

# Product Specification

Revision	V1.0		
Date	2020-04-24		
Model Name	BL-M8822CS1		
Product Name	IEEE 802.11a/b/g/n/ac 2T2R WiFi + Bluetooth SDIO Module		
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## Revision History

Date	Document Revision	Product Revision	Description
2019/02/27	0.1	V0.1	Preliminary release
2019/07/11	1.0	V1.0	Final release
2020/04/24	1.1	V1.0	Update 2ant related data

## 1. Introduction

### 1.1 General Description

BL-M8822CS1 is a highly integrated module that was built in a 2\*2 dual-band wireless LAN radio and Bluetooth radio. It combines a WLAN MAC, a 2T2R capable WLAN baseband, and RF in a single chip. It supports IEEE 802.11a/b/g/n/ac standard and provides the highest PHY rate up to 867Mbps, offering feature-rich wireless connectivity and reliable throughput from an extended distance. It includes Bluetooth 2.1/3.0/4.1/v4.2 LE.

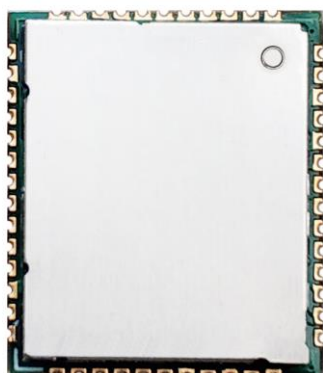


Figure 1-Top View



Figure 2-Bottom View

**Note:** The above pictures are for reference only

### 1.2 Features

- Operating Frequencies: 2.4~2.4835GHz or 5.15~5.85GHz
- Host Interface is SDIO (SDIO 1.1/2.0/3.0) and UART for BT
- IEEE Standards: IEEE 802.11a/b/g/n/ac
- Wireless data rate can reach up to 867Mbps
- Connect to external antenna through the half hole
- Power Supply: VBAT 3.3V $\pm$ 0.3V, main power supply; VDIO 3.3 $\pm$ 0.3V or 1.8 $\pm$ 0.2V, the SDIO, UART and PCM signal level range from 1.8V~3.3V.

1.3 Applications

- MID
- IP Camera
- STB
- Smart TV
- E-book
- Other devices which need to be supported by wireless network

2. Functional Block Diagram

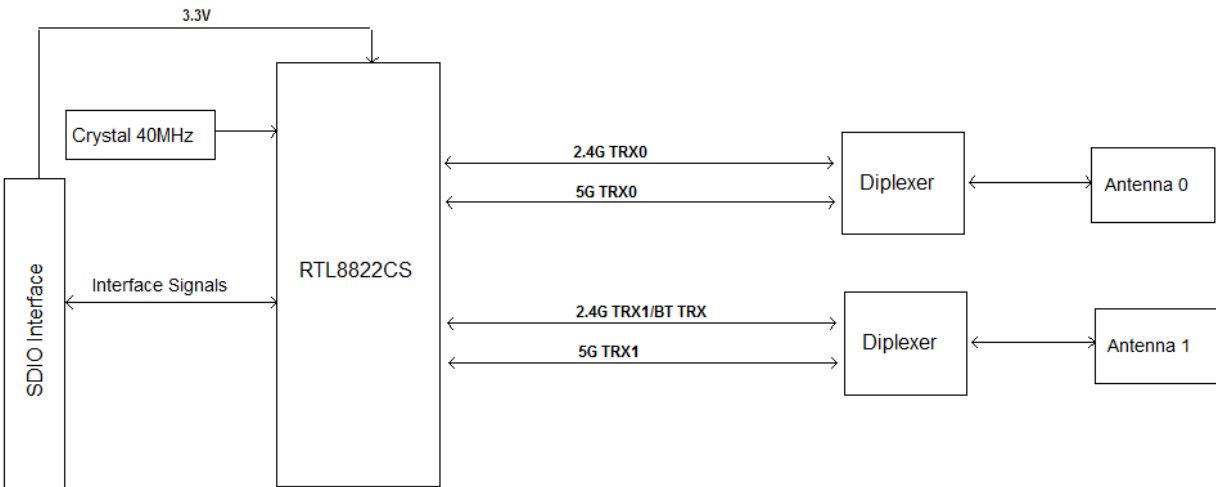


Figure 3-BL-M8822CS1

3. Product Technical Specifications

3.1 General Specifications

Item	Description
Product Name	BL-M8822CS1
Main Chip	RTL8822CS-VL-CG
Host Interface	SDIO for WiFi; UART for Bluetooth
IEEE Standards	IEEE 802.11a/b/g/n/ac
Operating Frequencies	2402~2480MHz, 2412-2462MHz, 5180~5240 MHz,5745-5825MHz
Modulation	WiFi: 802.11b DSSS: CCK, DQPSK, DBPSK 802.11g OFDM: 64-QAM,16-QAM, QPSK, BPSK 802.11n OFDM: 64-QAM,16-QAM, QPSK, BPSK 802.11ac OFDM: 256-QAM, 64-QAM,16-QAM, QPSK, BPSK BT: FHSS: GFSK, $\pi/4$ -DQPSK, 8PSK

Working Mode	Infrastructure, Ad-Hoc
Wireless Data Rate	WiFi: 802.11b: 1,2,5.5,11Mbps, 802.11a: 6,9,12,18,24,36,48,54Mbps, 802.11g: 6,9,12,18,24,36,48,54Mbps, 802.11n-2.4/5G HT20: MCS0~15, 6.5~144.4Mbps, 802.11n-2.4/5G HT40: MCS0~15, 13~300Mbps, 802.11ac-VHT20: MCS0~8, VHT40/80: MCS0~9, reach up to 867Mbps, BT: 1Mbps for BDR、BLE, 2、3Mbps for EDR
Rx Sensitivity	-95dBm (Min)
TX Power	16.0dBm (Max)
Antenna Type	Connect to the external antenna through half hole
Dimension(L*W*H)	15.1*13.1*2.4mm (L*W*H) Tolerance: +/-0.15mm
Clock Source	40MHz
Working Temperature	-10℃ to +70℃
Storage Temperature	-40℃ to +85℃

### 3.2 WiFi DC Power Consumption

VDD=3.3V, Ta= 25 °C, unit: mA				
Supply current		Typ		Max
RX sense mode (No Link)		172		202
802.11b	1Mbps		11Mbps	
Supply current	Typ.	Max.	Typ.	Max.
Continuous TX mode	395	436	347	440
RX mode	178	204	177	206
802.11g	6Mbps		54Mbps	
Supply current	Typ.	Max.	Typ.	Max.
Continuous TX mode	455	620	311	652
RX mode	183	216	183	220
802.11n HT20	MCS0		MCS7	
Supply current	Typ.	Max.	Typ.	Max.
Continuous TX mode	379	512	264	504
RX mode	182	216	183	216
802.11n HT20	MCS 8		MCS15	
Supply current	Typ.	Max.	Typ.	Max.

Continuous TX mode	398	536	265	544
RX mode	177	208	175	212
<b>802.11n HT40</b>	MCS0		MCS7	
Supply current	Typ.	Max.	Typ.	Max.
Continuous TX mode	317	432	231	428
RX mode	191	220	190	224
<b>802.11n HT40</b>	MCS 8		MCS15	
Supply current	Typ.	Max.	Typ.	Max.
Continuous TX mode	357	544	246	544
RX mode	184	216	185	216
<b>802.11a</b>	6Mbps		54Mbps	
Supply current	Typ.	Max.	Typ.	Max.
Continuous TX mode	412	512	279	528
RX mode	176	209	174	212
<b>802.11n HT20(5G)</b>	MCS0		MCS7	
Supply current	Typ.	Max.	Typ.	Max.
Continuous TX mode	398	492	273	504
RX mode	167	196	166	192
<b>802.11n HT20(5G)</b>	MCS8		MCS15	
Supply current	Typ.	Max.	Typ.	Max.
Continuous TX mode	513	704	319	712
RX mode	167	196	167	200
<b>802.11n HT40(5G)</b>	MCS0		MCS7	
Supply current	Typ.	Max.	Typ.	Max.
Continuous TX mode	369	504	252	504
RX mode	176	207	175	208
<b>802.11n HT40(5G)</b>	MCS8		MCS15	
Supply current	Typ.	Max.	Typ.	Max.
Continuous TX mode	448	716	293	720
RX mode	175	204	176	204
<b>802.11acVHT80(5G)</b>	MCS0		MCS9	
Supply current	Typ.	Max.	Typ.	Max.
Continuous TX mode	392	840	309	816
RX mode	184	212	185	212



3.3 Bluetooth RF Specification

RF Characteristics for BT				
Items	Contents			
Specification	BT V4.2/4.1/V4.0+BLE/V3.0/V2.1+EDR			
Modulation	FHSS: GFSK, $\pi/4$ -DQPSK, 8DPSK			
Channel frequency	2402~2480MHz			
Data rate	1Mbps,2Mbps,3Mbps			
TX Characteristics	min.	typ.	max.	Unit
Power level (BR/EDR)	0	4	8	dBm
Power level (BLE)	0	4	8	dBm
RX Characteristics	min.	typ.	max.	Unit
Minimum input level (Muti-slot packages sensitivity mode<0.1%)	-90	-85	-80	dBm

**ESD CAUTION:** Although this module is designed to be as robust as possible, Electrostatic Discharge (ESD) can damage this module. It must be protected from ESD at all times and handled under the protection of ESD.

4. Pin Assignments

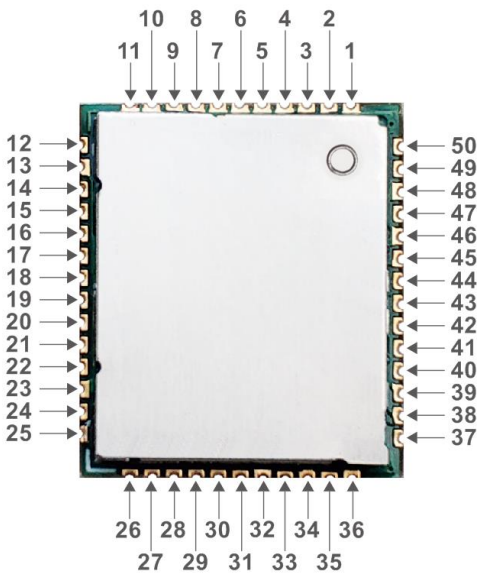


Figure 4-Top view

PIN	Function	Description
1	GND	Ground connections
2	WL/BT_ANT1	WLAN and BT ANT
3	GND	Ground connections
4	GND	Ground connections
5	GND	Ground connections
6	GND	Ground connections
7	GND	Ground connections
8	GND	Ground connections
9	WL_ANT0	WLAN_ANT
10	GND	Ground connections
11	GND	Ground connections
12	NC	No connection(floating)
13	NC	No connection(floating)
14	NC	No connection(floating)
15	WL_REG_ON	0: WL disable; 1: WL active (1.8~3.3V)
16	WL_WAKE	WLAN to wake up HOST
17	SDIO_CMD	SDIO command line
18	SDIO_CLK	SDIO clock line
19	SDIO_DATA3	SDIO data line 3
20	SDIO_DATA2	SDIO data line 2
21	SDIO_DATA0	SDIO data line 0



22	SDIO_DATA1	SDIO data line 1
23	GND	Ground connections
24	WL_WAKE	WLAN to wake up HOST
25	NC	No connection(floating)
26	NC	No connection(floating)
27	PCM_SYNC	PCM sync signal
28	PCM_IN	PCM data input
29	PCM_OUT	PCM data output
30	PCM_CLK	PCM clock
31	SUSCLK	External 32k or RTC clock input
32	GND	Ground connections
33	NC	No connection(floating)
34	VDIO	I/O Voltage supply input
35	NC	No connection(floating)
36	VBAT	3.3V Main Power Supply
37	NC	No connection(floating)
38	BT_REG_ON	0: BT disable; 1: BT active (1.8~3.3V)
39	GND	Ground connections
40	UART_TXD	Bluetooth UART interface
41	UART_RXD	Bluetooth UART interface
42	UART_RTS_N	GND
43	UART_CTS_N	Bluetooth UART interface
44	SD_RESET	SDIO System reset
45	NC	No connection(floating)
46	GND	Ground connections
47	NC	No connection(floating)
48	GND	Ground connections
49	HOST_WAKE_BT	HOST wake up Bluetooth device
50	BT_WAKE_HOST	Bluetooth device to wake up HOST

## 5. Typical Application Circuit

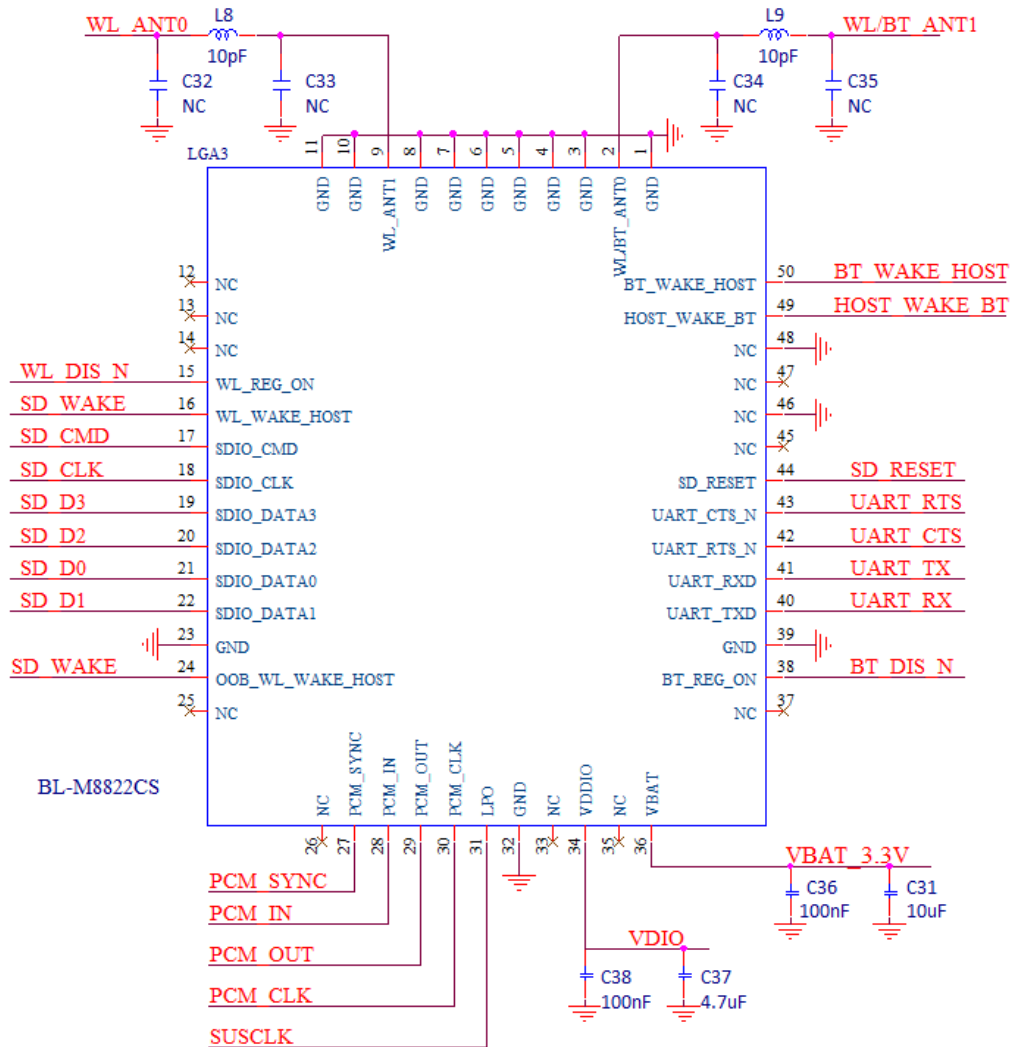


Figure 5-Typical Application Circuit

### NOTE:

- RF traces need to keep 50ohm impedance.
- PIN\_15 activates low WLAN disable, no connecting when using; the same as PIN\_38.
- Module's BT UART\_TX connects to reference circuit's RX, UART\_RX connects to reference circuit's TX.
- VDIO 3.3V for default speed and high-speed modes, 1.8V for SDR12/SDR25/SDR50/DDR50 modes.

## 6. Mechanical Specifications

Module dimension: Typical (L\*W\*H): 15.1\*13.1\*2.4mm Tolerance: +/-0.15mm

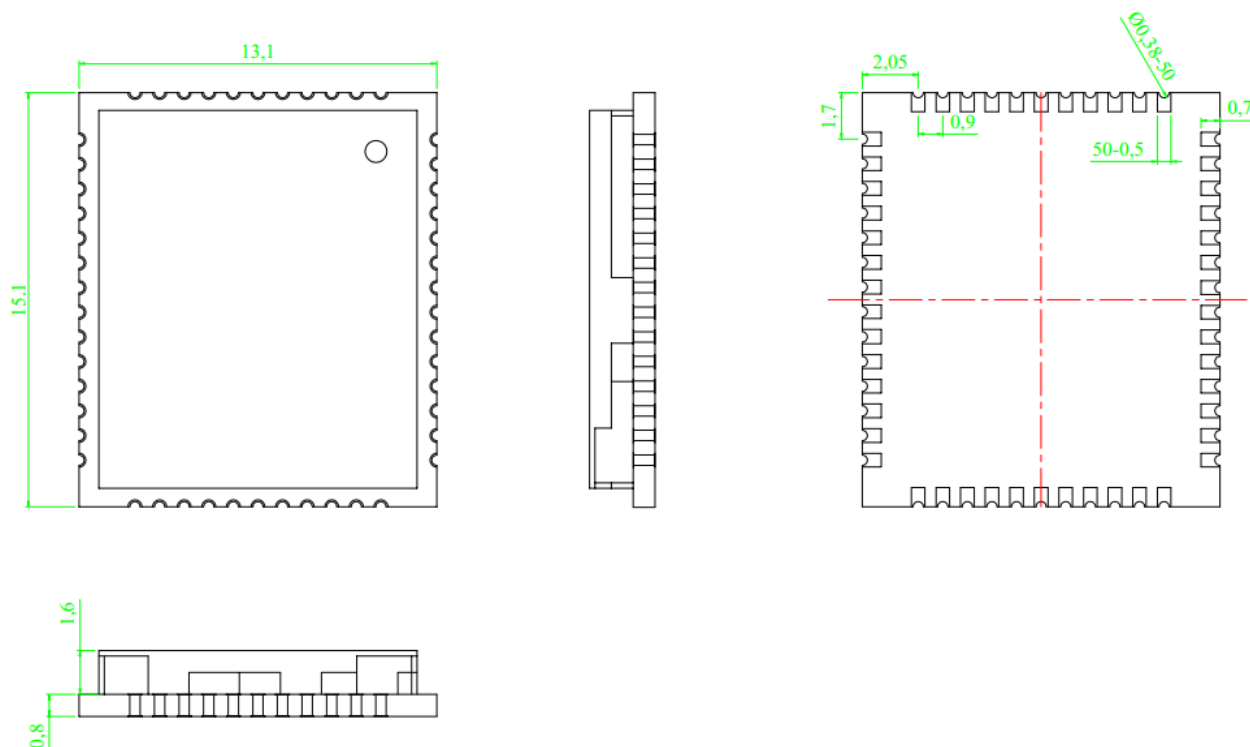


Figure 6-Module dimension

## 7. Others

### 7.1 Package Information



Figure 7-Package Information

### 7.2 Storage Temperature and Humidity

1. Storage Condition: Moisture barrier bag must be stored under 30°C, humidity under 85% RH.  
The calculated shelf life for the dry packed product shall be a 12months from the bag seal date.  
Humidity indicator cards must be blue, <30%.
2. Products require baking before mounting if humidity indicator cards reads > 30% temp < 30°C,  
humidity < 70% RH, over 96 hours.  
Baking condition: 125°C, 12 hours.  
Baking times: 1 time.

7.3 Recommended Reflow Profile

Reflow soldering shall be done according to the solder reflow profile, Typical Solder Reflow Profile is illustrated in Figures 8. The peak temperature is 245°C.

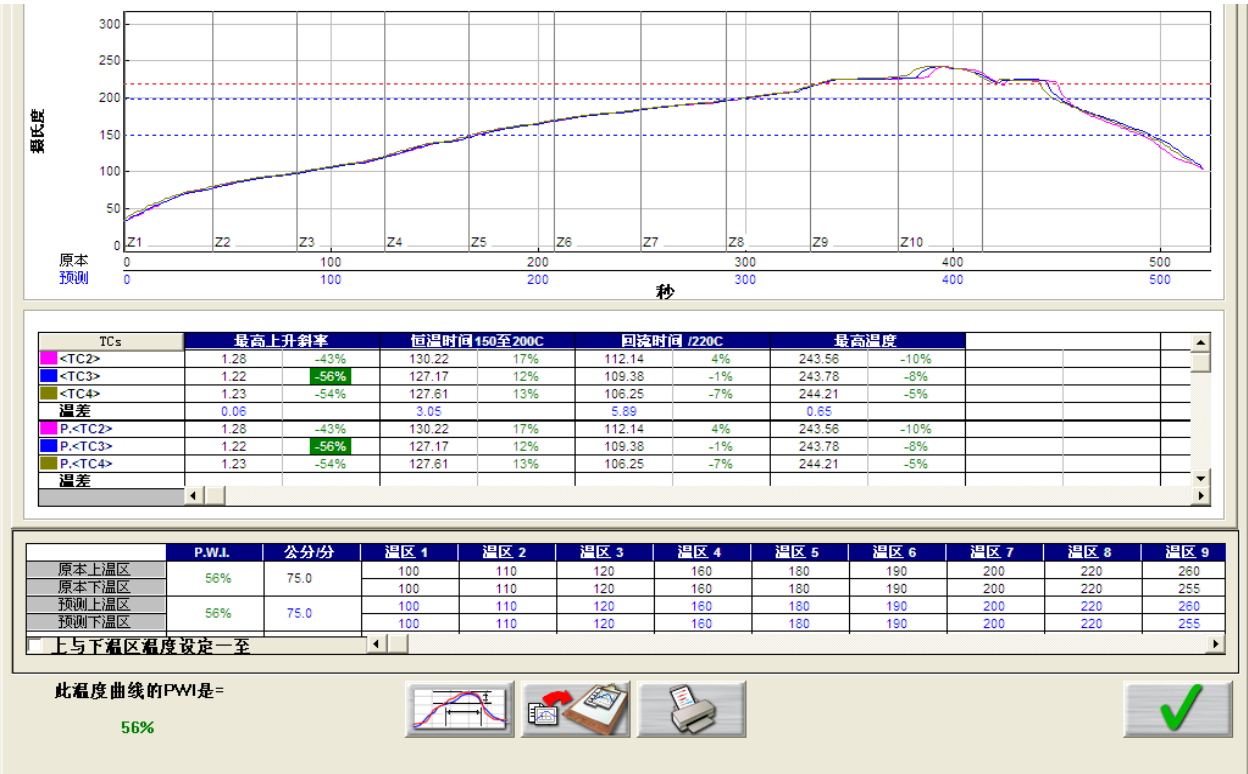


Figure 8-Typical Solder Reflow Profile

**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 0cm 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-M8822CS1**"

**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 **2AL6KBL-M8822CS1** 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-M8822CS1".

### 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.