Specifications Datasheet

Module supports:

Module Part Number:

Module #	Module Name	HT Part Number	remark
#1	WiFi+BT+BLE -Module -- MT7697H(IEEE802.11b/g/n,BT4.2)	HTMD-003A	

Role	Name:	Appointment:	Signature:
Author	Wang Ying	Design Engineer	
Checked by	Nick Qiao	PM – R&D	
Approved by	Yin Zhi Lin	CTO	
Date:	**Classification**	**Version:**	**Status:**
<18Mar 2018>	Confidential	<V0.1>	<Draft>

Revision History:

Version	Date (dd/mm/yyyy)	Author	Status	Modifications
V0.1	12/15/2018	Wang Ying	Draft	Doc creation

Contents

1 Introduction

1.1 Scope

This document is to specify the technical specifications of WiFi+BluetoothCombi-Module, which is customized designed for IEEE 802.11b/g/n/(ac) WLAN, Bluetooth/Bluetooth Low Energy applications.

Table 1: WiFi+BT+BLE Combi-Module Diversity:

Module #	Module Name	HT P/N	SOC	WLAN Standard Supported	Bluetooth Standard Supported	RF Frequency Band	Interface to Host	Module Size

#1	WiFi+BT+BLE - Combi-Module - MT7697H	HTMD-001U	MT7697H	IEEE802.11b/g/n	◆ V4.2	◆ 2.4G (2.4 ~ 2.5 GHz)	◆	16mm (L) x 16mm(W) x 3.5mm(H)

1.2 Product Features

WLAN:

- Dedicated high-performance 32-bit RISC CPU N9 up to 160MHz clock speed
- IEEE 802.11 b/g/n compliant
- Supports 20MHz, 40MHz bandwidth in 2.4GHz band
- Dual-band 1T1R mode with data rate up to 150Mbps
- Supports STBC, LDPC
- Greenfield, mixed mode, legacy modes support
- IEEE 802.11e support
- Security support for WFA WPA/WPA2 personal, WPS2.0
- Supports 802.11w protected managed frames
- QoS support of WFA WMM
- Integrated LNA, PA, and T/R switch
- Optional external LNA and PA support.
    - RX diversity support with additional RX input

Bluetooth:

- Bluetooth 4.2 Low Energy (LE)
- Integrated BALUN and PA
- Support SCO and eSCO link with re-transmission
- Channel assessment for AFH

Ambient Conditions:

- Operation Temperature: -10℃ ~ +70℃

- Storage Temperature: -20℃ ~ +85℃
- Operation Humidity: 10 ~ 90% RH
- Storage Humidity: 5 ~ 95% RH

Environmental compliance:
- RoHS compliant
- REACH compliant

Approbation:
- EU/ Russia:
  - ETSI/CE EN300 328 v1.8.1 (2.4G)
  - ETSI/CE EN50385
- LATAM:
  - US/Paraguay/Uruguay : FCC
- Bluetooth/BLE:
  - BQB(tbc)

1.3 Acronyms and abbreviations

BT	Bluetooth
BLE	Bluetooth Low Energy
BR	Basic Rate
EDR	Enhanced Data Rate
EVM	Error Vector Magnitude
CCK	complementary code keying (CCK),
CE	ConformitéEuropéenne (European Conformity)
DSSS	*Direct Sequence Spread Spectrum*
EMC	Electromagnetic Compatibility
EMF	Electromagnetic Fields,the acronym used for the issue of exposure ofhumans to EM-fields and the associated possible adverse health effects
EIRP	Effective Isotropically Radiated Power
ERP	Effective Radiated Power
ETSI	European Telecommunications Standards Institute
HCI	Host Controller Interface
HT	Huitong
HT20	High Throughput 20 MHz bandwidth (802.11n/ac)
HT40	High Throughput 40 MHz bandwidth (802.11n/ac)
IEC	International Electrotechnical Commission
IEEE	Institute of Electrical and Electronics Engineers
IP	Internet Protocol (IP)
Iperf	Iperf is a commonly used network testing tool that can create Transmission Control Protocol (TCP) and User Datagram Protocol (UDP) data streams and measure the throughput of a network that is carrying them, that was developed by the Distributed Applications Support Team (DAST) at the National Laboratory for Applied Network Research (NLANR)
ISM	Industrial, Scientific, and Medical
VHT80	Very High High Throughput 80 MHz bandwidth (802.11ac)
VHT160	Very High Throughput 160 MHz bandwidth (802.11ac)
LE	Low Energy
MAC	Media Access Control
MCS	Modulation and Coding Scheme
PID	Product ID

VID	Vendor ID
TX	Transmission
RX	Receiver
RSSI	Received Signal Strength Indicator
TSSI	Transmit Signal Strength Indicator
MIMO	Multiple-Input Multiple-Output
WoWLAN	Wake on WLAN
WoBLE	Wake up on BLE
QoS	Quality-of-Service (QoS)
EIRP	Equivalent Isotropically Radiated Power
TCP	Transmission Control Protocol (TCP)
TCP/IP	Internet Protocol Suite: TCP and Internet Protocol (IP)
TPC	Transmit Power Control
ISM	Industrial, Scientific and Medical (2.412GHz~2.484GHz)
U-NII	Unlicensed National Information Infrastructure
UDP	User Datagram Protocol (UDP) is the set of networkprotocols used for the Internet.
VSWR	Voltage Standing Wave Ratio
WiFi	Wireless Fidelity

1.4 REFERENCES

1. MT7697HD_Data_Sheet V1.01.pdf, 2016-5-10

2 Functional Descriptions

The module (s) is(are) a WiFi and Bluetooth Combi .
It supports IEEE 802.11b/g/n WLAN / WiFi Direct, as well as Bluetooth BR/EDR/BLE 4.2 dual modeapplications.

3 Technical Specifications

3.1 Absolute Maximum Ratings:

Stresses beyond these conditions listed below may cause permanent damage to the module.

Parameters	Maximum Rating
Power Supply Voltage at +3V3-WiFi	(-0.3 ~3.63)V
Input voltage to IO pins	(-0.3 ~3.63)V
Storage Temperature Conditions	–40 ℃ ~ +125℃.
Storage Humidity conditions	5% to 95% (RH)
ESD (HBM)	1000V

3.2 Recommended Operation Conditions

Parameters	Operation Conditions
+3.3V Power Supply Voltage	3.3V±5%
Operating Temperature Conditions	(–10 ℃ ~ +70℃) - No performance reduction up 65°C ambientTemperature

	- No component failure up to 70°C ambient Temperature.
Operating Humidity conditions	10% to 90% (RH)

3.3 ElectricalSpecifications

Pre-test conditions:

1 3.3V is applied at +3V3-WiFi, unless otherwise noted.

2 Operation Temperature = room temperature 25°C, unless otherwise noted.

3 CTQ parameters are marked with *.

Item No.	Parameters	Test Conditions	Specifications/Requirement			
			Min	Typ	Max	Units
3.3.1	+3.3V Power Supply Voltage	3.3V±5%	3.0	3.30	3.6	V
3.3.2	Current Consumption in Standby mode *	WiFi + BT			(tbc)	mA
3.3.3		WiFi only			1.50	mA
3.3.4		BT only			1.50	mA
3.3.5	Current Consumption in Operation mode	TX Mode (WiFi 2.4GHz, HT40, MCS15)			672.0	mA
3.3.6		RX Mode (WiFi 2.4GHz, HT40, MCS15)			296.0	mA
3.3.7		TX Mode (BT Continuous transmit)			69.0	mA
3.3.8		RX Mode (BT Continuous receive)			44.0	mA
3.3.9	ESD	EN61000-3-2/3-3: ESD - IEC61000/4/2 : 8kV air - ANATEL 442 : 8kV air discharge Module is mounted into Final product casing at the designed location.	No functional failures and no parts should suffer damage			

3.4 RF Performance

Pre-test conditions:

1) 3.3V is applied at +3V3-WiFi, unless otherwise noted.
2) WiFi+BT module and BT antenna are mounted at the designed location of host TV.
3) TX power is at typical level, measured at antenna feed point.
4) Front End Insertion loss (including Balun, impedance mis-match+diplexer):
   - 0.8dB(@2.4GHz),
5) WiFitypical test channels
   - 2.4G band: CH1 (2412MHz), CH6(2437MHz), CH11(2462MHz);
   - Bluetooth typical test channels:
   - 2402MHz、2441MHz、2480MHz.
6) Operation Temperature = room temperature 25°C, unless otherwise noted.
7) CTQ parameters are marked with *.

3.4.1 WiFiRF specifications

Item No.	Parameters	Test Conditions	Specifications/Requirement			
			Min	Typ	Max	Units
3.4.1.1	WiFi Throughput @ 90% probability	@72dB pathloss at 2.4GHz	60			Mbps
		@80dB pathloss at 2.4GHz	50			Mbps
		@85dB pathloss at 2.4GHz	45			Mbps
		@89dB pathloss at 2.4GHz	24			Mbps
		@97dB pathloss at 2.4GHz	9			Mbps
3.4.1.2		@69dB pathloss at 5GHz	25			Mbps
3.4.1.3	WiFi TX Output Power (measured at antenna port) *	TX Power @ 2.4GHz test channels, (at 6Mbps OFDM)	17.93	-	21.69	dBm
3.4.1.5	WiFi Initial carrier CenterFrequency tolerance*	2.4GHz band test channels	-75		+75	KHz
3.4.1.7	EVM*	802.11b (DSSS) (peak EVM value)				dB
3.4.1.8		802.11g/n (for OFDM, HT, and VHT) (64QAM, Code Rate: 2/3), (EVM RMS value)			-22	dB
3.4.1.9	WiFi RX Sensitivity	2.4GHz @ PER≤8%(injected at antenna port)(at 11Mbps, CCK)	-80			dBm
3.4.1.11	WiFi Maximum useable receive signal level	2.4GHz @ PER≤8%(injected at antenna port)(at 11Mbps, CCK)			-10	dBm
3.4.1.13	PER @-70dBm*	2.4GHz			8.0%	%

3.4.1.15	Adjacent Channel Rejection	2.4GHz @ PER≤8% (Reference Channel TX Power=sensitivity level+6dB, injected at antenna port) (at 11Mbps, CCK)		36		dB
3.4.1.17	Received Channel Power Indicator (RSSI) Accuracy	2.4GHz (TX=-50dBm, injected at antenna port)	-5		5	dB

3.4.2 Bluetooth RF Specifications

Item No.	Parameters	Test Conditions	Specifications/Requirement			
			Min	Typ	Max	Units
3.4.2.1	BT TX Output Power (Measured at BT antenna iPex connector)*	BT BDR mode, tested at 3 channels (2402MHz、2441MHz、2480MHz)	4.12	-	4.38	dBm
3.4.2.2		BT EDR mode, tested at 3 channels (2402MHz、2441MHz、2480MHz)	4.13	-	4.40	dBm
3.4.2.3		BLE mode, tested at 3 channels (2402MHz、2440MHz、2480MHz)	-3.76	-	-3.60	dBm
3.4.2.4	BT RX Sensitivity @ BER≤1%	BT BDR mode, tested at 3 channels (2402MHz、2441MHz、2480MHz)			-80	dBm
3.4.2.5		BT EDR mode, tested at 3 channels (2402MHz、2441MHz、2480MHz)			-80	dBm
3.4.2.6		BLE mode, tested at 3 channels (2402MHz、2440MHz、2480MHz)			-80	dBm
3.4.2.7	BT Maximum usable receive signal @ BER≤1%	BT BDR mode, tested at 3 channels (2402MHz、2441MHz、2480MHz)			-5	dBm
3.4.2.8		BT EDR mode, tested at 3 channels (2402MHz、2441MHz、2480MHz)			-5	dBm
3.4.2.9		BLE mode, tested at 3 channels (2402MHz、2440MHz、2480MHz)			-5	dBm
3.4.2.10	BT Initial carrier Frequency tolerance*	Tested at 3 channels (2402MHz、2441MHz、2480MHz)	-75		+75	KHz

3.4.2.11	BT operation Range	Measured with BT antenna and cable, mounted in dedicated TPV TV set, to be tested with TV platform and target device to be communicated with.	8			m

3.5 Quality, Environmental and Reliability

S/N	Electrical Test Requirement	TEST CONDITION	Requirement
3.5.1	Dry heat Test	Temp. : +70℃ Test time : 96 hrs	4 days
3.5.2	Low Temperature storage	Temp. : -25℃ Test time : 96 hrs	4 days
3.5.3	Temperature Shock	Temp. : -20℃ ~ +85℃, Duration : 30 min Ramp-up & Ramp-down for 5 min, Cycle : 1,000cycle.	35 days
3.5.4	Humidity Load Test	Leave samples in 40℃±5℃, 90 ~ 95% RH for 21days, and in standard test condition for 30 minutes	21 days
3.5.5	Vibration test	10-55-10Hz / amplitude 0.35mm / sweep rate 1 octave per min.	1 day
3.5.6	Cold Test	Operational/start up after min 4hrs at -10℃	1 day
3.5.7	Damp heat cyclic	Humidity 93%RH, 6h:temp from 25 ℃ to 40 ℃, 6hrs temp 40 ℃ to 25 ℃, 6hrs at 25 ℃, operational last hour only for 21 days.	21 days
3.5.8	Temperature step stress test	Operational up to a temperature of 60 ℃ for 16 days	16 days
3.5.9	Operation Life(MTBF)	Temp. : 60℃, 90% RH, MTBF 50,000 hrs	10 days

3.6 EMC Compliance and Certifications

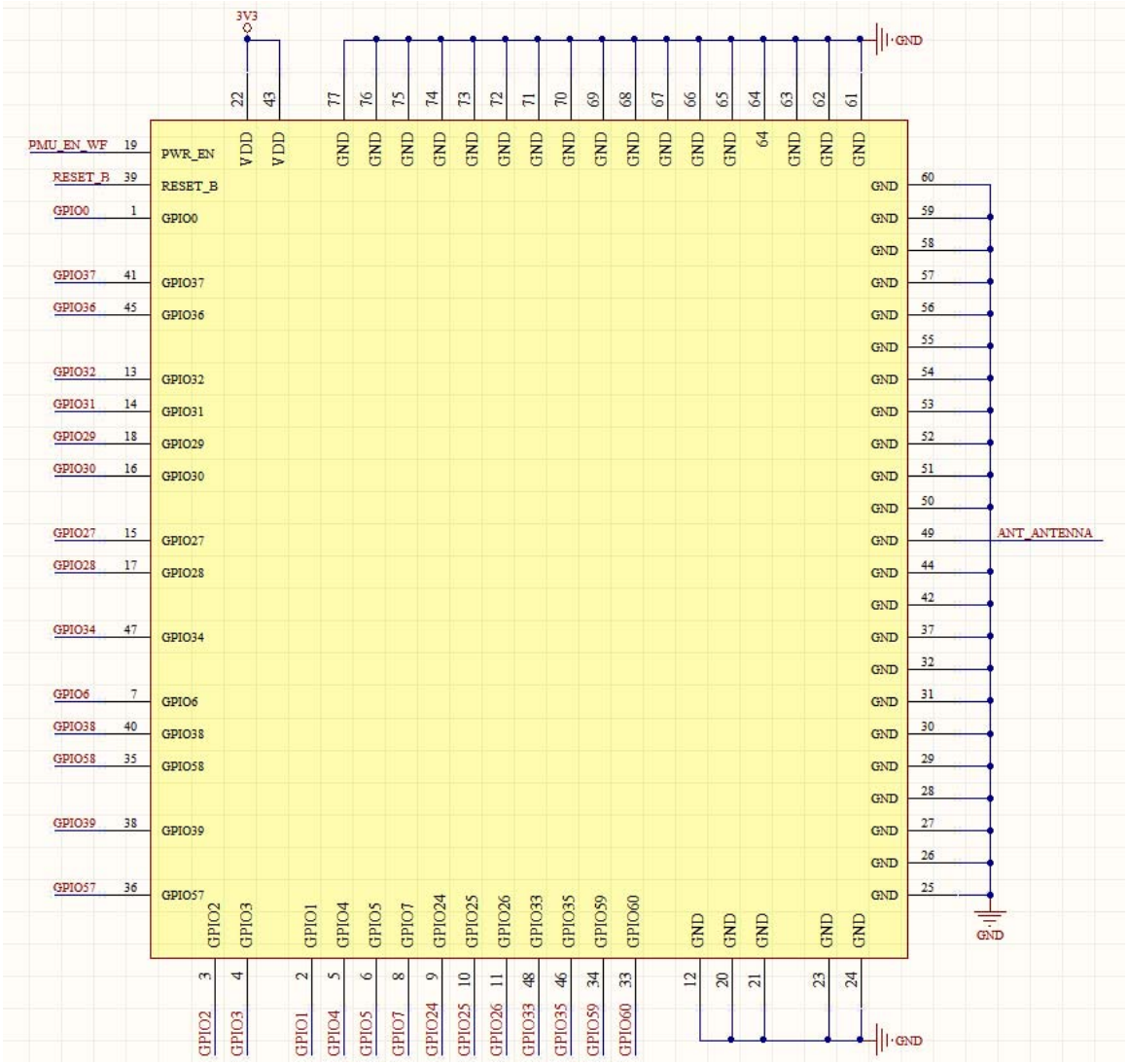
Region	Regulation Standards	Requirement
EU/RU	ETSI EN 300328	Fulfill CE with official test report at module level to meet the latest EMC requirement
LATAM:	US/Paraguay/Uruguay : FCC Brazil : ANATEL Argentina : CNC	Fulfill approbation requirements, with official test report at Module level
Bluetooth Global	BQB	(tbc, no requirement from TPV)

3.7 Environment Compliance

- RoHS compliant
- REACH compliant

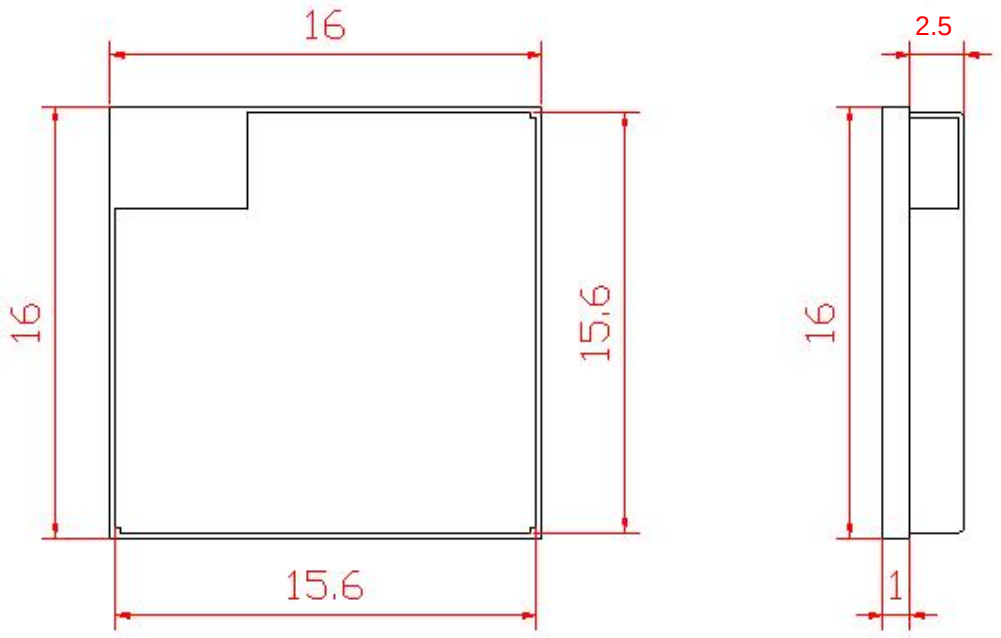
4 Mechanical Drawing

4.1 Pin define



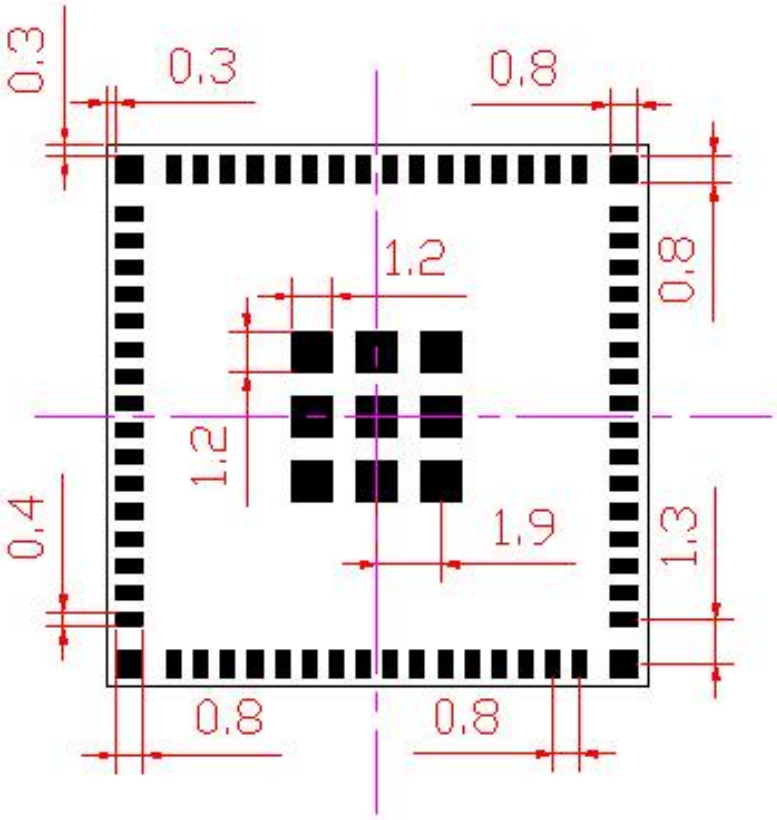
4.2 Mechanical Outline and dimensions

Dimension (TOP View)



unit:mm

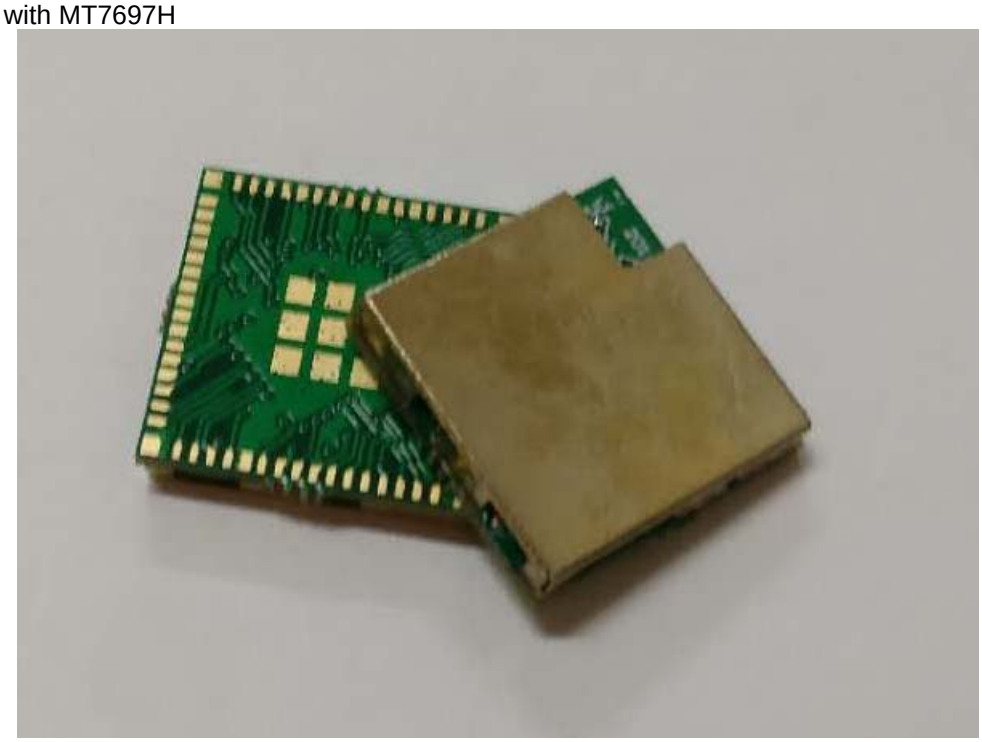
Dimension (Side View)&Dimension (Bottom View)



unit:mm

4.3 Actual Module image

Module with MT7697H



5 Software

5.1 MAC Address and Product ID:

Before module is shipped out of Huitong, the following addresses must be flashed intoEEPROM and with clear marking on the product:

- WiFiMAC address
- BT MAC Address
  :

6 Key Components

6.1 SOC Chipset MT7697H

Refer to
MT7697H_DatasheetV1.01

6.2 WiFi Antenna

PIFA Metal Stamped Antenna:

P/N	151727-20
FREQUENCY BAND：	2400 MHz-2500 MHz
MECHANICAL CONFIGURATION：	(see next page)

6.3RF Connector

U.FL Connector specification for BT connection:

7 Marking Information

The sticker on the module contents the following info:

- Type and Version number (on Bottom side,tbc)
- Serial number (on Bottom side, tbc)
- Manufacturing date (on Bottom side, tbc)
- WiFiMAC address (on Bottom side, tbc)
- BT MACaddress (on Bottom side, tbc)

FCC Statement:
Any Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the 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.
FCC 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& your body.
FCC Label Instructions:
The outside of final products that contains this module device must display a label referring to the enclosed
module. This exterior label can use wording such as: "Contains Transmitter Module FCC ID: PUW-HTMD003A or Contains FCC ID: PUW-HTMD003A " , Any similar wording that expresses the same meaning may be used.