

USER MANUAL

802.11a/b/g/n/ac 2Tx2R + BT5.2 WLAN Module

Model: WCBN3512R

PRODUCT FEATURES

BT FEATURE:

- Bluetooth V5.2 with BLE (BT low energy)
- Supports BT/BLE dual mode
- Supports BT/Wi-Fi coexistence
- Supports 7 BT links and 16 BLE link
- Supports SCO and eSCO link with re-transmission
- Supports wide-band speech
- Supports mSBC and SBC including mono and stereo
- Supports Packet Loss Concealment (PLC) function for better voice quality
- Supports LE Isochronous channels
- Supports LC3 including mono and stereo
- Supports secure connection with AES128 and ECC256
- Channel quality driven data rate adaptation
- Channel assessment and WB RSSI for AFH

WI-FI FEATURE:

- IEEE802.11 a/b/g/n/ac compliant
- Support 20Mhz, 40MHz, 80MHz bandwidth in 2.4GHz, 5GHz band
- Dual-band 2T2R mode
- MT7920QSN data rate up to 500Mbps with SDIO3.0
- Supports MU-MIMO RX
- Supports uplink MU-OFDAM TX and downlink MU-OFAMA RX
- Supports STBC, LDPC, TX Beamformer and Beamformee
- Greenfield, mixed mode, legacy modes support
- IEEE 802.11 d/e/h/i/j/k/mc/r/v/w support
- Security support for WFA WPA/WPA2/WPA3 personal, WPS2.0, WAPI
- QoS support of WFA WMM, WMM PS
- Integrated LNA, PA, and T/R switch

COMMON FEATURE:

- MT7920QSN is a highly integrated single chip which features a low power 2x2 11a/b/g/n/ac dual-band Wi-Fi subsystem and a Bluetooth v5.2 subsystem.
- Integrated high efficiency power management unit with single 3.3V power supply input
- Supports 40MHz crystal clock with low power operation in idle mode
- Embedded SRAM/ROM
- UART interface with hardware flow control
- Programmable and multiplexed GPIO pins
- SDIO device fully compliant to SDIO v3.0 specification

PRODUCT SPECIFICATIONS

MAIN CHIPSET

MediaTek MT7920QSN

FUNCTIONAL SPECIFICATIONS

BT Function	
Standard	Bluetooth V5.2 with BLE (BT low energy)
Bus Interface	SDIO3.0
Data Rate	1 Mbps, 2Mbps and Up to 3Mbps
Modulation Scheme	GFSK, $\pi/4$ -DQPSK and 8PSK
Frequency Range	2.402~2.480 GHz
Transmit Output Power	1dBm \leq Output Power \leq 5dBm
Receiver Sensitivity	BDR : $< 0.1\%$ BER at -95dBm EDR : $\pi/4$ -DQPSK at -94.5dBm ; 8PSK at -88 dBm LE : 1M at -98dBm , 2M at -95dBm
Wi-Fi Function	
Standard	IEEE802.11a; IEEE802.11b; IEEE 802.11g; IEEE 802.11n. IEEE802.11ac
Bus Interface	SDIO3.0
Data Rate	<p>802.11a: 54, 48, 36, 24, 18, 12, 9, 6 Mbps</p> <p>802.11b: 11, 5.5, 2, 1 Mbps</p> <p>802.11g: 54, 48, 36, 24, 18, 12, 9, 6 Mbps</p> <p>802.11n: MCS 0 to 7 for HT20MHz MCS 0 to 7 for HT40MHz</p> <p>802.11ac: MCS 0 to 8 for VHT20MHz MCS 0 to 9 for VHT40MHz MCS 0 to 9 for VHT80MHz</p>
Media Access Control	CSMA/CA with ACK
Modulation Technique	<p>802.11a: 64QAM, 16QAM, QPSK, BPSK</p> <p>802.11b: CCK, DQPSK, DBPSK</p> <p>802.11g: 64QAM, 16QAM, QPSK, BPSK</p> <p>802.11n: 64QAM, 16QAM, QPSK, BPSK</p>

802.11ac:

256QAM, 64QAM, 16QAM, QPSK, BPSK

Network Architecture	Ad-hoc mode (Peer-to-Peer) Infrastructure mode
Operation Channel	2.4GHz 11: (Ch. 1-11) – United States 13: (Ch. 1-13) – Europe 13: (Ch. 1-13) – Japan 5GHz 21: USA 19: EU 8: Japan
Frequency Range	802.11b,g,n 2.400 ~ 2.4835 GHz 802.11a,n,ac 5.15 ~ 5.85 GHz
EVM	CCK < 35% (11M) OFDM < -25dB (54M) MCS0(HT20/40MHz) < -5dB MCS7(HT20/40MHz) < -27dB MCS0(VHT20/40/80MHz) < -5dB MCS7(VHT 20/40/80MHz) < -27dB MCS8(VHT 20/40/80MHz) < -30dB MCS9(VHT 20/40/80MHz) < -32dB MCS11(VHT 20/40/80MHz) < -35dB
Transmit	11b 11Mbps: 19.5 ± 1.5 dBm 11g 54Mbps: 16.5 ± 1.5 dBm 11a 54Mbps: 15 ± 1.5 dBm 11n HT20_MCS7: 16 ± 1.5 dBm (2.4G), 14 ± 1.5 dBm (5G) 11n HT40_MCS7: 15.5 ± 1.5 dBm (2.4G), 14 ± 1.5 dBm (5G) 11ac VHT80_MCS9: 13 ± 1.5 dBm
Receiver Sensitivity	2.4G 11n HT20_MCS0: -90dBm 11n HT20_MCS7: -72dBm 5G 11n HT20_MCS0: -90dBm 11n HT20_MCS7: -72dBm 11n HT40_MCS0: -87dBm 11n HT40_MCS7: -69dBm 11ac VHT80_MCS9: -59dBm
Security	WFA WPA/WPA2/WPA3 personal, WPS2.0, WAPI

Common Function

Power Consumption *TBD*

Operating Voltage 3.3V ±10% I/O supply voltage

Antenna connector IPEX : 20279-001E-03

IPEX SPEC

MHF® Receptacle

3pad type

【Part Number】

Ground Contact : **Au** Plating

20279-001 E- * *

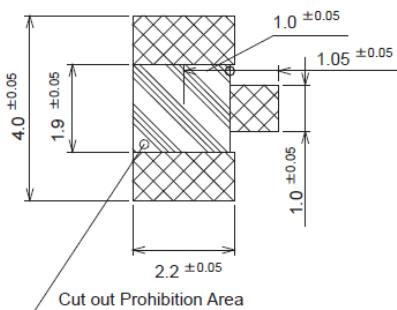
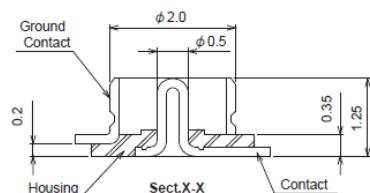
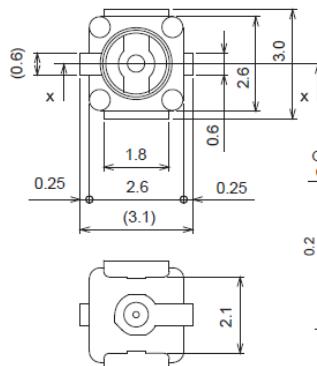
① ②

Ground Contact : **Ag** Plating

20314-001 E- 01

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①	Packing : Emboss Tape	01	2,500pcs
②	1reel	03	5,000pcs
		05	10,000pcs



PIN ASSIGMENT

Pin.	Pin Define	Description	I/O
1	GND	Ground	G
2	GND	Ground	G
3	GND	Ground	G
4	GND	Ground	G
5	GND	Ground	G
6	GND	Ground	G
7	AVDD_3V3	VBAT input power supply (3.3V)	P
8	GND	Ground	G
9	G3_Audio_SYNC	BT Audio sync pin	O
10	G4_DB_BT_TIME_SYNC	BT SW debug	O
11	GND	Ground	G
12	GND	Ground	G
13	GND	Ground	G
14	G9_BTRST_N	BT Sub reset#	I
15	G12_TIME_SYNC_UART_CTS_TSF		O
16	SDIO_CLK	SDIO clock input	I
17	SDIO_CMD	SDIO command line	I/O
18	SDIO_DATA_0	SDIO data line 0	I/O
19	SDIO_DATA_1	SDIO data line 0	I/O
20	SDIO_DATA_2	SDIO data line 0	I/O
21	SDIO_DATA_3	SDIO data line 0	I/O
22	EXT_IO_PWR	VDDIO input supply, connect to VDDIO (1.8V or 3.3V)	P
23	G13_DB_WF	Wi-Fi SW debug	O
24	G2_WFRST_N	Wi-Fi Sub reset#	I
25	GND	Ground	G
26	G0_BGF_INT_B	WoBT#	O
27	GND	Ground	G
28	RST_N	Reset#	I
29	GND	Ground	G
30	GND	Ground	G
31	GND	Ground	G
32	GND	Ground	G
33	GND	Ground	G
34	GND	Ground	G

ENVIRONMENTAL**OPERATING**

Ambient Operating Temperature: -10 to 70 °C (14 to 158 °F)

Ambient Relative Humidity: 5-90% (non-condensing)

STORAGE

Ambient Temperature: -40 to 85 °C (-40 to 185 °F)

Ambient Relative Humidity: 5-95% (non-condensing)

WARNINGS

FCC Statement:

Federal Communication Commission Interference Statement

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 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.

For product available in the USA/Canada market, only channel 1~11 can be operated.

Selection of other channels is not possible.

This device and its antenna(s) must not be co-located with any other transmitters except in accordance with FCC multi-transmitter product procedures.

Referring to the multi-transmitter policy, multiple-transmitter(s) and module(s) can be operated simultaneously without C2P.

This device is restricted for indoor use.

This device and its antenna(s) must not be co-located or operating in conjunction with any other antenna or transmitter

IMPORTANT NOTE:

FCC Radiation Exposure Statement:

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20

cm between the radiator & your body.

IMPORTANT NOTE:

This module is intended for OEM integrator. The OEM integrator is responsible for the compliance to all the rules that apply to the product into which this certified RF module is integrated.

Additional testing and certification may be necessary when multiple modules are used. 20 cm minimum distance has to be able to be maintained between the antenna and the users for the host this module is integrated into. Under such configuration, the FCC radiation exposure limits set forth for an population/uncontrolled environment can be satisfied.

Any changes or modifications not expressly approved by the manufacturer could void the user's authority to operate this equipment.

USERS MANUAL OF THE END PRODUCT:

In the users manual of the end product, the end user has to be informed to keep at least 20 cm separation with the antenna while this end product is installed and operated. The end user has to be informed that the FCC radio-frequency exposure guidelines for an uncontrolled environment can be satisfied. The end user has to also be informed that any changes or modifications not expressly approved by the manufacturer could void the user's authority to operate this equipment. If the size of the end product is smaller than 8x10cm, then additional FCC part 15.19 statement is required to be available in the users manual:

This device complies with Part 15 of 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 device and its antenna(s) must not be co-located or operating in conjunction with any other antenna or transmitter.

This device is restricted to indoor use.

LABEL OF THE END PRODUCT:

The final end product must be labeled in a visible area with the following " Contains FCC ID: PPQ-WCBN3512R ". If the size of the end product is larger than 8x10cm, then the following FCC part 15.19 statement has to also be available on the label: This device complies with Part 15 of 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 module is certified pursuant to Part 15 rules section 15.247, 15.407 and RSS-247.

This module has been approved to operate with the antenna types listed below, with the maximum permissible gain indicated.

Antenna Number	Brand Name	Model Name	Ant. Type	Connector	Support	Max Peak Gain
Antenna 1	SHENZHEN SOUTH STAR	N12-8145-ROA	PCB	I-Pex	2.4G+5G	2.4G : 4.07 dBi 5G : 4.56 dBi
Antenna 2	SHENZHEN SOUTH STAR	N12-8145-ROA	PCB	I-Pex	2.4G+5G+BT	2.4G : 3.42 dBi 5G : 4.97 dBi BT : 3.42 dBi

Information on test modes and additional testing requirements

This module has been approved under stand-alone configuration.

OEM integrator has been limited the operation channels in channel 1-11 for 2.4GHz band.

The separate approval is required for all other operating configurations, including portable configurations with respect to Part 2.1093/RSS-102 and different antenna configurations

The information on how to configure test modes for host product evaluation for different operational conditions for a stand-alone modular transmitter in a host, versus with multiple, simultaneously transmitting modules or other transmitters in a host can be found at KDB Publication 996369 D04.

OEM integrator is still responsible for testing their end product for any additional compliance requirements required with this module installed (for example, digital device emissions, PC peripheral requirements, etc.).

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/ISED authorization is no longer considered valid and the FCC/IC No. cannot 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 FCC/ISED authorization.

Additional testing, Part 15 Subpart B and ICES-003 disclaimer

Appropriate measurements (e.g. Part 15 Subpart B compliance) and if applicable additional equipment authorizations (e.g. SDoC) of the host product to be addressed by the integrator/manufacturer.

This module is only FCC/ISED authorized for the specific rule parts 15.247, 15.407/RSS-247 listed on the grant, and the host product manufacturer is responsible for compliance to any other FCC/ISED rules that apply to the host product as being Part 15 Subpart B/ICES-003 compliant.

IC Statement:

This device contains licence-exempt transmitter(s)/receiver(s) that comply with Innovation, Science and Economic Development Canada's licence-exempt RSS(s).

Operation is subject to the following two conditions:

1. This device may not cause interference.
2. This device must accept any interference, including interference that may cause undesired operation of the device.

L'émetteur/récepteur exempt de licence contenu dans le présent appareil est conforme aux CNR d'Innovation, Sciences et Développement économique Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes :

1. L'appareil ne doit pas produire de brouillage;

L'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

For product available in the USA/Canada market, only channel 1~11 can be operated.

Selection of other channels is not possible.

Pour les produits disponibles aux États-Unis / Canada du marché, seul le canal 1 à 11 peuvent être exploités. Sélection d'autres canaux n'est pas possible.

This device and its antenna(s) must not be co-located with any other transmitters except in accordance with IC multi-transmitter product procedures.

Referring to the multi-transmitter policy, multiple-transmitter(s) and module(s) can be operated simultaneously without reassessment permissive change.

Cet appareil et son antenne (s) ne doit pas être co-localisés ou fonctionnement en association avec une autre antenne ou transmetteur.

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.

les dispositifs fonctionnant dans la bande 5150-5250 MHz sont réservés uniquement pour une

utilisation à l'intérieur afin de réduire les risques de brouillage préjudiciable aux systèmes de satellites mobiles utilisant les mêmes canaux.

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 specified for point-to-point and non-point-to-point operation as appropriate.

le gain maximal d'antenne permis (pour les dispositifs utilisant la bande 5725-5850 MHz) doit se conformer à la limite de p.i.r.e. spécifiée pour l'exploitation point à point et non point à point, selon le cas.

Dynamic Frequency Selection (DFS) for devices operating in the bands 5250- 5350 MHz, 5470-5600 MHz and 5650-5725 MHz.

Sélection dynamique de fréquences (DFS) pour les dispositifs fonctionnant dans les bandes 5250-5350 MHz, 5470-5600 MHz et 5650-5725 MHz.

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.

le gain maximal d'antenne permis pour les dispositifs utilisant les bandes 5250-5350 MHz et 5470-5725 MHz doit se conformer à la limite de p.i.r.e.

Users should also be advised that high-power radars are allocated as primary users (i.e. priority users) of the bands 5250-5350 MHz and 5650-5850 MHz and that these radars could cause interference and/or damage to LE-LAN devices.

De plus, les utilisateurs devraient aussi être avisés que les utilisateurs de radars de haute puissance sont désignés utilisateurs principaux (c.-à-d., qu'ils ont la priorité) pour les bandes 5250-5350 MHz et 5650-5850 MHz et que ces radars pourraient causer du brouillage et/ou des dommages aux dispositifs LAN-EL.

For indoor use only.

Pour une utilisation en intérieur uniquement.

IMPORTANT NOTE:

IC Radiation Exposure Statement:

This equipment complies with IC RSS-102 radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20 cm between the radiator & your body.

Cet équipement est conforme aux limites d'exposition aux rayonnements IC établies pour un environnement non contrôlé. Cet équipement doit être installé et utilisé avec un minimum de 20 cm de distance entre la source de rayonnement et votre corps.

This radio transmitter (IC: 4491A-WCBN3512R) has been approved by Industry Canada to operate with the antenna types listed below with the maximum permissible gain and required antenna impedance for each antenna type indicated. Antenna types not included in this list,

having a gain greater than the maximum gain indicated for that type, are strictly prohibited for use with this device.

Le présent émetteur radio (IC: 4491A-WCBN3512R) a été approuvé par Industrie Canada pour fonctionner avec les types d'antenne énumérés ci-dessous et ayant un gain admissible maximal et l'impédance requise pour chaque type d'antenne. Les types d'antenne non inclus dans cette liste, ou dont le gain est supérieur au gain maximal indiqué, sont strictement interdits pour l'exploitation de l'émetteur.

The transmitter module may not be co-located with any other transmitter or antenna.

Le module émetteur peut ne pas être coïmplanté avec un autre émetteur ou antenne.

This module is intended for OEM integrator. The OEM integrator is still responsible for the IC compliance requirement of the end product, which integrates this module.

Any changes or modifications not expressly approved by the manufacturer could void the user's authority to operate this equipment.

USERS MANUAL OF THE END PRODUCT:

In the users manual of the end product, the end user has to be informed to keep at least 20 cm separation with the antenna while this end product is installed and operated. The end user has to be informed that the IC radio-frequency exposure guidelines for an uncontrolled

environment can be satisfied. The end user has to also be informed that any changes or modifications not expressly approved by the manufacturer could void the user's authority to operate this equipment. 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.

The transmitter module may not be co-located with any other transmitter or antenna.

Le module émetteur peut ne pas être coïmplanté avec un autre émetteur ou antenne.

LABEL OF THE END PRODUCT:

The final end product must be labeled in a visible area with the following " Contains IC : 4491A-WCBN3512R".

The user manual of the end product should include:

This device contains licence-exempt transmitter(s)/receiver(s) that comply with Innovation, Science and Economic Development Canada's licence-exempt RSS(s). Operation is subject to the following two conditions:

1. This device may not cause interference.

2. This device must accept any interference, including interference that may cause undesired operation of the device.

L'émetteur/récepteur exempt de licence contenu dans le présent appareil est conforme aux CNR d'Innovation, Sciences et Développement économique Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes :

1. L'appareil ne doit pas produire de brouillage;

2. L'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

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.

Les dispositifs fonctionnant dans la bande 5150-5250 MHz sont réservés uniquement pour une utilisation à l'intérieur afin de réduire les risques de brouillage préjudiciable aux systèmes de satellites mobiles utilisant les mêmes canaux.

ISED Radiation Exposure Statement:

This equipment complies with IC RSS-102 radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20cm between the radiator & your body.

Cet équipement est conforme aux limites d'exposition aux rayonnements IC établies pour un environnement non contrôlé. Cet équipement doit être installé et utilisé avec un minimum de 20cm de distance entre la source de rayonnement et votre corps.

For product available in the USA/Canada market, only channel 1~11 can be operated. Selection of other channels is not possible.

Pour les produits disponibles aux États-Unis / Canada du marché, seul le canal 1 à 11 peuvent être exploités. Sélection d'autres canaux n'est pas possible.

Table for Filed Antenna

Antenna Number	Brand Name	Model Name	Ant. Type	Connector	Support	Max Peak Gain
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Antenna 2	SHENZHEN SOUTH STAR	N12-8145-ROA	PCB	I-Pex	2.4G+5G+BT	2.4G : 3.42 dBi 5G : 4.97 dBi BT : 3.42 dBi

CE Statement:

This equipment complies with EU radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20 cm between the radiator & your body.

Japan Statement:

5GHz product for indoor use only.

W52/W53 屋内使用限定ただし登録局に接続される場合は除く

This module is limited to host model number: YY2079C / Brand: SONY