

WNFT-238AX(BT)

802.11ax Wave 2 Compliant with MU-MIMO

2T2R Wi-Fi+ Bluetooth 5.2 Combo M.2 Module



High-Speed Wireless Internet Access

SparkLAN WNFT-238AX(BT), the first M.2 WiFi-6 (802.11ax) module with latest Bluetooth technology 5.2 from Realtek, powering by the latest Realtek Combo chip, supports full IEEE802.11 ax/ac/a/b/g/n protocol, while working with Bluetooth at the same time.

WNFT-238AX(BT) supports 2 spatial streams concurrently (2T2R, or 2x2) in MU-MIMO mode. With a standard M.2 A/E key 2230 formfactor, WNFT-238AX(BT) can accommodate to all existing platform that has M.2 Adaptor pre-integrated, no extra work with platform design.

Software wise WNFT-238AX(BT) supports Microsoft Windows 10, the OS support enables WNFT-238AX(BT) capable to run both x86 platform, and ARM based platform*. WNFT-238AX(BT) will mainly support STA mode, recommended application includes digital signage/POS, tablets, laptops and other media consumption application (Consumer and commercial use) that requires high speed data transmission with low AP mode demand, and temperature requirement.

Embedded Application

Tablet/ Notebook/ Advertising machine/ OTT Box/ IPTV/ DVB/ STB / DV/ IPC/ Mini Driving Recorder/ Doorbell / Smart TV/ Intelligent Projector Pico/ VR/ AR terminal/ Wireless storage/ Printer/ POS machine/ Vehicle mounted front/ Rear Terminal UAV/ Robot/ Intelligent Gateway/ Smart city and other consumer electronic products.

Key Feature

- Two Transmit and Two Receive paths 20MHz / 40MHz / 80MHz bandwidth transmission
- Supports 802.11ac 2x2, Wave-2 compliant with MU-MIMO
- Maximum PHY data rate up to 286.8 Mbps using 20MHz bandwidth, 573.5Mbps using 40MHz bandwidth, and 1200Mbps using 80MHz bandwidth
- Bluetooth 5 system (BT 5.2 Logo Compliant), V4.2, V4.1, V4.0 LE, V3.0, Bluetooth V2.1+EDR system, backward compatible with BT version of 1.1, 1.2 and 2.0

Specification

Standards	IEEE 802.11ax/ac/a/b/g/n (2T2R) Bluetooth V5.2, V5.1, V5.0, V4.2, V4.1, V4.0LE, V3.0, V2.1+EDR
Chipset	Realtek RTL8852AE
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~2.484GHz, 5.150GHz~5.850GHz *Subject to local regulations
Interface	WLAN: PCIe Bluetooth: USB
Form Factor	M.2 2230-S3-A-E Key
Antenna	2 x IPEX MHF4 connectors, Support WLAN/BT co-existence Main: WLAN Aux: WLAN / BT
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) BT: Header: GFSK Payload 2M: $\pi/4$ -DQPSK Payload 3M: 8-DPSK
Power Consumption	TX mode: 860 mA RX mode: 450 mA

Operating Voltage	DC 3.3V
Operating Temperature Range	0°C~70°C
Storage Temperature Range	-40°C~85°C
Humidity (Non-Condensing)	5%~90% (Operating) 5%~90% (Storing)
Dimension L x W x H (in mm)	30mm(±0.15mm) x 22mm(±0.15mm) x 2.24mm(±0.3mm)
Weight (g)	2.5g
Driver Support	Windows 10
Security	64/128-bits WEP, WPA, WPA2, WPA3, 802.1x

OUTPUT POWER & SENSITIVITY

802.11b

Data Rate	Tx \pm 2dBm	Rx Sensitivity
11Mbps	19dBm	\leq -76dBm

802.11g

Data Rate	Tx \pm 2dBm	Rx Sensitivity
54Mbps	18dBm	\leq -65dBm

802.11n / 2.4GHz

	Data Rate	Tx \pm 2dBm (1TX)	Tx \pm 2dBm (2TX)	Rx Sensitivity
HT20	MCS7	17dBm	20dBm	\leq -61dBm
HT40	MCS7	17dBm	20dBm	\leq -61dBm

802.11a

Data Rate	Tx \pm 2dBm	Rx Sensitivity
54Mbps	18dBm	\leq -65dBm

802.11n / 5GHz

	Data Rate	Tx \pm 2dBm (1TX)	Tx \pm 2dBm (2TX)	Rx Sensitivity
HT20	MCS7	17dBm	20dBm	\leq -61dBm
HT40	MCS7	17dBm	20dBm	\leq -61dBm

802.11ac

	Data Rate	Tx \pm 2dBm (1TX)	Tx \pm 2dBm (2TX)	Rx Sensitivity
VHT80	MCS9	15dBm	18dBm	\leq -51dBm

802.11ax / 2.4 GHz

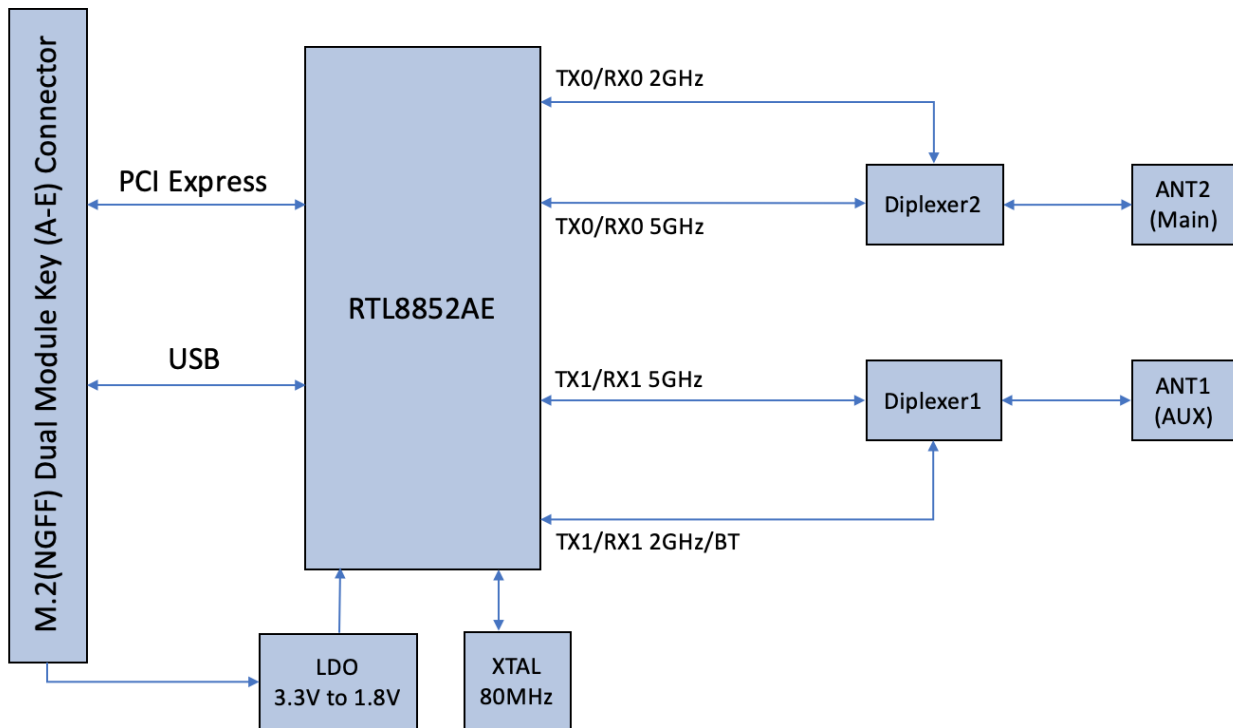
	Data Rate	Tx \pm 2dBm (1TX)	Tx \pm 2dBm (2TX)	Rx Sensitivity
HE40	MCS11	13 dBm	16dBm	\leq -49dBm

802.11ax / 5GHz

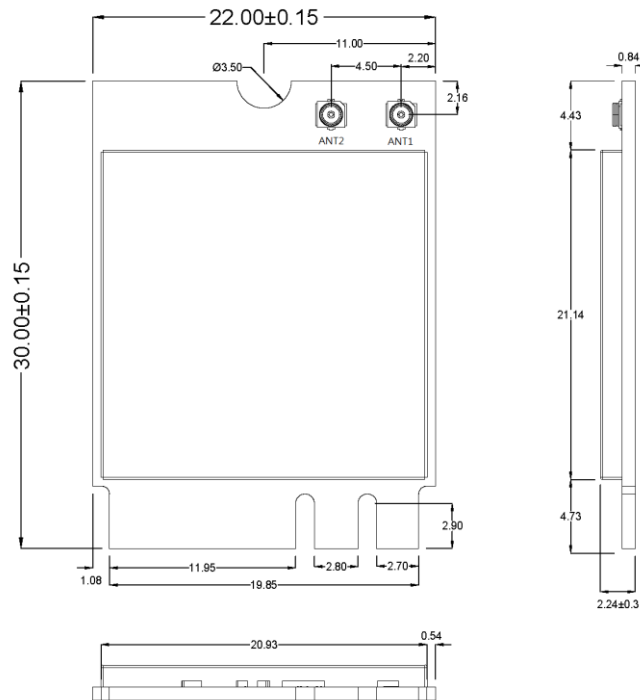
	Data Rate	Tx \pm 2dBm (1TX)	Tx \pm 2dBm (2TX)	Rx Sensitivity
HE20	HE11	13dBm	16dBm	\leq -52dBm
HE40	HE11	13dBm	16dBm	\leq -49dBm
HE80	HE11	13dBm	16dBm	\leq -46dBm

Bluetooth		
Data Rate	Tx ± 2dBm (Class 1 Device)	Rx Sensitivity
3Mbps	$0 \leq \text{Output Power} \leq +6\text{dBm}$	<0.1% BR, BER at -70dBm

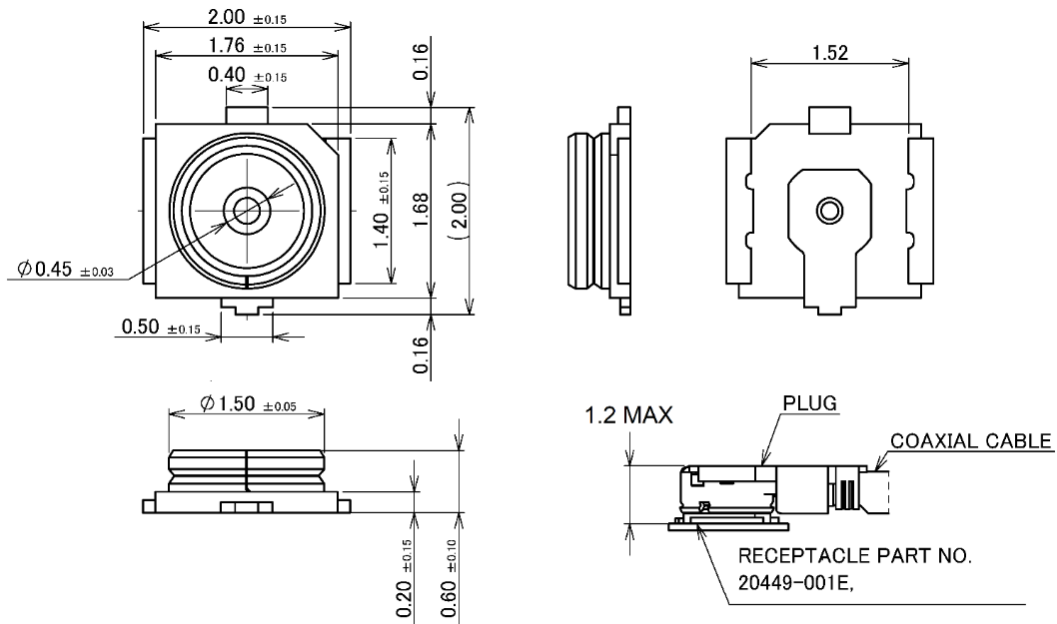
Block Diagram



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+	I/O	USB serial differential data Positive
5	USB_D-	I/O	USB serial differential data Negative
7	GND	G	Ground connections
9	NOTCH FOR KEY A	NC	No Connection
11	NOTCH FOR KEY A	NC	No Connection
13	NOTCH FOR KEY A	NC	No Connection
15	NOTCH FOR KEY A	NC	No Connection
17	NC	NC	No Connection
19	NC	NC	No Connection
21	NC	NC	No Connection
23	NC	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#	O	PCIe clock request
55	PEWAKE0#	O	PCIe wake signal
57	GND	G	Ground connections
59	RESERVED	NC	No Connection
61	RESERVED	NC	No Connection
63	GND	G	Ground connections

TOP			
Pin#	Pin Name	Type	Description
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

Pin Assignment

BOTTOM			
Pin#	Pin Name	Type	Description
2	3.3V	P	VDD system power supply input
4	3.3V	P	VDD system power supply input
6	LED_1#	O/OD	WLAN LED
8	NOTCH FOR KEY A	NC	No Connection
10	NOTCH FOR KEY A	NC	No Connection
12	NOTCH FOR KEY A	NC	No Connection
14	NOTCH FOR KEY A	NC	No Connection
16	LED_2#	O/OD	Bluetooth LED
18	GND	G	Ground connections
20	NC	DNC	DO Not Connect
22	NC	DNC	DO Not Connect
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	NC	DNC	DO Not Connect
34	NC	DNC	DO Not Connect
36	NC	DNC	DO Not Connect
38	VENDOR DEFINED	DNC	Do Not Connect
40	VENDOR DEFINED	NC	No Connection
42	VENDOR DEFINED	NC	No Connection
44	COEX3	NC	No Connection
46	COEX_TXD	DNC	Do Not Connect
48	COEX_RXD	DNC	Do Not Connect
50	SUSCLK	I	32.768KHz CLOCK INPUT

BOTTOM			
Pin#	Pin Name	Type	Description
52	PERST0#	I	PCIe host indication to reset the device Active low.
54	W_DISABLE2#	I	Turn off BT RF analog and front-end. Active low.
56	W_DISABLE1#	I	Turn off WLAN RF analog and front-end. Active low.
58	I2C_DATA	NC	No Connection
60	I2C_CLK	NC	No Connection
62	ALERT#	NC	No Connection
64	RESERVED	NC	No Connection
66	UIM_SWP	DNC	Do Not Connect
68	UIM_POWER_SNK	DNC	Do Not Connect
70	UIM_POWER_SRC	DNC	Do Not Connect
72	3.3V	P	VDD system power supply input
74	3.3V	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
WNFT-238AX(BT)	R9701A10003	802.11ax/ac/b/g/n Wi-Fi + BT M.2 Card, RTL8852AE,2T2R 2230

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-310N	R3410110228	Dipole Antenna, 3dBi/5dBi 2.4G/5GHz, MHF4 connector
CBIRF-NE150	R3470300025	RF Cable, I-PEX/MHF4 to RP-SMA(F); L150mm; Coaxial 0.81 Black
CBIRF-NE250	R3470300026	RF Cable, I-PEX/MHF4 to RP-SMA(F); L250mm; Coaxial 0.81 Black