



BL-M8731BS3

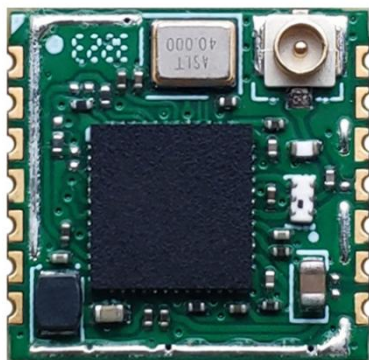
802.11n 150Mbps WLAN

SDIO Module Specification

SHENZHEN BILIAN ELECTRONIC CO., LTD

Add: 10~11/F, Building 1A, Huaqiang idea park, Guangming district, Shenzhen. Guangdong, China

Web: www.b-link.net.cn



(Top View)



(Bottom View)

Module Name: BL-M8731BS3	
Module Type: 802.11a/b/g/n 150Mbps WLAN SDIO Module	
Revision: V1.0	
Customer Approval:	
Company:	
Title:	
Signature:	Date:
B-link Approval:	
Title:	
Signature:	Date:

Revision History

Revision	Summary	Release Date	Revised By
0.1	Initial release	2023-10-15	Fnz
1.0	Official release	2023-10-17	Fnz

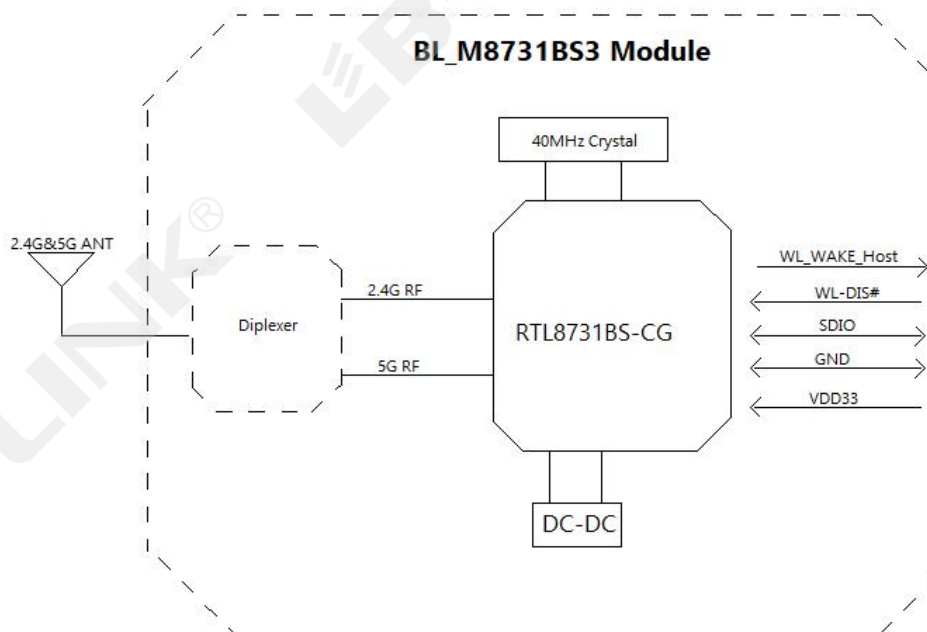
1. Introduction

BL-M8731BS3 is a highly integrated dual-band WLAN module base on RTL8731BS-CG, which combines WLAN MAC, 1T1R Baseband and Radio in single chip. It compatible IEEE 802.11a/b/g/n standard and supports Maximum PHY rate up to 150Mbps. The module provides excellent WLAN performance and lower cost ideal for wireless network applications such as set-top boxes, OTT boxes, projectors.

1.1 Features

- Operating Frequencies: 2.4~2.4835GHz or 5.15~5.85GHz
- Host Interface: SDIO 2.0 for WLAN
- IEEE Standard: IEEE 802.11a/b/g/n
- Wireless PHY rate can reach up to 150Mbps
- Power Supply: 3.3V main power and 3.3V I/O power

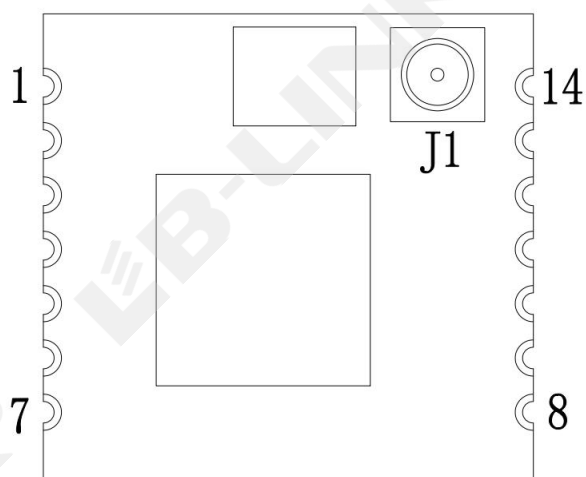
1.2 Block Diagram



1.3 General Specifications

Module Name	BL-M8731BS3
Chipset	RTL8731BS-CG
WLAN Standards	IEEE802.11 a/b/g/n
Host Interface	SDIO 2.0 for WLAN
Antenna	Connect to external antenna through IPEX / MHF-1 connector
Dimension	13.0*13.5*2.1mm (L*W*H)
Power Supply	DC 3.3V±0.2V @ 600 mA (Max)
Operation Temperature	-20°C to +70°C
Operation Humidity	10% to 95% RH (Non-Condensing)

2. Pin Assignments



Top view

2.1 Pin Definition

No	Pin Name	Type	I/O Level	Description
1	SD_D2	I/O	VDD33	SDIO data line 2
2	SD_D3	I/O	VDD33	SDIO data line 3
3	SD_CMD	I/O	VDD33	SDIO command line
4	GND	P		Ground connections
5	SD_CLK	I	VDD33	SDIO clock line

6	SD_D0	I/O	VDD33	SDIO data line 0
7	SD_D1	I/O	VDD33	SDIO data line 1
8	VDD33	P		3.3V Main and I/O power supply
9	WL_DSI#	I	VDD33	General Purpose Input / Output Pin GPIO13. This pin can externally shut down WLAN function when WL DIS# is pulled low, and SDIO interface will be also disabled. It can also be configured as the WLAN Radio-off function with host interface remaining connected. There is no pull-up resistor inside the module and high level input is required to enable WLAN function
10	GND	RF		RF Ground connections
11	WLAN ANT	RF		NC(Reserve 2.4G/5G RF PAD for WLAN_ANT)
12	GND	RF		RF Ground connections
13	NC	/		NC
14	WLAN_WAKE_HOST	O	VDD33	General Purpose Input / Output Pin GPIO14. This pin is used by WLAN to wake up the host when the remote wake function is enabled. The polarity can be defined by the customer
	J1	RF		2.4G/5G RF PAD for WLAN_ANT

P: Power, I: Input, O: Output, I/O: In/Output, RF: Analog RF Port

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	2.1	/
Supply Voltage	VDD33	3.1	3.3	3.5	V

3.2 Digital 3.3V I/O DC Specifications

Symbol	Parameter	Min	Typ	Max	Units
VIH	Input High Voltage	2.0	3.3	3.6	V
VIL	Input Low Voltage	--	0	0.5	V
VOH	Output High Voltage	2.97	3.3	3.6	V
VOL	Output Low Voltage	0	--	0.33	V

3.3 Current Consumption

Conditions : VDD33=3.3V ; Ta:25°C			
Use Case	VDD33 Current		
	Typ(I _{RMS})	Max(I _{Peak})	Units
WLAN Unassociated (Linux Driver)	72	76	mA
2.4G WLAN TCP throughput TX 90Mbps (Linux Drive)	337	372	mA
2.4G WLAN TCP throughput RX 90Mbps (Linux Drive)	101	348	mA
5G WLAN TCP throughput TX 90Mbps (Linux Driver)	301	340	mA
5G WLAN TCP throughput RX 90Mbps(Linux Driver)	103	332	mA
2.4G 11b 1Mbps TX @ 20dBm (1TX RF test)	448	464	mA
2.4G 11b 1Mbps RX (1RX RF test)	66	76	mA
2.4G 11b 11Mbps TX @ 20dBm (1TX RF test)	453	472	mA
2.4G 11g 6Mbps TX @ 20dBm (1TX RF test)	351	464	mA
2.4G 11g 54Mbps TX @ 19dBm (1TX RF test)	211	449	mA
2.4G 11n HT20 MCS0 TX @ 20dBm (1TX RF test)	376	528	mA
2.4G 11n HT20 MCS7 TX @ 18dBm (1TX RF test)	199	408	mA
2.4G 11n HT40 MCS0 TX @ 20dBm (1TX RF test)	315	472	mA
2.4G 11n HT40 MCS7 TX @ 18dBm (1TX RF test)	169	400	mA
2.4G 11n HT40 MCS7 RX (1RX RF test)	66	76	mA
5G 11a 6Mbps TX @ 19dBm (1TX RF test)	356	456	mA
5G 11a 6Mbps RX (1RX RF test)	65	70	mA
5G 11a 54Mbps TX @ 17dBm (1TX RF test)	216	448	mA
5G HT20 MCS0 TX@18dBm (1TX RF test)	358	480	mA
5G HT20 MCS7 TX@16dBm (1TX RF test)	201	416	mA
5G HT40 MCS0 TX@18dBm (1TX RF test)	324	480	mA
5G HT40 MCS7 TX@16dBm (1TX RF test)	199	400	mA
5G HT40 MCS7 RX (1RX RF test)	65	70	mA

4. WLAN RF Specifications

4.1 2.4G WLAN RF Specification

Conditions : VDD33=3.3V ; Ta:25°C			
Features	Description		
WLAN Standard	IEEE 802.11b/g/n		
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;		
Data Rate	802.11b: 1, 2, 5.5, 11Mbps; 802.11g: 6, 9, 12, 18, 24, 36, 48, 54Mbps; 802.11n (HT20): MCS0~MCS7 6.5~72.2Mbps; 802.11n (HT40): MCS0~MCS7 13.5~150Mbps;		
Frequency Tolerance	≤±20ppm		
2.4G Transmitter Specifications (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	20	±2	≤-15
802.11g@6Mbps	20	±2	≤-15
802.11g@54Mbps	19	±2	≤-25
802.11n@HT20_MCS0	20	±2	≤-10
802.11n@HT20_MCS7	18	±2	≤-28
802.11n@HT40_MCS0	20	±2	≤-10
802.11n@HT40_MCS7	18	±2	≤-28
2.4G Receiver Specifications			
RX Rate	Min Input Level (Typ)	Max Input Level (Typ)	PER
802.11b@1Mbps	-95dBm	-10dBm	< 8%
802.11b@11Mbps	-87dBm	-10dBm	< 8%
802.11g@6Mbps	-89dBm	-10dBm	< 10%
802.11g@54Mbps	-74dBm	-10dBm	< 10%
802.11n@HT20_MCS0	-87dBm	-10dBm	< 10%
802.11n@HT20_MCS7	-72dBm	-10dBm	< 10%
802.11n@HT40_MCS0	-87dBm	-10dBm	< 10%

802.11n@HT40_MCS7	-70dBm	-10dBm	< 10%
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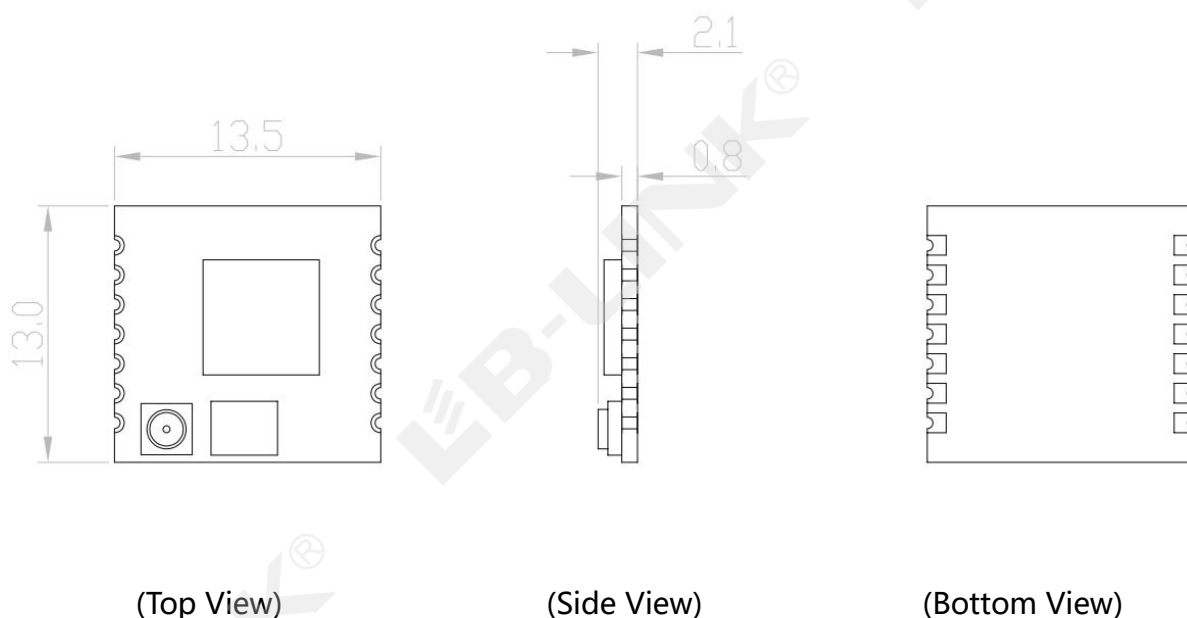
4.2 5G WLAN RF Specification

Conditions : VDD33=3.3V ; Ta:25°C			
Features	Description		
WLAN Standard	IEEE 802.11a/n		
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;		
Data Rate	802.11a: 6, 9, 12, 18, 24, 36, 48, 54Mbps; 802.11n (HT20): MCS0~MCS7 6.5~72.2Mbps; 802.11n (HT40): MCS0~MCS7 13.5~150Mbps;		
Frequency Tolerance	≤ ±20ppm		
5G Transmitter Specifications (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	19	±2	≤-10
802.11a@54Mbps	17	±2	≤-25
802.11n@HT20_MCS0	18	±2	≤-10
802.11n@HT20_MCS7	16	±2	≤-28
802.11n@HT40_MCS0	18	±2	≤-10
802.11n@HT40_MCS7	16	±2	≤-28
5G Receiver Specifications			
RX Rate	Min Input Level (Typ)	Max Input Level (Typ)	PER

802.11a@6Mbps	-91dBm	-10dBm	< 10%
802.11a@54Mbps	-74dBm	-10dBm	< 10%
802.11n@HT20_MCS0	-88dBm	-10dBm	< 10%
802.11n@HT20_MCS7	-72dBm	-10dBm	< 10%
802.11n@HT40_MCS0	-88dBm	-10dBm	< 10%
802.11n@HT40_MCS7	-70dBm	-10dBm	< 10%

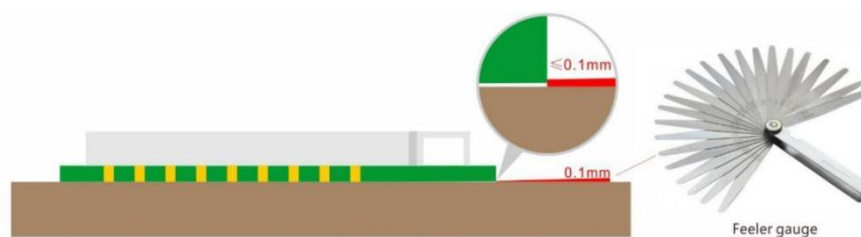
5. Mechanical Specifications

5.1 Module Outline Drawing



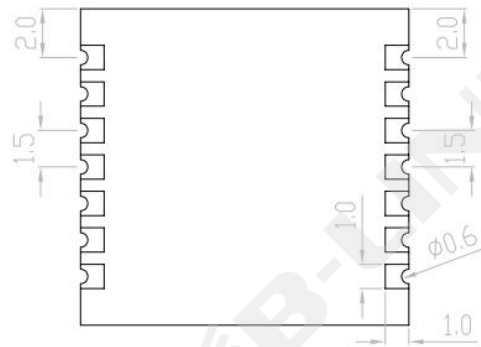
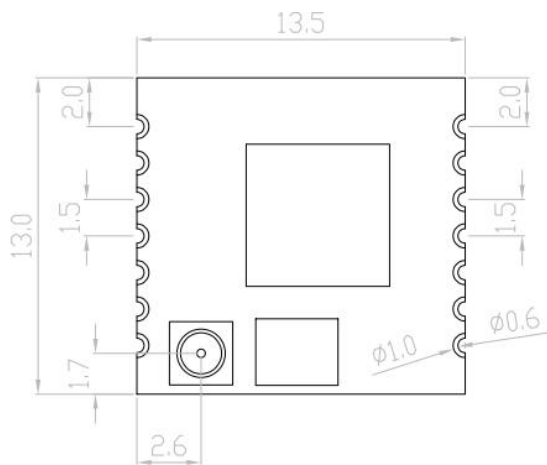
Module dimension: 13.0*13.5*2.1mm(L*W*H; Tolerance: $\pm 0.3\text{mm}_L/W$, $\pm 0.2\text{mm}_H$)

IPEX / MHF-1 connector dimension: 2.6*3.0*1.25mm (L*W*H; $\varnothing 2.0\text{mm}$)



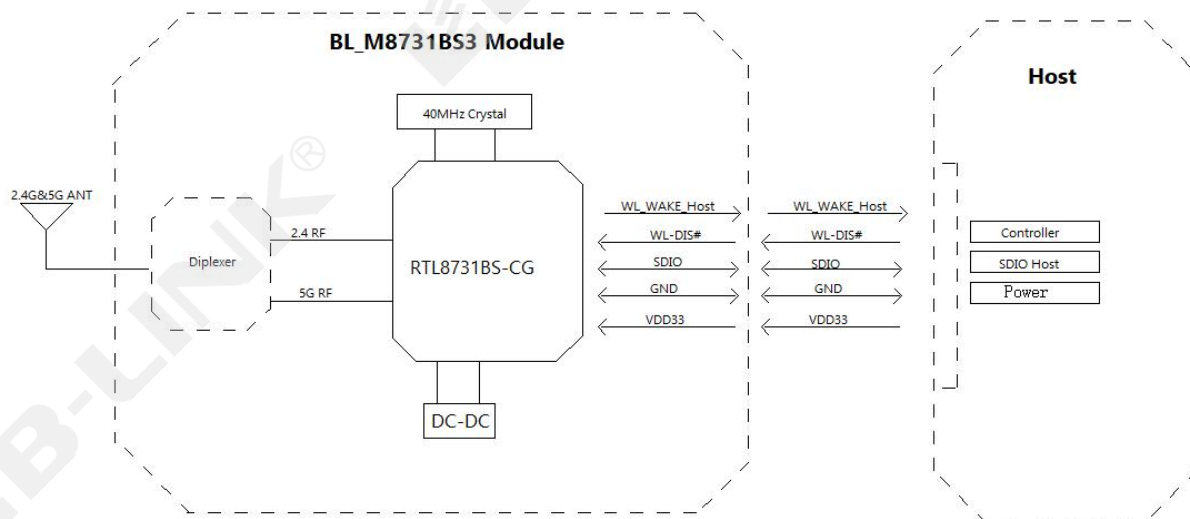
Module Bow and Twist: $\leq 0.1\text{mm}$

5.2 Mechanical Dimensions

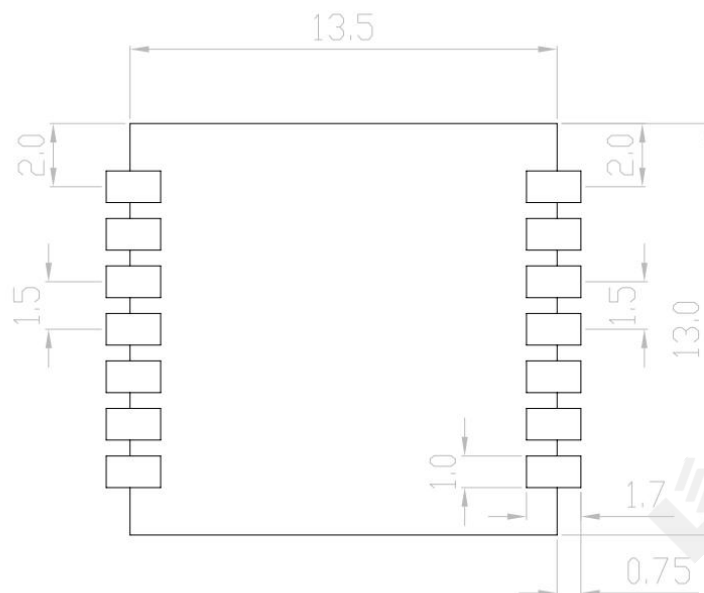


6. Application Information

6.1 Typical Application Circuit

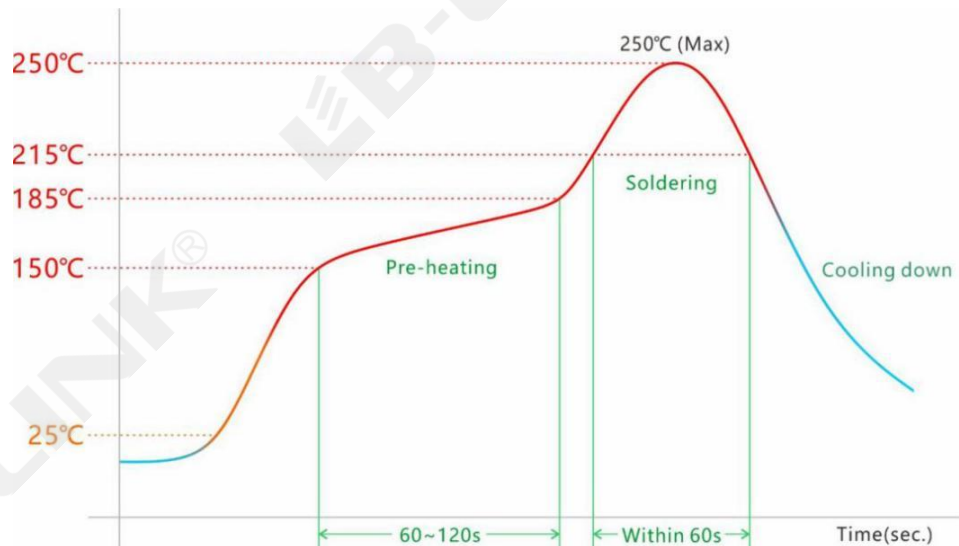


6.2 Recommend PCB Layout Footprint



(Design size: mm)

6.3 Reflow Soldering Standard Conditions



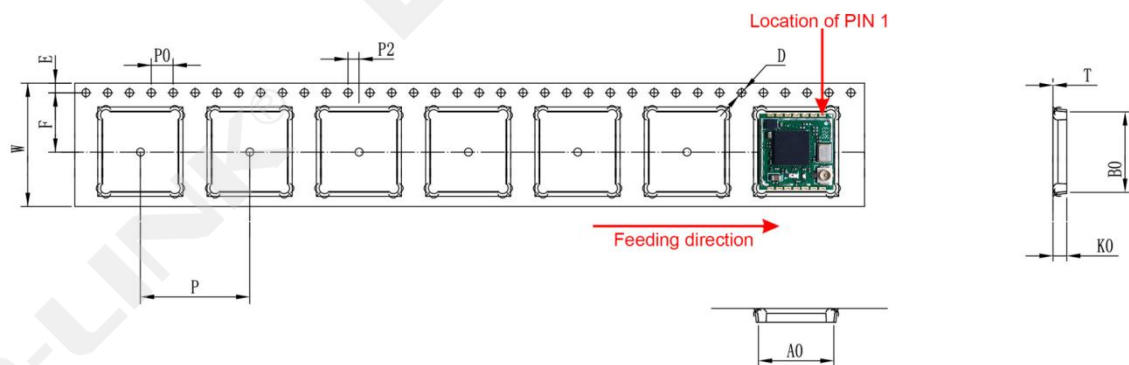
Please use the reflow within 2 times.
Set up the highest temperature within 250°C.

7. Key Components Of Module

No.	Parts	Specification	Manufacturer	Note
1	Chipset	RTL8731BS-CG	Realtek Semiconductor Corp.	
2	PCB	BL-M8731BS3	ShenZhen Tie Fa Technology Limited	
			SHEN ZHEN QILI ELECTRON CO.,LTD	
			Quzhou Sunlord Electronics Co.,Ltd	
			Huizhou Dayawan Kexiang Technology Circuit Board Co., Ltd	
3	Crystal	40MHz	Chengde oscillator Electronic Technology CO.,LTD	
			Lucki Electronics Co., Ltd	
			JinHua East Crystal Electronic CO.,LTD	
4	Diplexer	DP1608	Walsin Technology Corporation	
			TDK China Co., Ltd.	
			FTR Technology Corporation	

8. Package and Storage Information

8.1 Package Dimensions



ITEM	W	A0	B0	KO	E	F	P	P0	P2	D	T
DIM	24.00±0.3	13.40±0.1	13.90±0.1	2.40±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 1 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% RH (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