pin#	Pin Name	Type	Description
2	VDD_3V3	P	VDD system power supply input
4	GND	G	Ground connections
6	NC	—	No connect
8	NC	—	No connect
10	NC	—	No connect
12	NC	—	No connect
14	NC	—	No connect
16	NC	—	No connect
18	GND	G	Ground connections
20	WL_REG_ON_3V3	I	Low asserting reset for WiFi core
22	PCIE_PERST_L	I	PCIe host indication to reset the device. Active low.
24	NC	—	No connect
26	GND	G	Ground connections
28	NC	—	No connect
30	NC	—	No connect
32	NC	—	No connect
34	GND	G	Ground connections
36	NC	—	No connect
38	NC	—	No connect
40	GND	G	Ground connections
42	NC	—	No connect

## WPEB-265AXI(BT) [R33] Pin Assignment

BOTTOM			
Pin#	Pin Name	Type	Description
44	NC	—	No connect
46	NC	—	No connect
48	NC	—	No connect
50	GND	G	Ground connections
52	VDD_3V3_SIP	P	VDD system power supply input

Note: 1. Each pin has a type, that power (P), ground (G), open-drain (OD), input (I), and output (O).

## 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 WiFi+BT5.0 Half Mini PCIe Module
WPEB-265AXI(BT) [R33]	R9701A90003	802.11ax/ac/a/b/g/n 2T2R WiFi+BT5.0 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
AD-305N	R3410110223	Dipole Antenna, 5dBi/5dBi 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