

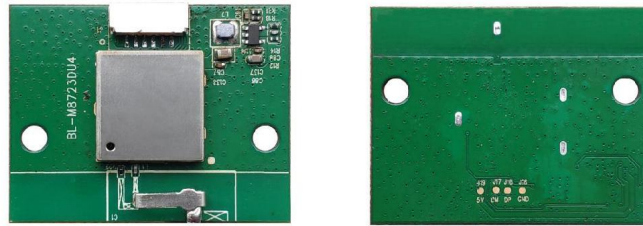


BL-M8723DU4

**802.11N 150Mbps WLAN+ Bluetooth 4.2
USB Module Specification**

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Module Name: BL-M8723DU4	
Module Type: 802.11b/g/n 1T1R WLAN + Bluetooth 4.2 USB Module	
Revision: V1.0	
Customer Approval:	
Company:	
Title:	
Signature:	Date:
LB-link Approval:	
Title:	
Signature:	Date:

Revision History

Revision	Summary	Release Date
0.1	Initial release	2022-01-15
0.11	Update the PCB	2022-03-31
1.0	Final release	2022-04-20



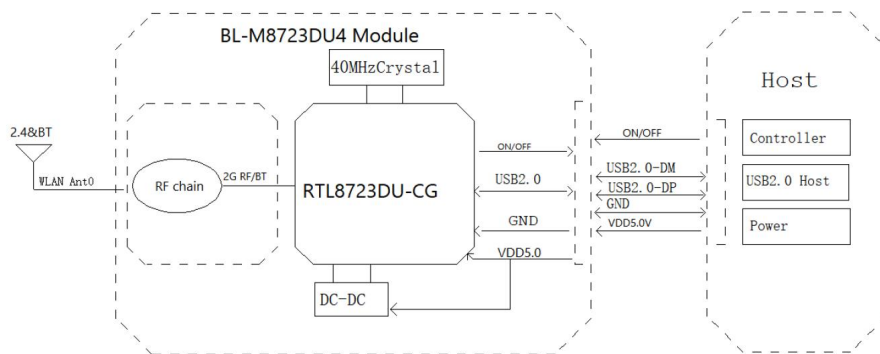
1. Introduction

BL-M8723DU4 is a highly integrated module built into 1 x 1 single wireless LAN and Bluetooth. Supports 1T1R WLAN baseband and RF. It supports IEEE802.11b/g/n standards and provides a maximum data rate up to 150Mbps, which can provide power-rich wireless connections and reliable throughput over long distances. Support Bluetooth 2.1/3.0/4.2.

1.1 Features

- Operating Frequencies: 2.4~2.4835GHz
- Host Interface is USB 2.0
- IEEE Standards: IEEE802.11 b/g/n
- Wireless data rate can reach up to 150Mbps
- Bluetooth 2.1/3.0/4.2
- Module built-in antenna
- Power Supply: VDD 5.0V $\pm$ 0.25V

1.2 Block Diagram

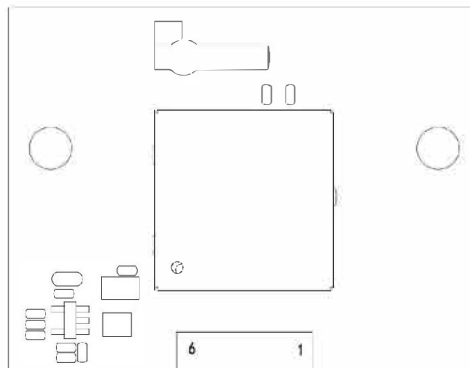




1.3 General Specifications

Module Name	BL-M8723DU4, WLAN+BT Combo Module
Chipset	RTL8723DU-CG
WiFi Standards	IEEE802.11b/g/n, 1T1R, 2.4G 150Mbps (Max)
Bluetooth Standards	V2.1/V4.2
Host Interface	USB2.0
Antenna	Module built-in antenna, max gain: 0.2dBi
Dimension	40.0*31.0*6.30mm (L*W*H), Tolerance: +/-0.15mm
Power Supply	Voltage: DC 5.0V±0.25V Standby Current: 80mA (Typ) Work Current: 350mA (Max)
Operation Temperature	-20°C to +70°C
Operation Humidity	10% to 95% RH (Non-Condensing)
Storage Temperature	-45°C to +85°C
Storage Humidity	10% to 95% RH (Non-Condensing)
System Supported	Linux/Android/IOS/win7-win10

2. Pin Assignments





2.1 Pin Definition

No	Pin Name	Type	Description	Supply
1	VDD5.0	--	Power supply 5V is required (5.25V Max)	
2	USB_DM -	I/O	USB data- (USB2.0)	
3	USB_DP +	I/O	USB data+ (USB2.0)	
4	GND	P	Ground connection	
5	BT_WAKE	I	Wake up BT (Pull high to wake up and pull low to close)	
6	ON/OFF	I	"EN" Control of 5V TO 3.3V DC-DC (Internal pull High, VIH>1.2V, VIL<0.4V, Turn on Delay≤100ms)	

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
Antenna gain		-	2.0	-	dBi
Supply Voltage	VDD5.0	4.75	5.0	5.25	V

3.2 Digital 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	0.9	V

3.3 Current Consumption

Conditions : VDD5.0=5V ; Ta:25°C			
Use Case	VDD5.0 Current (average)		
	Typ	Max	Units
WiFi Radio Off (Linux Driver)	76	100	mA
WiFi Disable (Linux Driver)	75	--	mA
WiFi Unassociated (Linux Driver)	78	100	mA
WoWLAN(Linux Driver)	74	100	mA
2.4G 1Mbps TX (1RF-Test)	321	335	mA
2.4G 1Mbps RX (1RF-Test)	91	98	mA
2.4G 11Mbps TX (1RF-Test)	285	300	mA
2.4G 11Mbps RX (1RF-Test)	91	98	mA
2.4G 6Mbps TX (1RF-Test)	268	278	mA
2.4G 6Mbps RX (1RF-Test)	91	98	mA
2.4G MCS0(HT20) TX (1RF-Test)	250	265	mA
2.4G MCS0(HT20) RX (1RF-Test)	91	98	mA
2.4G MCS7(HT20) TX (1RF-Test)	187	200	mA
2.4G MCS7(HT20) RX (RF-Test)	91	98	mA
2.4G MCS0(HT40) TX (1RF-Test)	240	260	mA
2.4G MCS0(HT40) RX (1RF-Test)	91	98	mA
2.4G MCS7(HT40) TX (1RF-Test)	182	190	mA
2.4G MCS7(HT40) RX (1RF-Test)	91	98	mA

4. Interface Timing Specifications

4.1 USB Bus during power on Sequence

7.1. USB Bus during Power On Sequence

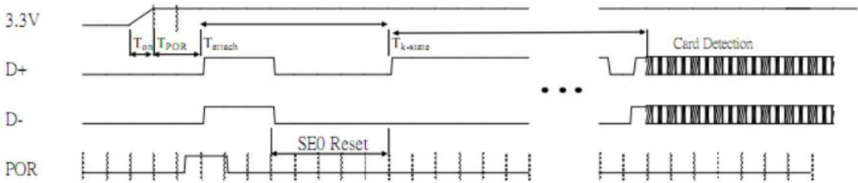


Figure 4. RTL8723DU USB Bus Power On Sequence

T_{on}: The main power ramp up duration
T_{por}: The power on reset releases and power management unit executes power on tasks
T_{attach}: USB attach state
T_{hstate}: the duration from register attached to USB host starting card detection procedure

The power on flow description:
After main 3.3V ramp up, the internal power on reset is released by power ready detection circuit and the power management unit will be enabled. The power management unit enables the internal regulator and clock circuits.
The power management unit also enables the USB circuits.
USB analog circuits attach registers to indicate the insertion of the USB device

Table 14. The typical timing range

	Unit	Min	Typical	Max
T _{on}	ms	0.2	1.5	5
T _{por}	ms	--	2	10
T _{attach}	ms	2	7	15
T _{hstate}	ms	50	250	--

4.2 Throughput Test

Mode	Supported mode	T/R(Mbps)	Mbps
AP Mode for 2.4G	Supported	40Mbps	--
STA Mode for 2.4G	Supported	60Mbps	--
AP+STA Concurrent mode for 2.4G	Supported	AP 20Mbps	STA 30Mbps



5. WiFi & Bluetooth RF Specification

5.1 2.4G WiFi RF Specification

Conditions: VDD5.0=5V; Ta:25°C			
Features	Description		
WLAN Standard	IEEE 802.11b/g/n		
Frequency Range	2.4~2.4835GHz (2.4GHz ISM Band)		
Modulation	802.11b DSSS: CCK, DQPSK, DBPSK 802.11g OFDM: 64QAM,16QAM, QPSK, BPSK 802.11n OFDM: 64QAM,16QAM, QPSK, BPSK		
Date Rate	802.11b: 1, 2 ,5.5,11Mbps, 802.11g: 6,9,12,18,24,36,48,54Mbps, 802.11n-HT20: MCS0~7, 6.5~72.2Mbps, 802.11n-HT40: MCS0~7, 13~150Mbps,		
Frequency Tolerance	≤ ±20ppm		
2.4G Transmitter Specifications			
TX Rate	TX Power	TX Power Tolerance	EVM
802.11b@1~11Mbps	17dBm	±2.0dBm	≤-10dB
802.11g@6Mbps	14dBm	±2.0dBm	≤-10dB
802.11g@54Mbps	14dBm	±2.0dBm	≤-25dB
802.11n@HT20_MCS0	14dBm	±2.0dBm	≤-10dB
802.11n@HT20_MCS7	14dBm	±2.0dBm	≤-28dB
802.11n@HT40_MCS0	14dBm	±2.0dBm	≤-10dB
802.11n@HT40_MCS7	14dBm	±2.0dBm	≤-28dB
2.4G Receiver Specifications			
RX Rate	Min Input Level(Typ)	Max Input Level(Typ)	PER
802.11b@1Mbps	-88dBm	-10dBm	< 8%
802.11b@11Mbps	-79dBm	-10dBm	< 8%
802.11g@6Mbps	-82dBm	-20dBm	< 10%
802.11g@54Mbps	-65dBm	-20dBm	< 10%
802.11n@HT20_MCS0	-82dBm	-20dBm	< 10%
802.11n@HT20_MCS7	-64dBm	-20dBm	< 10%
802.11n@HT40_MCS0	-79dBm	-20dBm	< 10%
802.11n@HT40_MCS7	-61dBm	-20dBm	< 10%



5.2 2.4G Authentication Channel Distribution

Regulation Domain (mib regdomain value)	Supported Channels
FCC	1,2,3,4,5,6,7,8,9,10,11
IC	1,2,3,4,5,6,7,8,9,10,11
ETSI	1,2,3,4,5,6,7,8,9,10,11,12,13
MKK	1,2,3,4,5,6,7,8,9,10,11,12,13,14

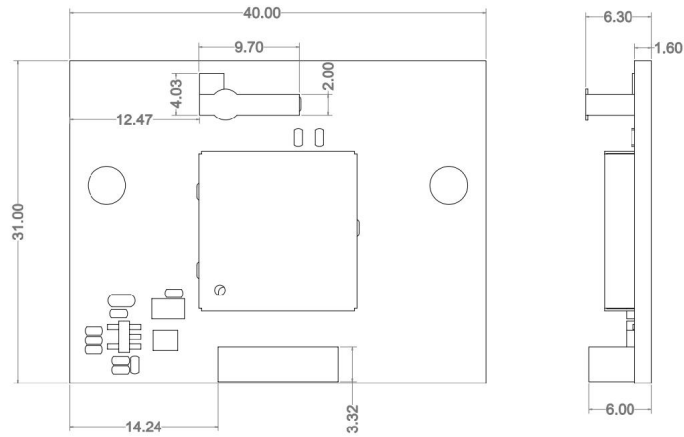
5.3 Bluetooth RF Specification

Conditions: VDD5.0=5V; Ta:25°C			
Features	Description		
Bluetooth Specification	Bluetooth v2.1+EDR/3.0+HS (Bluetooth Classic _ BT BR/EDR), Bluetooth 4.2		
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: π/4-DQPSK; EDR_3Mbps: 8DPSK; LE_1Mbps: GFSK (Uncoded);		
Bluetooth Transmitter Specifications			
Items	Min	Typ	Max
TX Power			
BR_1M TX Power	0	4	8
EDR_2/3M TX Power	0	4	8
LE_1M TX Power	0	4	8
BR_1M Modulation Characteristics			
Δf1avg	140kHz	157kHz	175kHz
Δf2max	115kHz	145kHz	--

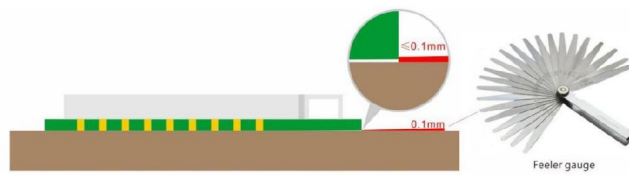
[For at least 99.9% of all Δf2max]				
Δf2avg / Δf1avg	0.8	0.98	--	
EDR Modulation Accuracy				
RMS DEVM (EDR_2M)	--	8%	20%	
99% DEVM (EDR_2M)	--	11%	30%	
Peak DEVM (EDR_2M)	--	15%	35%	
RMS DEVM (EDR_3M)	--	8%	13%	
99% DEVM (EDR_3M)	--	11%	20%	
Peak DEVM (EDR_3M)	--	15%	25%	
LE Modulation characteristics				
Δf1avg (LE_1M)	225kHz		275kHz	
Δf2max [For at least 99.9% of all Δf2max] (LE_1M)	185kHz	--	--	
Δf2avg / Δf1avg (LE_1M)	0.8	0.98	--	
Bluetooth Receiver Specifications				
Items	Sensitivity		Maximum Input Level	
	Input Level(Typ)	BER	Input Level(Typ)	BER
BR_1M	-92dBm	≤0.1%	-20dBm	≤0.1%
EDR_2M	-90dBm	≤0.01%	-20dBm	≤0.1%
EDR_3M	-88dBm	≤0.01%	-20dBm	≤0.1%
LE_1M	-90dBm	≤30.8%	-20dBm	≤0.1%

6. Mechanical Specifications

6.1 Module Outline Drawing

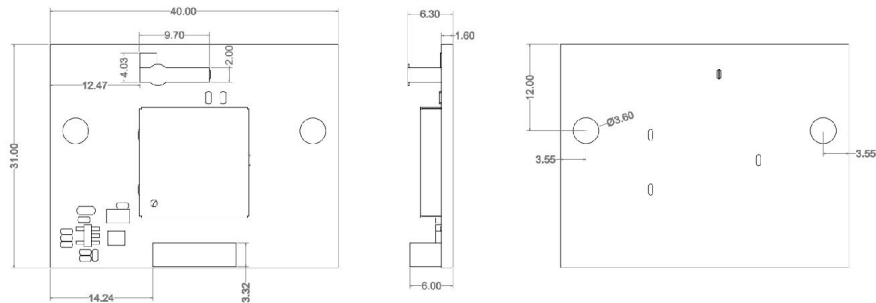


Module dimension: 40.0*31.0*6.30mm (L*W*H; Tolerance: $\pm 0.15\text{mm}$)



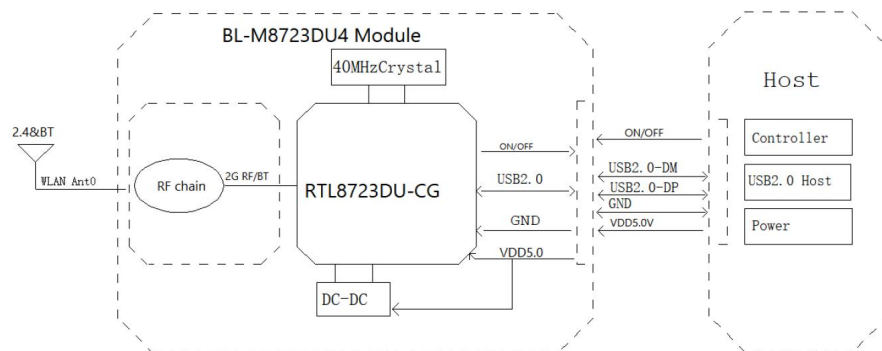
Module Bow and Twist: $\leq 0.1\text{mm}$

6.2 Mechanical Dimensions

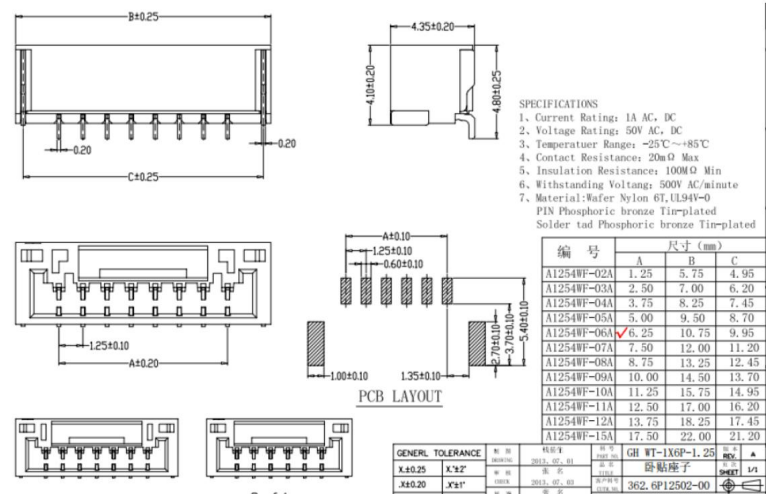


7. Application Information

7.1 Typical Application Circuit



7.2 Connector Specification

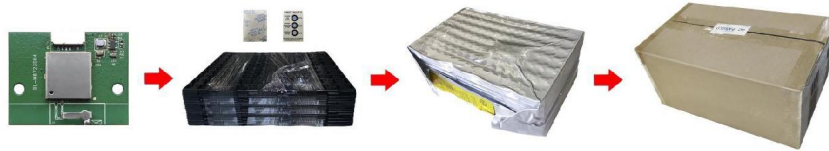


8. Key Components Of Module

No.	Parts	Specification	Manufacturer	Note
1	Chipset	RTL8723DU-CG,	Realtek	
2	PCB	BL-M8723DU4	Shen Zhen Tie Fa Technology limited	
			MILLION SOURCE PRINTED CIRCUIT BOARD CO., LTD	
			Quzhou Sunlord Electronics Co., Ltd	
3	Crystal	40MHz-3225	Lucki Electronics Co., Ltd	
			Shenzhen Kaiyuexiang Electronics Co., Ltd	
			Chengde Oscillator Electronic Technology Co., Ltd.	
4	PMIC	SOT23-5	TMI	
			SILERGY	

9. Package and Storage Information

9.1 Package Dimensions



Package specification:

1. 24 modules per blister plate and 288 modules per box.
2. The blister is bound with wire membrane and put into anti-static vacuum bag.
3. Put 1 bag of dry beads (20g) in each anti-static vacuum bag. 1 pcs 3 point humidity card.
4. The outer box size is 35.2*21.5*15.5cm.

9.2 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

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 use.

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

ESD Sensitivity:

ESD Protection: 4KV(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 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 device 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 device does cause harmful interference to radio or television reception, which can be determined by turning the device 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 device and receiver.
- Connect the device 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

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment

The antennas used for this transmitter must be installed to provide a separation distance of at least 20 cm from all persons and must not be co-located for operating in conjunction with any other antenna or transmitter.

This device complies with Part 15 of the FCC Rules and contains licence-exempt transmitter(s)/receiver(s) that comply with Innovation, Science and Economic Development Canada's licence-exempt RSS(s). 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

Please notice that if the FCC identification number is not visible when the module is installed inside another device, then the outside of the device into which the module is installed must also display a label referring to the enclosed module. This exterior label can use wording such as the following: "Contains FCC ID: 2AL6K-BL-M8723DU4" any similar wording that expresses the same meaning may be used.

The ISED certification label of a module shall be always clearly visible when installed in the host product; otherwise, the host product must be labelled to display the ISED certification number for the module, preceded by the word "contains" or similar wording expressing the same meaning, as follows: Contains IC: 20944-BLM8723DU4

The module is limited to OEM installation ONLY. The OEM integrator is responsible for ensuring that the end-user has no manual instruction to remove or install module.

Cet appareil contient des émetteurs / récepteurs exemptés de licence conformes aux RSS (RSS) d'Innovation, Sciences et Développement économique Canada. Le fonctionnement est soumis aux deux conditions suivantes : (1) Cet appareil ne doit pas causer d'interférences. (2) Cet appareil doit accepter toutes les interférences, y compris celles susceptibles de provoquer un fonctionnement indésirable de l'appareil