

Product Specification

Revision	V1.0		
Date	2019-07-04		
Model Name	BL-M7661BS1		
Product Name	802.11a/b/g/n/ac 2T2R WiFi + Bluetooth 5.0 SDIO Module		
Bilian Approve Field			
Engineer	QC	Sales	
Customer Approve Field			
Engineer	QC	Manufactory	Purchasing

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Revision History

Date	Document Revision	Product Revision	Description
2019/06/04	0.1	V0.1	Preliminary release
2019/07/04	1.0	V1.0	Final release

1. Introduction

1.1 General Description

BL-M7661BS1 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 base band, 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 and supports Bluetooth 5.0 system.



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 and 5.15~5.85GHz
- Host Interface is SDIO
- 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±0.3V, main power supply; VIO_SD 3.3±0.3V or 1.8±0.2V, power for SDIO host interface pins.

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

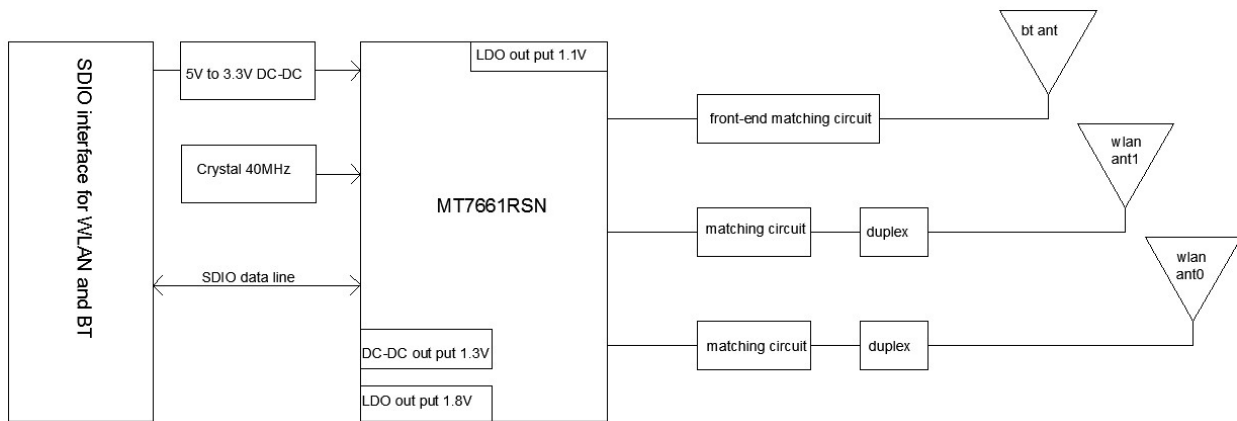


Figure 3-BL-M7661BS1

3. Product Technical Specifications

3.1 General Specifications

Item	Description
Product Name	BL-M7661BS1
Main Chip	MT7661RSN
Host Interface	SDIO for WiFi and Bluetooth
IEEE Standards	IEEE 802.11a/b/g/n/ac
Operating Frequencies	2.4~2.4835GHz, 5.180~5.835 GHz
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	19dBm (Max)
Antenna Type	Connect to the external antenna through half hole
Dimension(L*W*H)	15.1*13.1*1.7mm (L*W*H) Tolerance: +/-0.15mm
Clock Source	40MHz
Working Temperature	-10°C to +70°C
Storage Temperature	-40°C to +85°C

3.2 wifi DC Power Consumption

VDD=3.3V, Ta = 25 °C, unit: mA				
Supply current	Typ		Max	
RX sense mode (No Link)	60		100	
802.11b				
	1Mbps		11Mbps	
Supply current	Typ.	Max.	Typ.	Max.
Continuous TX mode	560	600	530	600
RX mode	80	130	87	142
802.11g				
	6Mbps		54Mbps	
Supply current	Typ.	Max.	Typ.	Max.
Continuous TX mode	736	750	640	700
RX mode	87	127	89	130
802.11n HT20				
	MCS0		MCS7	
Supply current	Typ.	Max.	Typ.	Max.
Continuous TX mode	700	730	630	650
RX mode	100	125	100	130
802.11n HT20				
	MCS 8		MCS15	
Supply current	Typ.	Max.	Typ.	Max.
Continuous TX mode	683	720	610	620

RX mode	100	130	100	135
802.11n HT40	MCS0		MCS7	
Supply current	Typ.	Max.	Typ.	Max.
Continuous TX mode	730	750	680	700
RX mode	120	150	130	150
802.11n HT40	MCS 8		MCS15	
Supply current	Typ.	Max.	Typ.	Max.
Continuous TX mode	710	735	632	651
RX mode	120	155	130	160
802.11a	6Mbps		54Mbps	
Supply current	Typ.	Max.	Typ.	Max.
Continuous TX mode	625	670	537	550
RX mode	87	130	90	135
802.11n HT20(5G)	MCS0		MCS7	
Supply current	Typ.	Max.	Typ.	Max.
Continuous TX mode	673	689	532	549
RX mode	100	135	100	150
802.11n HT20(5G)	MCS8		MCS15	
Supply current	Typ.	Max.	Typ.	Max.
Continuous TX mode	650	677	573	590
RX mode	100	145	100	155
802.11n HT40(5G)	MCS0		MCS7	
Supply current	Typ.	Max.	Typ.	Max.
Continuous TX mode	635	651	610	633
RX mode	126	161	137	172
802.11n HT40(5G)	MCS8		MCS15	
Supply current	Typ.	Max.	Typ.	Max.
Continuous TX mode	610	632	546	574
RX mode	121	163	137	162
802.11acVHT80(5G)	MCS0		MCS9	
Supply current	Typ.	Max.	Typ.	Max.
Continuous TX mode	527	542	496	528
RX mode	127	172	139	180

3.3 WiFi RF Specification

TX Power & EVM	WiFi-2.4G: $18.0 \pm 1.5\text{dBm} \& \lt -15\text{dB} @ 11\text{b } 11\text{Mbps}$ $16.0 \pm 1.5\text{dBm} \& \lt -28\text{dB} @ 11\text{g } 54\text{Mbps}$ $15.0 \pm 1.5\text{dBm} \& \lt -28\text{dB} @ 11\text{n-HT20/40-MCS7}$
	WiFi-5G: $16.0 \pm 2\text{dBm} \& \lt -28\text{dB} @ 11\text{a } 54\text{Mbps}$ $15.0 \pm 2\text{dBm} \& \lt -28\text{dB} @ 11\text{n-HT20/40-MCS7}$ $14 \pm 2\text{dBm} \& \lt -32\text{dB} @ 11\text{ac-HT80-MCS9}$
Receiver Minimum Input Sensitivity@PER	WiFi-2.4G: 11b 1Mbps: $-94\text{dBm} @ \text{PER} < 8\%$; 11b 11Mbps: $-86\text{dBm} @ \text{PER} < 8\%$; 11g 54Mbps: $-74\text{dBm} @ \text{PER} < 10\%$; 11n-HT20-MCS7: $-70\text{dBm} @ \text{PER} < 10\%$; 11n-HT40-MCS7: $-68\text{dBm} @ \text{PER} < 10\%$; WiFi-5G: 11a 54Mbps: $-72\text{dBm} @ \text{PER} < 10\%$; 11n-HT20-MCS7: $-68\text{dBm} @ \text{PER} < 10\%$; 11n-HT40-MCS7: $-66\text{dBm} @ \text{PER} < 10\%$; 11ac-HT80-MCS9: $-58\text{dBm} @ \text{PER} < 10\%$;

RF Test Report										
Path A										
2.4G										
Mode	Rate(Mbps)	Power(dBm)			EVM(dB)			Sensitivity(dBm)		
		CH1	CH7	CH13	CH1	CH7	CH13	CH1	CH7	CH13
11b	1	17.5	17.9	17.82	-23	-22	-22.4	-95	-95	-95
	11	17.7	18	17.9	-22	-22	-22	-88	-88	-88
11g	6	17	17.2	17	-22	-22	-22	-93	-93	-93
	54	15.16	15.1	15.3	-37	-35	-37	-75	-75	-75
Mode	Rate(Mbps)	Power(dBm)			EVM(dB)			Sensitivity(dBm)		
		CH3	CH7	CH11	CH3	CH7	CH11	CH3	CH7	CH11
11n	MCS0	16	16.2	16	-22	-23	-22	-91	-91	-91
HT40	MCS7	14	14.2	14	-35	-35	-34.9	-71	-71	-71
Path B										
Mode	Rate(Mbps)	Power(dBm)			EVM(dB)			Sensitivity(dBm)		
		CH1	CH7	CH13	CH1	CH7	CH13	CH1	CH7	CH13

11b	1	17.9	18	18	-22	-22	-22	-95	-95	-95
	11	17.8	18.2	18.3	-22	-23	-21	-88	-88	-88
11g	6	17	17.5	17.6	-22	-22	-22	-93	-93	-93
	54	15.5	15.6	15.7	-35	-36	-37	-75	-75	-75
Mode	Rate(Mbps)	Power(dBm)			EVM(dB)			Sensitivity(dBm)		
		CH3	CH7	CH11	CH3	CH7	CH11	CH3	CH7	CH11
11n	MCS0	16.88	17	17	-21	-22	-21	-91	-91	-91
HT40	MCS7	14.5	14.5	14.6	-35	-36	-35	-71	-71	-71

RF Test Report													
Path A													
5G													
Mode	Rate (Mbps)	Power(dBm)				EVM(dB)				Sensitivity(dBm)			
		CH 36	CH 100	CH 140	CH 161	CH 36	CH 100	CH 140	CH 161	CH 36	CH 100	CH 140	CH 161
11a	6	17.6	16.1	16.9	17.2	-19	-18	-19	-19	-93	-93	-93	-93
	54	15.7	15.2	14.8	14.6	-34	-34	-34	-33	-75	-75	-75	-75
Mode	Rate (Mbps)	Power(dBm)				EVM(dB)				Sensitivity(dBm)			
		CH 38	CH 102	CH 142	CH 159	CH 38	CH 102	CH 142	CH 159	CH 38	CH 102	CH 142	CH 159
11n	MCS0	16.8	16.6	16.2	16.3	-21	-19	-20	-19	-90	-90	-90	-90
40M	MCS7	14.5	14.3	14	13.9	-34	-34	-34	-33	-70	-70	-70	-70
Mode	Rate (Mbps)	Power(dBm)				EVM(dB)				Sensitivity(dBm)			
		CH 42	CH 106	CH 138	CH 155	CH 42	CH 106	CH 138	CH 155	CH 42	CH 106	CH 138	CH 155
11ac	MCS0	16.3	16	16	16	-21	-19	-19	-20	-85	-85	-85	-85
80M	MCS9	13.2	13.1	13	13	-35	-35	-34	-34	-60	-60	-60	-60
Path B													
5G													
Mode	Rate (Mbps)	Power(dBm)				EVM(dB)				Sensitivity(dBm)			
		CH 36	CH 100	CH 140	CH 161	CH 36	CH 100	CH 140	CH 161	CH 36	CH 100	CH 140	CH 161
11a	6	17.3	16.9	16.8	16.73	-21	-19	-19	-20	-92	-92	-92	-92
	54	15.5	15.4	15.3	15.3	-34	-33	-33	-33	-74	-74	-74	-74
Mode	Rate (Mbps)	Power(dBm)				EVM(dB)				Sensitivity(dBm)			
		CH 38	CH 102	CH 142	CH 159	CH 38	CH 102	CH 142	CH 159	CH 38	CH 102	CH 142	CH 159

11n	MCS0	16.2	16	16	16	-22	-20	-20	-20	-89	-89	-89	-89
40M	MCS7	14	13.9	13.8	13.8	-34	-33	-33	-33	-70	-70	-70	-70
Mode	Rate (Mbps)	Power(dBm)				EVM(dB)				Sensitivity(dBm)			
		CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH
		42	106	138	155	42	106	138	155	42	106	138	155
11ac	MCS0	16.3	16.2	16	16	-21	-20	-19	-20	-85	-85	-85	-85
80M	MCS9	13.2	13	12.9	12.8	-35	-34	-34	-34	-60	-60	-60	-60

3.4 Bluetooth RF Specification

RF Characteristics for BT				
Items	Contents			
Specification	BT V5.0/4.2/4.1/V4.0+BLE/V3.0/V2.1+EDR			
Modulation	BR&BLE PHY: GFSK, EDR PHY: $\pi/4$ -DQPSK, EDR PHY: 8DPSK			
Channel frequency	2.401~2.481 GHz			
Data rate	BR:1Mbps, EDR:2Mbps,3Mbps LE:1Mbps, LE:2Mbps (for BT 5.0 LE mode only),			
TX Characteristics	min.	typ.	max.	Unit
Power level (BR/EDR)	0	6	10	dBm
Power level (BLE)	0	6	10	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

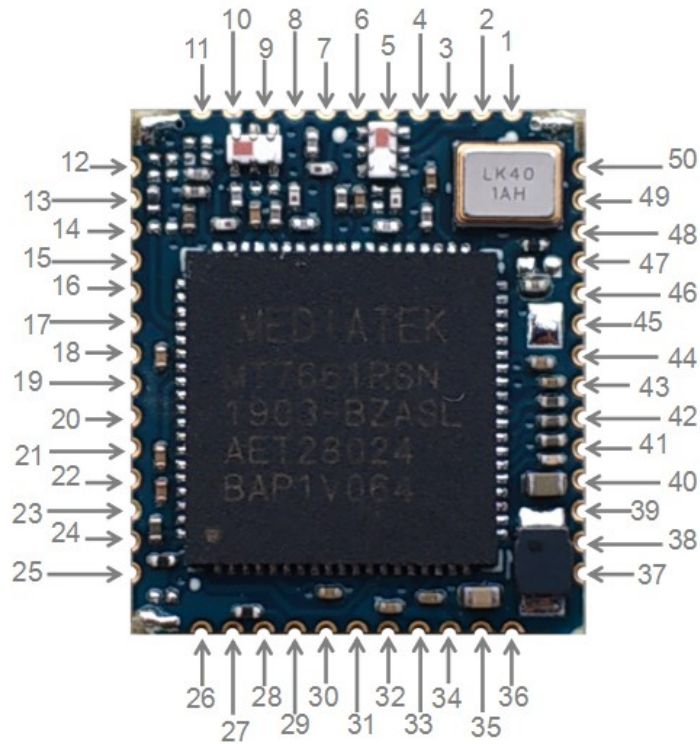


Figure 4-Top view

PIN	Function	Description
1	GND	Ground connections
2	WL_ANT1	WLAN_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	BT_ANT	BT_ANT
13	GND	Ground connections
14	UART_DBG	For UART debug use No connection(floating)
15	RST_N	System reset (active low)
16	WL_WAKE_HOST	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_INT_B	WLAN interrupt signal
25	NC	No connection(floating)
26	NC	No connection(floating)
27	PCM_SYNC	PCM sync signal(NC)
28	PCM_IN	PCM data input(NC)
29	PCM_OUT	PCM data output(NC)
30	PCM_CLK	PCM clock(NC)
31	NC	No connection(floating)
32	GND	Ground connections
33	NC	No connection(floating)
34	VIO_SD	I/O Voltage supply input
35	NC	No connection(floating)
36	VBAT	3.3V Main Power Supply
37	NC	No connection(floating)
38	NC	No connection(floating)
39	GND	Ground connections
40	UART_TXD	Bluetooth UART interface(NC)
41	UART_RXD	Bluetooth UART interface(NC)
42	UART_RTS_N	Bluetooth UART interface(NC)
43	UART_CTS_N	Bluetooth UART interface(NC)
44	NC	No connection(floating)
45	NC	No connection(floating)
46	GND	Ground connections
47	NC	No connection(floating)
48	GND	Ground connections
49	NC	No connection(floating)
50	BT_WAKE_HOST	Bluetooth device to wake up HOST

5. Typical Application Circuit

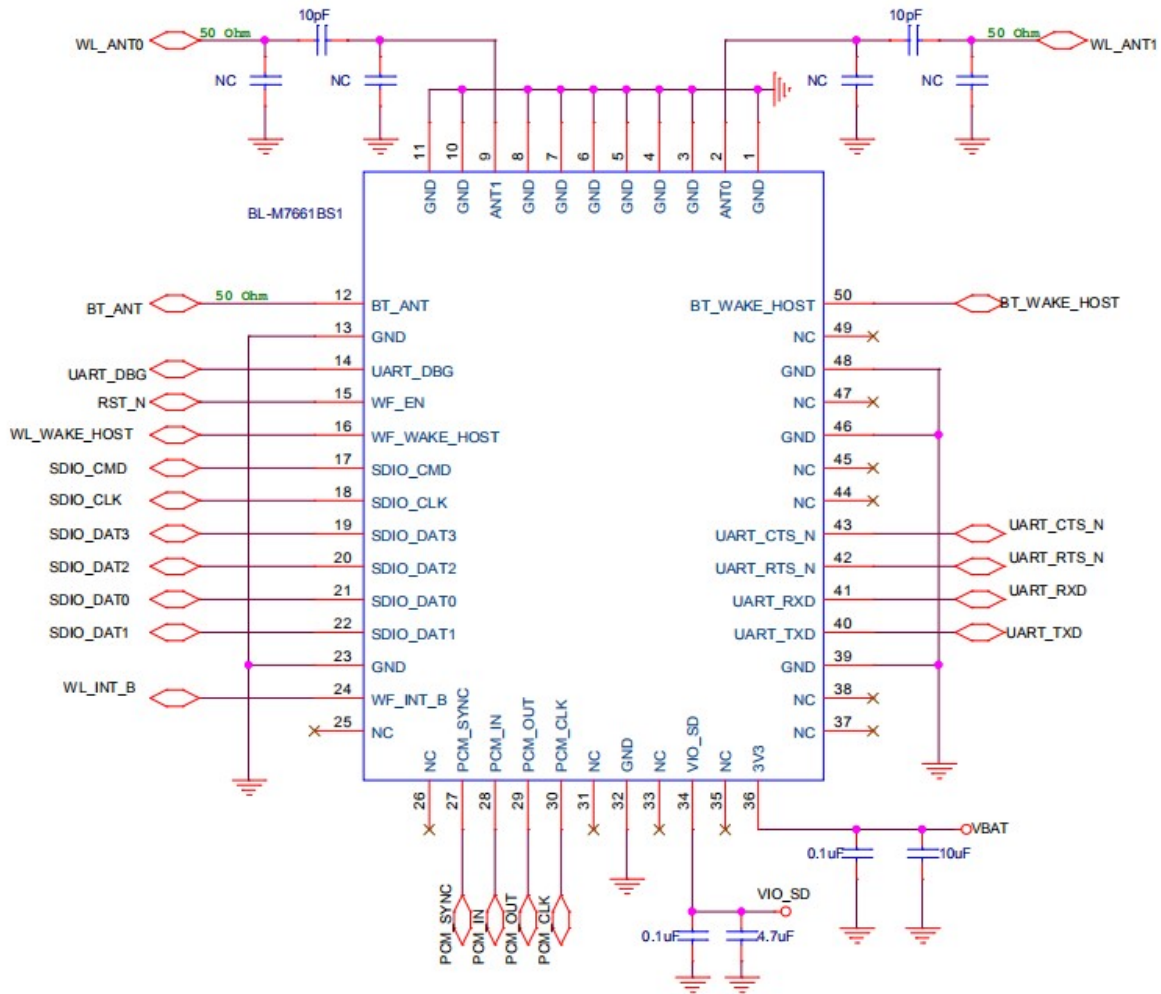


Figure 5-Typical Application Circuit

NOTE:

- a. RF traces need to keep 50 ohm impedance.
- b. PIN_15 activates low SDIO system reset.
- c. VIO_SD 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*1.7mm Tolerance: +/-0.15mm

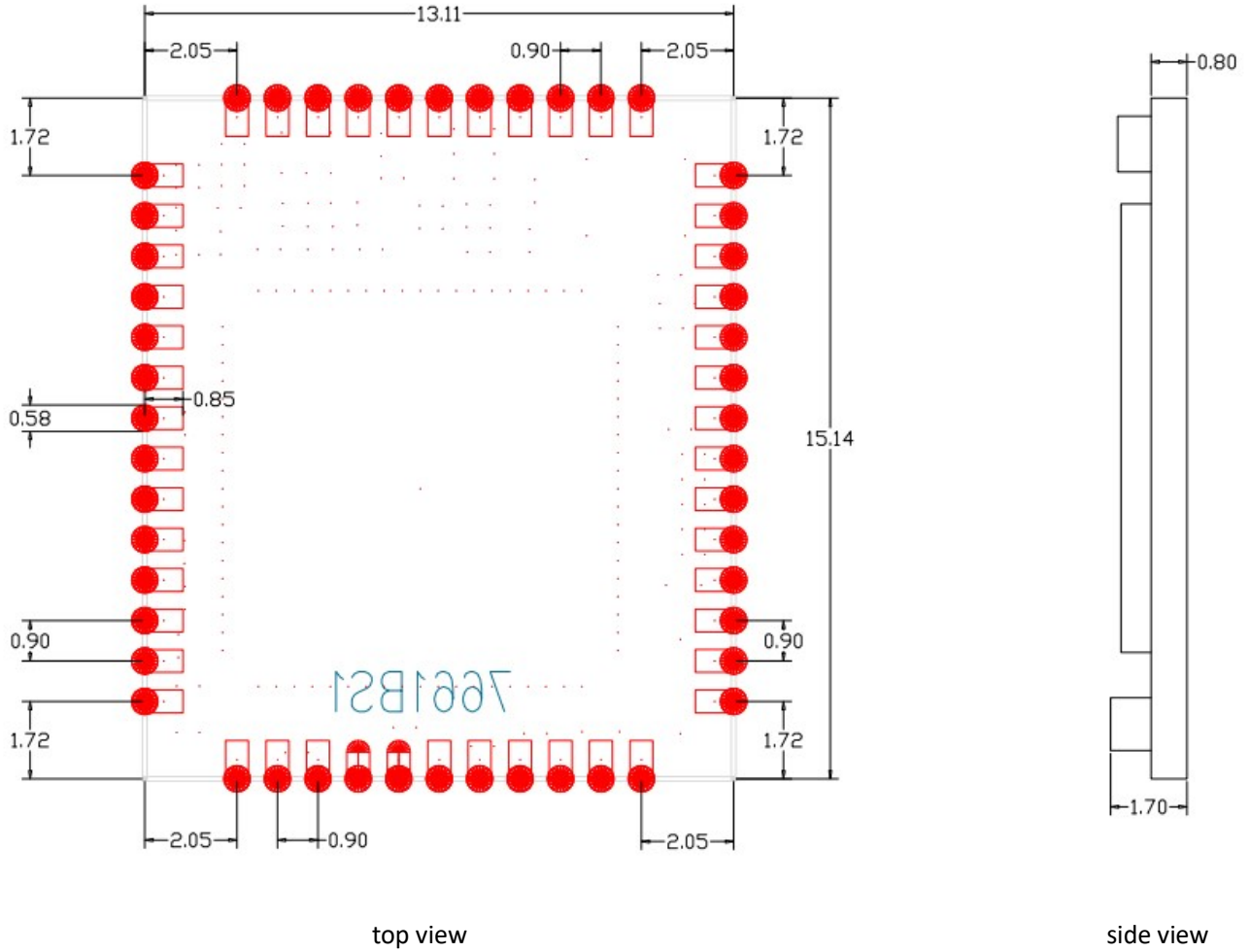


Figure 6-Module dimension (top view and side view)

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 12 months 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 15. The peak temperature is 245°C.

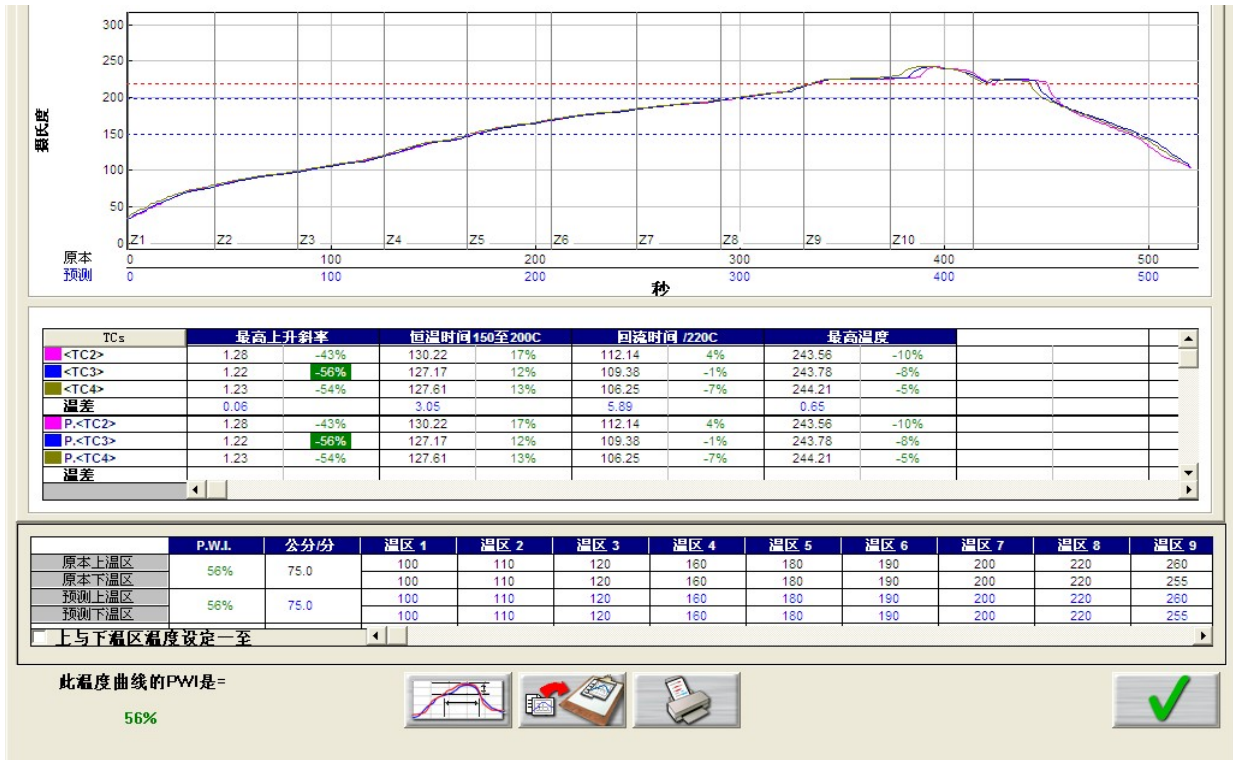


Figure 8-Typical Solder Reflow Profile