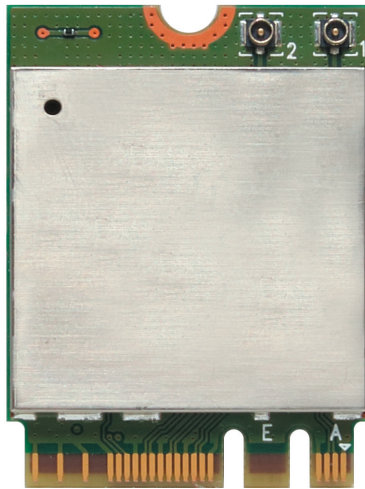




DHYK-8822 Information Sheet

802.11 ac/a/b/g/n 2x2 wifi and Bluetooth 4.2 combo M.2 2230 module, RTL8822BE



Overview:

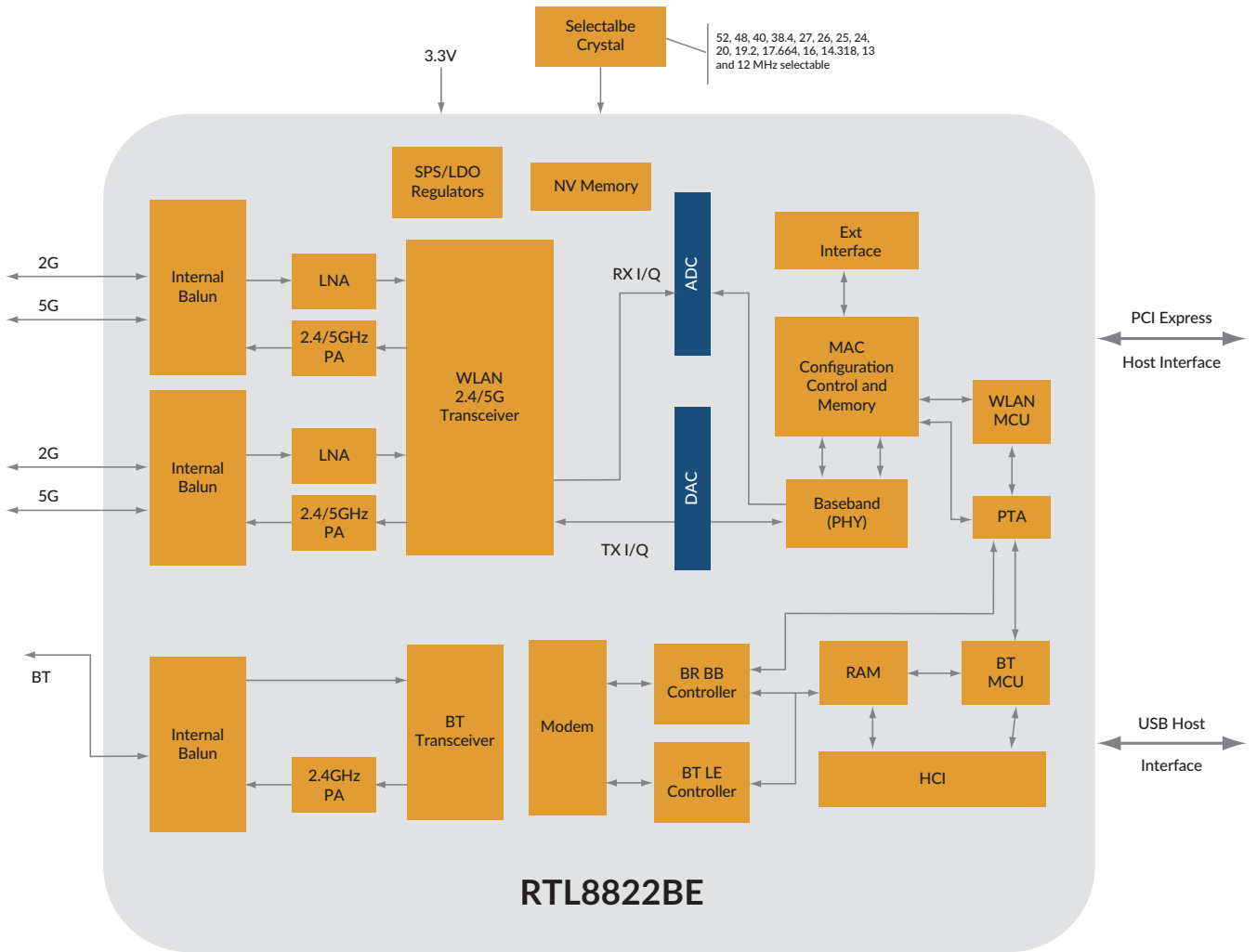
DHYK-8822 is an 802.11 ac/a/b/g/n dual band 2x2 wifi and Bluetooth combo M.2 2230 module designed for devices which require small size and lower-power consumption. It's a highly integrated module that supports 2-stream 802.11ac Wave 2 with MU-MIMO (Multi-User Multiple-Input, Multiple-Output), Transmit Beamforming, and Bluetooth.

With the cutting edge highly integrated technology, the DHYK-8822 provides the increased coverage and throughput performance required for high quality video and media applications in the home and enterprises.

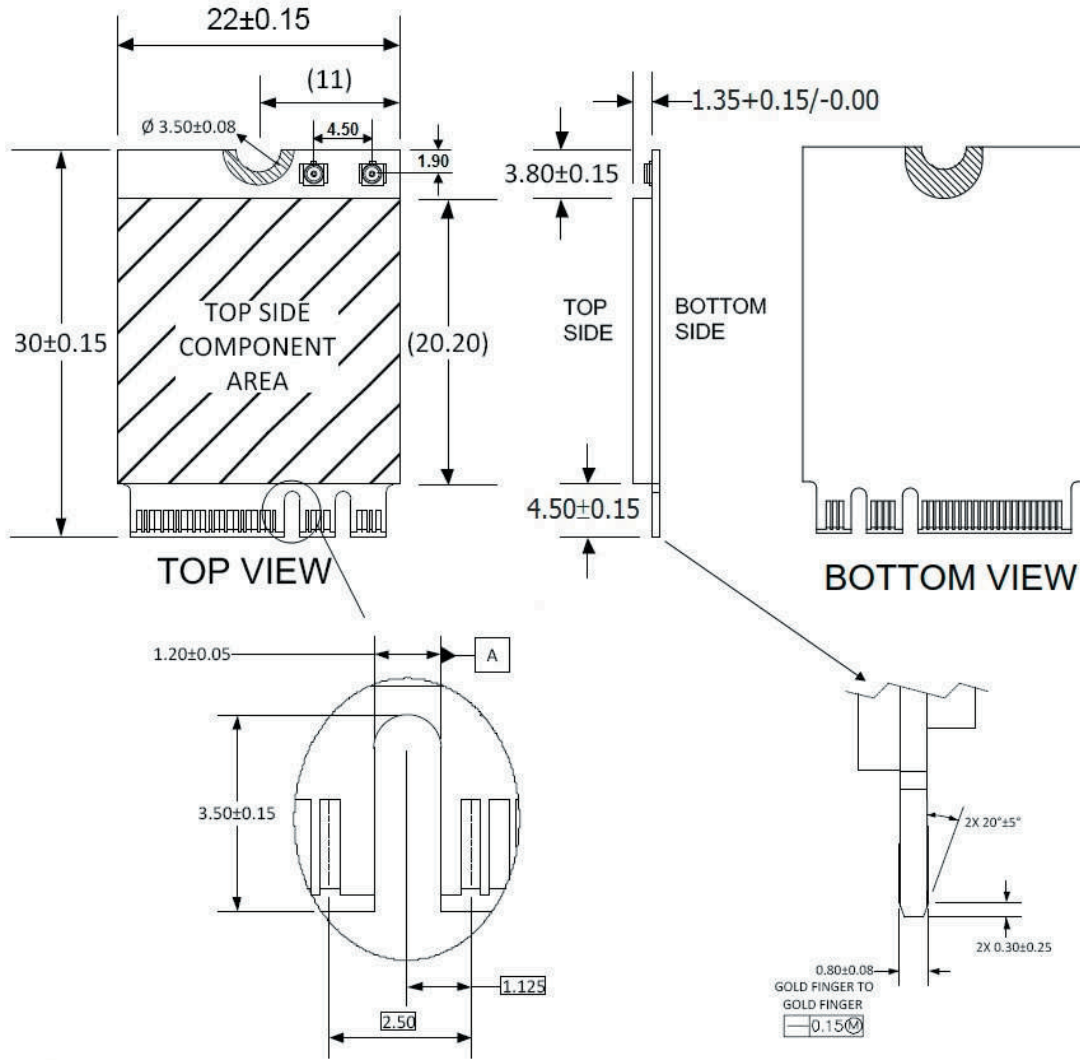
Features:

- » High integrated dual-band (2.4/5GHz) 802.11 ac/a/b/g/n 2Tx/2Rx WiFi and Bluetooth combo solution in M.2 2230 module is ideal for devices requiring small size and low-power connectivity.
- » Dual-band (2.4/5GHz) 2-stream 802.11ac supports 20/40/80MHz bandwidth and 256QAM modulation reaching maximum 867 Mbps PHY rate.
- » Wi-Fi compliant with 802.11ac Wave 2 provides advanced features including MU-MIMO and Transmit Beamforming.
- » Bluetooth supports V4.2, V4.1, V4.0 LE, V3.0+HS, V2.1+EDR, and it's backward compatible with V1.1, V1.2 and V2.0.
- » Bluetooth supports Class 1 (TX power maximum up to +6.5 dBm).
- » Bluetooth transmission includes 1Mbps, 2Mbps and 3Mbps EDR operations.
- » Bluetooth supports Simple Pairing (SP), Enhanced Inquiry Response (EIR), as well as SCATTERNET and PICONET.
- » HCI USB interface of Bluetooth works with Windows upper layer stack.
- » Advanced multi-radio coexistence between Wi-Fi, Bluetooth, and LTE subsystems ensure the best possible wireless experience, maximum performance, and lowest power consumption.
- » Supports Windows 7/8.1/10, and Linux (including STA, SoftAP, Wi-Fi-Direct P2P/Miracast) by project request
- » Standard 22 (W) x 30 (L) mm M.2 (NGFF) 2230-S3-A-E form factor.
- » Two IPEX MHF4 antenna connectors (2 for Wi-Fi and 1 for Bluetooth) for external antennas enable highest design flexibility.
- » Individual power calibration ensures high performance and stable quality.

Block Diagram:

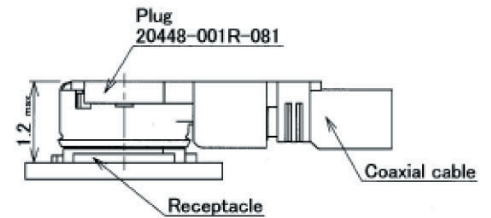
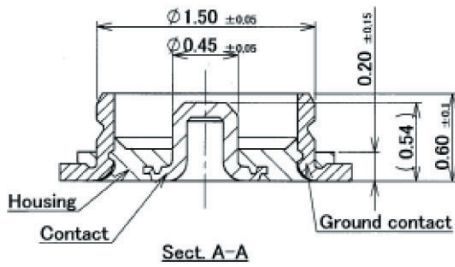
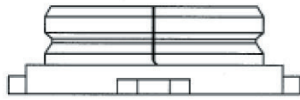
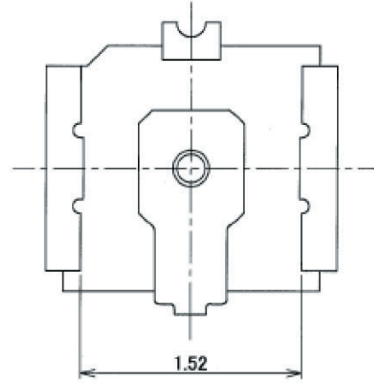
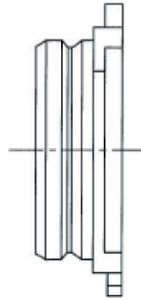
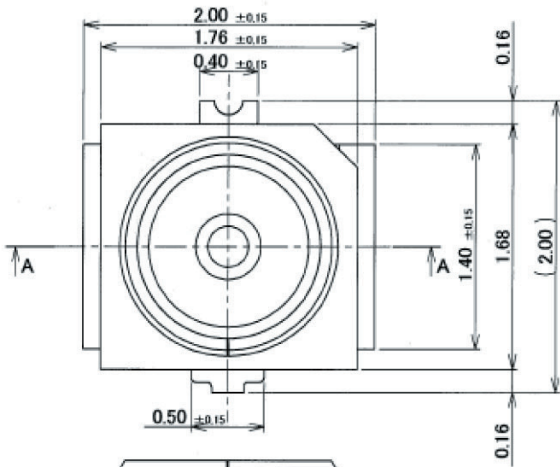


Mechanical Outline:



Unit: mm

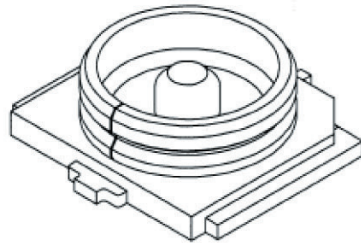
MHF4 Connector Specification:



Mating

Notes

1. Material
 - (1) Housing : LCP (GF=30%) black UL94-V-0
 - (2) Contact : brass
Au 0.05 μ m MIN. over Ni 1.27 μ m MIN.
 - (3) Ground contact : phosphor bronze
Au 0.03 μ m MIN. OVER Ni 1.27 μ m MIN.
2. Coplanarity : 0.1mm MAX
3. Packing : emboss tape
4. Mating partner part No.
20448-001R-081, 20462-001E
5. This is "Pb-free" connector
6. RoHS compliant



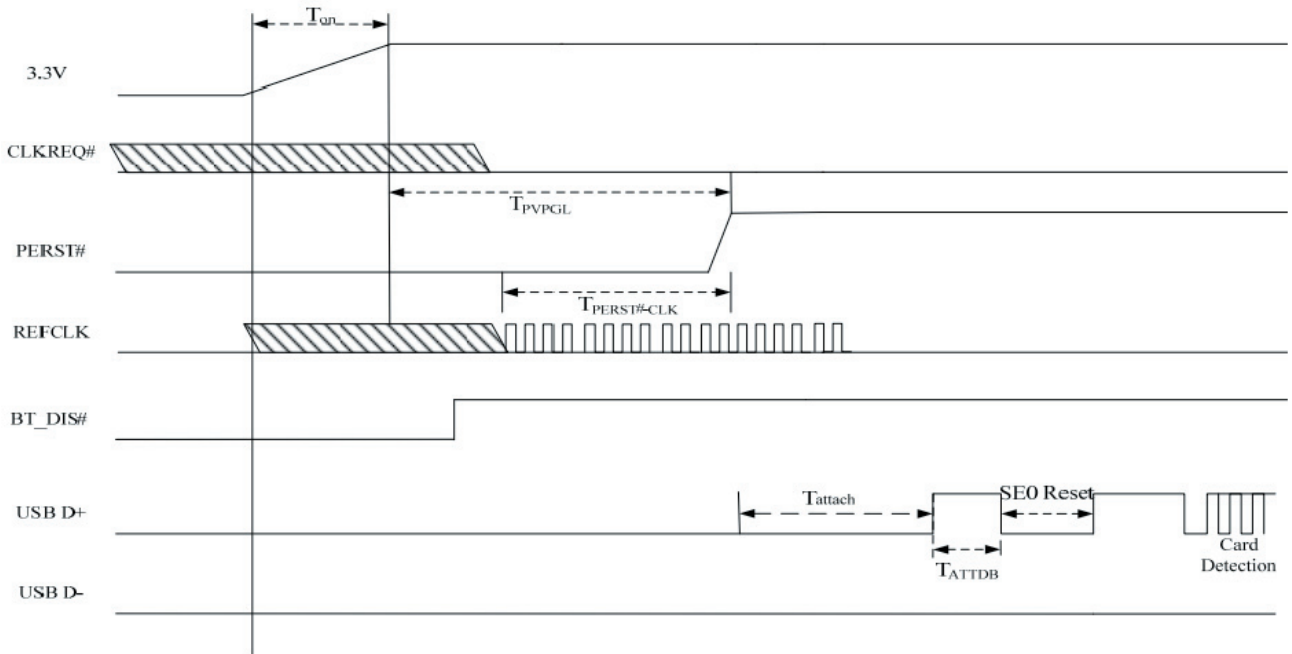
Pin Definition: (Module Key A-E)

Pin	Description	Status		Pin	Description	Status
1	GND	YES		2	3.3V	YES
3	USB_D+	YES		4	3.3V	YES
5	USB_D-	YES		6	LED_WLAN#	YES
7	GND	YES		8	NOTCH	NC
9	NOTCH	NC		10	NOTCH	NC
11	NOTCH	NC		12	NOTCH	NC
13	NOTCH	NC		14	NOTCH	NC
15	NOTCH	NC		16	LED_BT#	YES
17	NC	NC		18	GND	YES
19	NC	NC		20	USB_WAKE	NC
21	NC	NC		22	UART_TX	NC
23	NC	NC		24	NOTCH	NC
25	NOTCH	NC		26	NOTCH	NC
27	NOTCH	NC		28	NOTCH	NC
29	NOTCH	NC		30	NOTCH	NC
31	NOTCH	NC		32	UART_RX	NC
33	GND	YES		34	UART_RTS	NC
35	PERp0	YES		36	UART_CTS	NC
37	PERn0	YES		38	BT_WAKE	NC
39	GND	YES		40	RESERVED	NC
41	PETp0	YES		42	RESERVED	NC

Pin	Description	Status		Pin	Description	Status
43	PETn0	YES		44	COEX3	NC
45	GND	YES		46	COEX2	NC
47	REFCLK+	YES		48	COEX1	NC
49	REFCLK-	YES		50	SUSCLK(32kHz)	YES
51	GND	YES		52	PERST#	YES
53	CLKREQ#	YES		54	BT_DISABLE#	YES
55	PEWAKE#	YES		56	W_DISABLE#	YES
57	GND	YES		58	NFC DATA	NC
59	RESERVED	NC		60	NFC CLK	NC
61	RESERVED	NC		62	NFC INT	NC
63	GND	YES		64	NFC_RF_DIS	NC
65	RESERVED	NC		66	RESERVED	NC
67	RESERVED	NC		68	RESERVED	NC
69	GND	YES		70	RESERVED	NC
71	RESERVED	NC		72	3.3V	NC
73	RESERVED	NC		74	3.3V	NC
75	GND	YES				

* Pin 44/46/48 are only reserved for LTE coexistence, strongly recommend don't connect these pins for other purposes.

Power On Sequence:



T_{on} : The main power ramp up duration

T_{PVPGL} : Power valid to PERST# input inactive

$T_{PERST\#-CLK}$: Reference clock stable before PERST# inactive

T_{attach} : The interval to turn on BT after PERST# de-asserted

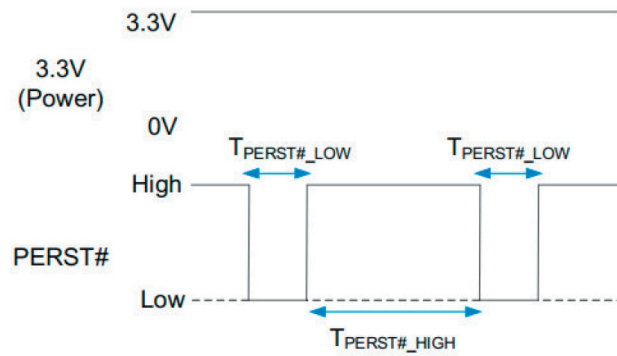
T_{ATTDB} : the debounce interval with a minimal duration of 100ms that provided by the USB system Software

$T_{SEO Reset}$: USB host send SEO Reset duration

Table.The typical timing range

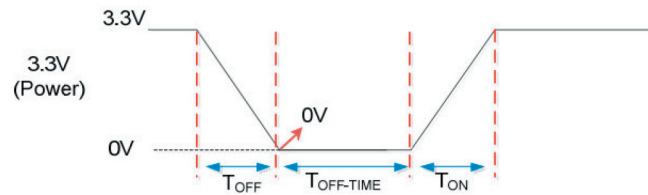
Symbol	Unit	Min	Typical	Max
T_{on}	ms	0.5	1.5	5
T_{PVPGL}	ms	Implementation specific;recommended 50ms		--
$T_{PERST\#-CLK}$	us	100		--
T_{attach}	ms	0.5	2	5
T_{ATTDB}	ms	100		
$T_{SEO Reset}$	ms	10	--	20

PCIe PERST# Timing Sequence



	Min	Typical	Max	Unit	Description
$T_{PERST\#_LOW}$	6	10	X	ms	PERST# low duration
$T_{PERST\#_HIGH}$	400	500	X	ms	PERST# high duration

Power Off Sequence



	Min	Typical	Max	Unit	Description
T_{OFF}	5	20	50	ms	Measure point start on 100% Measure point end on 0% (must be 0V)
$T_{OFF-TIME}$	500	--	--	ms	--
T_{ON}	0.5	1.5	5	ms	Measure point start on 0% (must be 0V) Measure point end on 100%

Specifications:

1. Wi-Fi portion

Main Chipset	Realtek RTL8822BE
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Tx/Rx	2T2R
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Standard Conformance	IEEE 802.11a, 802.11b, 802.11g, 802.11n, 802.11ac
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Frequency Range	<ul style="list-style-type: none">» USA:<ul style="list-style-type: none">» 2.412 – 2.484GHz» 5.15 – 5.35GHz» 5.47 – 5.725GHz» 5.725 – 5.85GHz» Europe:<ul style="list-style-type: none">» 2.412 – 2.484GHz» 5.15 – 5.35GHz» 5.47 – 5.725GHz» Japan:<ul style="list-style-type: none">» 2.412 – 2.484GHz» 5.15 – 5.35GHz» 5.47 – 5.725GHz
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Operating Channels

5GHz:

- » USA/Canada: 12 non-overlapping channels
- » Europe: 19 non-overlapping channels
- » Japan: 8 non-overlapping channels

2.4GHz:

- » USA/Canada: 11 (1-11)
 - » Europe: 13 (1-13)
 - » Japan: 14 on 802.11b (1-13 or 14th), 13 on 802.11g (1-13)
-

Data Rate

802.11a:

- » 6, 9, 12, 18, 24, 36, 48, 54Mbps

802.11b:

- » 1, 2, 5.5 and 11Mbps

802.11g:

- » 6, 9, 12, 18, 24, 36, 48, 54Mbps

802.11n:

- » 20MHz bandwidth (HT20): MCS 0 to 15
- » 40MHz bandwidth (HT40): MCS 0 to 15

802.11ac:

- » 20MHz bandwidth (HT20): MCS 0 to 8
 - » 40MHz bandwidth (HT40): MCS 0 to 9
 - » 80MHz bandwidth (HT80): MCS 0 to 9
-

Transmit Output Power (power tolerance +2/-2dB)

- » 802.11a: 13dBm@54Mbps
 - » 802.11b: 16dBm@11Mbps
 - » 802.11g: 16dBm@6Mbps; 14dBm@54Mbps
 - » 802.11n 5GHz/HT20: 16dBm@MCS0; 12dBm@MCS7
 - » 802.11n 5GHz/HT40: 16dBm@MCS0; 12dBm@MCS7
 - » 802.11n 2.4GHz/HT20: 16dBm@MCS0; 13dBm@MCS7
 - » 802.11n 2.4GHz/HT40: 13dBm@MCS0; 13dBm@MCS7
 - » 802.11ac 5GHz/HT80: 10dBm@MCS9
-

Receiver
Sensitivity

- » 802.11a: -66dBm@54Mbps
- » 802.11b: -81dBm@11Mbps
- » 802.11g: -82dBm@6Mbps; -66dBm@54Mbps
- » 802.11n 5GHz/HT20: -79dBm@MCS0; -65dBm@MCS7
- » 802.11n 5GHz/HT40: -79dBm@MCS0; -61dBm@MCS7
- » 802.11n 2.4GHz/HT20: -79dBm@MCS0; -65dBm@MCS7
- » 802.11n 2.4GHz/HT40: -79dBm@MCS0; -61dBm@MCS7
- » 802.11ac 5GHz/HT20: -62dBm@MCS8
- » 802.11ac 5GHz/HT40: -59dBm@MCS9
- » 802.11ac 5GHz/HT80: -54dBm@MCS9

MAC Protocol

CSMA/CA with ACK

Security

64-bit, 128-bit WEP, WPA, WPA-PSK, WPA2, WPA2-PSK, WPS,
IEEE 802.1X, IEEE 802.11i

Network
Architecture

Ad-hoc mode (Peer-to-Peer), Infrastructure mode

2. Bluetooth portion

Main Chipset Realtek RTL8822BE

Standard Conformance Bluetooth V4.2, V4.1, V4.0 LE, V3.0+HS, V2.1+EDR

Frequency Range 2.402 – 2.480 GHz

Modulation Scheme GFSK, $\pi/4$ -DQPSK and 8-DPSK

Transmit Output Power $0 \leq \text{Output Power} \leq +6.5\text{dBm}$; Class I Device

Receiver Sensitivity $< 0.1\% \text{ BER at } -70\text{dBm}$

3. Common Portion

Form Factor M.2 (NGFF) 2230-S3-A-E

Interface PCI Express 1.1 (Wi-Fi); USB2.0 (Bluetooth)

Operation Voltage 3.3V \pm 5% supply voltage

3.3V Ripple/Noise 300mVpp@Switching frequency > 1MHz

Operation Systems Supported Windows 7/8.1/10, Linux and Android (by project request)

Power Consumption @25°C (Average)

- » TX mode (VHT20, 11ac): 517mA
- » RX mode (VHT80, 11ac): 247mA
- » Non-Associated Idle: 6.2mA
- » Radio Disabled: 6.2mA

Remark: the maximum current consumption will be impacted by radiation environment and the driver mechanism.

Antenna two IPEX MHF4 antenna connectors (Chain 1 connector for Wi-Fi, Chain 2 connector for Wi-Fi or Bluetooth)

Operating Temperature Range -10°C ~ +70°C (ambient)

Storage Temperature Range	-40°C ~ +80°C
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Operating Relative Humidity	5 – 90% (non-condensing)
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Storage Relative Humidity	5 – 95% (non-condensing)
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Environment-Friendly Compliance	RoHS, Halogen Free
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Regulation Compliance	FCC, IC, CE, TELEC
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Ordering Information:

DHYK-8822 802.11 ac/a/b/g/n 2x2 wifi and Bluetooth 4.2 combo M.2 2230 module, RTL8822BE

Wireless radio modules are ESD sensitive, especially the components such as RF switch and the power amplifier. To avoid damage by electrostatic discharge, the following installation procedure is recommended:

- » Touch your hands and the bag or tray containing the radio module to a ground point on the host board (for example one of the mounting holes).
- » Install the radio module in the corresponding socket of host board.
- » Install the pigtail cable in the cutout of the enclosure. This will ground the pigtail to the enclosure.
- » Touch the I-PEX connector of the pigtail to the mounting hole (discharge), then plug onto the radio module.
- » Use external lightning protection for outdoor applications.
- » Make sure all antennas are being connected with the radio module (don't leave I-PEX connector open) before powering on the host device.