Manuals+

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SparkLAN WNFQ291BEBT WiFi 7-BT Module

Specification

Standards	IEEE 802.11be/ax/ac/a/b/g/n (2T2R) Bluetooth V5.4,V5.3,V5.2, V5.1, V5.0, V4.2, V4.1, V4.0LE, V3.0, V2.1+EDR
Chipset	Qualcomm WCN7851
Data Rate	802.11b: 11Mbps 802.11a/g: 54Mbps 802.11n: MCS0~15 802.11ac: MCS0~9 802.11ax: MCS0~13 802.11be: MCS0~13 Bluetooth: 1 Mbps, 2Mbps and Up to 3Mbps

Operating Frequency	IEEE 802.11 be/ax/ac/a/b/g/n ISM Band, 2.412GHz~2.483GHz, 5.150GHz~5.850GHz ,5.925~7.125GHz *Subject to local regulations
Interface	WLAN: PCIe Bluetooth: USB
Form Factor	M.2 2230 E Key
Antenna	2 x IPEX MHF4 connectors Ant 1: WiFi/BT Ant 2 : WiFi/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, 4096-QAM) 802.11be: OFDMA (BPSK, QPSK, 16-QAM, 64-QAM, 256-QAM, 1024-QAM,

	4096-QAM) BT: Header: GFSK Payload 2M: π/4-DQPSK Payload 3M: 8-DPSK
Power Consumption	11be TX mode: 1250 mA (MAX) RX mode: 1200 mA (MAX)
Operating Voltage	DC 3.3V

Operating Temperature Range	-40°~85°C (Operating)
Storage Temperature Range	-45°C ~+90°C (Storing)
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 2.5mm(± 0.3mm)
Weight (g)	3.42g
Driver Support	Win11/Linux (Open Source) (TBD)
Security	WPS2.0, WAPI, WPA, WPA2, WPA3

Installation

- Connect the Module to the PCIe slot of the computer.
- Install Wi-Fi driver driver.
- After the Wi-Fi Driver is installed, click the Network icon on Windows, then search the network , and connect the Wireless Network you want.

Federal Communication Commission Interference Statement

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed

and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

FCC Caution: Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.
Operations in the 5.15-5.25GHz band are restricted to indoor usage only.
This device meets all the other requirements specified in Part 15E, Section 15.407 of the FCC Rules.

FOR PORTABLE DEVICE USAGE (<20m from body/SAR needed)

Radiation Exposure Statement:
The product comply with the FCC portable RF exposure limit set forth for an uncontrolled environment and are safe for intended operation as described in this manual. The further RF exposure reduction can be achieved if the product can be kept as far as possible from the user body or set the device to lower output power if such function is available.

Body-worn Operation

- This device was tested for typical body-worn operations. To comply with RF exposure requirements, a minimum separation distance of 5 mm must be maintained between the user's body and the handset, including the antenna. Third-party belt-clips, holsters, and similar accessories used by this device should not contain any metallic

components. Body-worn accessories that do not meet these requirements may not comply with RF exposure requirements and should be avoided.

- The product comply with the FCC portable RF exposure limit set forth for an uncontrolled environment and are safe for intended operation as described in this manual.
- To comply with RF exposure requirements, a minimum separation distance of 5 mm must be maintained between the user's body including the antenna.

6e indoor device

For 6CD (Dual Client)
Statement in manual
Operation of transmitters in the 5.925-7.125 GHz band is prohibited for control of or communications with unmanned aircraft systems. KDB 996369 D03 OEM Manual v01 rule sections:

List of applicable FCC rules
This module has been tested for compliance to FCC Part 15.247, 15.407

Summarize the specific operational use conditions
The module is tested for standalone mobile RF exposure use condition. Any other usage conditions such as co-location with other transmitter(s) or being used in a portable condition will need a separate reassessment through a class II permissive change application or new certification.

NII-4 Client
This module is authorized for client device applications under the control of an indoor access point or subordinate.
The final host product must comply with the following operational restrictions:
a) Cannot have a direct connection to the internet to source the internet to other clients, access points, subordinates or clients from a wired or direct connection.

6CD
This module is authorized for Dual Client (6CD) device applications.
The final host product must comply with the following operational restrictions:

- a) Cannot connect directly to any other client device;
- b) Cannot source internet/network (obtained via wired connection or other means such as cellular) to other clients, access points and subordinate devices or provide any direct peer to peer connections to other clients or subordinates;
- c) Is prohibited for control of or communications with unmanned aircraft systems.

Limited module procedures

Not applicable.

Trace antenna designs

Not applicable.

RF exposure considerations

This equipment complies with FCC mobile radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with a minimum distance of 20cm between the radiator & your body. If the module is installed in a portable host, a separate SAR evaluation is required to confirm compliance with relevant FCC portable RF exposure rules.

Antennas

The following antennas have been certified for use with this module; antennas of the same type with equal or lower gain may also be used with this module, except as described below. The antenna must be installed such that 20 cm can be maintained between the antenna and users.

For 6CD:

Demonstration of compliance to Contention-Based Protocol requirements across UNII-5/6/7/8 bands has been determined using a lowest antenna gain of 5.16dBi. The use of antennas with gain lower than this will require a separate Class II permissive change re-evaluation or new certification.

Antenna Set	RF Chain No.	Brand	Model	Antenna Net Gain (dBi)	Frequency Range	Cable Loss (dB)	Antenna Type	Connector Type	Cable Length
1	Chain0/1	Hong-Bo	260-25094	3.53	2.4~2.4835GHz	0.74	PIFA	MHF 4L	300mm
				3.06	5.15~5.25GHz	1.16			
				3.07	5.25~5.35GHz	1.18			
				4.81	5.47~5.725GHz	1.26			
				4.2	5.725~5.850GHz	1.28			
2	Chain0/1	Hong-Bo	260-25083	5.09	5.850~5.895 GHz	1.29	PIFA	MHF 4L	300mm
				5.14	5.925~6.425 GHz	1.35			
				5.09	6.425~6.525 GHz	1.38			
				5.16	6.525~6.875 GHz	1.45			
				5.12	6.875~7.125 GHz	1.50			
3	Chain0/1	Hong-Bo	260-25084	3.22	2.4~2.4835 GHz	0.49	Monopole	MHF 4L	200mm
				3.35	5.150~5.250 GHz	0.76			
				3.42	5.250~5.350 GHz	0.77			
				4.77	5.470~5.725 GHz	0.80			
				4.72	5.725~5.850 GHz	0.84			
				4.71	5.850~5.895 GHz	0.84			
				4.75	5.925~6.425 GHz	0.86			
				4.29	6.425~6.525 GHz	0.91			
				4.81	6.525~6.875 GHz	0.96			
				4.74	6.875~7.125 GHz	0.98			

Newly

Antenna Set	RF Chain No.	Brand	Model	Antenna Net Gain (dBi)	Frequency Range	Cable Loss (dB)	Antenna Type	Connector Type	Cable Length (mm)
4	Chain0/1	SparkLAN	AD-513AX	3.11	2.4~2.4835	None	Dipole	I-PEX MHF4	150
				2.97	5.15~5.25				
				2.96	5.25~5.35				
				4.46	5.47~5.725				
				4.07	5.725~5.850				
				4.07	5.850~5.895				
				4.53	5.925~6.425				
				4.06	6.425~6.525				
				4.04	6.525~6.875				
				3.97	6.875~7.125				
5	Chain0/1	SparkLAN	AD-510AX	2.27	2.4~2.4835	None	Dipole	RP-SMA (M)	150
				2.88	5.15~5.25				
				2.69	5.25~5.35				
				2.58	5.47~5.725				
				2.6	5.725~5.850				
				2.6	5.850~5.895				
				3.23	5.925~6.425				
				3.34	6.425~6.525				
				3.52	6.525~6.875				
				3.52	6.875~7.125				
6	Chain0/1	SparkLAN	AD-512AX	2.35	2.4~2.4835	None	Dipole	RP-SMA (M)	150
				2.82	5.15~5.25				
				2.94	5.25~5.35				
				3	5.47~5.725				
				2.75	5.725~5.850				
				2.80	5.850~5.895				
				2.87	5.925~6.425				
				3.02	6.425~6.525				
				3.02	6.525~6.875				
				2.61	6.875~7.125				
7	Chain0/1	SparkLAN	AD-516AX	1.65	2.4~2.4835	-	Dipole	I-PEX MHF4	250
				4.3	5.150~5.850				
				4.38	5.850~5.895				
				4.43	5.925~6.425				
				4.45	6.425~6.525				
				4.46	6.525~6.875				
				4.48	6.875~7.125				
8	Chain0/1	Johanson	2450AD18A6050	2	2.4~2.4835	-	Chip	I-PEX MHF4	N/A
				1.5	5.150~5.850				
				2.7	5.850~5.895				
				2.7	5.925~6.425				
				2.7	6.425~6.525				
				2.7	6.525~6.875				
				2.7	6.875~7.125				

The above Antenna information is declared by the manufacturer and for more detailed features description, please refer to the manufacturer's specifications; the laboratory shall not be held responsible.

Label and compliance information

- The final end product must be labeled in a visible area with the following: "Contains FCC ID: RYK-WNFQ291BEBT". The grantee's FCC ID can be used only when all FCC compliance requirements are met.
- The OEM integrator has to be aware not to provide information to the end user regarding how to install or remove this RF module in the user's manual of the end product which integrates this module.
- The end product user manual shall include all required regulatory information/warning as shown in this manual.

Information on test modes and additional testing requirements

This transmitter is tested in a standalone mobile RF exposure condition and any colocated or simultaneous transmission with other transmitter(s) or portable use will require a separate class II permissive change re-evaluation or new certification.

Additional testing, Part 15 Subpart B disclaimer

- This transmitter module is tested as a subsystem and its certification does not cover the FCC Part 15 Subpart B (unintentional radiator) rule requirement applicable to the final host. The final host will still need to be reassessed for compliance to this portion of rule requirements if applicable.
- OEM/Host manufacturers are ultimately responsible for the compliance of the Host and Module. The final product must be reassessed against all the essential requirements of the FCC rule such as FCC Part 15 Subpart B before it can be placed on the US market. This includes reassessing the transmitter module for compliance with the Radio and EMF essential requirements of the FCC rules. This module must not be incorporated into any other device or system without retesting for compliance as multi-radio and combined equipment.
- As long as all conditions above are met, further transmitter test will not be required.
- However, the OEM integrator is still responsible for testing their end-product for any additional compliance requirements required with this module installed.

Note EMI Considerations

Please follow the guidance provided for host manufacturers in KDB publications 996369

D02 and D04.

How to make changes

Only Grantees are permitted to make permissive changes. Please contact us should the host integrator expect the module to be used differently than as granted: Grady Lin / CTO

SparkLAN Communications, Inc.

Tel: 886-2-2659-1880

Fax: 886-2-2659-5538

E-mail: grady.lin@sparklan.com

IMPORTANT NOTE: In the event that these conditions cannot be met (for example certain laptop configurations or co-location with another transmitter), then the FCC authorization is no longer considered valid and the FCC ID cannot be used on the final product. In these circumstances, the OEM integrator will be responsible for reevaluating the end product (including the transmitter) and obtaining a separate FCC authorization.

Industry Canada statement

This device complies with ISED's licence-exempt RSSs. Operation is subject to the following two conditions:
(1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Caution

1. the device for operation in the band 5150-5250 MHz is only for indoor use to reduce the potential for harmful interference to co-channel mobile satellite systems;
2. for devices with detachable antenna(s), the maximum antenna gain permitted for devices in the bands 5250- 5350 MHz and 5470-5725 MHz shall be such that the equipment still complies with the e.i.r.p. limit; (detachable antenna only)
3. for devices with detachable antenna(s), the maximum antenna gain permitted for devices in the band 5725-5850 MHz shall be such that the equipment still complies with the e.i.r.p. limits as appropriate; (detachable antenna only)

4. where applicable, antenna type(s), antenna models(s), and worst-case tilt angle(s) necessary to remain compliant with the e.i.r.p. elevation mask requirement set forth in section 6.2.2.3 shall be clearly indicated.

FOR PORTABLE DEVICE USAGE (<20m from body/SAR needed)

Radiation Exposure Statement:

The product comply with the Canada portable RF exposure limit set forth for an uncontrolled environment and are safe for intended operation as described in this manual. The further RF exposure reduction can be achieved if the product can be kept as far as possible from the user body or set the device to lower output power if such function is available.

For IC Canada

The antenna-to-user separation distance must be >20 mm.

With default power setting. 14mm bystander modular SAR is achieved in the IC grant. To ensure compliance with the radio frequency (RF) exposure guidelines, this device must be used at least 14 mm away from your body or nearby persons. Failure to observe this warning could result in the RF exposure levels exceeding the applicable limits.

In addition. Modular SAR of 5mm antenna-to-user separation distance is also achieved in the same IC grant with reduced power. Please contact Qualcomm if there is need to implement reduced power to leverage 5mm Modular SAR.

This device is intended only for OEM integrators under the following conditions: (For module device use)

1. The antenna must be installed and operated with greater than 20cm between the antenna and users, and
2. The transmitter module may not be co-located with any other transmitter or antenna. As long as 2 conditions above are met, further transmitter test will not be required. However, the OEM integrator is still responsible for testing their end-product for any additional compliance requirements required with this module installed

IMPORTANT NOTE:

In the event that these conditions can not be met (for example certain laptop

configurations or co-location with another transmitter), then the Canada authorization is no longer considered valid and the IC ID can not be used on the final product. In these circumstances, the OEM integrator will be responsible for re-evaluating the end product (including the transmitter) and obtaining a separate Canada authorization.

End Product Labeling FOR MOBILE DEVICE USAGE (>20cm/low power)

This transmitter module is authorized only for use in device where the antenna may be installed and operated with greater than 20cm between the antenna and users. The final end product must be labeled in a visible area with the following: "Contains IC: 6158A-WNFQ291BEBT".

End Product Labeling FOR PORTABLE DEVICE USAGE (<20m from body/SAR needed)

The product can be kept as far as possible from the user body or set the device to lower output power if such function is available. The final end product must be labeled in a visible area with the following: "Contains IC: 6158AWNFQ291BEBT"

Manual Information To the End User

The OEM integrator has to be aware not to provide information to the end user regarding how to install or remove this RF module in the user's manual of the end product which integrates this module.

The end user manual shall include all required regulatory information/warning as show in this manual.

For 6e statement in manual

RSS-248 Issue 2 General statement (all equipment class)

Devices shall not be used for control of or communications with unmanned aircraft systems.

Dual Client

Prohibited for control of or communications with unmanned aircraft systems, including drones.

This device is prohibited for control of or communications with unmanned aircraft systems, including drones.

This radio transmitter [6158A-WNFQ291BEBT] has been approved by Innovation, Science and Economic Development Canada to operate with the antenna types listed below, with the maximum permissible gain indicated. Antenna types not included in this list that have a gain greater than the maximum gain indicated for any type listed are strictly prohibited for use with this device.

Antenna Set	RF Chain No.	Brand	Model	Antenna Net Gain (dBi)	Frequency Range	Cable Loss (dB)	Antenna Type	Connector Type	Cable Length
1	Chain0/1	Hong-Bo	260-25094	3.53	2.4~2.4835GHz	0.74	PIFA	MHF 4L	300mm
				3.06	5.15~5.25GHz	1.16			
				3.07	5.25~5.35GHz	1.18			
				4.81	5.47~5.725GHz	1.26			
				4.2	5.725~5.850GHz	1.28			
2	Chain0/1	Hong-Bo	260-25083	5.09	5.850~5.895 GHz	1.29	PIFA	MHF 4L	300mm
				5.14	5.925~6.425 GHz	1.35			
				5.09	6.425~6.525 GHz	1.38			
				5.16	6.525~6.875 GHz	1.45			
				5.12	6.875~7.125 GHz	1.50			
3	Chain0/1	Hong-Bo	260-25084	3.22	2.4~2.4835 GHz	0.49	Monopole	MHF 4L	200mm
				3.35	5.150~5.250 GHz	0.76			
				3.42	5.250~5.350 GHz	0.77			
				4.77	5.470~5.725 GHz	0.80			
				4.72	5.725~5.850 GHz	0.84			
				4.71	5.850~5.895 GHz	0.84			
				4.75	5.925~6.425 GHz	0.86			
				4.29	6.425~6.525 GHz	0.91			
				4.81	6.525~6.875 GHz	0.96			
				4.74	6.875~7.125 GHz	0.98			

Newly

Antenna Set	RF Chain No.	Brand	Model	Antenna Net Gain (dBi)	Frequency Range	Cable Loss (dB)	Antenna Type	Connector Type	Cable Length (mm)
4	Chain0/1	SparkLAN	AD-513AX	3.11 2.97 2.96 4.46 4.07 4.07 4.53 4.06 4.04 3.97	2.4~2.4835 5.15~5.25 5.25~5.35 5.47~5.725 5.725~5.850 5.850~5.895 5.925~6.425 6.425~6.525 6.525~6.875 6.875~7.125	None	Dipole	I-PEX MHF4	150
5	Chain0/1	SparkLAN	AD-510AX	2.27 2.88 2.69 2.58 2.6 2.6 3.23 3.34 3.52 3.52	2.4~2.4835 5.15~5.25 5.25~5.35 5.47~5.725 5.725~5.850 5.850~5.895 5.925~6.425 6.425~6.525 6.525~6.875 6.875~7.125	None	Dipole	RP-SMA (M)	150
6	Chain0/1	SparkLAN	AD-512AX	2.35 2.82 2.94 3 2.75 2.80 2.87 3.02 3.02 2.61	2.4~2.4835 5.15~5.25 5.25~5.35 5.47~5.725 5.725~5.850 5.850~5.895 5.925~6.425 6.425~6.525 6.525~6.875 6.875~7.125	None	Dipole	RP-SMA (M)	150
7	Chain0/1	SparkLAN	AD-516AX	1.65 4.3 4.38 4.43 4.45 4.46 4.48	2.4~2.4835 5.150~5.850 5.850~5.895 5.925~6.425 6.425~6.525 6.525~6.875 6.875~7.125	-	Dipole	I-PEX MHF4	250
8	Chain0/1	Johanson	2450AD18A6050	2 1.5 2.7 2.7 2.7 2.7 2.7	2.4~2.4835 5.150~5.850 5.850~5.895 5.925~6.425 6.425~6.525 6.525~6.875 6.875~7.125	-	Chip	I-PEX MHF4	N/A

The above Antenna information is declared by the manufacturer, and for a more detailed features description, please refer to the manufacturer's specifications; the laboratory shall not be held responsible.

For 6e statement in manual
RSS-248 Issue 3 General statement (all equipment class)

- Devices shall not be used for control of or communications with unmanned aircraft systems.
- Devices shall not be used on oil platforms.
- Devices shall not be used on aircraft, except for the low-power indoor access points, indoor subordinate devices, low-power client devices, and very low-power devices operating in the 5925-6425 MHz band, that may be used on large aircraft as defined in the Canadian
- Aviation Regulations, while flying above 3,048 metres (10,000 feet).

- Devices shall not be used on automobiles.
- Devices shall not be used on trains.
- Devices shall not be used on maritime vessels.

This device complies with Directive 2014/53/EU. issued by the Commission of the European Community.

Declaration of Conformity

Please added certification standard in your user manual, which depends on the test standards your device performed.

If the DoC should be a simplified version, please take below as reference –

Hereby, Sparklan declares that the radio equipment type [designation of type of radio equipment] is in compliance with Directive 2014/53/EU.

The full text of the EU declaration of conformity is available at the following internet address:

The frequency and maximum transmitted power in EU are listed as belows,

- 2412 – 2472 MHz: 19.87 dBm
- 5180 – 5250 MHz: 22.95 dBm
- 5260 – 5320 MHz: 22.84 dBm
- 5500 – 5700 MHz: 22.86 dBm
- 5745 – 5865 MHz: 13.92 dBm
- 5955 – 6415 MHz LPI: 22.92 dBm
- 5955 – 6415 MHz VLP: 13.83 dBm
- 2402 – 2480 MHz BT-LE: 18.7 dBm
- 2402 – 2480 MHz BT-EDR: 19.11 dBm

WLAN 5GHz:
Operations in the 5.15-5.35GHz band are restricted to indoor usage only.

WLAN 6GHz:
For Low power indoor (LPI use): Operations in the 5955 – 6415MHz are restricted to indoor usage only.

Frequently Asked Questions

- **Q: What should I do if I encounter connection issues after installing the driver?**

  A: If you experience connection problems, try restarting your computer and reconnecting to the network. Ensure that the antenna is properly positioned for optimal signal reception.

- **Q: Can this Wireless Module be used with Mac OS?**

  A: Currently, driver support is available for Windows 11 and Linux. Compatibility with Mac OS is not guaranteed at this time.

Documents / Resources

	[SparkLAN WNFQ291BEBT WiFi 7-BT Module](#) [[pdf](#)] Instruction Manual RYK-WNFQ291BEBT, RYKWNFQ291BEBT, WNFQ291BEI BT, WNFQ291BEBT WiFi 7-BT Module, WNFQ291BEBT, WiFi 7-BT Module, 7-BT Module

References

- [User Manual](#)

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