

## WNFB-265AXI(BT)

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

2T2R Wi-Fi+Bluetooth 5.0 Combo

M.2 2230 Module



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

WNFB-265AXI(BT) is a 802.11ax WiFi 6+Bluetooth 5.0 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 5.0 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: MCS0~1 802.11ac: 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, 5.150GHz~5.350GHz, 5.470GHz~5.720GHz, 5.725GHz~5.845GHz *Subject to local regulations
<b>Interface</b>	WLAN: PCIe ; Bluetooth: UART
<b>Form Factor</b>	M.2 2230 (KEY E)
<b>Antenna</b>	2 x IPEX MHF4 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%~95% (Operating) 5%~95% (Storing)
<b>Dimension L x W x H (in mm)</b>	30mm( $\pm 0.3$ mm) x 22mm( $\pm 0.3$ mm) x 2.40mm( $\pm 0.3$ mm)
<b>Weight (g)</b>	$\leq 3.5$ g
<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 $\pm$ 2dBm	Rx Sensitivity
11Mbps	18.5dBm	$\leq$ -87dBm

802.11g		
Data Rate	Tx $\pm$ 2dBm	Rx Sensitivity
54Mbps	17dBm	$\leq$ -74dBm

802.11a		
Data Rate	Tx $\pm$ 2dBm	Rx Sensitivity
54Mbps	14.5dBm	$\leq$ -75dBm

802.11n / 2.4GHz				
HT20	Data Rate	Tx $\pm$ 2dBm (1TX)	Tx $\pm$ 2dBm (2TX)	Rx Sensitivity
	MCS7	16.5dBm	19.5dBm	$\leq$ -74dBm

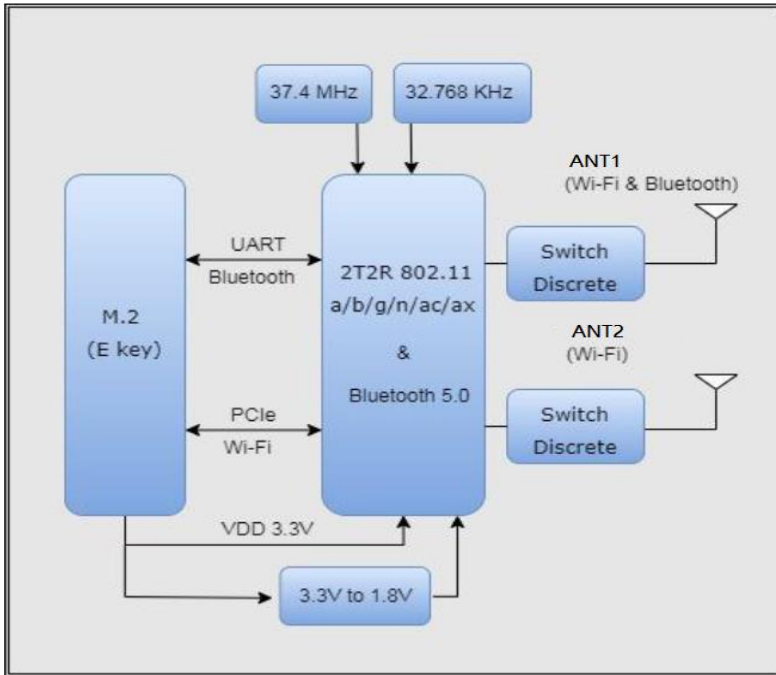
802.11n / 5GHz				
HT20	Data Rate	Tx $\pm$ 2dBm (1TX)	Tx $\pm$ 2dBm (2TX)	Rx Sensitivity
	MCS7	13.5dBm	16.5dBm	$\leq$ -73dBm
HT40	MCS7	13.5dBm	16.5dBm	$\leq$ -70dBm

802.11ac				
VHT80	Data Rate	Tx $\pm$ 2dBm (1TX)	Tx $\pm$ 2dBm (2TX)	Rx Sensitivity
	MCS9	9dBm	12dBm	$\leq$ -68dBm

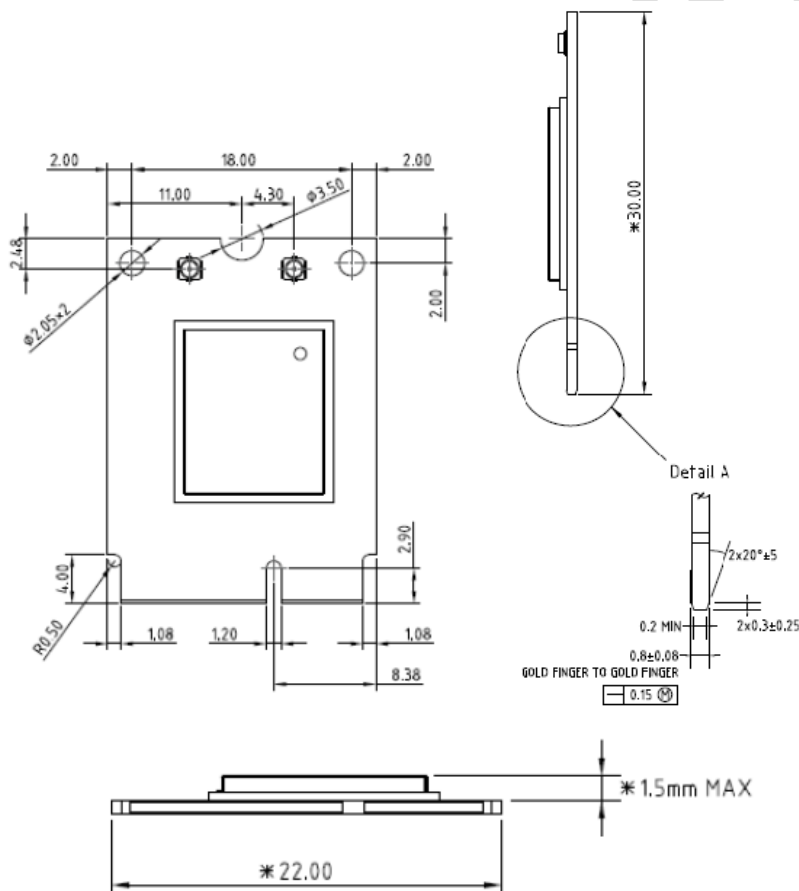
802.11ax / 5GHz				
HE20	Data Rate	Tx $\pm$ 2dBm (1TX)	Tx $\pm$ 2dBm (2TX)	Rx Sensitivity
	HE7	13.5dBm	16.5dBm	$\leq$ -68dBm
HE40	HE7	13.5dBm	16.5dBm	$\leq$ -68dBm
HE80	HE9	9dBm	12dBm	$\leq$ -59dBm

Bluetooth		
Data Rate	Tx $\pm$ 2dBm (Class 1 Device)	Rx Sensitivity
1Mbps	0 $\leq$ Output Power $\leq$ 7dBm	<0.01% BER at -90dBm
2Mbps	0 $\leq$ Output Power $\leq$ 7dBm	<0.01% BER at -91dBm

**Block Diagram**



**Mechanical Diagram (mm)**



## Pin Assignment

1	GND	3.3Vaux	2
3	USB_D+	3.3Vaux	4
5	USB_D-	LED#1 (I/O)	6
7	GND	PCM_CLK/125 SCK(I/O/1.8V)	8
9	SDIO CLK(I/O/1.8V)	PCM_SYNC/125 WS(I/O/1.8V)	10
11	SDIO CMD(I/O/1.8V)	PCM_OUT/125 SD_OUT(I/O/1.8V)	12
13	SDIO DAT0(I/O/1.8V)	PCM_IN/125 SD_IN(I/O/1.8V)	14
15	SDIO DAT1(I/O/1.8V)	LED#2 (I/O)	16
17	SDIO DAT2(I/O/1.8V)	GND	18
19	SDIO DAT3(I/O/1.8V)	UART Wake (I/O/3.3V)	20
21	SDIO Wake(O/I/1.8V)	UART TXD (O/I/1.8V)	22
23	SDIO Reset(O/I/1.8V)	Key	24
25	Key	Key	26
27	Key	Key	28
29	Key	Key	30
31	Key	Key	32
33	Key	UART RXD (I/O/1.8V)	34
35	GND	UART RTS (O/I/1.8V)	36
37	PERp0	UART CTS (I/O/1.8V)	38
39	PERn0	VENDOR DEFINED3	40
41	GND	VENDOR DEFINED2	42
43	PETp0	VENDOR DEFINED1	44
45	PETn0	COEX3(I/O/1.8V)	46
47	GND	COEX2(I/O/1.8V)	48
49	REFOLKP0	COEX1 (I/O/1.8V)	50
51	REFOLKN0	SUBCLK(32KHz) (I/O/3.3V)	52
53	GND	PERST0# (I/O/3.3V)	54
55	CLKREQ0# (I/O/3.3V)	W_DISABLE#2 (I/O/3.3V)	56
57	PEWake0# (I/O/3.3V)	W_DISABLE#1 (I/O/3.3V)	58
59	GND	I2C DATA (I/O/3.3)	60
61	RESERVED/PERp1	I2C CLK (I/O/3.3)	62
63	RESERVED/PERn1	ALERT# (O/I/3.3)	64
65	GND	RESERVED	66
67	RESERVED/PETp1	UIM_SWP/PERST1#	68
69	RESERVED/PETn1	UIM_POWER_SNK/CLKREQ1#	70
71	GND	UIM_POWER_SRC/GPIO1/PEWAKE1#	72
73	RESERVED/REFOLKP1	3.3Vaux	74
75	RESERVED/REFOLKN1	3.3Vaux	
	GND		

## Pin Assignment

TOP			
Pin#	Pin Name	Type	Description
1	GND	G	Ground connections
3	NC	—	No connect
5	NC	—	No connect
7	GND	G	Ground connections
9	NC	—	No connect
11	NC	—	No connect
13	NC	—	No connect
15	NC	—	No connect
17	NC	—	No connect
19	NC	—	No connect
21	WL_HOST_WAKE	O	WLAN wake up HOST
23	WL_REG_ON	I	Used by PMU to power up or power down the internal module regulators used by the WLAN section. <b>(must be connet to CPU'S GPIO)</b>
25	Module Key	—	Mechanical Key
27	Module Key	—	Mechanical Key
29	Module Key	—	Mechanical Key

## Pin Assignment

TOP			
Pin#	Pin Name	Type	Description
31	Module Key	—	Mechanical Key
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#	I/O	PCIe clock request
55	PEWAKE0#	OD	PCIe PME Wake
57	GND	G	Ground connections
59	NC	—	No connect
61	NC	—	No connect
63	GND	G	Ground connections
65	NC	—	No connect
67	NC	—	No connect
69	GND	G	Ground connections
71	NC	—	No connect
73	NC	—	No connect
75	GND	G	Ground connections

## Pin Assignment

BOTTOM			
Pin#	Pin Name	Type	Description
2	3.3Vaux	P	VDD system power supply input
4	3.3Vaux	P	VDD system power supply input
6	NC	—	No connect
8	PCM_CLK	I/O	PCM clock
10	PCM_SYNC	I/O	PCM sync signal
12	PCM_OUT	O	PCM Data output

## Pin Assignment

BOTTOM			
Pin#	Pin Name	Type	Description
14	PCM_IN	I	PCM data input
16	NC	—	No connect
18	GND	G	Ground connections
20	BT_HOST_WAKE	O	Bluetooth wake up Host
22	UART_TXD	O	Bluetooth UART interface
24	Module Key	—	Mechanical Key
26	Module Key	—	Mechanical Key
28	Module Key	—	Mechanical Key
30	Module Key	—	Mechanical Key
32	UART_RXD	I	Bluetooth UART interface
34	UART_RTS_N	O	Bluetooth UART interface
36	UART_CTS_N	I	Bluetooth UART interface
38	NC	—	No connect
40	NC	—	No connect
42	BT_REG_ON	I	Used by PMU to power up or power down the internal module regulators used by the Bluetooth section. <b>(must be connet to CPU'S GPIO)</b>
44	NC	—	No connect
46	NC	—	No connect
48	NC	—	No connect
50	EXT_LPO	I	External sleep clock input (32.768KHz)
52	PERST0#	I	PCIe host indication to reset the device
54	BT_DEV_WAKE	I	HOST wake-up Bluetooth device
56	NC	—	No connect
58	NC	—	No connect
60	NC	—	No connect
62	NC	—	No connect
64	NC	—	No connect
66	NC	—	No connect
68	NC	—	No connect
70	NC	—	No connect
72	3.3Vaux	P	VDD system power supply input
74	3.3Vaux	P	VDD system power supply input

## Certification

### Dipole Ant.

- FCC
- CE (RED EN 300 328 V2.1.1 / 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 5.0 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
AD-305N	R3410110223	Dipole Antenna, 5dBi/5dBi 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