

1.Module: WC1NH25

This document is to specify the product requirements for 802.11a/b/g/n/ac/ax and Bluetooth USB Module. This Card is based on MediaTek MT7921AUN chipset .It is a complete dual-band(2.4GHz and 5GHz)WIFI 2 ×2 MIMO MAC/PHY/Radio System-on-a-Chip. This module provides a high level of integration with adual-stream IEEE 802.11ax MAC/ base band /radio. The WLAN operation supports 20MHz, 40MHz and 80MHz channels for data rates up to 1201Mbps. It is also backward complied with IEEE 802.11a standard from 5.15~5.850GHz wideband and IEEE 802.11b/g standard from 2.4~2.5GHz. It can be used to provide up to 54Mbps for IEEE 802.11a and IEEE 802.11g, 11Mbps for IEEE 802.11b and 300Mbps for IEEE802.11n. The Bluetooth part supports latest 5.2 .

With seamless roaming, fully interoperability and advanced security with WEP standard, 802.11 a/b/g/n/ac USB2.0 Module offers absolute interoperability with different vendors 802.11a/b/g/n/ac. Access Points through the wireless LAN.

2.Features

Chips	MT7921AUN
Spec	IEEE 802.11 a/b/g/n/ac/ax 2T/2R BLUETOOTH 5.2
Frequency Band	2400 ~ 2483.5 MHz、 5150~5850 MHz、 5925~7125MHz
Power Voltage	3.3V
Dimension	26x38x3mm
Environmental Range	Operation temperature:-10~70°C
Modulation	BPSK/QPSK/16QAM/64QAM/256QAM/DBPSK/DQPSK/CCK 、 GFSK π /4-DQPSK 8DPSK

3. Electrical Characteristics

Parameter	Min	Max	Unit
Power Supply Voltage	2.97V	3.63V	V
Ambient Temperature	-10	70	°C

Digital I/O

Symbol	Parameter	Min	TYPE	Max	Unit
DVDDIO	3.3V IO Voltage	2.7	3.3	3.63	V
DVDDIO_18V	1.8V IO Voltage	1.7	1.8	1.9	V
V _{IL}	Input Low Voltage	-0.3	-	VDD3.3*0.25	V
V _{IH}	Input High Voltage	DVDDIO*0.625	-	VDD3.3+0.3	V
V _{OL}	Output Low Voltage	-0.3	-	0.4	V
V _{OH}	Output High Voltage	DVDDIO*0.75	-	VDD3.3+0.3	V

4. Electrical Specifications for Wi-Fi (Radiation Test)

RF Characteristics for IEEE802.11b (11Mbps mode unless otherwise specified)

Items	Contents
Specification	IEEE802.11b
Mode	DSSS/CCK
Channel frequency	2400 ~ 2483.5 MHz
Data rate	at most 11Mbps

Note 1. Normal Condition : 25℃ , VDD=3.3V.

Note 2. This varies by regulatory domain.
Refer to the product documentation for specific details for each regulatory domain.

Note 3. The maximum power setting will vary by channel and according to individual country regulations.
Refer to the product documentation for specific details.

RF Characteristics for IEEE802.11g (54Mbps mode unless otherwise specified)

Items	Contents
Specification	IEEE802.11g
Mode	OFDM
Channel frequency	2400 ~ 2483.5 MHz
Data rate	at most 54Mbps

Note 1. Normal Condition : 25℃ , VDD=3.3V.

Note 2. This varies by regulatory domain.
Refer to the product documentation for specific details for each regulatory domain.

Note 3. The maximum power setting will vary by channel and according to individual country regulations.
Refer to the product documentation for specific details.

RF Characteristics for IEEE802.11n (MCS7 mode unless otherwise specified)

Items	Contents
Specification	IEEE802.11n – 2.4GHz
Mode	11n
Channel frequency	2400 ~ 2483.5 MHz
Data rate	HT20 at most 144Mbps
	HT40 at most 300Mbps

Note 1. Normal Condition : 25℃ , VDD=3.3V.
 Note 2. This varies by regulatory domain.
 Refer to the product documentation for specific details for each regulatory domain.
 Note 3. The maximum power setting will vary by channel and according to individual country regulations.
 Refer to the product documentation for specific details.

RF Characteristics for IEEE802.11ax (MCS11 mode unless otherwise specified)

Items	Contents
Specification	IEEE802.11ax
Mode	HE-SU
Channel frequency	2400 ~ 2483.5 MHz
Data rate	at most 573.5Mbps

Note 1. Normal Condition : 25℃ , VDD=3.3V.
 Note 2. This varies by regulatory domain.
 Refer to the product documentation for specific details for each regulatory domain.
 Note 3. The maximum power setting will vary by channel and according to individual country regulations.
 Refer to the product documentation for specific details.

RF Characteristics for IEEE802.11a (54Mbps mode unless otherwise specified)

Items	Contents
Specification	IEEE802.11a
Mode	OFDM
Channel frequency	5150~5850 MHz
Data rate	at most 54Mbps
Note 1. Normal Condition : 25℃ , VDD=3.3V. Note 2. This varies by regulatory domain. Refer to the product documentation for specific details for each regulatory domain. Note 3. The maximum power setting will vary by channel and according to individual country regulations. Refer to the product documentation for specific details.	

RF Characteristics for IEEE802.11n (MCS7 mode unless otherwise specified)

Items	Contents
Specification	IEEE802.11n – 2.4GHz
Mode	11n
Channel frequency	5150~5850 MHz
Data rate	HT20 at most 144Mbps
	HT40 at most 300Mbps
Note 1. Normal Condition : 25℃ , VDD=3.3V. Note 2. This varies by regulatory domain. Refer to the product documentation for specific details for each regulatory domain. Note 3. The maximum power setting will vary by channel and according to individual country regulations. Refer to the product documentation for specific details.	

RF Characteristics for IEEE802.11ac (MCS8/9 mode unless otherwise specified)

Items	Contents
Specification	IEEE802.11ac – 5GHz
Mode	VHT
Channel frequency	5150 ~ 5850 MHz
Data rate	at most 866Mbps

Note 1. Normal Condition : 25℃ , VDD=3.3V.

Note 2. This varies by regulatory domain.

Refer to the product documentation for specific details for each regulatory domain.

Note 3. The maximum power setting will vary by channel and according to individual country regulations.

Refer to the product documentation for specific details.

RF Characteristics for IEEE802.11ax (MCS11 mode unless otherwise specified)

Items	Contents
Specification	IEEE802.11ax – 5GHz
Mode	HE-SU
Channel frequency	5150 ~ 5850 MHz
Data rate	at most 1201Mbps

Note 1. Normal Condition : 25℃ , VDD=3.3V.

Note 2. This varies by regulatory domain.

Refer to the product documentation for specific details for each regulatory domain.S

Note 3. The maximum power setting will vary by channel and according to individual country regulations.

Refer to the product documentation for specific details.

RF Characteristics for IEEE802.11ax (MCS11 mode unless otherwise specified)

Items	Contents
Specification	IEEE802.11ax – 6GHz
Mode	HE-SU
Channel frequency	5925~7125MHz
Data rate	at most 1201Mbps

Note 1. Normal Condition : 25℃ , VDD=3.3V.

Note 2. This varies by regulatory domain.

Refer to the product documentation for specific details for each regulatory domain.S

Note 3. The maximum power setting will vary by channel and according to individual country regulations.

Refer to the product documentation for specific details.

BT Transmitter Performance

Parameter (Condition)	Min.	Typ.	Max.	Unit	
Transmit Power (PGPSK)	5	8	11	dBm	

Power Density			20	dBm
Frequency Range	2402		2480	MHz
20dB Bandwidth			1000	kHz

In-band Spurious Emissions

$\pm 500\text{kHz}$			-20	dBc
$ M-N = 2\text{MHz}$			-20	dBm
$ M-N \geq 3\text{MHz}$			-40	dBm

Modulation Characteristics, frequency Deviation

$\Delta F_{1\text{avg}}$ (00001111 sequence in payload)	140		175	kHz
$\Delta F_{2\text{max}}$ (10101010 sequence in payload)	115			kHz
$\Delta F_{1\text{avg}} / \Delta F_{2\text{max}}$	0.8			KHz
Initial Carrier Frequency Tolerance	-75		75	kHz

Carrier Frequency Drift

DH1 Packet	-25		25	kHz
DH3 Packet	-40		40	kHz
DH5 Packet	-40		40	kHz
Drift rate	10		20	kHz / μs

Note 1. Normal Condition : 25°C , VDD=3.3V.

Note 2. Supported Bluetooth TX power class 1.

BT Transmitter Performance

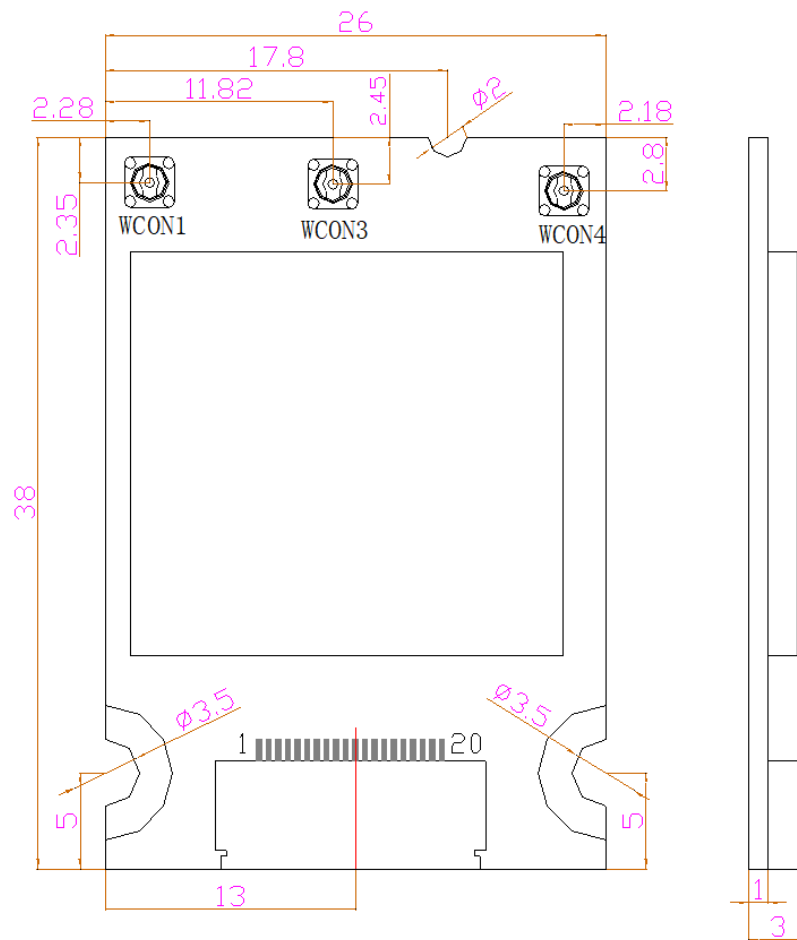
Parameter (Condition)		Min.	Typ.	Max.	Unit
EDR Relative Transmit Power		-4	-	1	dB
EDR Carrier Frequency Stability					
ω_i (2-DH5 and 3-DH5)		-75		75	kHz
ω_0 (2-DH5 and 3-DH5)		-10		10	kHz
$\omega_i + \omega_0$ (2-DH5 and 3-DH5)		-75		75	kHz
EDR Modulation Accuracy					
RMS DEVM	2-DH5			20	%
	3-DH5			13	%
99% DEVM DEVM < 0.30, $\pi/4$ -DQPSK DEVM < 0.20, 8DPSK symbols	2-DH5	99			%
	3-DH5	99			%
Peak DEVM	2-DH5			35	%
	3-DH5			25	%
EDR Differential Phase Encoding (packet with 0 error > 99%)		99			%
EDR In-band Spurious Emissions					
$ M-N = 1\text{MHz}$				Ptx_ref-26	dBm
$ M-N = 2\text{MHz}$				-20	dBm
$ M-N = 3\text{MHz}$				-40	dBm

Note 1. EDR power and BDR power is same

BLE RF Performance

Parameter (Condition)	Min.	Typ.	Max.	Unit
Tx Power	5	8	9	dBm
Rx sensitivity (GFSK, BER, 1 Mbps)			-80	dBm
Mod Char : delta F1 average	225		275	kHz
Mod Char : delta F2 max	99.9		-	%
Mod Char : ratio	80		-	%

5. Mechanical Dimensions



注:

WCON1:BT0 Path;

WCON3:WF1 Path; WCON4:WF2 Path;

Pin Description

Pin	Definition	Remark	I/O	IC PIN#
1	3.3V	3.3V	P	-
2	3.3V	3.3V	P	-
3	3.3V	3.3V	P	-
4	GND	Ground	-	-
5	GND	Ground	-	-
6	DM	USB DM/USB D- single	A	#35
7	DP	USB DP/USB D+ single	A	#34
8	GND	Ground	-	-
9	GND	Ground	-	-
10	PCM_CLK	PCM_CLK for BT audio signals	I	#18(GPIO10)
11	PCM_SYNC	PCM_SYNC for BT audio signals	I	#22(GPIO6)
12	7921_PCM_DIN	PCM_IN for BT audio signals	I	#20(GPIO8)
13	7921_PCM_DOUT	PCM_OUT for BT audio signals	O	#21(GPIO7)
14	GND	Ground	-	
15	7921_PMU_RST	power-on reset (POR) function	I	#105
16	BT_RST	BT Subsys RST	I	#19(GPIO9)
17	WOWL	WoW for active-low (Internal pull-up 10K Ohm)	O	#44(GPIO1)
18	WOBLE	WoBLE for active low (Internal pull-up 10K Ohm)	O	#46(GPIO0)
19	TSF	Timing Synchronization Function	O	#16(GPIO12)
20	LE_Sync	BT Audio Sync	O	#41(GPIO3)

Compliance Information

FCC

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.

- FCC regulations restrict the operation of this device to indoor use only.
- This device is prohibited from being operated on oil platforms, cars, trains, boats, and aircraft, except it can be operated in large aircraft while flying above 10,000 feet in the 5.925-6.425 GHz band.
- Transmitters in the 5.925-7.125 GHz band are prohibited from operating to control or communicate with unmanned aircraft systems.

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

This device should be installed and operated with minimum 20 cm between the radiator and your body.

ISED

This device contains licence-exempt transmitter(s)/receiver 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.

Cet appareil contient des émetteurs / récepteurs exempts de licence qui sont conformes aux RSS exempts de licence d'Innovation, Sciences et Développement économique Canada. Son fonctionnement est soumis aux deux conditions suivantes:

- (1) Cet appareil ne doit pas provoquer d'interférences.
- (2) Cet appareil doit accepter toute interférence, y compris les interférences qui peuvent provoquer un fonctionnement indésirable de l'appareil.

This device should be installed and operated with minimum 20 cm between the radiator and your body.

Cet appareil doit être installé et utilisé avec un minimum de 20 cm entre le radiateur et votre corps.

- 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).
 - Operation shall be limited to indoor use only.
-
- Les dispositifs ne doivent pas être utilisés pour le contrôle ou les communications avec des systèmes d'aéronefs sans pilote.
 - Les dispositifs ne doivent pas être utilisés sur des plates-formes pétrolières.
 - Les dispositifs ne doivent pas être utilisés à bord d'un aéronef, sauf pour les points d'accès à faible puissance pour usage intérieur, les dispositifs subordonnés intérieurs, les dispositifs clients à faible puissance et les dispositifs à très faible puissance fonctionnant dans la bande 5925-6425 MHz, qui peuvent être utilisés à bord des grands aéronefs tels que définis dans le Règlement de l'aviation canadien, lorsqu'ils volent à plus de 3 048 mètres (10 000 pieds).
 - Le fonctionnement doit être limité à une utilisation en intérieur uniquement.

This module has been approved by Innovation, Science and Economic Development Canada to operate with the antenna types listed in Antennas section of integration instructions, 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.

Ce module a été approuvé par Innovation, Sciences et Développement économique Canada pour fonctionner avec les types d'antennes énumérés dans la section Antennes des instructions d'intégration, avec le gain maximal admissible indiqué. Les types d'antennes non inclus dans cette liste et ayant un gain supérieur au gain maximal indiqué pour tout type listé sont strictement interdits avec cet appareil.

INTEGRATION INSTRUCTIONS

List of applicable FCC/ISED rules

-This device complies with FCC Part 15.247/15.407 and ISED RSS-247/RSS-248.

Summarize the specific operational use conditions

- This device mobile/fixed application only.
- Operation shall be limited to indoor use only.
- This device is prohibited from being operated on oil platforms, cars, trains, boats, and aircraft, except it can be operated in large aircraft while flying above 10,000 feet in the 5.925-6.425 GHz band.
- Transmitters in the 5.925-7.125 GHz band are prohibited from operating to control or communicate with unmanned aircraft systems.
- The host device must be powered by a wired connection, not battery power. They may use battery backup only during power outages.
- The antennas must be integrated into the host device, and the host device cannot have or use a weatherized enclosure.

Limited module procedures

NA(FCC)

This module is approved under Limited Modular Approval (LMA) only, as required by ISED.

For ISED, full Modular Approval is not permitted due to specific regulatory considerations including:

- Minimum antenna gain requirements for contention-based protocol operation.
- Restrictions on integrated antennas.
- Indoor versus outdoor use limitations.

Trace antenna designs

-NA

RF exposure considerations

This module complies with FCC/ISED RF radiation exposure limits set forth for an uncontrolled environment. The module is limited to installation in mobile applications.

This device should be installed and operated with minimum 20Cm between the radiator and user body.

The host manual shall include the RF exposure statements.

If RF exposure statements and use conditions are not provided, then the host product manufacturer is required to take responsibility of the module through a change in FCC ID (new application).

Antennas

This module has been approved by FCC/ISED to operate with the antenna 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 Type: FPC Antenna

M3 series

	M3(BT)	M3(WIFI1)	M3(WIFI2)
Frequency Range(MHz)	Gain(dBi)	Gain(dBi)	Gain(dBi)
2400~2500	1.91	1.71	1.42
5150~5850	NA	2.91	3.42
5925~7125	NA	2.36	3.55

M5 series

	M5(BT)	M5(WIFI1)	M5(WIFI2)
Frequency Range(MHz)	Gain(dBi)	Gain(dBi)	Gain(dBi)
2400~2500	3.35	3.35	4.21
5150~5850	NA	3.98	4.90
5925~7125	NA	5.01	5.36

S7 series

	S7(BT)	S7(WIFI1)	S7(WIFI2)
Frequency Range(MHz)	Gain(dBi)	Gain(dBi)	Gain(dBi)
2400~2500	1.95	1.78	2.11
5150~5850	NA	2.58	2.87
5925~7125	NA	2.75	2.98

Label and compliance information

The module is labeled with its own FCC ID/ISED certification number.

If the FCC ID/ISED certification number is not visible when the module is installed inside another device, then the outside of the device into which the module is installed must also display a label referring to the enclosed module. In that case, the final end product must be labeled in a visible area with the following:

For FCC

“Contains FCC ID: 2B03L-WC1NH25”,

For ISED

“Contains IC: 2703H-WC1NH25”.

The host manual shall include the following regulatory statement:

Please refer to the Compliance Information Section in this document.

Information on test modes and additional testing requirements

Testing of the host product with all the transmitters installed - referred to as the composite investigation test- is recommended, to verify that the host product meets all the applicable FCC rules.

Co-location of this module with other transmitters that operate simultaneously are required to be evaluated using the multi-transmitter procedures.

Additional testing, Part 15 Subpart B disclaimer

The modular transmitter is only FCC authorized for the specific rule parts (i.e., FCC transmitter rules) listed on the grant, and that the host product manufacturer is responsible for compliance to any other FCC rules that apply to the host not covered by the modular transmitter grant of certification.

The host product may need to be evaluated against the FCC Part 15B criteria for unintentional radiators in order to be properly authorized for operation as a Part 15 digital device.

Note EMI Considerations

Note that a host manufacture is recommended to use D04 Module Integration Guide recommending as "best practice" RF design engineering testing and evaluation in case non-linear interactions generate additional non-compliant limits due to module placement to host components or properties.

How to make changes

Since only Grantees are permitted to make permissive changes, a new FCC ID may be required if the module is used in a manner different from the certified configuration.