



## **BL-M8852BS2**

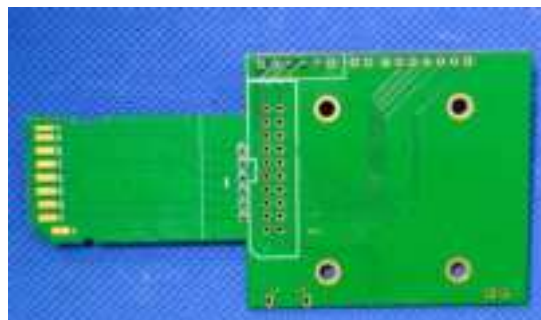
**802.11ax 1200Mbps WLAN + BT v5.2  
SDIO Module Specification**

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(Top View)



(Bottom View)

Module Name: BL-M8852BS2	
Module Type: 802.11a/b/g/n/ac/ax 1200Mbps WLAN + Bluetooth v5.2 Combo SDIO Module	
Revision: V1.1	
Customer Approval:	
Company:	
Title:	
Signature:	Date:
LB-link Approval:	
Title:	
Signature:	Date:

## Revision History

Revision	Summary	Release Date	Revised By
0.1	Initial release	2022-10-18	
1.0	official version	2022-12-12	
1.1	Update module key components	2023-06-06	Drq
1.1	Version not updated to V1.1 Digital 3.3V IO update	2023-11-10	Fnz

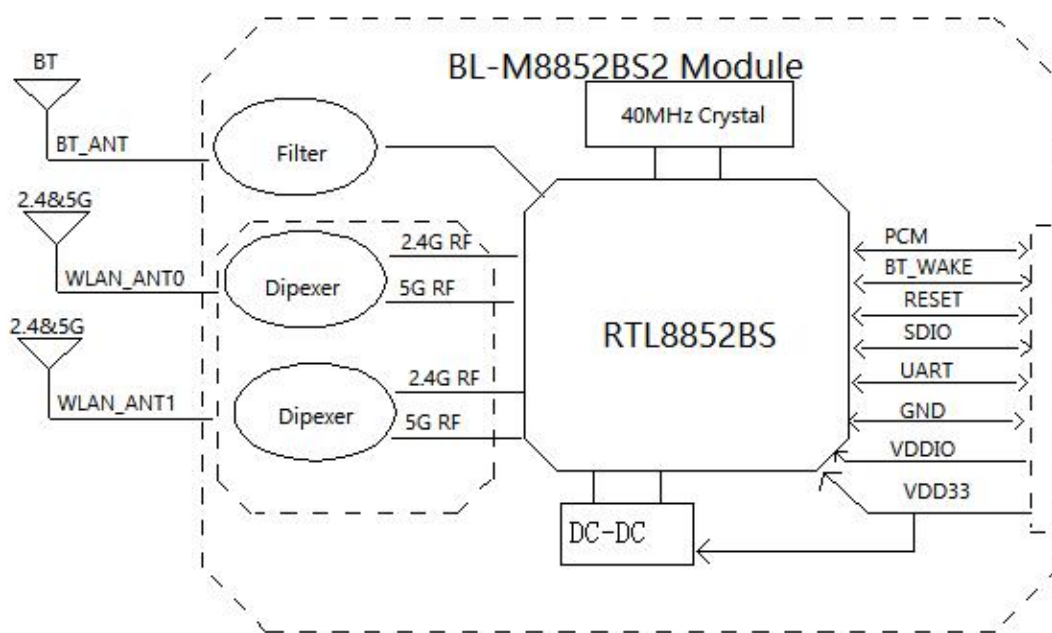
## 1.Introduction

The BL-M8852BS2 is a highly integrated Dual-band WLAN + Bluetooth Combo module. It combines a 2T2R Dual-band WLAN subsystem with SDIO3.0 interface controllers and a Bluetooth v5.2 subsystem with UART interface controller. The module compatible IEEE 802.11a/b/g/n/ac/ax standard and provides the maximum PHY rate up to 1201Mbps, it supports Bluetooth dual mode with v5.2/v4.2/v2.1 compliant. The module provides a complete solution for high-performance integrated WLAN and Bluetooth devices such as OTT Boxes, Set-top Boxes, HD Cameras, etc.

### 1.1 Features

- Operating Frequencies: 2.4~2.4835GHz or 5.15~5.85GHz
- Support Dual-band 2T2R mode with 20/40/80Mhz bandwidth
- Support 802.11ax with OFDMA and MU-MIMO
- Dual Mode Bluetooth support: Simultaneous LE and BR / EDR
- DC 3.3V main power supply and 3.3V/1.8V IO power supply

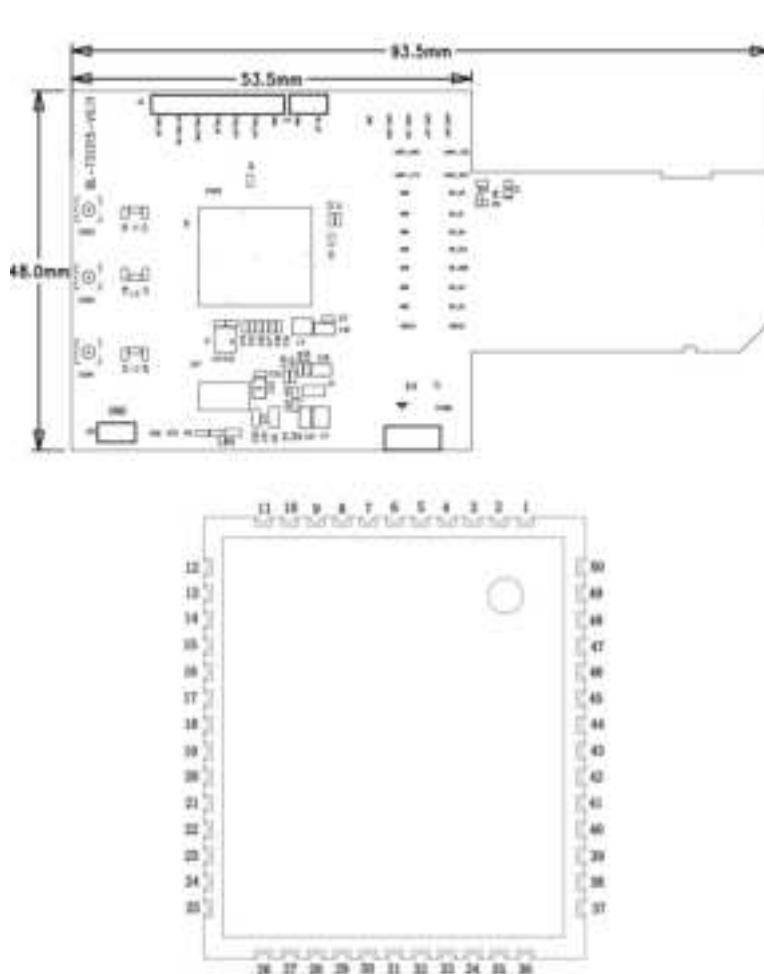
### 1.2 Block Diagram



## 1.3 General Specifications

Module Name	BL-M8852BS2
Chipset	RTL8852BS-CG
WLAN Standards	IEEE802.11a/b/g/n/ac/ax
Host Interface	SDIO for WLAN & UART for BT
Antenna	Connect to external antennas through the half hole
Power Supply	VDD33=3.3V±0.2V@1100 mA (Max) VDDIO=3.3V±0.2V / 1.8V±0.1V
Operation Temperature	-20°C to +70°C
Operation Humidity	10% to 95% RH (Non-Condensing)

## 2. Pin Assignments



## 2.1 Pin Definition

No	Pin Name	Type	I/O Level	Module Pin Description
1	GND	RF		RF Ground connections
2	ANT1	RF		2.4G / 5G RF PAD for WLAN_ANT1
3	GND	RF		RF Ground connections
4	GND	RF		RF Ground connections
5	GND	RF		RF Ground connections
6	GND	RF		RF Ground connections
7	GND	RF		RF Ground connections
8	GND	RF		RF Ground connections
9	ANT0	RF		2.4G / 5G RF PAD for WLAN_ANT0
10	GND	RF		RF Ground connections
11	GND	RF		RF Ground connections
12	BT_ANT	RF		2.4G RF PAD for BT_ANT
13	GND	RF		RF Ground connections
14	GPIO5	I/O	VDDIO	Shared with GPIO5. Power on Trap Pin : Do not pull it high before TTrap_Ready (500ms Typical)
15	SD_RESET	I	VDDIO	Shared with GPIO9. This pin can externally shut down the WLAN function when SD_RESET is pulled low. When this pin is pulled low, SDIO interface will be disabled. We suggest configuring the control pin in Host side as open drain output. (Reserved UART_RXD for BQB test)
16	WL_WAKE_HOST	O	VDDIO	Shared with GPIO10. This WLAN device to wake-up Host output
17	SD_CMD	I/O	VDDIO	SDIO command line
18	SD_CLK	I	VDDIO	SDIO clock line
19	SD_D3	I/O	VDDIO	SDIO data3 line
20	SD_D2	I/O	VDDIO	SDIO data2 line
21	SD_D0	I/O	VDDIO	SDIO data0 line
22	SD_D1	I/O	VDDIO	SDIO data1 line
23	GND	P		Ground connections
24	NC	/		NC
25	NC	/		NC
26	NC	/		NC

27	PCM_SYNC	I/O	VDDIO	Shared with GPIO2. Power on Trap Pin. PCM Synchronization control input(Slave mode) / output(Master mode).
28	PCM_IN	I	VDDIO	Shared with GPIO0. PCM data Input. Power on Trap : GPIO0~4 is mode select T <sub>Trap_Ready</sub> =500ms(Typical) 0: Normal operation mode 1: Test/debug mode
29	PCM_OUT	O	VDDIO	Shared with GPIO1. Power on Trap Pin. PCM data Out
30	PCM_CLK	I/O	VDDIO	Shared with GPIO3. Power on Trap Pin. PCM Clock input(Slave mode) / output(Master mode)
31	NC	/		NC
32	GND	P		Ground connections
33	NC	/		NC
34	VDDIO	P		1.8V±0.1V or 3.3V±0.2V power for SDIO interface and other I/Os
35	NC	/		NC
36	VDD33	P		3.3V Main Power Supply
37	NC	/		NC
38	BT-DIS	I	VDDIO	Shared with GPIO11. This pin can externally shut down the BT function when BT-DIS is pulled Low. When this Pin is pulled low, UART interface will be also disabled. This pin can be also defined as the BT Radio-off function with host interface remaining connected. (Reserved UART_TXD for BQB test)
39	GND	P		Ground connections
40	UART_TXD	O	VDDIO	UART data out
41	UART_RXD	I	VDDIO	UART data input
42	UART_RTS	O	VDDIO	UART RTS out
43	UART_CTS	I	VDDIO	UART CTS input
44	WL-DIS	I	VDDIO	Shared with GPIO15. This pin can be defined as the WLAN Radio-off function with host interface remaining connected. When this pin is pulled low, WLAN Radio will be disabled
45	GPIO4	I	VDDIO	Shared with GPIO4. Power on Trap Pin
46	GND	P		Ground connections
47	SUSCLK	I	VDDIO	External 32K clock input.

				Power on Trap Pin : Do not pull it high before T <sub>Trap_Ready</sub> (500ms Typical)
48	GND	P		Ground connections
49	HOST_WAKE_BT	I	VDDIO	Shared with GPIO13. The Host to wake-up this BT device input
50	BT_WAKE_HOST	O	VDDIO	Shared with GPIO14. This BT device to wake-up Host output

P: Power or Ground; I/O: In/Output; I: Input; O :Output; O/D:Open Drain Output;  
RF: Analog RF Port or RF Ground;

### 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			1.7	2	/
Supply Voltage	VDD33	3.1	3.3	3.5	V
	VDDIO/3.3V	3.1	3.3	3.5	V
	VDDIO/1.8V	1.7	1.8	1.9	V

#### 3.2 Digital 3.3V IO DC Specifications

Symbol	Parameter	Min	Typ	Max	Units
VIH	Input High Voltage	2.0	3.3	3.6	V
VIL	Input Low Voltage	--	0	0.9	V
VOH	Output High Voltage	2.97	--	3.3	V
VOL	Output Low Voltage	0	--	0.33	V

#### 3.3 Digital 1.8V I/O DC Specifications

Symbol	Parameter	Min	Typ	Max	Units
VIH	Input High Voltage	1.26	1.8	3.6	V
VIL	Input Low Voltage	--	0	0.8	V

VOH	Output High Voltage	1.62	--	1.8	V
VOL	Output Low Voltage	0	--	0.18	V

### 3.4 Current Consumption

Conditions : VDD33&VDDIO=3.3V ; Ta:25°C			
Use Case	VDD33 Current)		
	Typ(I <sub>RMS</sub> )	MAX(I <sub>Peak</sub> )	Units
WLAN&BT Unassociated (Linux Driver)	145	150	mA
2.4G WLAN TCP throughput TX 90Mbps (Linux Driver)	425	720	mA
5G WLAN TCP throughput TX 90Mbps (Linux Driver)	483	920	mA
2.4G 11b 1Mbps TX@ 18dBm(1TX RF test)	341	410	mA
2.4G 11b 1Mbps RX (1RX RF test)	181	220	mA
2.4G 11g 6Mbps TX@18dBm (1TX RF test)	257	420	mA
2.4G 11g 54Mbps TX@17dBm(1TX RF test)	162	400	mA
2.4G 11g 54Mbps RX (1RX RF test)	181	220	mA
2.4G 11n HT20_MCS8 TX@18dBm (2TX RF test)	397	710	mA
2.4G 11n HT40_MCS15 TX @16dBm(2TX RF test)	185	710	mA
2.4G 11ax HE40_MCS0 TX@16dBm(2TX RF test)	269	710	mA
2.4G 11ax HE40_MCS11 @TX15dBm (2TX RF test)	194	700	mA
2.4G 11ax HE40_MCS11 RX (2RX RF test)	181	220	mA
5G 11a 54Mbps TX @17dBm (1TX RF test)	236	850	mA
5G 11a 54Mbps RX (1RX RF test)	175	260	mA
5G 11n HT20_MCS0 TX@17dBm (1TX RF test)	443	850	mA
5G 11ac VHT80_MCS0 TX@17dBm(2TX RF test)	320	900	mA
5G 11ax HE80_MCS0 TX@16dBm (2TX RF test)	305	900	mA
5G 11ax HE80_MCS0 RX (2RX RF test)	175	260	mA
BT			
DH1 TX(RF-Test) @5dBm	240	268	mA
3DH1 TX(RF-Test) @5dBm	240	268	mA
LE 1M TX(RF-Test) @5dBm	229	268	mA
LE 2M TX(RF-Test) @5dBm	215	268	mA
LE 2M RX(RF-Test)	215	244	mA



## 4. WLAN & Bluetooth RF Specifications

### 4.1 2.4G WLAN RF Specification

Conditions : VDD33=3.3V ; Ta:25℃			
Features		Description	
WLAN Standard		IEEE 802.11b/g/n/ax, CSMA/CA	
Frequency Range		2.4~2.4835GHz (2.4GHz ISM Band)	
Channels		Ch1~Ch13 (For 20MHz Channels)	
Modulation		802.11b (DSSS): CCK, DQPSK, DBPSK; 802.11g (OFDM): BPSK, QPSK, QAM16, QAM64; 802.11n (OFDM): BPSK, QPSK, QAM16, QAM64; 802.11ax (OFDMA): BPSK, BPSK_DCM, QPSK, QPSK_DCM, QAM16, QAM16_DCM, QAM64, QAM256, QAM1024;	
Data Rate		802.11b: 1, 2, 5.5, 11Mbps; 802.11g: 6, 9, 12, 18, 24, 36, 48, 54Mbps; 802.11n (HT20): MCS0~MCS7(1T1R_SISO) 6.5~72.2Mbps; 802.11n (HT20): MCS8~MCS15(2T2R_MIMO) 13~144.4Mbps; 802.11n (HT40): MCS0~MCS7(1T1R) 13.5~150Mbps; 802.11n (HT40): MCS8~MCS15(2T2R) 27~300Mbps; 802.11ax (HE_MU,26~242RU): MCS0~MCS11(1T1R) 0.4~143.4Mbps; 802.11ax (HE_MU,26~242RU): MCS0~MCS11(2T2R) 0.8~286.8Mbps; 802.11ax (HE_SU, non-OFDMA 20MHz): MCS0~MCS11(1T1R) 3.6~143.4Mbps; 802.11ax (HE_SU, non-OFDMA 20MHz): MCS0~MCS11(2T2R) 7.3~286.8Mbps; 802.11ax (HE_SU, non-OFDMA 40MHz): MCS0~MCS11(1T1R) 7.3~286.8Mbps; 802.11ax (HE_SU, non-OFDMA 40MHz): MCS0~MCS11(2T2R) 14.6~573.5Mbps;	
Frequency Tolerance		≤±20ppm	
2.4G Transmitter Specifications (ANT0 & ANT1. TX power tolerance calibrated, customers can define the target TX power by modifying configuration file of the driver software. Customers must define the TX power same or lower than recommended Target TX Power as below)			
TX Rate	Recommended Target TX Power (dBm)	TX Power Tolerance (dBm)	EVM (dB)
802.11b@1~11Mbps	18	±2	≤-10
802.11g@6Mbps	18	±2	≤-10
802.11g@54Mbps	17	±2	≤-25
802.11n@HT20_MCS0	18	±2	≤-10
802.11n@HT20_MCS7	17	±2	≤-28

802.11n@HT40_MCS0	17	±2	≤-10
802.11n@HT40_MCS7	16	±2	≤-28
802.11ax@HE_SU 20M_MCS0	16	±2	≤-10
802.11ax@HE_SU 20M_MCS11	15	±2	≤-35
802.11ax@HE_SU 40M_MCS0	16	±2	≤-10
802.11ax@HE_SU 40M_MCS11	15	±2	≤-35
<b>2.4G Receiver Specifications (WLAN_ANT0&amp;WLAN_ANT1)</b>			
<b>RX Rate</b>	<b>Min Input Level (Typ)</b>	<b>Max Input Level (Typ)</b>	<b>PER</b>
802.11b@1Mbps	-94dBm	-5dBm	< 8%
802.11b@11Mbps	-87dBm	-5dBm	< 8%
802.11g@6Mbps	-92dBm	-5dBm	< 10%
802.11g@54Mbps	-74dBm	-5dBm	< 10%
802.11n@HT20_MCS0	-92dBm	-5dBm	< 10%
802.11n@HT20_MCS7	-72dBm	-5dBm	< 10%
802.11n@HT40_MCS0	-89dBm	-5dBm	< 10%
802.11n@HT40_MCS7	-69dBm	-5dBm	< 10%
802.11ax@HE_SU 20M_MCS0	-91dBm	-5dBm	< 10%
802.11ax@HE_SU 20M_MCS11	-63dBm	-5dBm	< 10%
802.11ax@HE_SU 40M_MCS0	-88dBm	-5dBm	< 10%
802.11ax@HE_SU 40M_MCS11	-60dBm	-5dBm	< 10%

## 4.2 5G WLAN RF Specification

<b>Conditions: VDD33=3.3V; Ta:25°C</b>	
<b>Features</b>	<b>Description</b>
WLAN Standard	IEEE 802.11a/n/ac/ax, CSMA/CA
Frequency Range	5.15~5.25GHz; 5.25~5.35GHz; 5.47~5.73GHz; 5.735~5.835GHz (5GHz ISM Band)
Channels	Ch36, Ch40, Ch44, Ch48; Ch52~Ch64; Ch100~Ch140; Ch149~Ch165 (For 20MHz Channels)
Modulation	802.11a (OFDM): BPSK, QPSK, QAM16, QAM64; 802.11n (OFDM): BPSK, QPSK, QAM16, QAM64; 802.11ac (OFDM): BPSK, QPSK, QAM16, QAM64, QAM256; 802.11ax (OFDMA): BPSK, BPSK_DCM, QPSK, QPSK_DCM, QAM16,

	QAM16_DCM, QAM64, QAM256, QAM1024;		
Data Rate	802.11a: 6, 9, 12, 18, 24, 36, 48, 54Mbps; 802.11n (HT20): MCS0~MCS7(1T1R_SISO) 6.5~72.2Mbps; 802.11n (HT20): MCS8~MCS15(2T2R_MIMO) 13~144.4Mbps; 802.11n (HT40): MCS0~MCS7(1T1R) 13.5~150Mbps; 802.11n (HT40): MCS8~MCS15(2T2R) 27~300Mbps; 802.11ac (VHT20): MCS0~MCS8(1T1R) 6.5~86.7Mbps; 802.11ac (VHT20): MCS0~MCS8(2T2R) 13~173.3Mbps; 802.11ac (VHT40): MCS0~MCS9(1T1R)13.5~200Mbps; 802.11ac (VHT40): MCS0~MCS9(2T2R)27~400Mbps; 802.11ac (VHT80): MCS0~MCS9(1T1R)29.3~433.3Mbps; 802.11ac (VHT80): MCS0~MCS9(2T2R)58.5~866.7Mbps; 802.11ax (HE_MU,26~484RU): MCS0~MCS11(1T1R) 0.4~286.8Mbps; 802.11ax (HE_MU,26~484RU): MCS0~MCS11(2T2R) 0.8~573.5Mbps; 802.11ax (HE_SU, non-OFDMA 20MHz): MCS0~MCS11(1T1R) 3.6~143.4Mbps; 802.11ax (HE_SU, non-OFDMA 20MHz): MCS0~MCS11(2T2R) 7.3~286.8Mbps; 802.11ax (HE_SU, non-OFDMA 40MHz): MCS0~MCS11(1T1R) 7.3~286.8Mbps; 802.11ax (HE_SU, non-OFDMA 40MHz): MCS0~MCS11(2T2R) 14.6~573.5Mbps; 802.11ax (HE_SU, non-OFDMA 80MHz): MCS0~MCS11(1T1R) 15.3~600.4Mbps; 802.11ax (HE_SU, non-OFDMA 80MHz): MCS0~MCS11(2T2R) 30.6~1201Mbps;		
Frequency Tolerance	≤ ±20ppm		
5G Transmitter Specifications (ANT0 & ANT1. TX power tolerance calibrated, customers can define the target TX power by modifying configuration file of the driver software. Customers must define the TX power same or lower than recommended Target TX Power as below)			
TX Rate	Recommended Target TX Power (dBm)	TX Power Tolerance (dBm)	EVM (dB)
802.11a@6Mbps	18	±2	≤-10
802.11a@54Mbps	17	±2	≤-25
802.11n@HT20_MCS0	17	±2	≤-10
802.11n@HT20_MCS7	16	±2	≤-28
802.11n@HT40_MCS0	17	±2	≤-10
802.11n@HT40_MCS7	16	±2	≤-28
802.11ac@VHT80_MCS0	17	±2	≤-10

802.11ac@VHT80_MCS9	16	±2	≤-32
802.11ax@HE_SU 80M_MCS0	16	±2	≤-10
802.11ax@HE_SU 80M_MCS11	15	±2	≤-35
<b>5G Receiver Specifications (WLAN_ANT0&amp;WLAN_ANT1)</b>			
<b>RX Rate</b>	<b>Min Input Level (Typ)</b>	<b>Max Input Level (Typ)</b>	<b>PER</b>
802.11a@6Mbps	-92dBm	-5dBm	< 10%
802.11a@54Mbps	-74dBm	-5dBm	< 10%
802.11n@HT20_MCS0	-91dBm	-5dBm	< 10%
802.11n@HT20_MCS7	-72dBm	-5dBm	< 10%
802.11n@HT40_MCS0	-88dBm	-5dBm	< 10%
802.11n@HT40_MCS7	-69dBm	-5dBm	< 10%
802.11ac@VHT80_MCS0	-85dBm	-5dBm	< 10%
802.11ac@VHT80_MCS9	-60dBm	-5dBm	< 10%
802.11ax@HE_SU 80M_MCS0	-82dBm	-5dBm	< 10%
802.11ax@HE_SU 80M_MCS11	-56dBm	-5dBm	< 10%

### 4.3 Bluetooth RF Specification

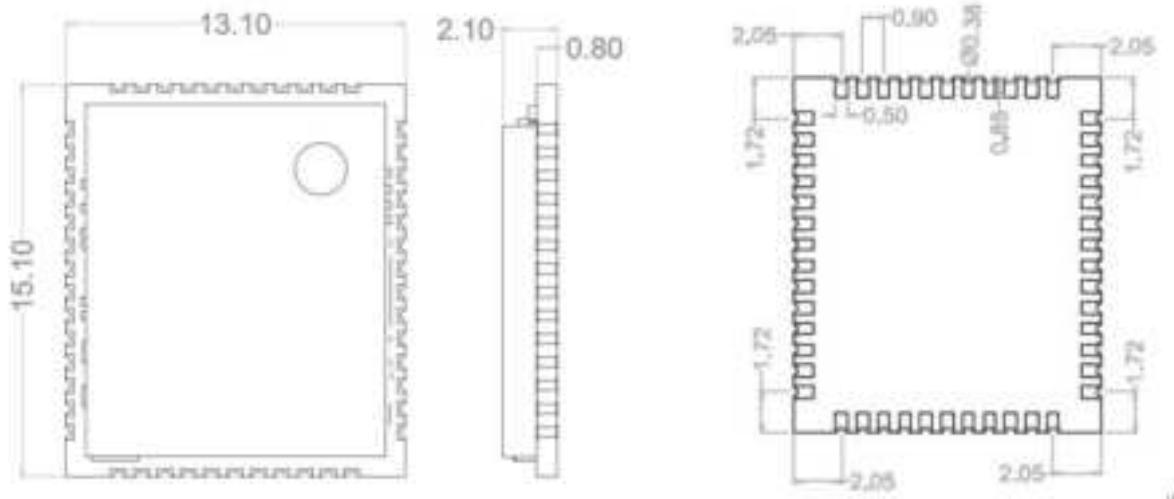
<b>Conditions: VDD33=3.3V; Ta:25°C</b>	
<b>Features</b>	<b>Description</b>
Bluetooth Specification	Bluetooth Core Specification v5.2/4.2/2.1
Frequency Range	2.4~2.4835GHz (2.4GHz ISM Band)
Channels	Bluetooth Classic: Ch0~Ch78 (For 1MHz Channels); Bluetooth Low Energy: Ch0~Ch39 (For 2MHz Channels);
Power Classes	Bluetooth Classic: Class1; Bluetooth Low Energy: Class1.5;
Data Rate & Modulation	BR_1Mbps: GFSK; EDR_2Mbps: π/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 (BT_ANT)			
Items	Min	Typ	Max
TX Power			
BR_1M	2dBm	5dBm	8dBm
EDR_2M /3M	2dBm	5dBm	8dBm
LE_125K/500K/1M/2M	2dBm	5dBm	8dBm
Items	Min	Typ	Max
BR_1M (DH1) Modulation Characteristics			
$\Delta f_{1avg}$	140KHz	165.1KHz	175KHz
$\Delta f_{2avg}$	115KHz	153.1KHz	/
$\Delta f_{2max}$	115KHz	153.1KHz	/
$\Delta f_{2avg}/\Delta f_{1avg}$	0.8	0.92	/
BR_1M (DH1) Initial Carrier Frequency Tolerance			
Init Freq Error	-75kHz	13.7kHz	+75kHz
EDR_3M(3DH5) EDR Carrier Frequency Stability and Modulation Accuracy			
$\omega_i$	-75KHz	3.02KHz	+75KHz
$\omega_i + \omega_o$	-75KHz	3.49KHz	+75KHz
$\omega_o$	-10KHz	0.41KHz	+10KHz
8DPSK RMS DEVM	/	0.037	0.13
8DPSK Peak DEVM	/	0.072	0.25
LE_1M Modulation Characteristics			
$\Delta f_{1avg}$	225KHz	252.28KHz	275KHz
$\Delta f_{2avg}$	185KHz	231.54KHz	/
$\Delta f_{2max}$	185KHz	224.60KHz	/
$\Delta f_{2avg}/\Delta f_{1avg}$	0.8	0.918	/
LE_2M Modulation Characteristics			
$\Delta f_{1avg}$	450KHz	499.73KHz	550KHz
$\Delta f_{2avg}$	370KHz	495.79KHz	/
$\Delta f_{2max}$	370KHz	477.90KHz	/

Δf2avg/Δf1avg	0.8	0.992	/	
Bluetooth Receiver Specifications (BT_ANT)				
Items	Sensitivity		Maximum Input Level	
	Input Level(Typ)	BER	Input Level(Typ)	BER
BR_1M (DH1)	-90dBm	≤0.1%	-10dBm	≤0.1%
EDR_3M (3DH5)	-83dBm	≤0.01%	-10dBm	≤0.1%
	Input Level(Typ)	PER	Input Level(Typ)	PER
LE_125K	-95dBm	≤5%	-10dBm	≤5%
LE_1M	-90dBm	≤5%	-10dBm	≤5%
LE_2M	-87dBm	≤5%	-10dBm	≤5%

## 5. Mechanical Specifications

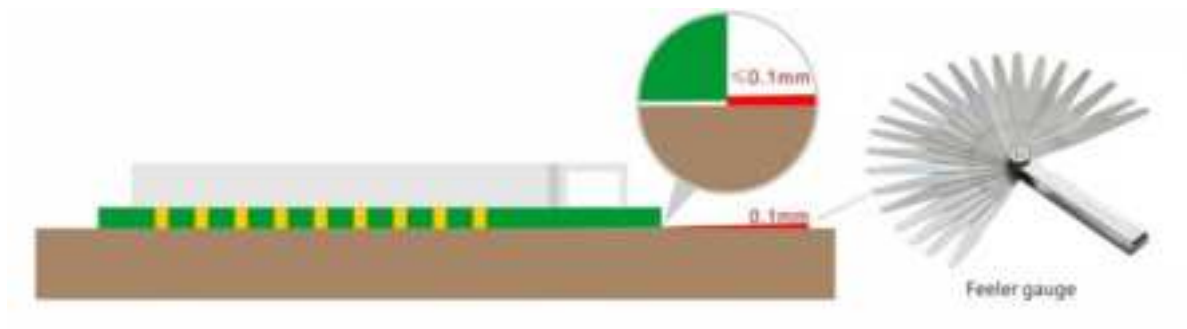
### 5.1 Module Outline Drawing



(Top View)

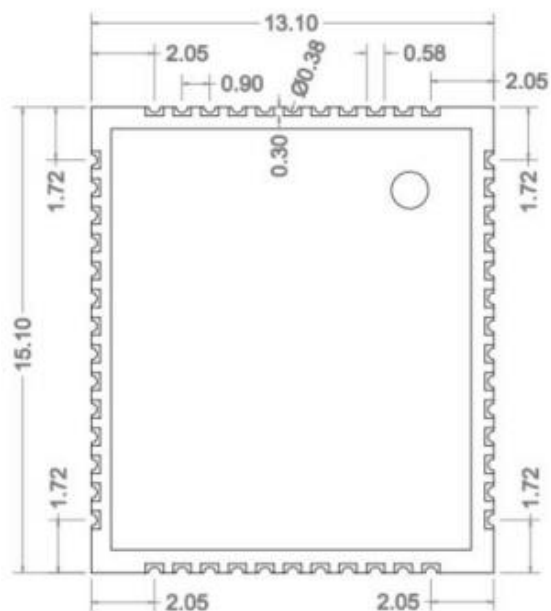
(Side View)

(Bottom View)

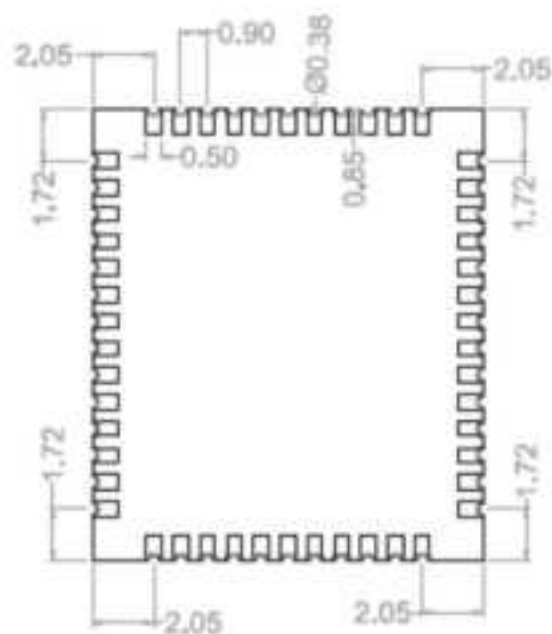


Module Bow and Twist:  $\leq 0.1\text{mm}$

## 5.2 Mechanical Dimensions



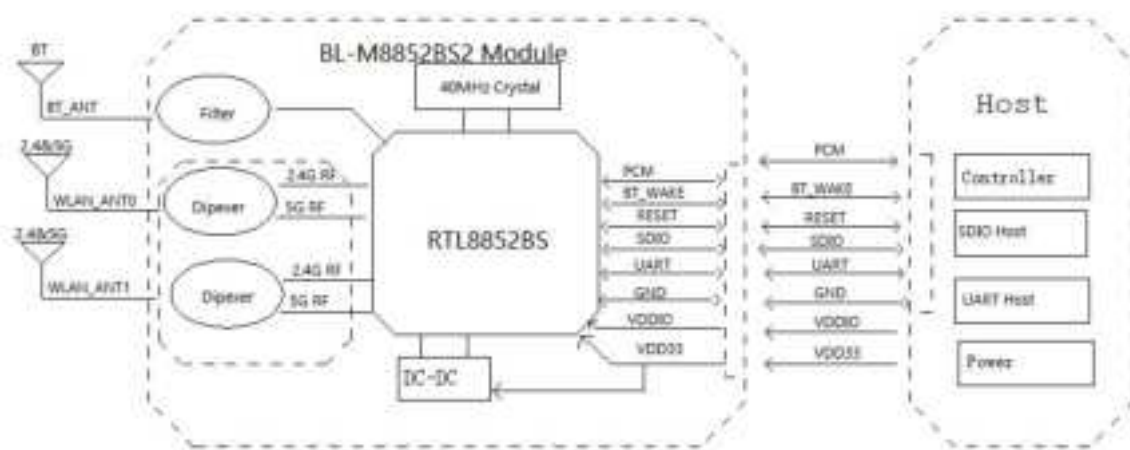
(Top View)



(Bottom View)

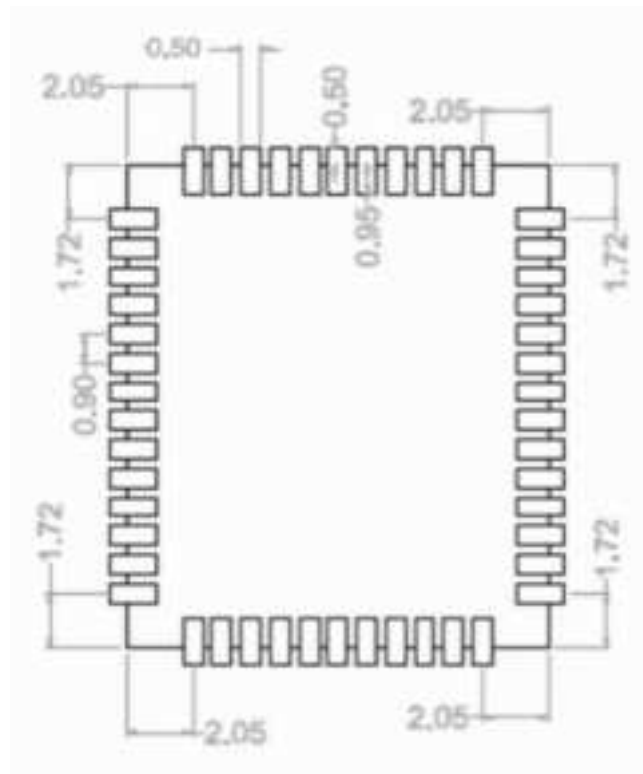
## 6. Application Information

### 6.1 Typical Application Circuit



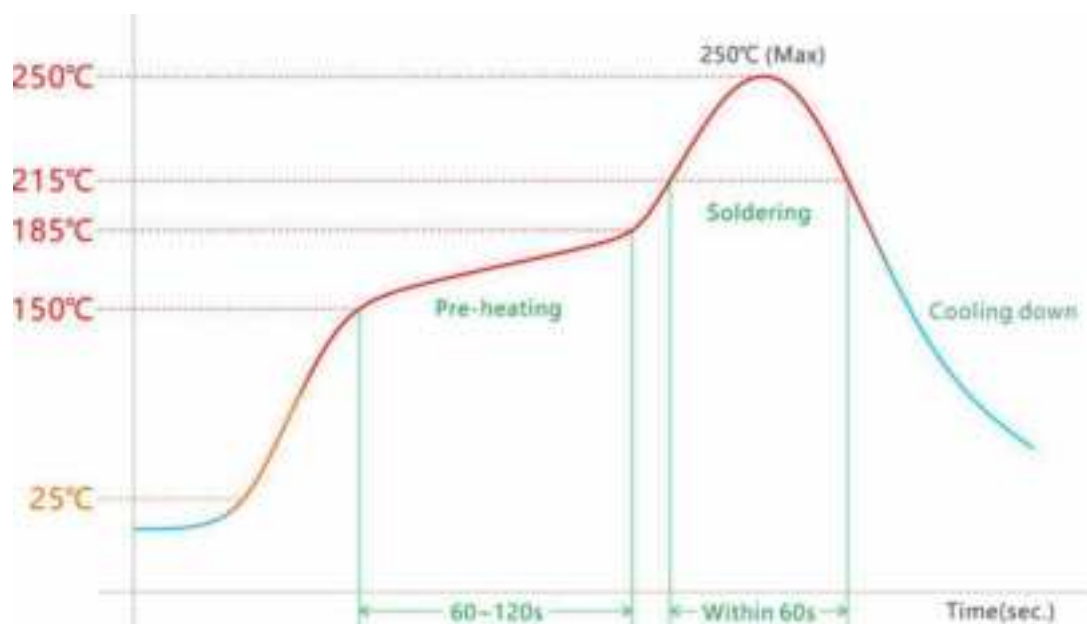


## 6.2 Recommend PCB Layout Footprint



(Design Unit: mm)

## 6.3 Reflow Soldering Standard Conditions



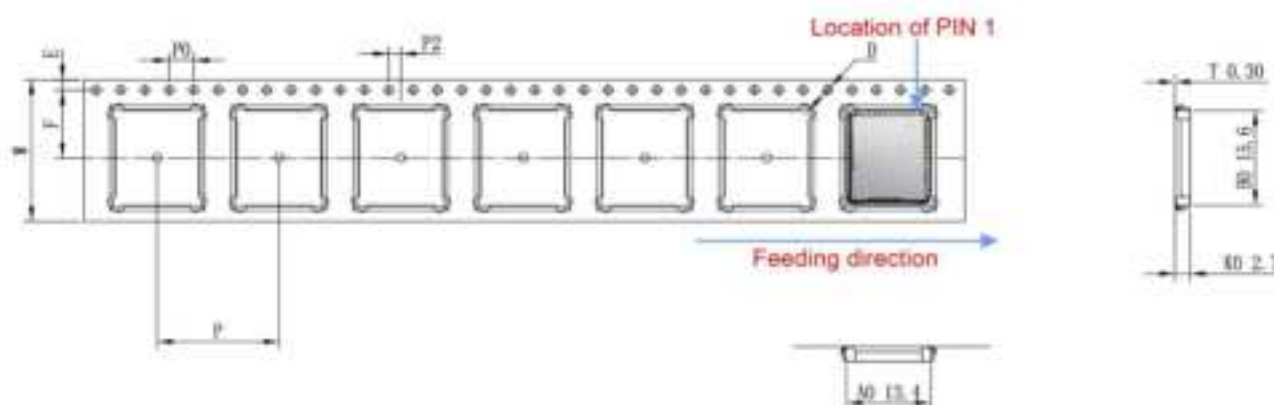
Please use the reflow within 2 times.  
Set up the highest temperature within 250°C.

## 7. Key Components of Module

No.	Parts	Specification	Manufacturer	Note
1	Chipset	RTL8852BS-CG	Realtek Semiconductor Corp.	
2	PCB	BL-M8852BS2	SHEN ZHEN QILI ELECTRON CO.,LTD	
			Huizhou Dayawan Kexiang Technology Circuit Board Co., Ltd	
			ShenZhen Tie Fa Technology Limited	
			Quzhou Sunlord Electronics Co.,Ltd.	
3	Crystal	40MHz-2016	HOSONIC ELECTRONIC CO.,LTD	
			Chengde oscillator Electronic Technology CO.,LTD	
			JinHua East Crystal Electronic CO.,LTD	
4	Diplexer	DIP1608	Walsin Technology Corporation	
			Dongguan Hekang Electronics Co.,LTD	
			Shenzhen Sunlord Electronics Co.,Ltd.	

## 8. Package and Storage Information

### 8.1 Package Dimensions



ITEM	W	A0	B0	K0	E	F	P	P0	P2	D	T
DIM	24.00±0.3	13.40±0.1	15.60±0.1	2.70±0.1	1.75±0.1	11.5±0.1	20.00±0.1	4.00±0.1	2.00±0.1	Ø1.5±0.1	0.30±0.05



#### Package specification:

1. 1,000 modules per roll and 5,000 modules per box.
2. Outer box size: 37.5\*36\*29cm.
3. The diameter of the blue environment-friendly rubber plate is 13 inches, with a total thickness of 28mm (with a width of 24mm carrying belt).
4. Put 1 package of dry agent (20g) and humidity card in each anti-static vacuum bag.
5. Each carton is packed with 5 boxes..

## 8.2 Storage Conditions

#### Absolute Maximum Ratings:

Storage temperature: -40°C to +85°C,  
Storage humidity: 10% to 95 (Non-Condensing)

#### Recommended Storage Conditions:

Storage temperature: 5°C to +40°C,  
Storage humidity: 20% to 90% RH

Please use this Module within 12month after vacuum-packaged.

The Module shall be stored without opening the packing.

After the packing opened, the Module shall be used within 72hours.

When the color of the humidity indicator in the packing changed,

The Module shall be baked before soldering.

Baking condition: 60°C, 24hours, 1time.

#### ESD Sensitivity:

ESD Protection: 2KV (HBM, Maximum rating)

The Module is a static-sensitive electronic device.

Do not operate or store near strong electrostatic fields.

Take proper ESD precautions!



**ESD CAUTION**

## 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.

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.

This modular has been tested and found to comply with part 15 requirements for Modular Approval.

FCC Caution: Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

## **Integration instructions for host product manufacturers according to KDB 996369 D03 OEM Manual v01r01**

### **2.2 List of applicable FCC rules**

CFR 47 FCC Part 15 Subpart C and Subpart F has been investigated. It is applicable to the modular transmitter

### **2.3 Specific Operational Use Conditions - Antenna Placement Within the Host Platform**

The module is tested for standalone mobile RF exposure use condition.

- The antenna must be installed such that 20cm is maintained between the antenna and users,
- The transmitter module may not be co-located with any other transmitter or antenna.

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.

## 2.4 Limited Module Procedures

Not applicable

## 2.5 Trace Antenna Designs

Users should connect antennas to half hole pad through copper tube structure or FP

types of RF trace and the trace impedance must be controlled in 50Ω.recommends

that the total insertion loss between the antenna pads and antennas should meet

the following requirements:

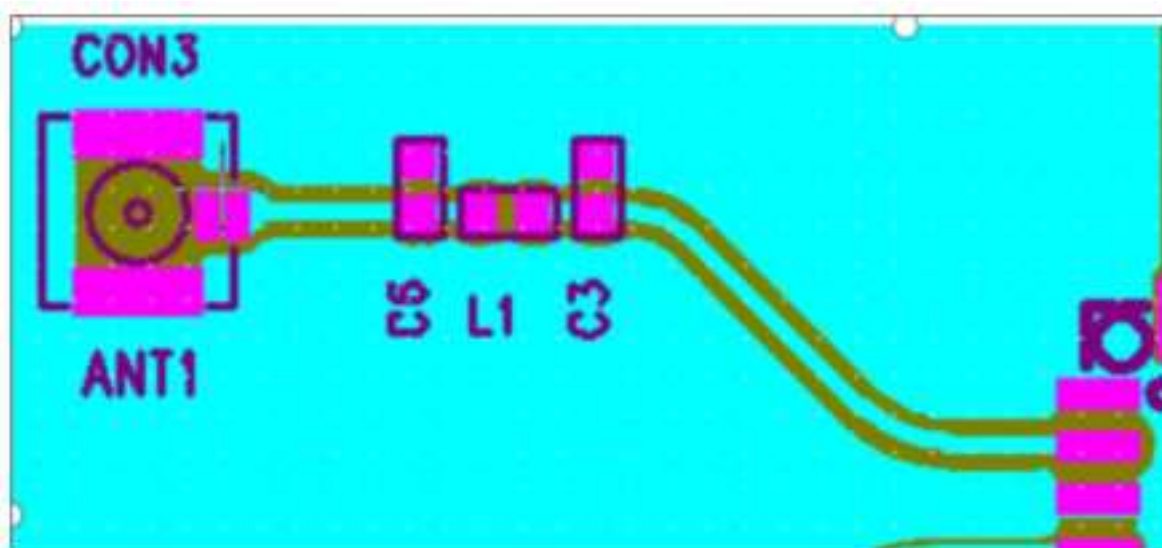
Trace loss

Frequency	Loss
2400MHz-2500MHz	<1.2dB
5150MHz-5850MHz	<1.2dB

To facilitate the antenna tuning and certification test, a RF connector and an

antenna matching circuit should be added. The following figure is the

recommended circuit.

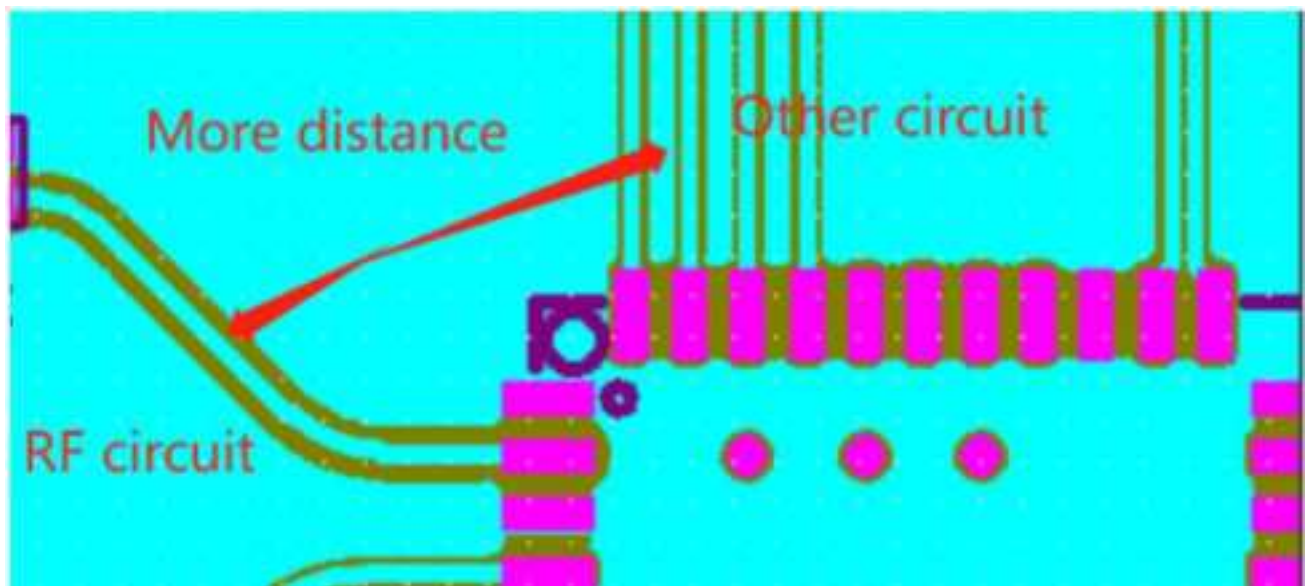


The module needs to be attached to the PCB board and connected to the external antenna through the solder joint of the circuit on the PCB. The gain of the external antenna is 2dBi (Max.)

,  
the internal structure is copper tube structure or FPC. A resistance of 0R is added between the module and the antenna at L1 to ensure that the impedance of the connection between the module and the antenna reaches 50R. The ANT1 position on the PCB is where the external antenna is connected.

#### RF traces layout

1. Keep the RF trace from module ant pin to antenna as short as possible
2. RF trace should be 50  $\Omega$  either on the top layer or in the inner layer
3. RF trace should be avoided right angle and sharp angle.
4. Put enough GND vias around RF traces.
5. RF trace should be far away from other high speed signal lines.



Avoiding the paroling rout of other system antennas nearby.

There should be some distance from The GND to the inner conductor of the IPEX connector. It is better to keep out all the layers from inner to the outer conductor.





## 2.6 RF Exposure Considerations

## 2.7 Antenna Type and Gain

Only antennas of the same type with equal or lower gain may also be used with this module.

Antenna Specification list below:

## 2.8 Label and compliance information

**Explanation:** The host system using this module, should have label in a visible area

indicated the following texts: "Contains FCC ID: 2AL6KBL -M8852BS2

## **2.9 Information on Test Modes and Additional Testing Requirements**

This transmitter is tested in a standalone mobile RF exposure condition and any co-located or simultaneous transmission with other transmitter(s) class II permissive change re-evaluation or new FCC authorization.

Host manufacturer installed this modular with single modular approval should perform the test of radiated emission and spurious emission according to FCC part 15C, Part 15E, 15.209, 15.207 requirement, only if the test result comply with FCC part 15C, Part 15E, 15.209, 15.207 requirement, then the host can be sold legally.

## **2.10 Additional testing, Part 15 Subpart B disclaimer**

The grantee should include a statement that the modular transmitter is only FCC authorized for the specific rule parts (i.e., FCC transmitter rules) listed on the grant, and that the host product manufacturer is responsible for compliance to any other FCC rules that apply to the host not covered by the modular transmitter grant of certification. If the grantee markets their product as being Part 15 Subpart B compliant (when it also contains unintentional-radiator digital circuitry), then the grantee shall provide a notice stating that the final host product still requires Part 15 Subpart B compliance testing with the modular transmitter installed. Explanation: the grantee is responsible for compliance to any other FCC rules and notice that the final host should be required part 15 subpart B testing when the modular transmitter installed, when it also contains unintentional-radiator digital circuitry.

### **OEM integration instructions:**

This device is intended only for OEM integrators under the following conditions:

The transmitter module may not be co-located with any other transmitter or antenna. The module shall be only used with the external antenna(s) that has been originally tested and certified with this module.

As long as the conditions above are met, further transmitter test 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 (for example, digital device emissions, PC peripheral requirements, etc.).

### **Validity of using the module certification:**

In the event that these conditions cannot be met (for example certain laptop configurations or co-location with another transmitter), then the FCC authorization for this module in combination with the host equipment is no longer considered valid and the FCC ID of the module 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 Transmitter Module FCC ID: 2AL6KBL- M8852 BS2".

**Information that must be placed in the end user manual:**



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.