

WNFB-265AXI(BT)

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

2T2R Wi-Fi+Bluetooth 5.3 Combo

M.2 2230 Module



Wi-Fi+Bluetooth Combo Solution M.2 2230 Module

WNFB-265AXI(BT) is a 802.11ax WiFi 6+Bluetooth 5.3 M.2 2230 (KEY E) Module, 802.11ax allow efficient allocation of low data-rate connections, improve the battery life of IoT sensors, and extend the range of Wi-Fi signals. WNFB-265AXI(BT) M.2 module brings steady, high-speed Wi-Fi connectivity for Remote control, Smart manufacturing, shop, home, TV etc. The new 802.11ax standard with its unique features such as OFDMA, 1024QAM, Target Wake Time (TWT). 802.11ax (WiFi 6) enables smooth streaming of high-resolution videos, fewer dropped connections and faster connections farther away from the router and in dense environments.

WNFB-265AXI(BT) M.2 2230 (KEY E) module can support Multi-User MIMO (MU-MIMO) technology to increase channel capacity when simultaneously servicing multiple devices using the same frequency chunks and can accomplish up to speed of 1200Mbps with dual stream. Bluetooth 5 features including Low-Energy 2 Mbps and Low-Energy Long Range. Furthermore the included PCIe interface for Wi- Fi, UART/PCM interface for Bluetooth.

Embedded Application

Applications include medical devices, security systems, industrial PC, Remote control, digital signs, STB, embedded / tablet PC's, smart devices, Smart manufacturing, shop, Home, TV, 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 host digital interface: HCI UART (up to 4 Mbps), PCM for audio data.
- 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, 2.400GHz~2.4835GHz, 5.150GHz~5.850GHz *Subject to local regulations
Interface	WLAN: PCIe Bluetooth: UART
Form Factor	M.2 2230 E KEY
Antenna	2 x IPEX MHF4 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: 660mA (Max.) RX Mode: 201mA (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) 5%~95% (Storing)
Dimension L x W x H (in mm)	30mm(± 0.15 mm) x 22mm(± 0.15 mm) x 2.8mm(± 0.2 mm)
Weight (g)	≤ 3.5 g
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	14.5dBm	\leq -76dBm

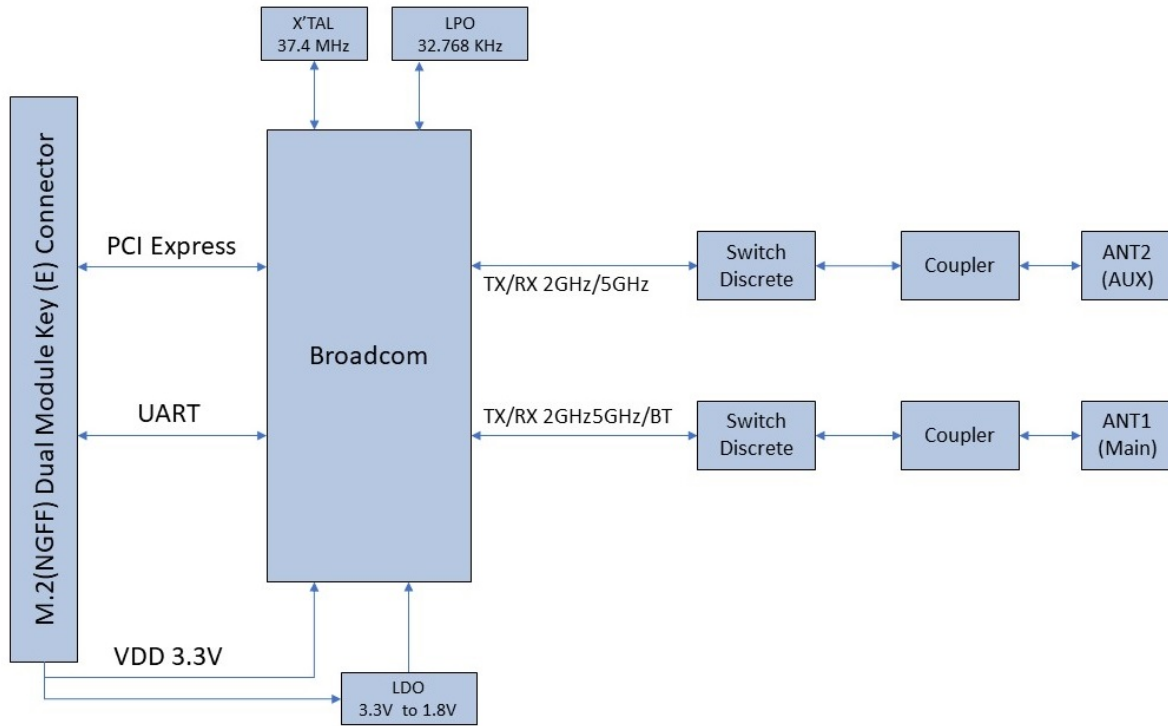
802.11n / 5GHz				
HT20	Data Rate	Tx \pm 2dBm (1TX)	Tx \pm 2dBm (2TX)	Rx Sensitivity
	MCS7	13.5dBm	16.5dBm	\leq -73dBm
HT40	MCS7	11dBm	14dBm	\leq -70dBm

802.11ac				
VHT80	Data Rate	Tx \pm 2dBm (1TX)	Tx \pm 2dBm (2TX)	Rx Sensitivity
	MCS9	9dBm	12dBm	\leq -57dBm

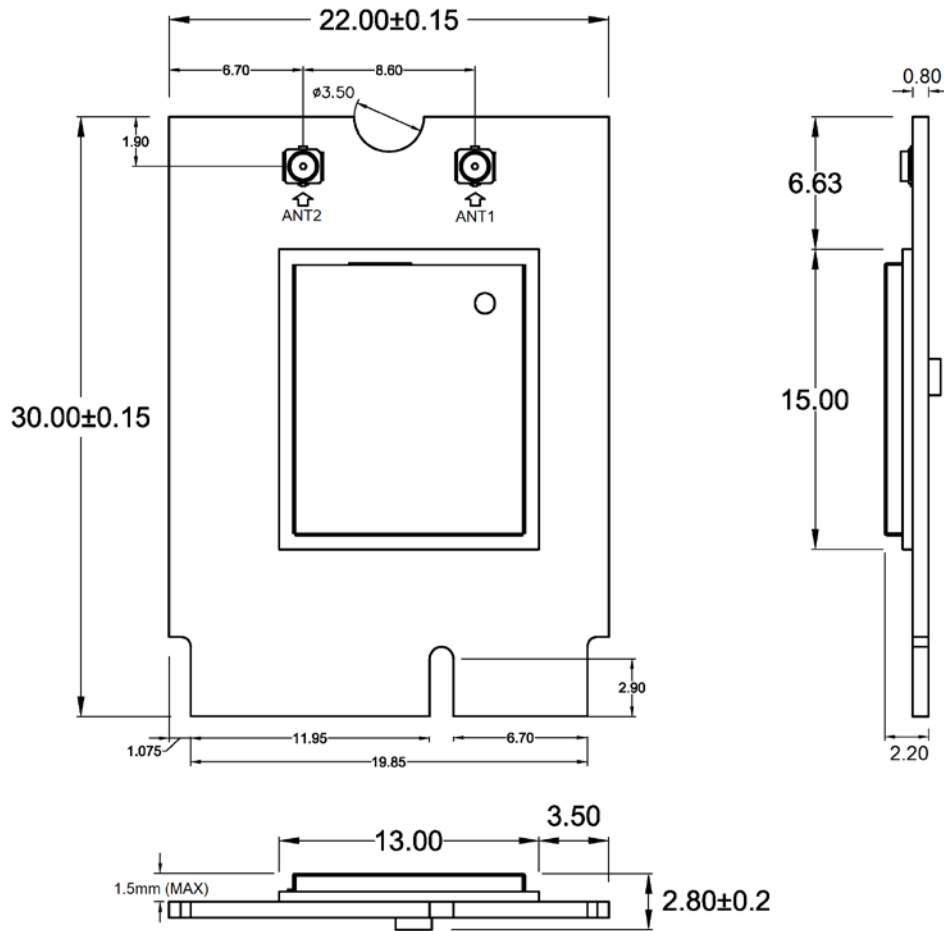
802.11ax / 5GHz				
HE20	Data Rate	Tx \pm 2dBm (1TX)	Tx \pm 2dBm (2TX)	Rx Sensitivity
	HE7	13.5dBm	16.5dBm	\leq -69dBm
HE40	HE7	11dBm	14dBm	\leq -68dBm
HE80	HE9	9dBm	12dBm	\leq -60dBm

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

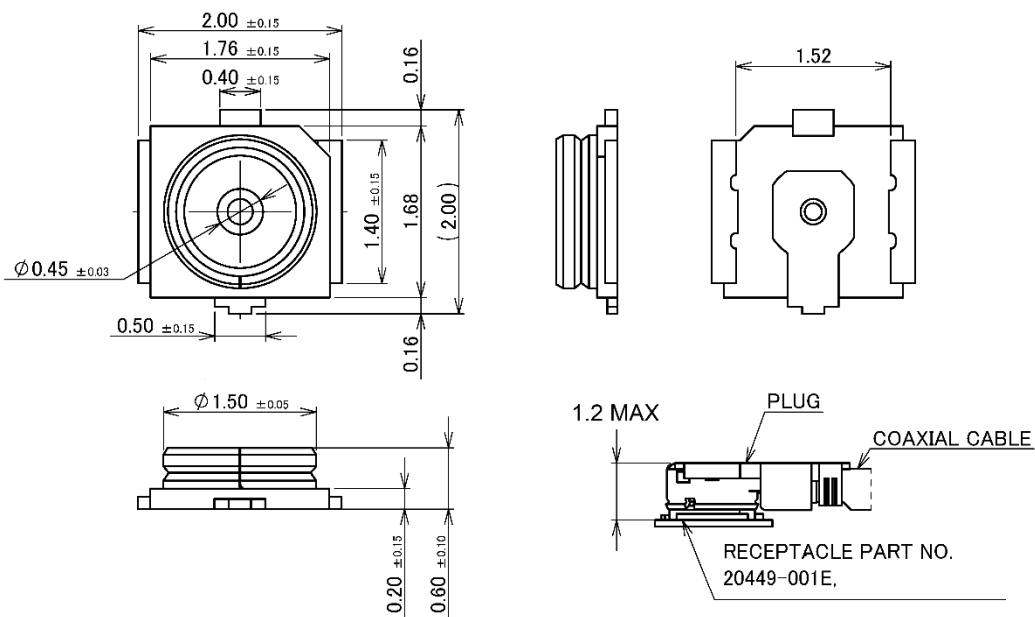
Block Diagram



Mechanical Diagram (mm)



MHF4 Connector spec



Unit: mm

Pin Assignment

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

TOP			
Pin#	Pin Name	Type	Description
1	GND	G	Ground connections
3	USB_D+	NC	No Connection
5	USB_D-	NC	No Connection
7	GND	G	Ground connections
9	SDIO_CLK(1.8V)	NC	No Connection
11	SDIO_CMD(1.8V)	NC	No Connection
13	SDIO_DATA0(1.8V)	NC	No Connection
15	SDIO_DATA1(1.8V)	NC	No Connection
17	SDIO_DATA2(1.8V)	NC	No Connection
19	SDIO_DATA3(1.8V)	NC	No Connection
21	SDIO_WAKE#(1.8V)	NC	No Connection
23	SDIO_RESET# (1.8V)	NC	No Connection
25	NOTCH FOR KEY E	NC	No Connection
27	NOTCH FOR KEY E	NC	No Connection
29	NOTCH FOR KEY E	NC	No Connection
31	NOTCH FOR KEY E	NC	No Connection
33	GND	G	Ground connections
35	PERp0	I	PCI Express receive data-Positive
37	PERn0	I	PCI Express receive data-Negative
39	GND	G	Ground connections
41	PETp0	O	PCI Express transmit data-Positive
43	PETn0	O	PCI Express transmit data-Negative
45	GND	G	Ground connections
47	REFCLKp0	I	PCI Express differential clock input-Positive
49	REFCLKn0	I	PCI Express differential clock input-Negative
51	GND	G	Ground connections
53	CLKREQ0#(3.3V)	I/O	PCIe clock request
55	PEWAKE0#(3.3V)	OD	PEWAKE0#(1.8V) PCIe PME Wake
57	GND	G	Ground connections
59	RESERVED	NC	No Connection
61	RESERVED	NC	No Connection

TOP			
Pin#	Pin Name	Type	Description
63	GND	G	Ground connections
65	RESERVED	NC	No Connection
67	RESERVED	NC	No Connection
69	GND	G	Ground connections
71	RESERVED	NC	No Connection
73	RESERVED	NC	No Connection
75	GND	G	Ground connections

Note: Power (P), Ground (G), Open-Drain (OD), Input(I), Output(O), Do Not Connect (DNC), No Connection (NC)

Pin Assignment

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

BOTTOM			
Pin#	Pin Name	Type	Description
2	3.3 V	P	VDD system power supply input
4	3.3 V	P	VDD system power supply input
6	LED_1#	NC	No Connection
8	PCM_CLK (1.8V)	I/O	PCM clock
10	PCM_SYNC (1.8V)	I/O	PCM sync signal
12	PCM_OUT (1.8V)	O	PCM Data output
14	PCM_IN (1.8V)	I	PCM data input
16	LED_2#	NC	No Connection
18	GND	G	Ground connections
20	UART_WAKE#(3.3V)	O	BT_HOST_WAKE(1.8V) Bluetooth wake up Host
22	UART_TXD(1.8V)	O	Bluetooth UART interface
24	NOTCH FOR KEY E	NC	No Connection
26	NOTCH FOR KEY E	NC	No Connection
28	NOTCH FOR KEY E	NC	No Connection
30	NOTCH FOR KEY E	NC	No Connection
32	UART_RXD(1.8V)	I	Bluetooth UART interface
34	UART_RTS(1.8V)	O	Bluetooth UART interface
36	UART_CTS(1.8V)	I	Bluetooth UART interface
38	VENDOR DEFINED	I	BT_DEV_WAKE(1.8V) HOST wake-up Bluetooth device

BOTTOM			
Pin#	Pin Name	Type	Description
40	VENDOR DEFINED	O	WL_HOST_WAKE(1.8V) WLAN wake up HOST
42	VENDOR DEFINED	NC	No Connection
44	COEX3(1.8V)	NC	No Connection
46	COEX_TXD(1.8V)	NC	No Connection
48	COEX_RXD(1.8V)	NC	No Connection
50	SUSCLK(3.3V)	NC	No Connection
52	PERST0#(3.3V)	I	PCIe host indication to reset the device
54	W_DISABLE2#(3.3V)	I	BT_REG_ON(3.3V) Used by PMU to power up or power down the internal module regulators used by the Bluetooth section. (must be connect to CPU'S GPIO)
56	W_DISABLE1#(3.3V)	I	WL_REG_ON(3.3V) Used by PMU to power up or power down the internal module regulators used by the WLAN section. (must be connect to CPU'S GPIO)
58	I2C_DATA(1.8V)	NC	No Connection
60	I2C_CLK(1.8V)	NC	No Connection
62	ALERT#(1.8V)	NC	No Connection
64	RESERVED	NC	No Connection
66	UIM_SWP	NC	No Connection
68	UIM_POWER_SNK	NC	No Connection
70	UIM_POWER_SRC	NC	No Connection
72	3.3 V	P	VDD system power supply input
74	3.3 V	P	VDD system power supply input

Note: Power (P), Ground (G), Open-Drain (OD), Input(I), Output(O), Do Not Connect (DNC), No Connection (NC)

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
WNFB-265AXI(BT)	R9701A10001	802.11ax/ac/a/b/g/n 2T2R Industrial Grade Wi-Fi / Bluetooth 5.3 Combo M.2 2230 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-NE150	R3470300025	RF Cable, I-PEX/MHF4 to RP-SMA(F); L:150mm; Coaxial 0.81 Black
CBIRF-NE250	R3470300026	RF Cable, I-PEX/MHF4 to RP-SMA(F); L:250mm; Coaxial 0.81 Black