M632USA1

IEEE 802.11a/b/g/n 2T2R USB WiFi Module
Integrated Bluetooth 2.1/3.0/4.0

特性 Features：

- ➤ **接收制式 Reserving System**
  IEEE Std. 802.11a
  IEEE Std. 802.11b
  IEEE Std. 802.11g
  IEEE Std. 802.11n
  Bluetooth 2.1/3.0/4.0
- ➤ **芯片方案 Chip Solution**
  Mediatek MT7632U
- ➤ **结构大小 Size**
  22mm x32mm x 3.5mm

Model Overview：

WIFI-2-M632USA1	SMD	IEEE 802.11a/b/g/n	300Mbps	2.4G/5G	9I hYf bU UbhYbbU	3.3V	□
		Bluetooth 2.1/3.0/4.0	3Mbps	2.4G			

1. Introduction

M632USA1 module design is based on Mediatek MT7632U solution, The MT7632U is a highly integrated single chip which has built in a 2x2 dual-band wireless LAN radio and Bluetooth radio. It includes Bluetooth EDR and LE radio which complies with Bluetooth v2.1+EDR, v3.0, and v4.0+BLE. The Module is a highly integrated MAC/BBP and 2.4/5GHz PA/LNA single chip which supports a 300Mbps PHY rate. The Module is designed to support standard-based features in the areas of security, quality of service, and international regulations, giving end users the greatest performance anytime and in any circumstance. This documentation describes the engineering requirements specification.

1.1 RF module Overview

The general HW architecture for the module is shown in Figure 1. This WLAN Module design is based on Mediatek MT7632U. It is a highly integrated single-chip MIMO(Multiple In Multiple Out) Wireless LAN (WLAN) network interface controller complying with the 802.11 specification and Bluetooth over USB interface. It combines a MAC, a 2T2R capable baseband, and RF in a single chip. An intelligent Wi-Fi/Bluetooth coexistence algorithm is implemented to provide the best harmonized Wi-Fi and Bluetooth radio performance.
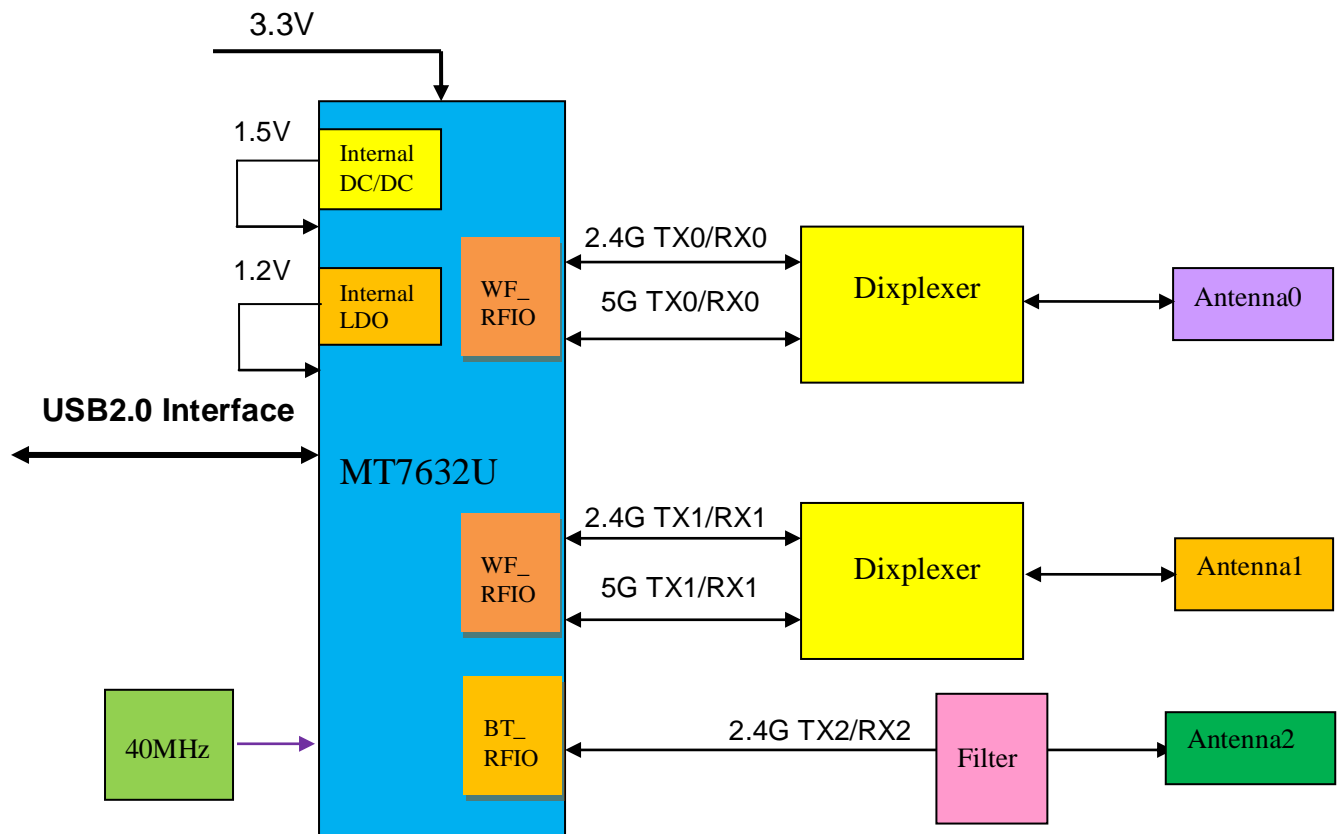

Figure 1 M632USA1 Block Diagram

1.2 Specification reference

This specification is based on additional references listed below.

_ IEEE Std. 802.11a

_ IEEE Std. 802.11b

_ IEEE Std. 802.11g

_ IEEE Std. 802.11n

_ Bluetooth 2.1/3.0/4.0

## 1.3 System Functions

Table1: General Specification as below:

Main Chipset	Mediatek MT7632U
Operating Frequency	2.4G/5G
WiFi Standard	802.11a/b/g/n (2x2)
Bluetooth	2.1/3.0/4.0

Modulation	WIFI:11b: DBPSK, DQPSK and CCK and DSSS
	  11a/g: BPSK, QPSK, 16QAM, 64QAM and OFDM
	  11n: BPSK, QPSK, 16QAM, 64QAM and OFDM
	
	BT: FHSS,GFSK,DPSK,DQPSK

Data rates	11b: 1, 2, 5.5 and 11Mbps 11a/g: 6, 9, 12, 18, 24, 36, 48 and 54 Mbps 11n: MCS0~15, up to 300Mbps
Form factor	17pins ,
Host Interface	USB 2.0
PCB Stack	4-layers design
Dimension	Typical，22mm x 32mm x 1mm
Antenna	External Antennas Design
Operation Temperature	0℃ to +40℃
Storage Temperature	-15℃ to +45℃
Operation Voltage	3.3V +/-10%

2. Mechanical Specification

2.1 Mechanical Outline Drawing

Typical Dimension (W x L): 22mmx 32mm x 3.5mm

General tolerance: ±0.15mm
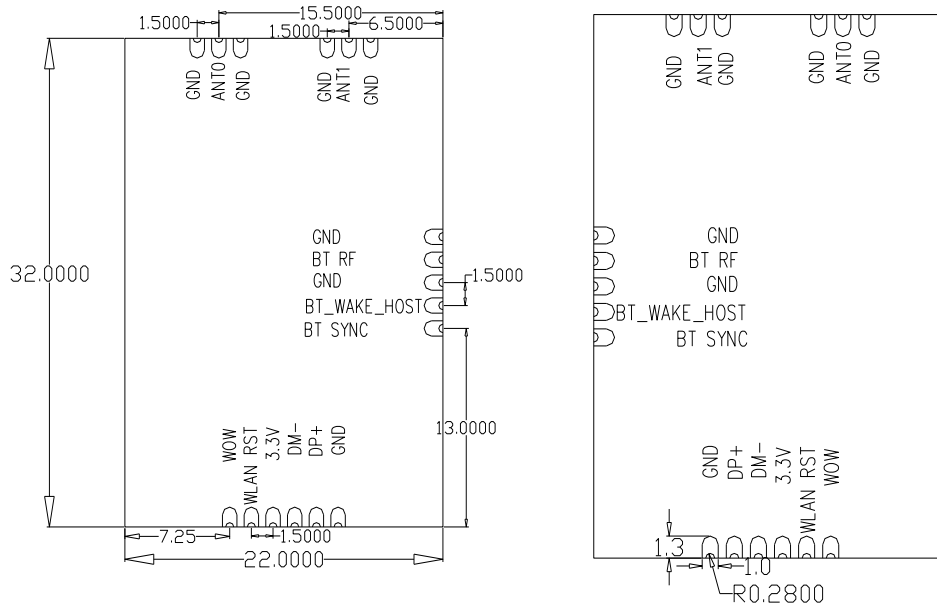
Pin	type
1	WOW
2	WLAN RST
3	3.3V
4	DM-
5	DP+
6	GND
7	BT SYNC
8	BT_WAKE_HOST
9	GND
10	BT RF
11	GND
12	GND
13	ANT1
14	GND
15	GND
16	ANT0
17	GND

2.2 Product Picture

TOP VIEW
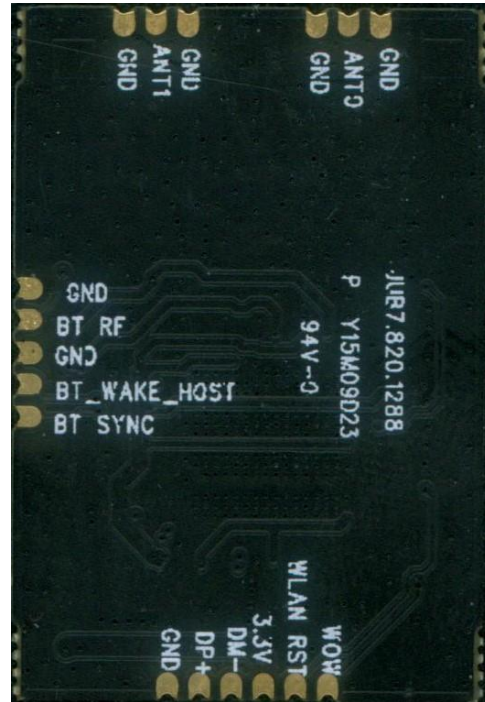
BOTTOM VIEW

3. Electrical Specification

This Specification is based-on conductive DVT testing result. The extreme condition include overall temperature (0℃,+25℃,+40℃) and overall voltage (3.0V,3.3V,3.6V).

3. 1 IEEE 802.11g/a Section:

Items	Contents				
Specification	IEEE802.11g & IEEE802.11a				
Mode	BPSK, QPSK, 16QAM, 64QAM and OFDM				
Channel	CH1 to CH13 @ 11g CH36 to CH165 @ 11a				
Data rate	6, 9, 12, 18, 24, 36, 48, 54Mbps				
TX Characteristics	Min.	Typ.	Max.	Unit	Remark
1. Power Levels					
1) 15dBm Target (For Each antenna port) @ 11g	Æ	Æ	17	dBm	
2) 14dBm Target (For Each antenna port) @ 11a	Æ	Æ	16	dBm	
2. Spectrum Mask @ Target Power					
1) at fc +/-11MHz	-	-	-20	dBr	
2) at fc +/-20MHz	-	-	-28	dBr	
3) at fc > +/-30MHz	-	-	-40	dBr	
3. Constellation Error(EVM) @ Target Power					
1) 6Mbps	-	-	-5	dB	
2) 9Mbps	-	-	-8	dB	
3) 12Mbps	-	-	-10	dB	
4) 18Mbps	-	-	-13	dB	
5) 24Mbps	-	-	-16	dB	
6) 36Mbps	-	-	-19	dB	
7) 48Mbps	-	-	-22	dB	
8) 54Mbps	-	-	-25	dB	
4. Frequency Error					
1) IEEE802.11g	-25	-	25	ppm	
2) IEEE802.11a	-30		30	ppm	
RX Characteristics	Min.	Typ.	Max.	Unit	
5. Minimum Input Level Sensitivity(each chain)					
1) 6Mbps (PER ≦10%)	-	-	-82	dBm	
2) 9Mbps (PER ≦10%)	-	-	-81	dBm	
3) 12Mbps (PER ≦10%)	-	-	-79	dBm	
4) 18Mbps (PER ≦10%)	-	-	-77	dBm	
5) 24Mbps (PER ≦10%)	-	-	-74	dBm	
6) 36Mbps (PER ≦10%)	-	-	-70	dBm	
7) 48Mbps (PER ≦10%)	-	-	-66	dBm	
8) 54Mbps (PER ≦10%)	-	-	-65	dBm	
6. Maximum Input Level (PER ≦10%)					
1) IEEE802.11g	-20	-	-	dBm	
2) IEEE802.11a	-30			dBm	

3.2 IEEE 802.11b Section:

Items	Contents				
Specification	IEEE802.11b				
Mode	DBPSK, DQPSK and CCK and DSSS				
Channel	CH1 to CH13				
Data rate	1, 2, 5.5, 11Mbps				
TX Characteristics	Min.	Typ.	Max.	Unit	Remark
1. Power Levels(Calibrated)					
1) 17dBm Target (For Each antenna port)	Ǽ	Ǽ	19	dBm	
2. Spectrum Mask @ Target Power					
1) fc +/-11MHz to +/-22MHz	-	-	-30	dBr	
2) fc > +/-22MHz	-	-	-50	dBr	
3. Constellation Error(EVM) @ Target Power					
1) 1Mbps	-	-	-10	dB	
2) 2Mbps	-	-	-10	dB	
3) 5.5Mbps	-	-	-10	dB	
4) 11Mbps	-	-20	-10	dB	
4. Frequency Error	-25	-	25	ppm	
RX Characteristics	Min.	Typ.	Max.	Unit	
5. Minimum Input Level Sensitivity(each chain)					
1) 1Mbps (FER ≦8%)	-	-83	-76	dBm	
2) 2Mbps (FER ≦8%)	-	-80	-76	dBm	
3) 5.5Mbps (FER ≦8%)	-	-79	-76	dBm	
4) 11Mbps (FER ≦8%)	-	-76	-76	dBm	
6. Maximum Input Level (FER ≦8%)	-10	-	-	dBm	

3.3 IEEE 802.11n HT20 Section:

Items	Contents				
Specification	IEEE802.11n HT20 @ 2.4G IEEE802.11n HT20 @ 5G				
Mode	BPSK, QPSK, 16QAM, 64QAM and OFDM				
Channel	CH1 to CH13 @ 2.4G CH36 to CH165 @ 5G				
Data rate (MCS index)	MCS0/1/2/3/4/5/6/7/8/9/10/11/12/13/14/15				
TX Characteristics	Min.	Typ.	Max.	Unit	Remark
1. Power Levels					
1) 16dBm Target (For Each antenna port) **@2.4G/MCS0~MCS6**	12	16	18	dBm	
2) 14dBm Target (For Each antenna port) @ 2.4G/MCS7	12	14	16	dBm	
3) 13dBm Target (For Each antenna port) **@5G/MCS0~MCS6**	10	13	17	dBm	
4) 13dBm Target (For Each antenna port) @ 5G/MCS7	10	13	15	dBm	
2. Spectrum Mask @ Target Power					
1) at fc +/-11MHz	-	-	-20	dBr	
2) at fc +/-20MHz	-	-	-28	dBr	
3) at fc > +/-30MHz	-	-	-45	dBr	
3. Constellation Error(EVM) @ Target Power					
1) MCS0	-	-	-5	dB	
2) MCS1	-	-	-10	dB	
3) MCS2	-	-	-13	dB	
4) MCS3	-	-	-16	dB	
5) MCS4	-	-	-19	dB	
6) MCS5	-	-	-22	dB	
7) MCS6	-	-	-25	dB	
8) MCS7	-	-	-28	dB	
4. Frequency Error					
1) IEEE802.11n HT20 @ 2.4G	-25	-	25	ppm	
2) IEEE802.11n HT20 @ 5G	-20	-	20	ppm	
RX Characteristics	Min.	Typ.	Max.	Unit	
5. Minimum Input Level Sensitivity(each chain)					
1) MCS0 (PER ≦10%)	-	-	-82	dBm	
2) MCS1 (PER ≦10%)	-	-	-79	dBm	
3) MCS2 (PER ≦10%)	-	-	-77	dBm	
4) MCS3 (PER ≦10%)	-	-	-74	dBm	
5) MCS4 (PER ≦10%)	-	-	-70	dBm	
6) MCS5 (PER ≦10%)	-	-	-66	dBm	
7) MCS6 (PER ≦10%)	-	-	-65	dBm	
8) MCS7 (PER ≦10%)	-	-	-64	dBm	
6. Maximum Input Level (PER ≦10%)					
1) IEEE802.11n HT20 @ 2.4G	-20	-	-	dBm	
2) IEEE802.11n HT20 @ 5G	-30	-	-	dBm	

3.4 IEEE 802.11n HT40 Section:

Items	Contents				
Specification	IEEE802.11n HT20 @ 2.4G IEEE802.11n HT20 @ 5G				
Mode	BPSK, QPSK, 16QAM, 64QAM and OFDM				
Channel	CH3 to CH11 @ 2.4G CH38 to CH163 @ 5G				
Data rate (MCS index)	MCS0/1/2/3/4/5/6/7/8/9/10/11/12/13/14/15				
TX Characteristics	Min.	Typ.	Max.	Unit	Remark
1. Power Levels (Calibrated)					
1) 16dBm Target (For Each antenna port) **@2.4G/MCS0~MCS6**	12	16	18	dBm	
2) 14dBm Target (For Each antenna port) @ 2.4G/MCS7	12	14	16	dBm	
3) 13dBm Target (For Each antenna port) **@5G/MCS0~MCS6**	10	14	17	dBm	
4) 13dBm Target (For Each antenna port) @ 5G/MCS7	10	12	15	dBm	
2. Spectrum Mask @ Target Power					
1) at fc +/-21MHz	-	-	-20	dBr	
2) at fc +/-40MHz	-	-	-28	dBr	
3) at fc > +/-60MHz	-	-	-45	dBr	
3. Constellation Error(EVM) @ Target Power					
1) MCS0	-	-	-5	dB	
2) MCS1	-	-	-10	dB	
3) MCS2	-	-	-13	dB	
4) MCS3	-	-	-16	dB	
5) MCS4	-	-	-19	dB	
6) MCS5	-	-	-22	dB	
7) MCS6	-	-	-25	dB	
8) MCS7	-	-	-28	dB	
4. Frequency Error					
1) IEEE802.11n HT20 @ 2.4G	-25	-	25	ppm	
2) IEEE802.11n HT20 @ 5G	-20	-	20	ppm	
RX Characteristics	Min.	Typ.	Max.	Unit	
5. Minimum Input Level Sensitivity(each chain)					
1) MCS0 (PER ≦10%)	-	-	-79	dBm	
2) MCS1 (PER ≦10%)	-	-	-76	dBm	
3) MCS2 (PER ≦10%)	-	-	-74	dBm	
4) MCS3 (PER ≦10%)	-	-	-71	dBm	
5) MCS4 (PER ≦10%)	-	-	-67	dBm	
6) MCS5 (PER ≦10%)	-	-	-63	dBm	
7) MCS6 (PER ≦10%)	-	-	-62	dBm	
8) MCS7 (PER ≦10%)	-	-	-61	dBm	
6. Maximum Input Level(PER ≦10%)					
1) IEEE802.11n HT20 @ 2.4G	-20	-	-	dBm	
2) IEEE802.11n HT20 @ 5G	-30	-	-	dBm	

3.5 Bluetooth Section:

Items	Contents				
Specification	BT2.1/3.0/4.0				
Mode	FHSS,GFSK,DPSK,DQPSK				
Number of Channel	79 Channels				
Frequency Band	2.402 GHz ~2.480GHz				
	Min.	Typ.	Max.	Unit	Remark
1. Output Power	-	7.5	-	dBm	
2.Gain step	2	4	8	dB	
3. Receiver sensitivity (BER ≦0.1%)	-	-93.5	-80	dBm	
4. Maximum usable signal (BER ≦0.1%)	-	-5	-		
5. C/I co-channel (BER<0.1%)	-	4	11	dB	
6. C/I 1MHz (BER<0.1%)	-	-14	0	dB	
7. C/I 2MHz (BER<0.1%)	-	-42	-30	dB	
8. C/I≥3MHz (BER<0.1%)	-	-49	-40	dB	
9. C/I Image channel (BER<0.1%)	-	-25	-9	dB	
10. C/I Image 1MHz (BER<0.1%)	-	-50	-20	dB	
11. Inter-modulation	-	-13	-	dB	
12. Out-of-band blocking					
1). 30MHz to 2000MHz	-10	-	-	dBm	
2). 2000MHz to 2399MHz	-27	-	-	dBm	
3). 2498MHz to 3000MHz	-27	-	-	dBm	
4). 3000MHz to 12.75GHz	-10	-	-	dBm	
13. Modulation characteristics					
1). Δf1avg	140	157	175	KHz	
2). Δf2max (For at least 99.9% of all Δf2max)	115	140	-	KHz	
3). Δf1avg /Δf2avg	0.8	0.98	-	KHz	
14. ICFT	-75	±20	+75	KHz	
15. Carrier frequency drift					
1). One slot packet (DH1)	-25	±15	+25	KHz	
2). Two slot packet (DH3)	-40	±15	+40	KHz	
3). Five slot packet (DH5)	-40	±15	+40	KHz	
4). Max drift rate	-	6	20	KHz/50us	
16. TX output spectrum(20dB bandwidth)	-	922	1000	KHz	
17. In-Band spurious emission					
1). ±2MHz offset	-	-45	-20	dBm	
2). ±3MHz offset	-	-48	-40	dBm	
3). >±3MHz offset	-	-48	-40	dBm	

FCC STATEMENT

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.

 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.

FCC Statement: This equipment complies with FCC radiation limits set forth for an uncontrolled environment. This equipment mush not be colocated or operating with any other antenna or transmitter.   This module is designed to comply with FCC statement FCC ID is: 2ADID-M632USA

The host system using this module should have label in a visible area indicated the following texts "Contains FCC ID: 2ADID-M632USA". 2.4G and 5G can transmit simultaneously when sharing antennas.

Operations in the 5.15-5.25GHz band are restricted to indoor usage only.

FCC Radiation Exposure Statement:

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. In order to avoid the possibility of exceeding the FCC radio frequency exposure limits, Human proximity to the antenna shall not be less than 20cm (8 inches) during normal operation.

When OEG purchase the module, they can only buy this antenna to match the modules The max antenna gain of antenna is 2dBi. The follwing is a example of the module and antenna: