



BL-M7638BU4

**IEEE 802.11a/b/g/n 300Mbps WLAN +
Bluetooth 5.0 Combo Module**

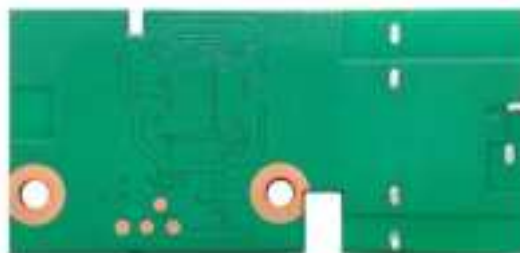
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Web: www.b-link.net.cn



Top view



Bottom view

Module Name: BL-M7638BU4	
Module Type: 802.11a/b/g/n 300Mbps WLAN + Bluetooth 5.0 Combo Module	
Revision: V1.0	
Customer Approval:	
Company:	
Title:	
Signature:	Date:
BL-link Approval:	
Title:	
Signature:	Date:

Revision History

Revision	Summary	Release Date
1.0	Official release	2021-01-26

1. Introduction

BL-M7638BU4 module design is based on Mediatek MT7638BUN solution, The MT7638BUN 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, v4.2, and v5.0. 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.

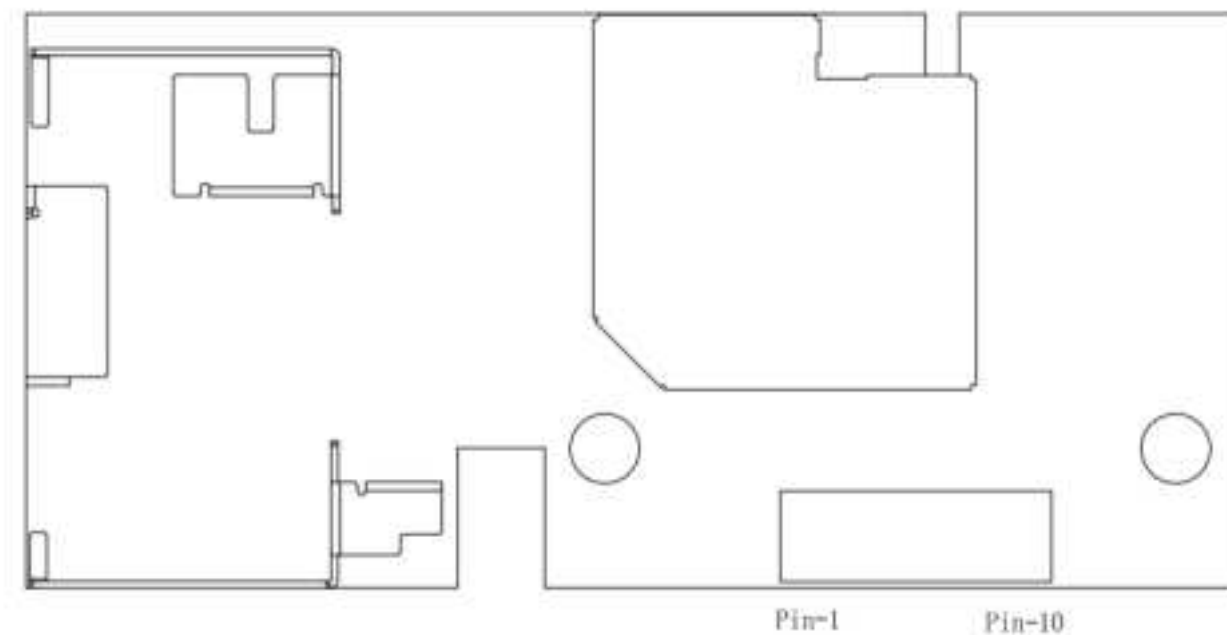
1.1 Features

- Operating Frequencies: 2.4~2.4835GHz or 5.15~5.85GHz
- Host Interface is USB 2.0
- IEEE Standards: IEEE 802.11a/b/g/n
- Wireless data rate can reach up to 300Mbps
- Power Supply: 5V±0.2V main power supply

1.3 General Specifications

Module Name	BL-M7638BU4
Chipset	Mediatek MT7638BUN
WiFi Standards	IEEE802.11a/b/g/n
Host Interface	USB2.0
Dimension	33mm x 70mm x 6.0mm (L*W*H) , Tolerance: $\pm 0.15\text{mm}$
Power Supply	DC5V \pm 0.2V
Operation Temperature	-20°C to +70°C
Storage Temperature	-40°C to +125°C
Operation Humidity	10% to 95% RH (Non-Condensing)

2. Pin Assignments



Top view

2.1 Pin Definition

No	Pin Name	Type	Description	Supply
1	DC_EN	I/O	Reset the module by controlling the DC / DC enable pin	
2	BT_WAKE_HOST	I/O	Bluetooth wake up host	
3	VDD	P	Main power supply	
4	DM-	I/O	USB 2.0 differential line	
5	DP+	I/O	USB 2.0 differential line	
6	GND	P	GND	
7	GND	P	GND	
8	3D_SYNC	I/O	synchronization function	
9	REG_ON	I/O	Module reset	
10	WLAN_DEV_WAKE	I/O	WLAN_DEV_WAKE	

P: Power, I: Input, O: Output, I/O: In/Output

3. Electrical and Thermal Specifications

3.1 Recommended Operating Conditions

Parameters		Min	Typ	Max	Units
Ambient Operating Temperature		-20	25	70	°C
External Antenna VSWR		/	/	/	/
Supply Voltage	DC-5V	4.8	5.0	5.2	V

3.2 Current Consumption

Conditions : VDD=5V ; Ta:25°C			
Use Case	VDD Current (average)		
	Typ	Max	Units
2.4G 1Mbps TX (RF-Test, 1TX) for 18dBm	260	290	mA
2.4G 1Mbps RX (RF-Test, 1RX)	100	120	mA
2.4G 11Mbps TX (RF-Test, 1TX) for 18dBm	270	300	mA
2.4G 11Mbps RX (RF-Test, 1RX)	100	120	mA
2.4G 6Mbps TX (RF-Test, 1TX) for 18dBm	240	270	mA
2.4G 6Mbps RX (RF-Test, 1RX)	100	130	mA
2.4G 54Mbps TX (RF-Test, 1TX) for 14dBm	130	160	mA
2.4G 54Mbps RX (RF-Test, 1RX)	100	120	mA
2.4G MCS0(HT20) TX (RF-Test, 1TX) for 16dBm	220	250	mA
2.4G MCS0(HT20) RX (RF-Test, 1RX)	100	120	mA
2.4G MCS7(HT20) TX (RF-Test, 1TX) for 14dBm	140	170	mA
2.4G MCS7(HT20) RX (RF-Test, 1RX)	110	120	mA
2.4G MCS8(HT40) TX (RF-Test, 2TX) for 16dBm	410	440	mA
2.4G MCS8(HT40) RX (RF-Test, 2RX)	110	130	mA
2.4G MCS15(HT40) TX (RF-Test, 2TX) for 14dBm	260	290	mA

2.4G MCS15(HT40) RX (RF-Test, 2RX)	110	130	mA
5G 6Mbps TX (RF-Test, 1TX) for 16dBm	360	390	mA
5G 6Mbps RX (RF-Test, 1RX)	100	120	mA
5G 54Mbps TX (RF-Test, 1TX) for 14dBm	220	250	mA
5G 54Mbps RX (RF-Test, 1RX)	100	120	mA
5G MCS0(HT20) TX (RF-Test, 1TX) for 16dBm	350	380	mA
5G MCS0(HT20) RX (RF-Test, 1RX)	110	130	mA
5G MCS7(HT20) TX (RF-Test, 1TX) for 14dBm	220	250	mA
5G MCS7(HT20) RX (RF-Test, 1RX)	100	120	mA
5G MCS7(HT40) TX (RF-Test, 1TX) for 14dBm	220	255	mA
5G MCS7(HT40) RX (RF-Test, 1RX)	110	130	mA
5G MCS8(HT40) TX (RF-Test) for 16dBm	580	610	mA
5G MCS8(HT40) RX (RF-Test)	110	130	mA
5G MCS15(HT40) TX (RF-Test) for 14dBm	485	515	mA
5G MCS15(HT40) RX (RF-Test)	120	140	mA
BT BR_1M DH5 TX@3dBm(MPTools, WiFi_Disable)	110	130	mA
BT EDR_3M DH5 TX@3dBm(MPTools, WiFi_Disable)	100	110	mA
BT LE_1M TX@3dBm(MPTools, WiFi_Disable)	110	130	mA
BT LE_2M TX@3dBm(MPTools, WiFi_Disable)	100	110	mA
BT BR_1M DH5 RX Active(MPTools, WiFi_Disable)	60	90	mA
BT EDR_3M DH5 RX Active(MPTools, WiFi_Disable)	70	110	mA
BT LE_1M RX Active(MPTools, WiFi_Disable)	60	100	mA
BT LE_2M RX Active(MPTools, WiFi_Disable)	60	90	mA

4. WIFI & Bluetooth RF Specifications

4.1 WIFI RF Specification

Conditions : VDD=5V ; Ta:25°C			
Features	Description		
WLAN Standard	IEEE 802.11a/b/g/n		
Frequency Range	2.4GHz~2.4835GHz /5.15~5.85Hz		
Channels	CH1~CH13 (For 20MHz Channels) CH36, CH40, CH44, CH48; CH149~CH165 (For 20MHz Channels)		
Modulation	802.11b (DSSS) : DBPSK , DQPSK , CCK ; 802.11a/g (OFDM) : BPSK , QPSK , 16QAM , 64QAM ; 802.11n (OFDM) : BPSK , QPSK , 16QAM , 64QAM ; BT: 8DPSK,π/4DQPSK, GFSK		
Date Rate	WIFI: 802.11b: 1, 2 ,5.5,11Mbps 802.11a/g: 6,9,12,18,24,36,48,54Mbps 802.11n: HT20 reach up to144.4Mbps, HT40 reach up to300Mbps BT: 1Mbps for Basic Rate 2,3Mbps for Enhanced Date Rate		
Frequency Tolerance	≤ ±15ppm		
2.4G Receiver Specifications			
RX Rate	Min Input Level(Typ)	Max Input Level(Typ)	PER
802.11b@1Mbps	-92dBm	-10dBm	< 8%
802.11b@11Mbps	-85dBm	-10dBm	< 8%
802.11g@6Mbps	-90dBm	-15dBm	< 10%
802.11g@54Mbps	-72dBm	-15dBm	< 10%
802.11n@HT20_MCS0	-88dBm	-15dBm	< 10%
802.11n@HT20_MCS7	-68dBm	-15dBm	< 10%
802.11n@HT40_MCS0	-86dBm	-15dBm	< 10%
802.11n@HT40_MCS7	-66dBm	-15dBm	< 10%
802.11a@54Mbps	-72dBm	-15dBm	< 10%
802.11a@HT20/40_MCS7	-68dBm	-15dBm	< 10%

4.1 Bluetooth RF Specification

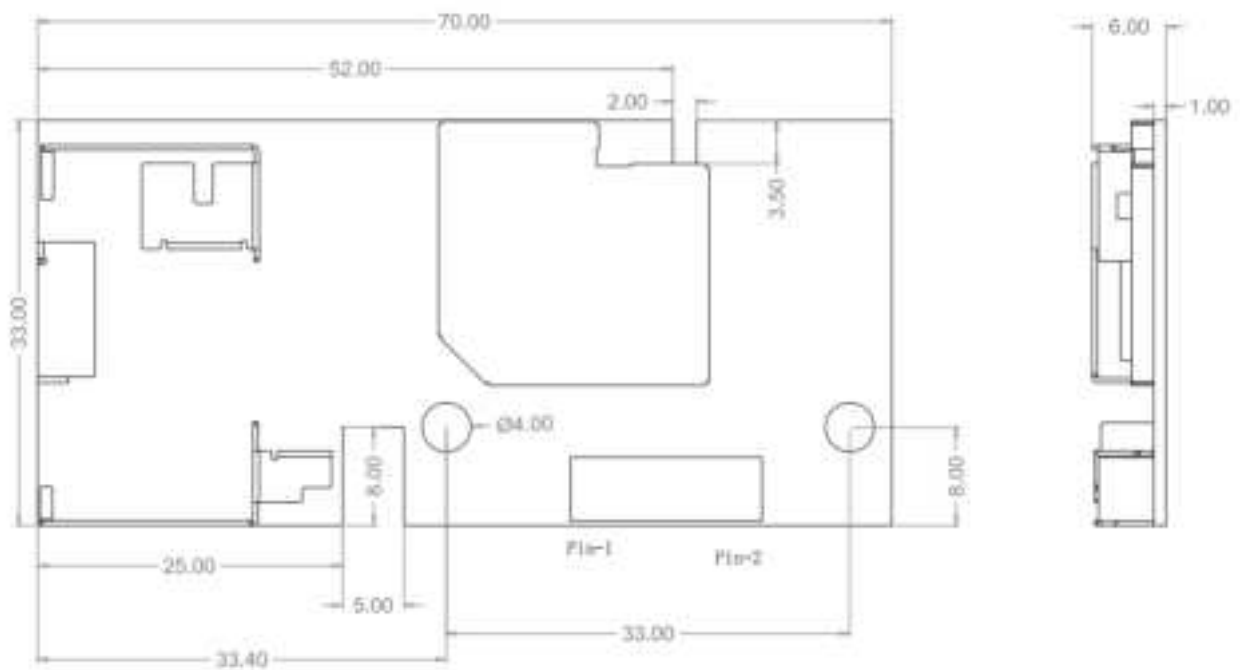
Conditions: VDD33=3.3V; Ta:25°C			
Features	Description		
Bluetooth Specification	Bluetooth v2.1+EDR/3.0+HS/4.2/5.0		
Frequency Range	2.4~2.4835GHz (2.4GHz ISM Band)		
Channels	Bluetooth Classic: Ch0~Ch78 (For 1MHz Channels); Bluetooth Low Energy: Ch0~Ch39 (For 2MHz Channels);		
Power Classes	Bluetooth Classic: Class1; Bluetooth Low Energy: Class1.5;		
Date Rate & Modulation	BR_1Mbps: GFSK; EDR_2Mbps: $\pi/4$ -DQPSK; EDR_3Mbps: 8DPSK; LE_125Kbps: GFSK (Coded_S=8); LE_500Kbps: GFSK (Coded_S=2); LE_1Mbps: GFSK (Uncoded); LE_2Mbps: GFSK (Uncoded);		
Bluetooth Transmitter Specifications			
Items	Min (dBm)	Typ (dBm)	Max (dBm)
TX Power			
BR_1M	2	5	10
EDR_2M	2	5	10
EDR_3M	2	5	10
LE_125/500K	2	5	10
LE_1M	2	5	10
LE_2M	2	5	10

Bluetooth Receiver Specifications				
Items	Sensitivity		Maximum Input Level	
	Input Level (Typ: dBm)	BER	Input Level (Typ: dBm)	BER
BR_1M	-90	≤0.1%	-5	≤0.1%
EDR_2M	-80	≤0.01%	-5	≤0.1%
EDR_3M	-70	≤0.01%	-5	≤0.1%
	Input Level	PER	Input Level	PER
LE_125K	-90	≤30.8%	-5	≤30.8%
LE_500K	-90	≤30.8%	-5	≤30.8%
LE_1M	-90	≤30.8%	-5	≤30.8%
LE_2M	-90	≤30.8%	-5	≤30.8%

Note: For BER receiver sensitivity test, bit error rate (BER) better than 0.1% for a minimum of 1600000 bits transmitted by the tester; For EDR receiver sensitivity test, bit error rate (BER) better than 0.01% for a minimum of 16000000 bits transmitted by the tester; For LE receiver sensitivity test, packet error rate (PER) better than 30.8% for a minimum of 1500 packets transmitted by the tester.

5. Mechanical Specifications

5.1 Module Outline Drawing



Top view

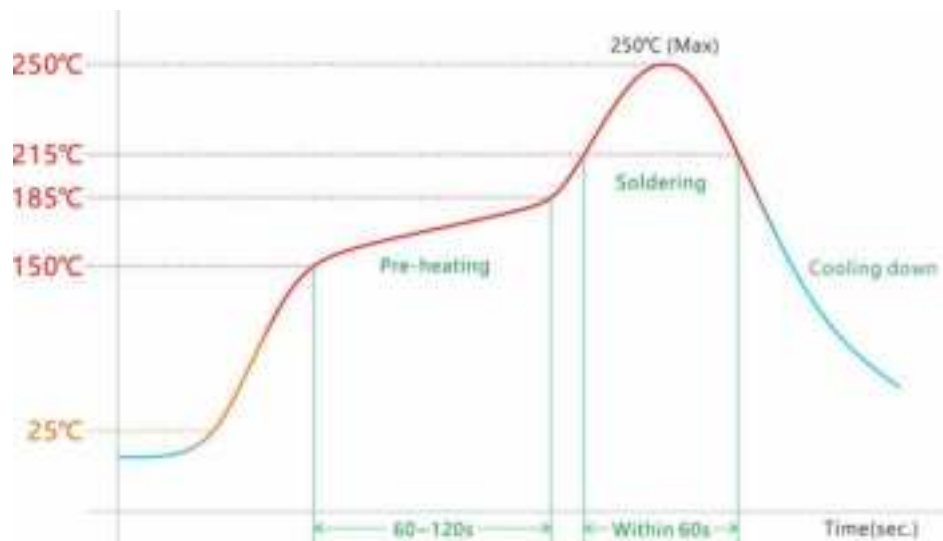
Side view

Module dimension: 33.0*70.0*6.0mm (L*W*H; Tolerance: ± 0.15 mm)



Module Bow and Twist: $\leq 0.1\text{mm}$

6. Reflow Soldering Standard Conditions



Please use the reflow within 2 times.
Set up the highest temperature within 250°C.

7. Key Components Of Module

No.	Parts	Specification	Manufacturer	Note
1	Chipset	MT7638BUN	Mediatek	
2	PCB	BL-M7638BU4	Shenzhen Tie Fa Technology limited	
			Guangdong KINGSHINE ELECTRONICS CO., LTD	
			Quzhou Sunlord Electronics Co., Ltd	
3	Crystal	240MHz-10pF-10ppm-3225	HUBEI TKD ELECTRONICS TECHNOLOGY CO., LTD.	
			LUCKI CM ELECTRONICS CO., LTD	
			HOSONIC ELECTRONIC CO., LTD.	
			SHENZHEN KAIYUEXIANG ELECTRONICS CO., LTD	

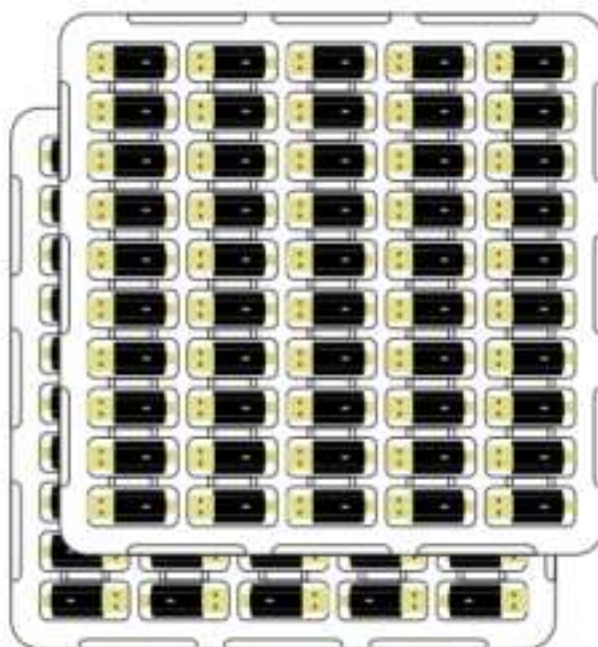
8. Package and Storage Information

8.1 Package Dimensions

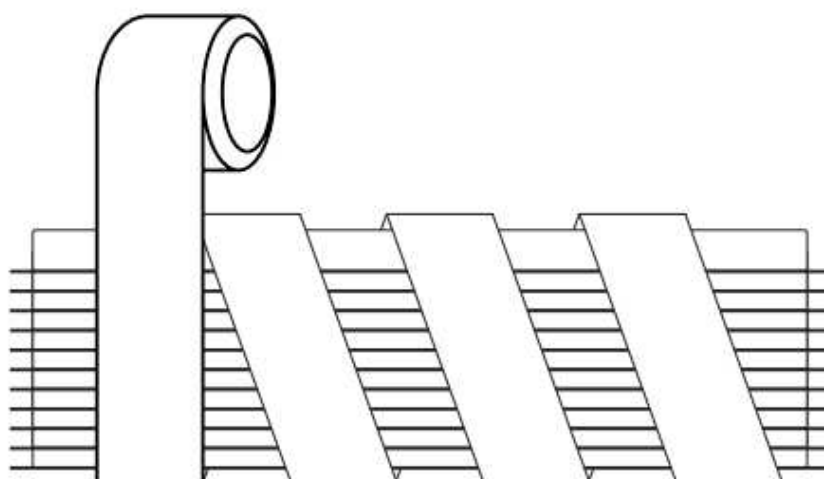


包装标准概要

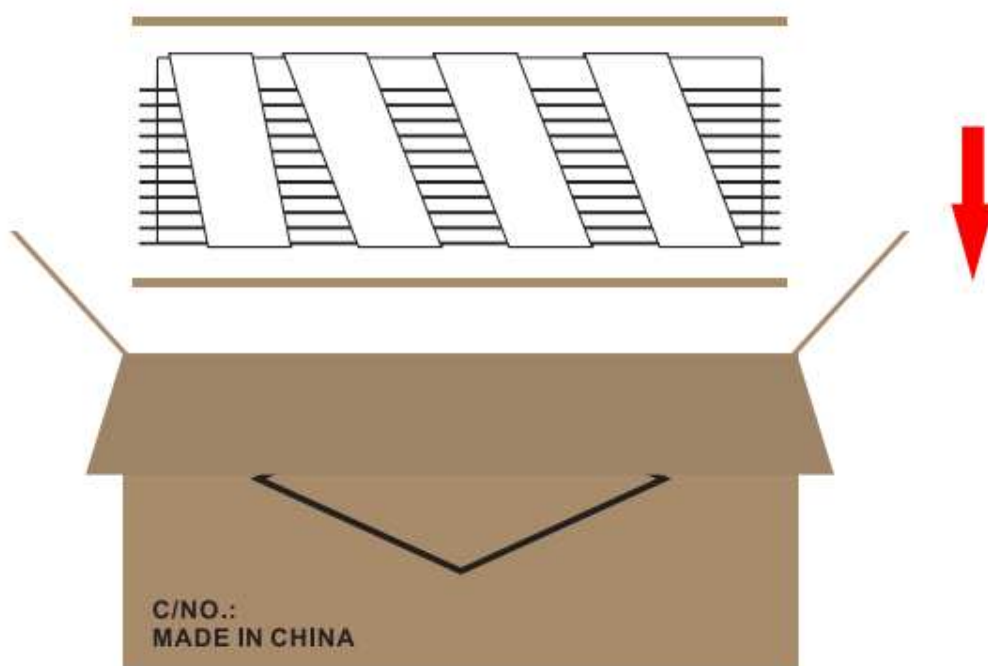
1



注意：每盘一盘，吸塑必须要如图180°调头叠放
每箱共叠11盘吸塑，最上面一盘为空盘 (以防产品运输中错位)，共500个产品

2

按吸塑盘实际尺寸适当用电线膜缠好

3

- 1.上下各放1张平卡，如图所示装箱
- 2.装箱后按品质要求工字形封箱

纸箱贴纸打印及粘贴标准

10021678: 空白贴纸*2

产品型号:	BL-W8821CU7
名称:	USB无线网卡
箱号:	 XXXXXXXXXX-XXXX
制单号:	XXXXXXXX
产品料号:	7000XXXX
净重:	XX (KG)
毛重:	XX (KG)
数量:	500 (PC)

打印内容如图:
根据产品相关信息, 按实际打印
(字体无要求, 推荐微软雅黑)



左侧唛



右侧唛



8.2 Storage Conditions

Absolute Maximum Ratings:

Storage temperature: -45°C to +85°C

Storage humidity: 10% to 95% RH (Non-Condensing)

Recommended Storage Conditions:

Storage temperature: 5°C to +40°C

Storage humidity: 20% to 90% RH

ESD Sensitivity:

The Module is a static-sensitive electronic device.

Do not operate or store near strong electrostatic fields.

Take proper ESD precautions!

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, 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 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:**2AL6KBL-M7638BU4**"

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 **FCCID: 2AL6KBL-M7638BU4** has been approved by Federal Communications Commission to operate with the 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.

Model	Type	Connector	Peak gain (dBi)				
			2400-2483.5 MHz	5150-5250 MHz	5250-5350 MHz	5470-5725 MHz	5725-5850 MHz
2400-2483.5 MHz	External Antenna	/	2.0dBi	/	/	/	/
5000-6000 MHz	External Antenna	/	/	2.0dBi	/	/	2.0dBi

2.8 Label and compliance information

The final end product must be labeled in a visible area with the following" Contains FCC ID:2AL6KBL-M7638BU4".

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.