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欧飞信科技

O8723UE

Wi-Fi 1T1R 11n + Bluetooth4.2

Combo Module

Datasheet

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Cover of Approval Sheet

PRODUCT NAME	Part No.	Description
O8723UE	FWAAO8723UE10	RTL8723DU-CG USB 1T1R 3.3V 12.9*12.2*2.3mm 11n WIFI+BT4.2 Shield CAN
	FWAAO8723UE20	RTL8723DU-CG USB 1T1R 3.3V 12.9*12.2*2.3mm 11n WIFI+BT4.2 2Antenna Shield CAN

Customer: _____

Customer P/N: _____

Signature: _____

Date: _____

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Maker Information:

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Revision History

Version	Date	Description	Draft	Approved
1.0	2022-07-05	-Preliminary Project version	CCJ	Turbo
1.1	2022-08-11	-Addition the description	CCJ	Turbo
1.2	2023-02-15	- Pinout definition，photo, working temperature update	CCJ	Turbo

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CONTENTS

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1.Overview

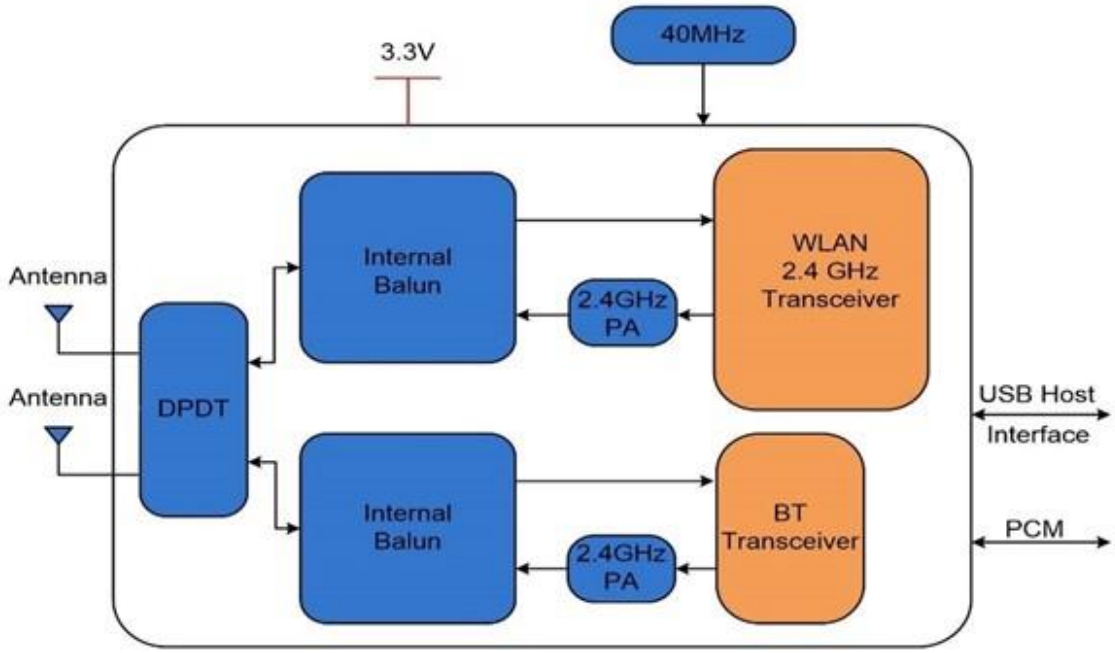
1.1 Introduction

O8723UE is a highly integrated single-chip 802.11b/g/n 1T1R WLAN, and an integrated Bluetooth Smart Ready single chip with USB 2.0 multi-function,board size is 12.2mm x 13mm.The module provides simple legacy and 20MHz/40MHz co-existence mechanisms to ensure backward and network compatibility and Bluetooth can support BT2.1+EDR/BT3.0 and BT4.2.

1.2 Features

- 802.11b/g/n 1T1R WLAN and Bluetooth single chip
- Complies with USB2.0 for WLAN and BT controller
- IEEE standards support: IEEE 802.11b, IEEE 802.11g, IEEE 802.11n, IEEE 802.11d, IEEE 802.11e, IEEE 802.11h, IEEE 802.11i
- Fully Qualified for Bluetooth 2.1+EDR specification including both 2Mbps and 3Mbps modulation mode
- Fully qualified for Bluetooth 4.2 Dual mode
- Enterprise level security which can apply WPA/WPA2 certification for Wi-Fi

1.3 Block Diagram



1.4 General Specification

Model Name	O8723UE
Product Description	Support Wi-Fi/Bluetooth functionalities
Dimension	L x W x H: 12.2 x 13 x 2.3 (typical) mm
Wi-Fi Interface	USB2.0
BT Interface	USB2.0
Operting temperature	0°C to 70°C
Storage temperature	-55°C to 85°C

Note: The module can work normally at -30°C to 85°C

1.5 Recommended Operating Rating

Feature		Minimum	Type	Maximum	Units
Operating Temperature*		0	25	70	°C
VCC		3.15	3.3	3.45	V
Power Consumption (Type VCC)	TX (2.4G HT40)	223 mA			
	RX (2.4G HT40)	92 mA			
	BT on	8.5 mA			

2. RF Specification

2.1 Wi-Fi RF Specification

Feature	Description		
Operating Frequency	2.400～2.4835GHz		
Standards	Wi-Fi: IEEE 802.11b/g/n & Wi-Fi compliant		
Operating Channel	2.4GHz : Ch1~14		
Modulation	802.11b : CCK 802.11 g/n : OFDM /64-QAM、16-QAM、QPSK、BPSK		
PHY Data rates	Wi-Fi:802.11b:11,5.5,2,1Mbps 802.11g:54,48,36,24,18,12,9,6Mbps 802.11n: up to 150Mbps		
Output Power, tolerance ± 1.5 dB			
Protocol Standard	Data Rate	Spec.(dBm)	EVM(dB)
802.11b	@11Mbps	16	≦-10
802.11g	@54Mbps	15	≦-25
802.11n	@MCS 7	14	≦-28
Receiver Sensitivity CCK modulation PER≦8%、OFDM modulation PER≦10%			
Protocol Standard	Data Rate	Spec.(dBm)	
802.11b	1Mbps	-91	
	11Mbps	-85	
802.11g	6Mbps	-87	
	54Mbps	-70	

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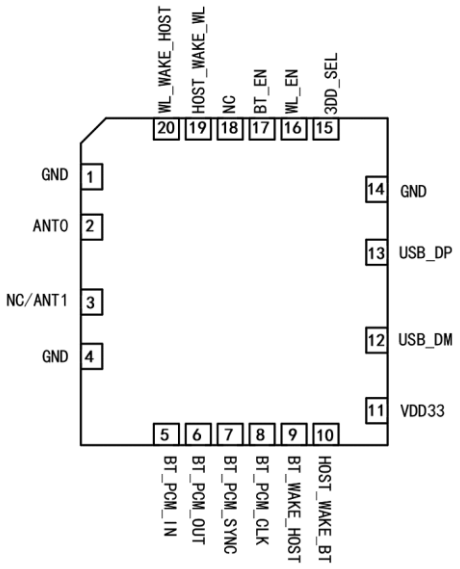
802.11n	HT20_MCS 0 HT20_MCS 7	-87 -69
	HT40_MCS 0	-84
	HT40_MCS 7	-66

2.2 BT RF Specification

Feature	Description		
Operating Frequency	2.400～2.4835GHz		
Number of Channels	79 channels for classic、40 channels for BLE		
Standards	V2.1+EDR/BT v3.0/BT v3.0+HS/BT v4.2		
Modulation	8DPSK, π/4 DQPSK, GFSK		
PHY Data rates	1 Mbps for Basic Rate 2,3 Mbps for Enhanced Data Rate		
Output Power	Min(dBm)	Typical(dBm)	Max(dBm)
	6	8	10
Sensitivity @ BER=0.1% for GFSK (1Mbps)		-89	
Sensitivity @ BER=0.01% for π/4-DQPSK (2Mbps)		-86	
Sensitivity @ BER=0.01% for 8DPSK (3Mbps)		-83	

3.Pin Assignments

3.1 Pin Outline



3.2 Pin Definition

NO	Name	Type	Description	Voltage
1	GND	-	Ground connections	
2	ANT 0	I/O	Single antenna is for WiFi and Bluetooth，dual antenna is WiFi ANT	
3	NC/ANT1	–	NC if the version is single antenna,bluetooth antenna if dual antenna version	

4	GND	-	Ground connections	
5	BT_PCM_IN	I/O	BT_PCM_IN.If not used please NC, Don't connected to ground.	3.3V
6	BT_PCM_OUT	I/O	BT_PCM_OUT. If not used please NC, Don't connected to ground.	3.3V
7	BT_PCM_SYNC	I/O	BT_PCM_SYNC. If not used please NC, Don't connected to ground.	3.3V
8	BT _PCM _CLK	I/O	BT_PCM_CLK. If not used please NC, Don't connected to ground	3.3V
9	BT _WAKE _HOST	O	Bluetooth device wake up host IC pin GPIO14, pull high boot to test mode. pull low boot to normal mode. be careful to using this pin.	3.3V
10	HOST _WAKE _BT	I	Host wake up Bluetooth device C pin GPIO13	3.3V
11	VDD33	-	Main power voltage source input 3.3V	3.3V
12	USB _DM	I/O	USB2.0 differential pair for WLAN And Bluetooth	
13	USB _DP	I/O	USB2.0 differential pair for WLAN And Bluetooth	
14	GND	-	Ground connections	
15	3DD_SEL	I/O	Not connecting Don't connected to ground IC pin GPIO6	
16	WL_EN	I	WLAN disable Default pull high, external pull low disable WL	3.3V
17	BT_EN	I	Bluetooth disable Default pull high, external pull low disable BT	3.3V
18	NC	-	Not connecting (Don't connected to ground)	
19	HOST_WAKE_WL	I	Host wake up WLAN device IC pin BT_GPIO14	3.3V
20	WL_WAKE_HOST	O	WLAN device wake up host IC pin GPIO8	3.3V

4.Dimensions

4.1Physical Dimensions and Module Photo

(Unit: mm)

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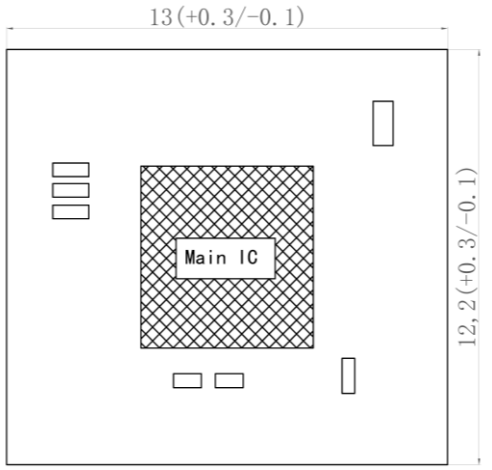
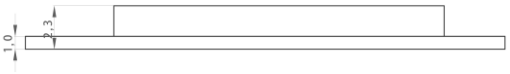
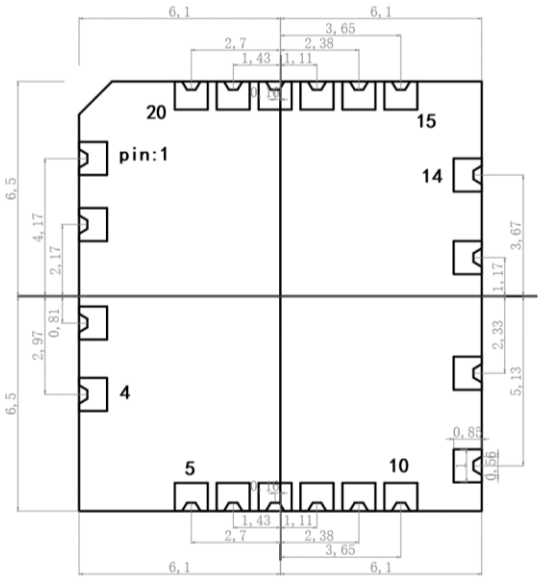
L x W：13 x 12.2(+0.3/-0.1) mm 	
H: 2.3 (±0.2)mm	
Weight	4.5g

4.2 Module Physical Dimensions

(Unit: mm)

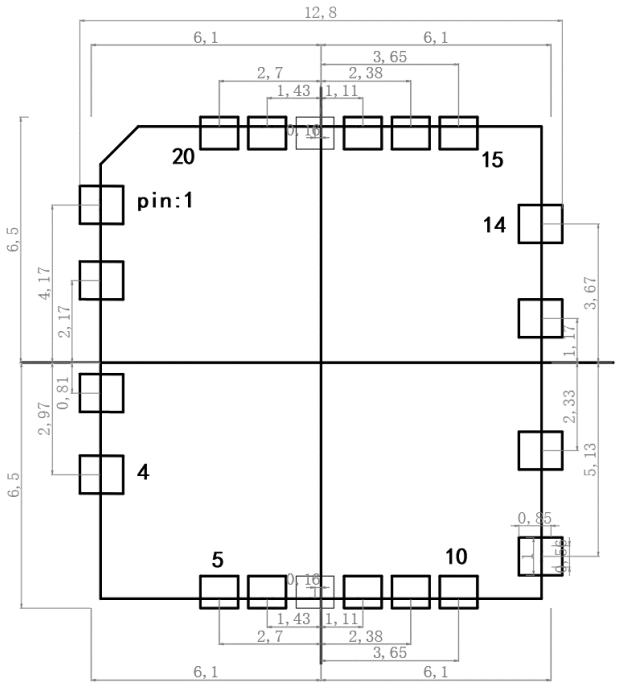
< TOP VIEW >



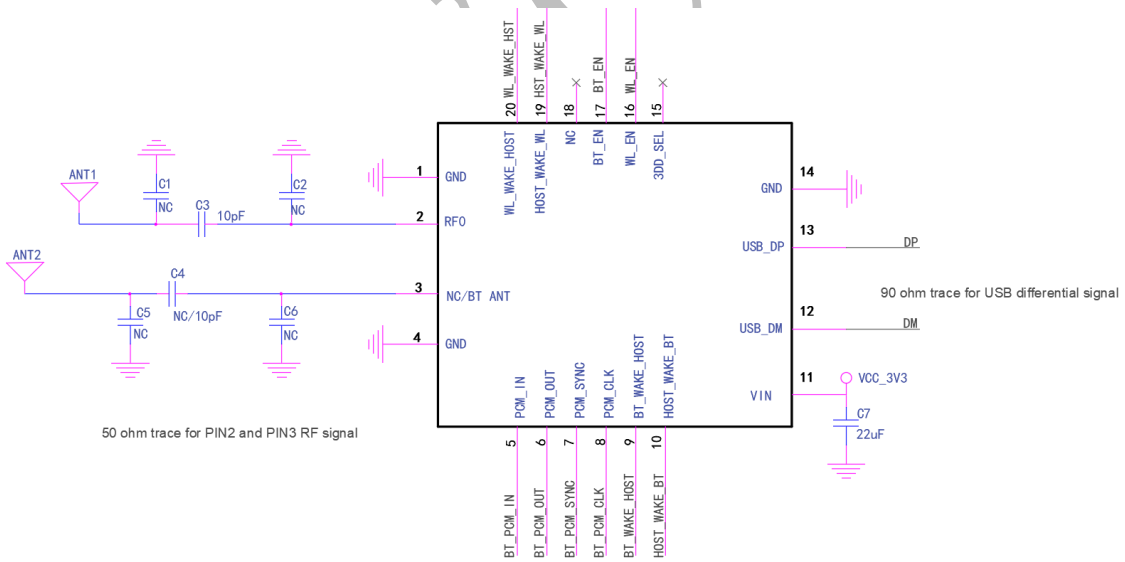
4.3 Layout Recommendation

(Unit: mm)

< TOP VIEW >



5 Reference Design



Note: 1, Please add 22uF cap for VCC_3V3. 2, For USB 2.0 differential signal, requires 90 ohm impedance. 3, For PIN2 and PIN3 RF IO trace, keep 50 ohm impedance.

2, When the version is single antenna, ANT0 is WiFi and Bluetooth shared antenna, and ANT1 is NC. ANT0 is WiFi antenna and ANT1 is Bluetooth antenna when is dual antenna version.

5.2 External Antenna

When the customer selects an external antenna, the external antenna selected must meet the parameter requirements specified ,Impedance 50Ω

5.3 Timing information

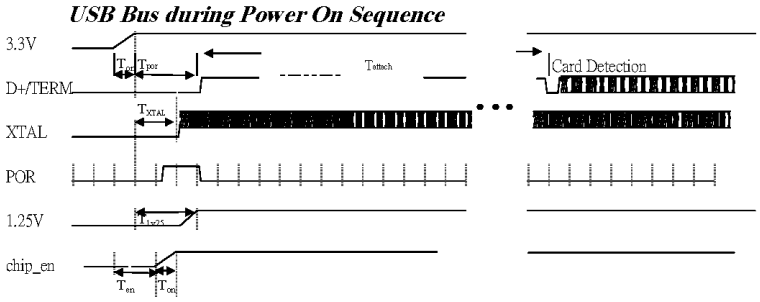


Figure 4 RTL8723DU USB Bus Power On Sequence

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
$T_{k\text{-}state}$: the duration from resister 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 resisters 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_{xtal}	ms	--	1.5	8
T_{attach}	ms	100	250	--
T_{1v25}	ms	-	2	5
T_{en}	ms	0	0	5

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PCM Interface Characteristics

The RTL8723D supports a PCM digital audio interface that is used for transmitting digital audio/voice data to/from the Audio Codec. Features are supported as below:

- Supports Master and Slave mode
- Programmable long/short Frame Sync
- Supports 8-bit/16-bit linear PCM formats
- PCM Master Clock Output: 64, 128, 256, or 512kHz
- Supports SCO/ESCO link

PCM Format

FrameSync is the synchronizing function used to control the transfer of DAC_Data and ADC_Data. A Long FrameSync indicates the start of ADC_Data at the rising edge of FrameSync (Figure 7. Long FrameSync), and a Short FrameSync indicates the start of ADC_Data at the falling edge of FrameSync (Figure 8. Short FrameSync).

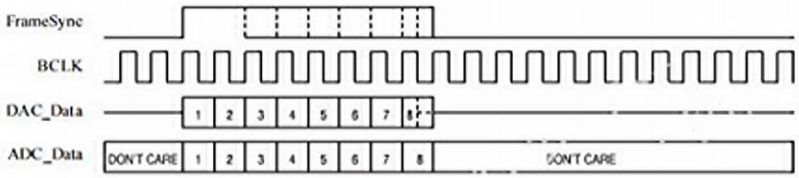


Figure 7. Long FrameSync

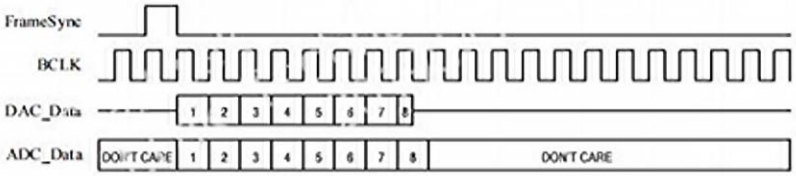


Figure 8. Short FrameSync

5.4 Real-world Testing

Protocol Standard	channel	Power (dBm)	EVM(dB)	Rx Sensitivity (dBm)
802.11b(11Mbps)	2412	17	-26.6	-88
	2437	16.8	-26.8	-88
	2472	17.2	-26.7	-88
802.11n(20Mbps_MCS7)	2412	14.6	-33	-71
	2437	14.1	-33.1	-71
	2472	14.7	-32.8	-71
802.11n(40Mbps_MCS7)	2422	14.9	-32.6	-69
	2437	14.2	-33.2	-69
	2472	14.1	-33.2	-69

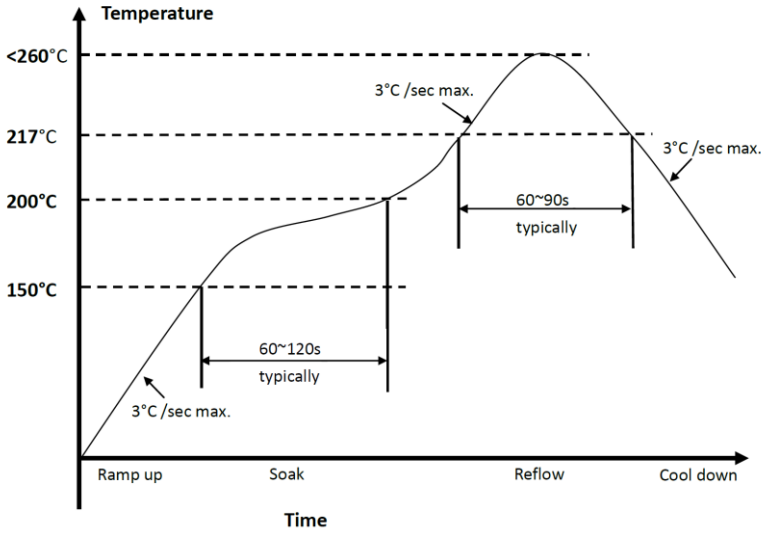
Description: The test environment is: temperature 25 °C humidity 60%

6 Recommended Reflow Profile

Referred to IPC/JEDEC standard.

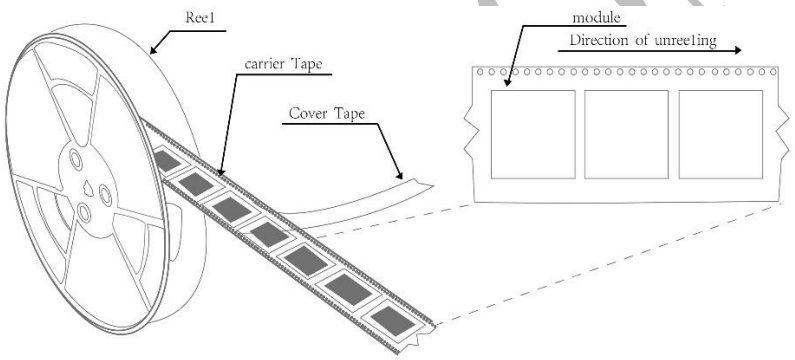
Peak Temperature : <260°C

Number of Times : 2 times max



7 Package

7.1 Reel



7.2 Storage Temperature And Humidity

1. Storage Condition: Moisture barrier bag must be stored under 30℃, 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℃, humidity < 70% RH, over 96 hours.
Baking condition: 125℃, 12 hours. Baking times: 1 time.

THE END