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:WXT28M2511

(MediaTek : MT7921AU)

Wifi module

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

拟制 DESIGN	审核 CHECK	批准 APPROVAL
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WXT28M2511

Document revision history

Revision	Date	Approved by	Remarks
Version 1.0	2022-09-26		Draft
Version 1.1	2022-12-21		增加 2.4G 最大吞吐量



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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 ×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 5.15~5.825GHz 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 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

- 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 date 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/mc/r/v/w support
- Security support for WFA WPA/WPA2/WPA3 personal, WPS2.0, WAPI
- Drivers support Win10, Win8, Win7, XP, Linux
- High speed USB 2.0 interface
- High speed USB 3.0 interface
- HSF compliant

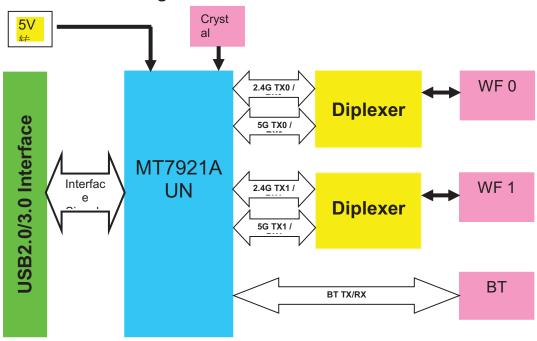
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3. Application Diagrams

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	$ullet$ 2400 \sim 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 ℃ 1J±F 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℃ -83 dBm for 11Mbps 		

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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	$ullet$ 2400 \sim 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		
	Transmitter Output	Typical RF Output Power at each RF chain,		
3.2.2.7	Power at Antenna	at room Temp. 25℃		
	Connector	14±F dBm at 54Mbps		
3.2.2.8	Receiver Sensitivity	\bullet Typical Sensitivity at each RF chain. @Frame (1000-byte PDUs) Error Rate<10% at room Temp 25 $^{\circ}\mathrm{C}$		
3.2.2.0	at Antenna Connector	• -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℃ 14±F 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 		

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3.2.4 IEEE 802.11n Section

	Feature	Detailed Description			
3.2.4.1	Standard	• IEEE 802.11n	• IEEE 802.11n		
3.2.4.2	Radio and Modulation Type	BPSK , QPSK , 16QAM ,64QAM with OFDM			
3.2.4.3	Operating Frequency	5GHz: 5.15~5.25GHz; 5.25~	 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	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±FdBm at MCS7 5GHz Band/HT20 13±FdBm at MCS7 32±FdBm at MCS7 32±FdBm at MCS7 			
3.2.4.7	Receiver Sensitivity at Antenna Connector	Typical Sensitivity at each RF cl Rate=10% and at room Temp. 25°C 2.4GHz Band/HT20 •-68dBm at MCS7 5GHz Band/HT20 •-68dBmat MCS7	hain. @Frame(1000-byte PDUs)Error 2.4GHz Band/HT40 • -66dBm at MCS7 5GHz Band/HT40 • -66dBm at MCS7		



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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℃ 18±1dBm 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 5GHz Band / HT20 5GHz Band / HT40 • -64dBm at MCS8 • -58dBm 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 Mbps5G: 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°C 1 6±1dBm HT80 at MCS11 		
3.2.6.7	Receiver Sensitivity at Antenna Connector	1 6±1dBm HT80 at MCS11 Typical Sensitivity at each RF chain. @Frame(1000-byte PDUs)Error Rate<10% at room Temp 25℃ 2GHz Band / HT20 2GHz Band / HT40 -57dBm at MCS11 5GHz Band / HT20 5GHz Band / HT40 -57dBm at MCS11 5GHz Band / HT80 -53dBm at MCS11		



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3.2.7 Bluetooth Section

Feather		Description				
General specification	General specification					
Bluetooth standard	Bluetooth V2.1/4.2/5	.2				
Frequency band	2402MHz-2480MHz					
Channel Numbers	79 channels for BDR 40 channels for BLE	+EDR				
Modulation	GFSK, π/4-DQPSK a	and 8DPSK				
RF specification						
	Min (dBm)	Type (dBm)	Max (dBm)			
BDR Output Power		9				
BLE Output Power		5				
Sensitive @BER=0.1% FOR GFSK(1Mbps)		-86				
Sensitive @BER=0.01% FOR		-86				
π /4-DQPSK(2Mbps)						
Sensitive @BER=0.01% FOR 8DPSK(3Mbps)		-80				
Maximum input level	GFSK(1Mbps) -20dBm					
·	π /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	С
Ambient Operating Temperature	0	70	С
Junction Temperature	0	125	С

4.2 General Section

	Feature	Detailed Description
4.2.1	Antenna Type	WIFI&BT: PCB Antenna
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

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

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4.4 **EEPROM Information**

BT

Vendor ID	0E8D
Product ID	7961

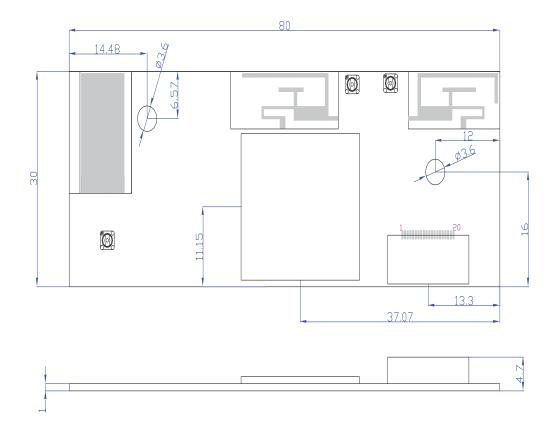
WiFi

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
VIL	Input Low Voltage	-0.3		VDD3.3*0.25	V
VIH	Input High Voltage	VDD3.3*0.625		VDD3.3+0.3	V
Vol	Output Low Voltage	-0.3		0.4	V
Vон	Output High Voltage	VDD3.3-0.4		VDD3.3+0.3	V

5. Mechanical Dimensions





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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	О
S	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 (內有10K电阻上拉到3.3V),低电平有效	О
1ξ	RESET	Reset controlled by main SOC(内有10K电阻上拉到3.3V),低电平有效	I
16	Γv	Power supply	-
17	۲v	Power supply	-
18	ζv	Power supply	-
19	۲v	Power supply	-
20	ξv	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

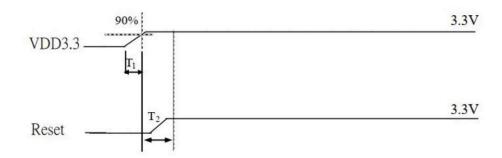


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6. Component preparation

物料名称/Type	供应商品牌/Manufacturer
晶振/Crystal	晶宝时频 CREC/加高 HARMONY
oscillator	田玉中,例 CREC/ 加山山 HARMONI
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
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

7. Interface Timing Specification



The typical timing range

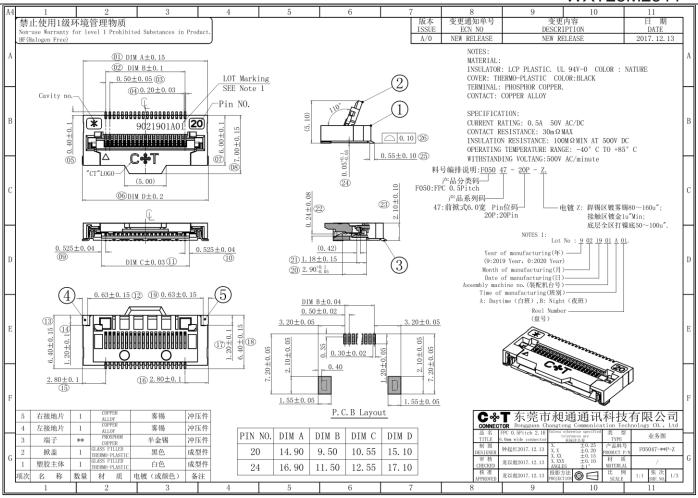
	Unit	Min	Typical	Max
T_1	ms	0.25	2	5
T ₂	ms	1		(de);

Note: T2 must be asserted after VDD3.3 ready

Appendix 1: SMTconnector



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FCC 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.

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

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursua nt to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful inte rference in a residential installation. This equipment generates uses and can radiate radio frequency energy a nd, if not installed and used in accordance with the instructions, may cause harmful interference to radio com munications. 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 turn ing 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 important announcement Important Note:

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 20cm between the radiator and your body.

This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter. Country Code selection feature to be disabled for products marketed to the US/Canada.

This device is intended only for OEM integrators under the following conditions:

- 1. The antenna must be installed such that 20 cm is maintained between the antenna and users, and
- 2. The transmitter module may not be co-located with any other transmitter or antenna,
- 3. For all products market in US, OEM has to limit the operation channels in CH1 to CH11 for 2.4G band by supplied firmware programming tool. OEM shall not supply any tool or info to the end-user regarding to Regulatory Domain change. (if modular only test Channel 1-11)

As long as the three conditions above are met, further transmitter testing 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 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 re-evaluating the end product (including the transmitter) and obtaining a separate FCC authorization.

End Product Labeling

The final end product must be labeled in a visible area with the following" Contains FCC ID: **2A94K-WXT28M2511**"

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.

Integration instructions for host product manufacturers according to KDB 996369 D03 OEM Manual v01

2.2 List of applicable FCC rules

CFR 47 FCC PART 15 SUBPART C has been investigated. It is applicable to the modular transmitter

2.3 Specific operational use conditions

This module is stand-alone modular. If the end product will involve the Multiple simultaneously transmitting condition or different operational conditions for a stand-alone modular transmitter in a host, host manufacturer have to consult with module manufacturer for the installation method in end system.

2.4 Limited module procedures

Not applicable

2.5 Trace antenna designs

Not applicable

2.6 RF exposure considerations

This equipment complies with FCC 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.

2.7 Antennas

This radio transmitter FCC ID:2A94K-WXT28M2511 has been approved by Federal Communications Commission to operate with

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 No.	Type of antenna:	Gain of the antenna (Max.)	Frequency range:	
2.4GWiFi	PCB Antenna	ANT0:2.93dBi	2412-2462MHz	
2.46 WIFI	PCB Antenna	ANT1:3.27dBi	2412-24021VITI2	
ECIALI ANI	DCD Automa	ANT0:3.72dBi	E400 E00EMLI=	
5GWLAN	PCB Antenna	ANT1:3.86dBi	5180-5825MHz	
BLE&BT	PCB Antenna	2dBi	2402-2480MHz	

2.8 Label and compliance information

The final end product must be labeled in a visible area with the following" Contains FCC ID:2A94K-WXT28M2511".

2.9 Information on test modes and additional testing requirements

Host manufacturer is strongly recommended to confirm compliance with FCC requirements for the transmitter when the module is installed in the host.

2.10 Additional testing, Part 15 Subpart B disclaimer

Host manufacturer is responsible for compliance of the host system with module installed with all other applicable requirements for the system such as Part 15 B.