

FCC 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 or more of the following measures:

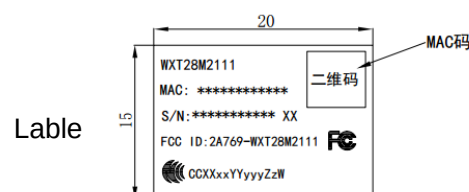
- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

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

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. CAUTION: Any changes or modifications not expressly approved by the grantee of this device could void the user's authority to operate the equipment.

The modular can be installed or integrated in mobile or fix devices only. This modular cannot be installed in any portable device, for example, USB dongle like transmitters is forbidden.

This module is applicable to 15.247 and 15.407. It also meets the testing requirements of part 15B.



RF exposure warning

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment.

This equipment must be installed and operated in accordance with provided instructions and the antenna(s) used for this transmitter must be installed to provide a separation distance of at least 20 cm from all persons and must not be co-located or operating in conjunction with any other antenna or transmitter.

**IEEE 802.11 a/b/g/n/ac/ax 2T/2R+ Bluetooth V2.1/4.2/5.2
USB2.0/3.0 Module**

Model Number:WXT28M2111
(MediaTek : MT7921AU)

客户认可 Custom Approval Section		
Custom Name		
Department		
Approval		Date:

拟制 DESIGN	审核 CHECK	批准 APPROVAL
赵聪	秦楠	高照
2023-09-08	2023-09-08	2023-09-08

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PRODUCTS SPECIFICATION

WXT28M2111

Document revision history

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Version 1.0	2023-09-08		Draft



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WXT28M2111

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1. General Description

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 MT7921 chipset. It is a complete dual-band (2.4GHz and 5GHz) WIFI 2 x2 MIMO MAC/PHY/Radio System-on-a-Chip. This module provides a high level of integration with a dual-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 compliant with IEEE 802.11a standard from 5.15~5.825GHz 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 IEEE 802.11n. The Bluetooth part supports latest 5.2.

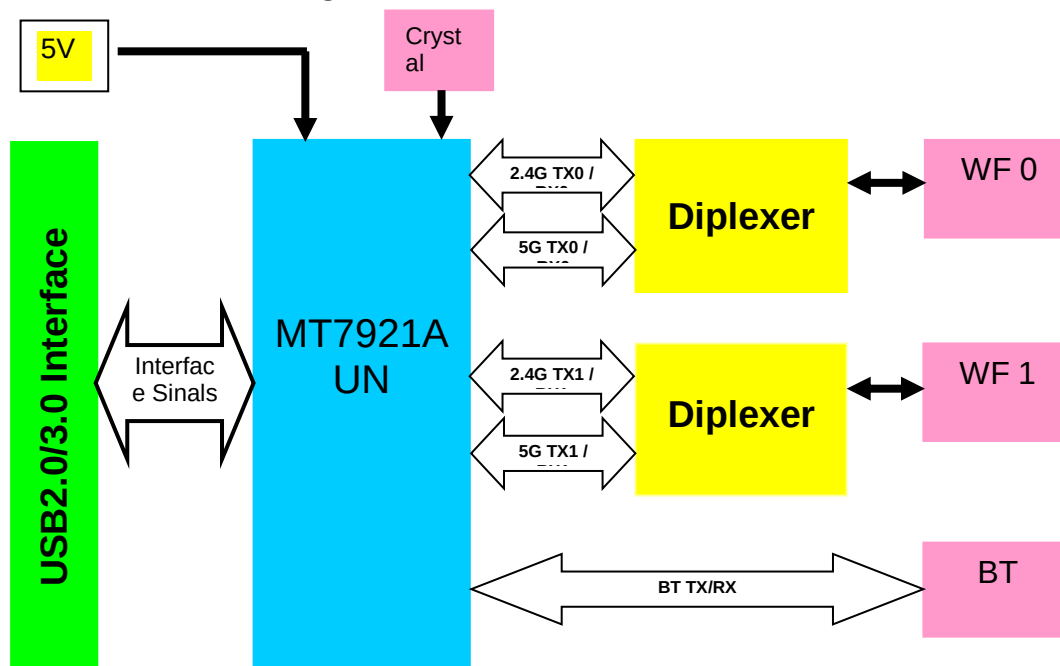
With seamless roaming, fully interoperability and advanced security with WEP standard, 802.11 a/b/g/n/ac USB 2.0 Module offers absolute interoperability with different vendors 802.11a/b/g/n/ac. Access Points through the wireless LAN.

2. Features

- Compatible with IEEE 802.11a standard to provide wireless 54Mbps data rate
- Compatible with IEEE 802.11b standard to provide wireless 11Mbps data rate
- Compatible with IEEE 802.11g standard to provide wireless 54Mbps data rate
- Compatible with IEEE 802.11n standard to provide wireless 300Mbps data rate
- Compatible with IEEE 802.11ac standard to provide wireless 866.7Mbps data rate.
- Compatible with IEEE 802.11ax standard to provide wireless 1201Mbps data rate.
- Operation at 2.4~2.5GHz and 5.15~5.825GHz frequency band to meet worldwide regulations.
- Support MU-MIMO RX.
- Bluetooth specification 2.1+EDR
- Bluetooth 5.2 Low Energy (LE)
- IEEE 802.11 d/e/h/i/j/k/m/r/v/w support
- Security support for WPA/WPA2/WPA3 personal, WPS 2.0, WAPI
- Drivers support Win10, Win8, Win7, XP, Linux
- High speed USB 2.0 interface
- High speed USB 3.0 interface
- HSF compliant

3. Application Diagrams

3.1 Functional Block Diagram



3.2 General Requirements

3.2.1 IEEE 802.11b Section

	Feature	Detailed Description
3.2.1.1	Standard	IEEE 802.11b
3.2.1.2	Radio and Modulation Schemes	DQPSK , DBPSK and CCK with DSSS
3.2.1.3	Operating Frequency	2400 ~ 2483.5MHz ISM band
3.2.1.4	Channel Numbers	13 channels for Worldwide
3.2.1.5	Data Rate	at most 11Mbps
3.2.1.6	Media Access Protocol	CSMA/CA with ACK
3.2.1.7	Transmitter Output Power at Antenna Connector	- Typical RF Output Power at each RF chain, and at room Temp. 25°C 14±2 dBm at 11Mbps
3.2.1.8	Receiver Sensitivity at Antenna Connector	- Typical Sensitivity at each RF chain. @Frame (1000-byte PDUs) Error Rate<8% at room Temp 25°C -83 dBm for 11Mbps

3.2.2 IEEE 802.11g Section

	Feature	Detailed Description
3.2.2.1	Standard	IEEE 802.11g
3.2.2.2	Radio and Modulation Type	QPSK , BPSK , 16QAM ,64QAM with OFDM
3.2.2.3	Operating Frequency	2400 ~ 2483.5MHz ISM band
3.2.2.4	Channel Numbers	13 channels for Worldwide
3.2.2.5	Data Rate	at most 54Mbps
3.2.2.6	Media Access Protocol	CSMA/CA with ACK
3.2.2.7	Transmitter Output Power at Antenna Connector	- Typical RF Output Power at each RF chain, at room Temp. 25°C 14±2 dBm at 54Mbps
3.2.2.8	Receiver Sensitivity at Antenna Connector	- Typical Sensitivity at each RF chain. @Frame (1000-byte PDUs) Error Rate<10% at room Temp 25°C -71 dBm for 54Mbps

3.2.3 IEEE 802.11a Section

	Feature	Detailed Description
3.2.3.1	Standard	IEEE 802.11a
3.2.3.2	Radio and Modulation Type	QPSK , BPSK , 16QAM ,64QAM with OFDM
3.2.3.3	Operating Frequency	5.15~5.25GHz 5.25~5.35GHz 5.47~5.725GHz 5.725~5.825GHz
3.2.3.4	Data Rate	at most 54Mbps
3.2.3.5	Media Access Protocol	CSMA/CA with ACK
3.2.3.6	Transmitter Output Power at Antenna Connector	- Typical RF Output Power at each RF chain, at room Temp. 25°C 14±2 dBm at 54Mbps
3.2.3.7	Receiver Sensitivity at Antenna Connector	- Typical Sensitivity at each RF chain. @Frame (1000-byte PDUs) Error Rate<10% at room Temp 25°C -71 dBm for 54Mbps

3.2.4 IEEE 802.11n Section

	Feature	Detailed Description	
3.2.4.1	Standard	IEEE 802.11n	
3.2.4.2	Radio and Modulation Type	BPSK , QPSK , 16QAM ,64QAM with OFDM	
3.2.4.3	Operating Frequency	2.4GHz :2400 ~ 2483.5MHz for ISM band 5GHz : 5.15~5.25GHz; 5.25~5.35GHz; 5.47~5.725GHz; 5.725~5.825GHz;	
3.2.4.4	Data Rate	at most 300 Mbps	
3.2.4.5	Media Access Protocol	CSMA/CA with ACK	
3.2.4.6	Transmitter Output Power at Antenna Connector	Typical RF Output Power at each RF chain,and at roomTemp. 25°C	
		2.4GHz Band/HT20 14±2dBm at MCS7	2.4GHz Band/HT40 14±2dBm at MCS7
		5GHz Band/HT20 14±2dBm at MCS7	5GHz Band/HT40 14±2dBm at MCS7
3.2.4.7	Receiver Sensitivity at Antenna Connector	Typical Sensitivity at each RF chain. @Frame(1000-byte PDUs)Error Rate=10% and at room Temp. 25°C	
		2.4GHz Band/HT20 -68dBm at MCS7	2.4GHz Band/HT40 -66dBm at MCS7
		5GHz Band/HT20 -68dBmat MCS7	5GHz Band/HT40 -66dBm at MCS7

3.2.5 IEEE 802.11ac Section

	Feature	Detailed Description		
3.2.5.1	Standard	IEEE 802.11ac		
3.2.5.2	Radio and Modulation Type	QPSK , BPSK , 16QAM ,64QAM,256QAM with OFDM		
3.2.5.3	Operating Frequency	5GHz : 5.15~5.25GHz; 5.25~5.35GHz; 5.47~5.725GHz; 5.725~5.825GHz;		
3.2.5.4	Data Rate	at most 866.7 Mbps		
3.2.5.5	Media Access Protocol	CSMA/CA with ACK		
3.2.5.6	Transmitter Output Power at Antenna Connector	- Typical RF Output Power at each RF chain, at room Temp. 25°C 13±2dBm HT80 at MCS9		
3.2.5.7	Receiver Sensitivity at Antenna Connector	Typical Sensitivity at each RF chain. @Frame(1000-byte PDUs)Error Rate<10% at room Temp 25°C		
		<table><tr><td>5GHz Band / HT20 -64dBm at MCS8 </td><td>5GHz Band / HT40 -58dBm at MCS9 </td></tr></table>	5GHz Band / HT20 -64dBm at MCS8	5GHz Band / HT40 -58dBm at MCS9
		5GHz Band / HT20 -64dBm at MCS8	5GHz Band / HT40 -58dBm at MCS9	
<table><tr><td>5GHz Band / HT80 -55dBm at MCS9 </td><td></td></tr></table>	5GHz Band / HT80 -55dBm at MCS9			
5GHz Band / HT80 -55dBm at MCS9				

3.2.6 IEEE 802.11ax Section

	Feature	Detailed Description	
3.2.6.1	Standard	IEEE 802.11ax	
3.2.6.2	Radio and Modulation Type	QPSK , BPSK , 16QAM ,64QAM,256QAM, 1024QAM	
3.2.6.3	Operating Frequency	2G: 2400 ~ 2483.5MHz ISM band 5GHz : 5.15~5.25GHz; 5.25~5.35GHz; 5.47~5.725GHz; 5.725~5.825GHz;	
3.2.6.4	Data Rate	2.4G: at most 573.5 Mbps 5G: at most 1201 Mbps	
3.2.6.5	Media Access Protocol	CSMA/CA with ACK	
3.2.6.6	Transmitter Output Power at Antenna Connector	- Typical RF Output Power at each RF chain, at room Temp. 25℃ 11±2dBm HT80 at MCS11	
3.2.6.7	Receiver Sensitivity at Antenna Connector	Typical Sensitivity at each RF chain. @Frame(1000-byte PDUs)Error Rate<10% at room Temp 25℃	
		2GHz Band / HT20 -57dBm at MCS11	2GHz Band / HT40 -55dBm at MCS11
		5GHz Band / HT20 -57dBm at MCS11	5GHz Band / HT40 -55dBm at MCS11
		5GHz Band / HT80 -53dBm at MCS11	



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3.2.7 Bluetooth Section

Feather		Description	
General specification			
Bluetooth standard	Bluetooth V2.1/3.0/4.2/5.2		
Frequency band	2402MHz-2480MHz		
Channel Numbers	79 channels for BDR+EDR 40 channels for BLE		
Modulation	GFSK, $\pi/4$ -DQPSK and 8DPSK		
RF specification			
	Min (dBm)	Type (dBm)	Max (dBm)
BDR Output Power		7	
BLE Output Power		5	
Sensitive @BER=0.1% FOR GFSK(1Mbps)		-86	
Sensitive @BER=0.01% FOR $\pi/4$ -DQPSK(2Mbps)		-86	
Sensitive @BER=0.01% FOR 8DPSK(3Mbps)		-80	
Maximum input level	GFSK(1Mbps) -20dBm		
	$\pi/4$ -DQPSK(2Mbps) -20dBm		
	8DQPSK(3Mbps) -20dBm		
Sensitive @PER=30.8% FOR BLE		-90	

4. Electrical and Thermal Characteristics

4.1 Temperature Limit Ratings

Parameter	Minimum	Maximum	Units
Storage Temperature	-40	+80	°C
Ambient Operating Temperature	0	70	°C
Junction Temperature	0	125	°C

4.2 General Section

	Feature	Detailed Description
4.2.1	Antenna Type	• WIFI&BT:IPEX connector
4.2.2	Operating Voltage	• 5V±10%
4.2.3	Current Consumption	• <300mA@RX • <2000mA@TX
4.2.4	Form Factor and Interface	• High Speed USB3.0/USB2.0 Interface

4.3 Software

Driver	Win10,Win8,Win7, XP, Linux, MAC
Security	64/128-bits WEP, WPA, WPA2

4.4 EEPROM Information

BT

Vendor ID	0E8D
Product ID	7961

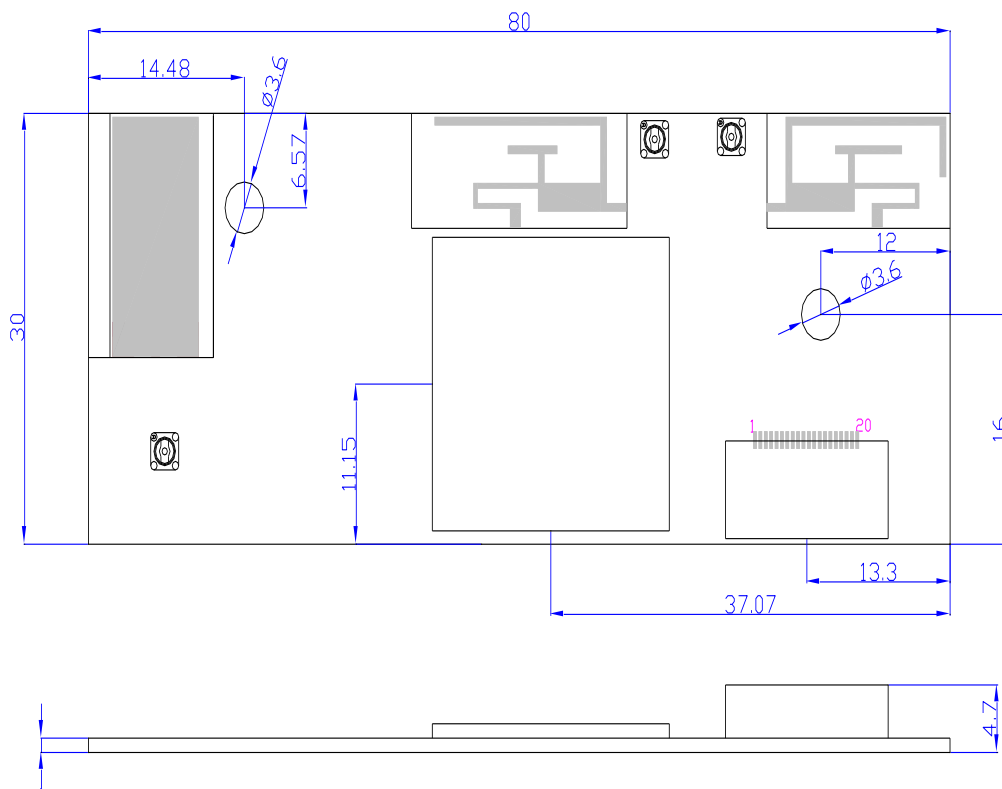
WiFi

Reg Domain	Worldwide 2.4G/5G Read from registry; Control by driver
Vendor ID	0E8D
Product ID	7961

4.5 DC Characteristics

Symbol	Parameter	Min	TYPE	Max	Unit
V_{IL}	Input Low Voltage	-0.3		$V_{DD3.3} \pm 0.25$	V
V_{IH}	Input High Voltage	$V_{DD3.3} \pm 0.625$		$V_{DD3.3} + 0.3$	V
V_{OL}	Output Low Voltage	-0.3		0.4	V
V_{OH}	Output High Voltage	$V_{DD3.3} - 0.4$		$V_{DD3.3} + 0.3$	V

5. Mechanical Dimensions



Pin	Symbol	DESCRIPTION	I/O
1	GND	GND	-
2	GND	GND	-
3	GND	GND	-
4	USB3_TX-	USB3.0	O
5	USB3_TX+	USB3.0	O
6	GND	GND	-
7	USB3_RX-	USB3.0	I
8	USB3_RX+	USB3.0	I
9	GND	GND	-
10	GND	GND	-
11	D+	USB Communication signal USB-DP)	I/O
12	D-	USB Communication signal USB-DM	I/O
13	GND	GND	-
14	GPI01	BT/WIFI wake up host (内有10K电阻上拉到3.3V), 低电平有效	O
15	RESET	Reset controlled by main SOC (内有10K电阻上拉到3.3V), 低电平有效	I
16	5V	Power supply	-
17	5V	Power supply	-
18	5V	Power supply	-
19	5V	Power supply	-
20	5V	Power supply	-

尺寸误差范围:

长度(mm)	误差(mm)
0-5	±0.15
5-10	±0.20
10-50	±0.30
>50	±0.40

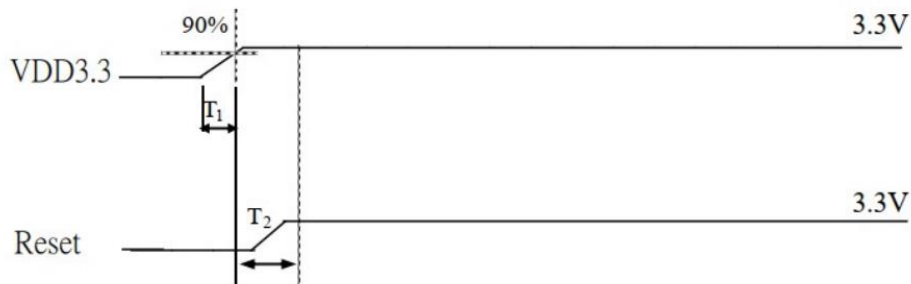
6. Product picture



7. Component preparation

物料名称/ Type	供应商品牌/ Manufacturer
晶振/ Crystal oscillator	晶宝时频 CREC/HOSONIC
电阻/ Resistance	华新科 Walsin /国巨 Yageo
WIFI 芯片/IC	MTK
电容/ Capacitance	Murata (村田) /华新科 Walsin/国巨 Yageo
电感/ Inductance	Murata (村田) /奇力新 CHILISIN
功率电感	风华科技/佳邦/奇力新/风华
印制板/PCB	富智祥/科翔/宝信欣旺/凌航达
双工器/IC	华新科/ ACX/佳利
降压管	拓尔微电子/Fiti Power/蕊源
SMT connector	昶通

8. Interface Timing Specification



The typical timing range

	Unit	Min	Typical	Max
T ₁	ms	0.25	2	5
T ₂	ms	1	--	--

Note: T₂ must be asserted after VDD3.3 ready

FCC Statements

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.

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

FCC Radiation Exposure Statement

The modular can be installed or integrated in mobile or fix devices only. This modular cannot be installed in any portable device, for example, USB dongle like transmitters is forbidden.

This modular complies with FCC RF radiation exposure limits set forth for an uncontrolled environment. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter. This modular must be installed and operated with a minimum distance of 20 cm between the radiator and user body.

If the FCC identification 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. This exterior label can use wording such as the following: "Contains Transmitter Module FCC ID: 2A769-WXT28M2111 Or Contains FCC ID: 2A769-WXT28M2111"

When the module is installed inside another device, the user manual of this device must contain below warning statements:

1. 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.

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

The devices must be installed and used in strict accordance with the manufacturer's instructions as described in the user documentation that comes with the product.

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 final host product still requires Part 15 Subpart B compliance testing with the modular transmitter installed.

The end user manual shall include all required regulatory information/warning as shown in this manual, include:

This product must be installed and operated with a minimum distance of 20 cm between the radiator and user body.