



PRODUCT SPECIFICATION

Version 1.0

802.11b/g/n Wi-Fi 2T2R / Bluetooth v5.0 Combo Chip over USB v2.0 interface

Model Number: WT21M2610
(MediaTek : MT7638GU)

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

拟制 DESIGN	审核 CHECK	批准 APPROVAL
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2018-05-09	2018-05-09	2018-05-09

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PRODUCTS SPECIFICATION

WT21M2610

Document revision history

Revision	Date	Approved by	Remarks
Version 1.0	2018-05-09		Draft



1. General Description

MT7638G is highly integrated single chip which features a low power 2x2 11b/g/n dual-band Wi-Fi subsystem and a Bluetooth subsystem. The Wi-Fi subsystem contains the 802.11b/g/n radio, baseband, and MAC that are designed to meet both the low power and high throughput application.

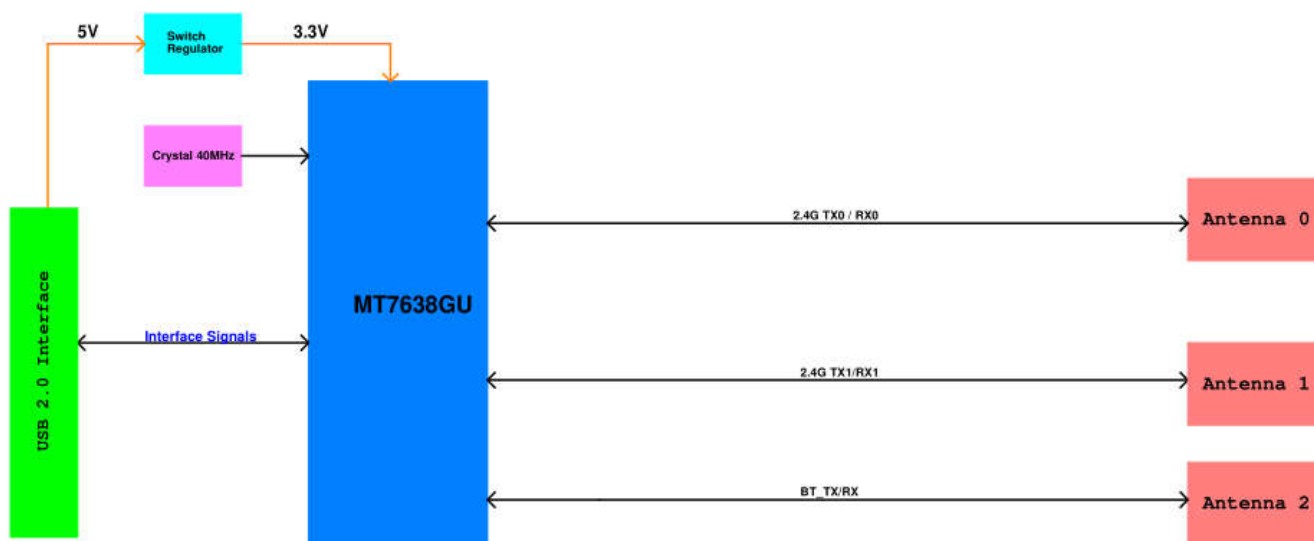
MT7638G has a 32-bit RISC MCU that handles Wi-Fi and Bluetooth tasks, and an ARM Cortex-R4 MCU that could offload data frame processing in Wi-Fi host driver. The Bluetooth subsystem contains the Bluetooth radio, baseband, link controller. It also uses the 32-bit RISC MCU for the Bluetooth protocols.

2. Features

- 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.
- Support 20MHz, 40MHz, bandwidth in 2.4GHz band
- Dual-band 2T2R mode, data rate up to 300Mbps with USB2.0.
- Support STBC, LDPC, TX Beamformer and RX Beamformee
- Greenfield, mixed mode, legacy modes support
- IEEE 802.11 d/e/h/i/j/k/m/r/v/w support
- Security support for WPA WPA2 personal, WPS2.0, WAPI
- QoS support of WFA WMM, WMM PS
- Bluetooth specification 2.1+EDR
- Bluetooth 4.2 Low Energy (LE)
- Bluetooth 5.0
- ROHS 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 11 channels for USA
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
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 / 11 channels for USA
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
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

3.2.4 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 2.4GHz :2412~ 2462MHz for USA
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 2.4GHz Band/HT40
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

3.2.5 Bluetooth Section

Feather		Description	
General specification			
Bluetooth standard	Bluetooth V5.0 of 1,2,and3 Mbps		
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		5	
BLE Output Power		12	
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	60	C
Junction Temperature	0	125	C

4.2 General Section

	Feature	Detailed Description
5.2.1	Antenna Type	• WIFI: PIFA Antenna ;
5.2.2	Operating Voltage	• 5V $\pm$ 10%
5.2.3	Current Consumption	• <300mA@RX • <1000mA@TX
5.2.4	Form Factor and Interface	• High Speed USB2.0 Interface

4.3 Software

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

4.4 EEPROM Information

BT

Vendor ID	default
Product ID	default

WiFi

Reg Domain	Worldwide 2.4G Read from registry : Control by driver

Vendor ID	default
Product ID	default

4.5 DC Characteristics

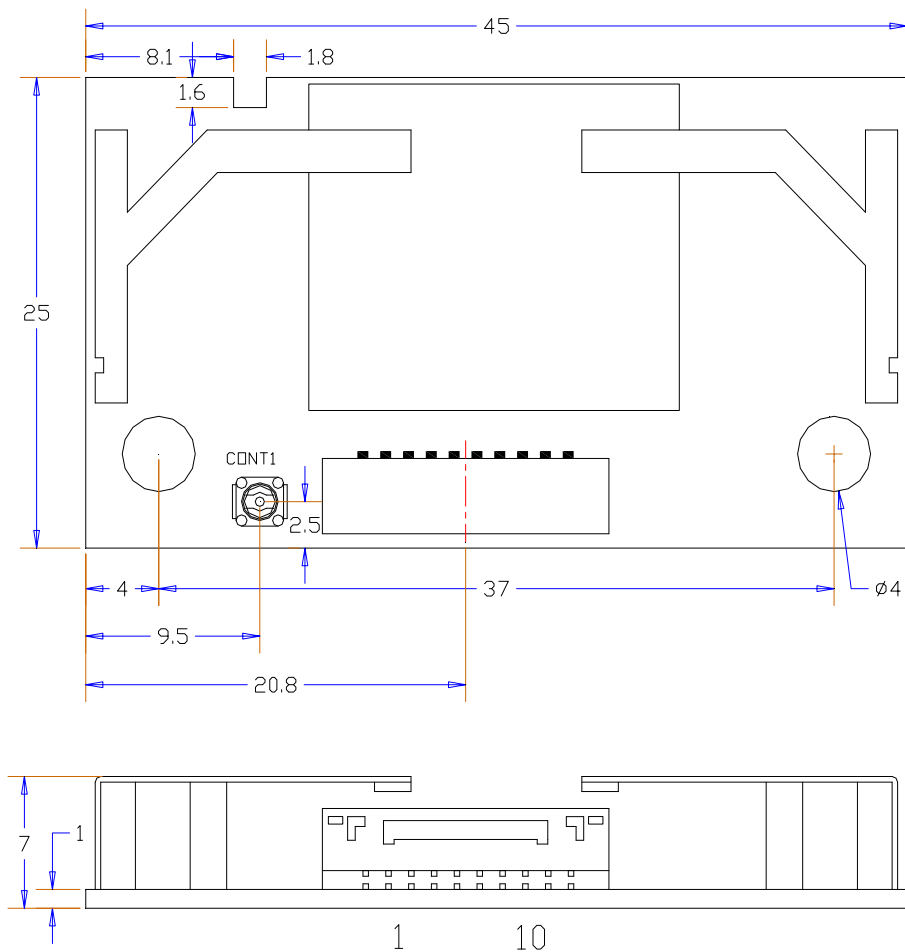
Symbol	Parameter	Min	TYPE	Max	Unit
V_{IL}	Input Low Voltage	-0.3		$V_{DD3.3} \times 0.25$	V
V_{IH}	Input High Voltage	$V_{DD3.3} \times 0.625$		$V_{DD3.3} + 0.3$	V
V_{OL}	Output Low Voltage	-0.3		0.4	V
V_{OH}	Output High Voltage	$V_{DD3.3} - 0.4$		$V_{DD3.3} + 0.3$	V

5. Component preparation

关键器件清单 Key device list

物料名称 name of mat	供应商品牌 Supplier brand
晶振 crystal oscill	晶宝时频/加高 Jinbao time frequency/higher
电阻 resistance	华新科/国巨 Huaxinke/guo ju
WIFI 芯片 WiFi SoC	MTK
电容 capacitance	Murata (村田) / 华新科/国巨 (murata) / hua xinke/guo ju
电感 inductance	Murata (村田) / 佳邦/奇立新 (murata) / karabong/kiriyoshi
印制板 printed board	柏承/富智祥/科翔 Bai cheng/fu zhixiang/ke xiang

6 Mechanical Dimensions



Pin	Symbol	Remark	I/O
1	NC	NC	-
2	NC	NC	-
3	BT-WAKE -HOST	BT wake up host (内有10K电阻到3.3V上拉)	0
4	GND	GND	-
5	WOWLAN	Wake on Wireless LAN (内有10K电阻到3.3V上拉)	O
6	Power_EN	Power_EN (低电平有效)	I
7	GND	GND	-
8	USB- DP	USB Communication signal USB-DP	I/O
9	USB -DM	USB Communication signal USB-DM	I/O
10	5V	VDD 5V	I

*TOLERANCES ARE +/-0.15mm UNLESS OTHERWISE SPECIFIED

*UNIT:mm

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.

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.

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

This transmitter module is authorized only for use in device where the antenna may be installed such that 20 cm may be maintained between the antenna and users. The final end product must be labeled in a visible area with the following: Contains FCC ID: 2AC23-WT21M2610.

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.

Antenna Information

The WT21M2610 has been designed to pass certification with the antenna listed (for BT) below. The required antenna impedance is 50 ohms.

The WT21M2610 has been designed to pass certification with ingrate antenna for WLAN.

Model	Type	Connector	Peak gain (dBi)	Description
			2400 – 2483.5 MHz	
WC0D-60	PIFA	R-SMA	1.72	BT Antenna