



## Product Specification

<b>Revision</b>	V1.0		
<b>Date</b>	2018-05-25		
<b>Model Name</b>	BL-M8723DU1		
<b>Product Name</b>	IEEE 802.11b/g/n (1T1R) WIFI +Bluetooth		
<b>Bilian Approve Field</b>			
<b>Engineer</b>	QC	<b>Sales</b>	
<b>Customer Approve Field</b>			
<b>Engineer</b>	QC	<b>Manufactory</b>	<b>Purchasing</b>

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## Revision History

Date	Document Revision	Product Revision	Description
/	0.1	V0.1	Preliminary release
2017/05/21	1.0	V1.0	Officially released

## 1. Introduction

### 1.1 General Description

BL-M8723DU1 is a highly integrated single-chip 802.11n Wireless LAN (WLAN) USB2.0 Multi-Function network interface controller with integrated Bluetooth 2.1//4.2 controller. It combines a WLAN MAC, a 1T1R capable WLAN baseband, and RF in a single chip. The RTL8723DU provides a complete solution for a high-performance integrated wireless and Bluetooth device. The integration provides better coordination between 802.11 and Bluetooth, and with sophisticated dynamic power control and packet traffic arbitration, RTL8723DU is able to provide the best coexistence performance Overview.

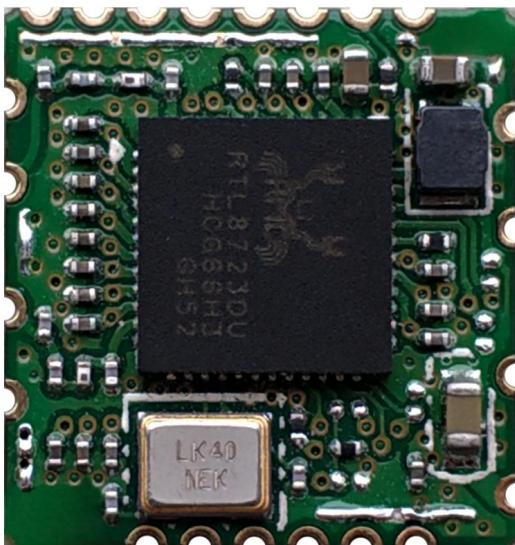


Figure 1 Top View



Figure 2 Bottom View

### 1.2 Features

- Operating Frequencies : BT:2.402~2.48GHz(BT)/WIFI:2.412~2.472GHz(USA 11Channels, Europe and others 13 channels)
- Host Interface is USB, complies with USB 2.0
- IEEE Standards : IEEE 802.11b/g/n
- Wireless data rate can reach up to 150Mbps
- Bluetooth controller complies with Bluetooth core specification V4.2
- Connect to the external antenna through the half hole
- Power Supply:3.3V±0.2V

### 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

### 3.1. Single-Band 11n (1x1) Solution with Integrated Bluetooth Controller with Antenna Diversity

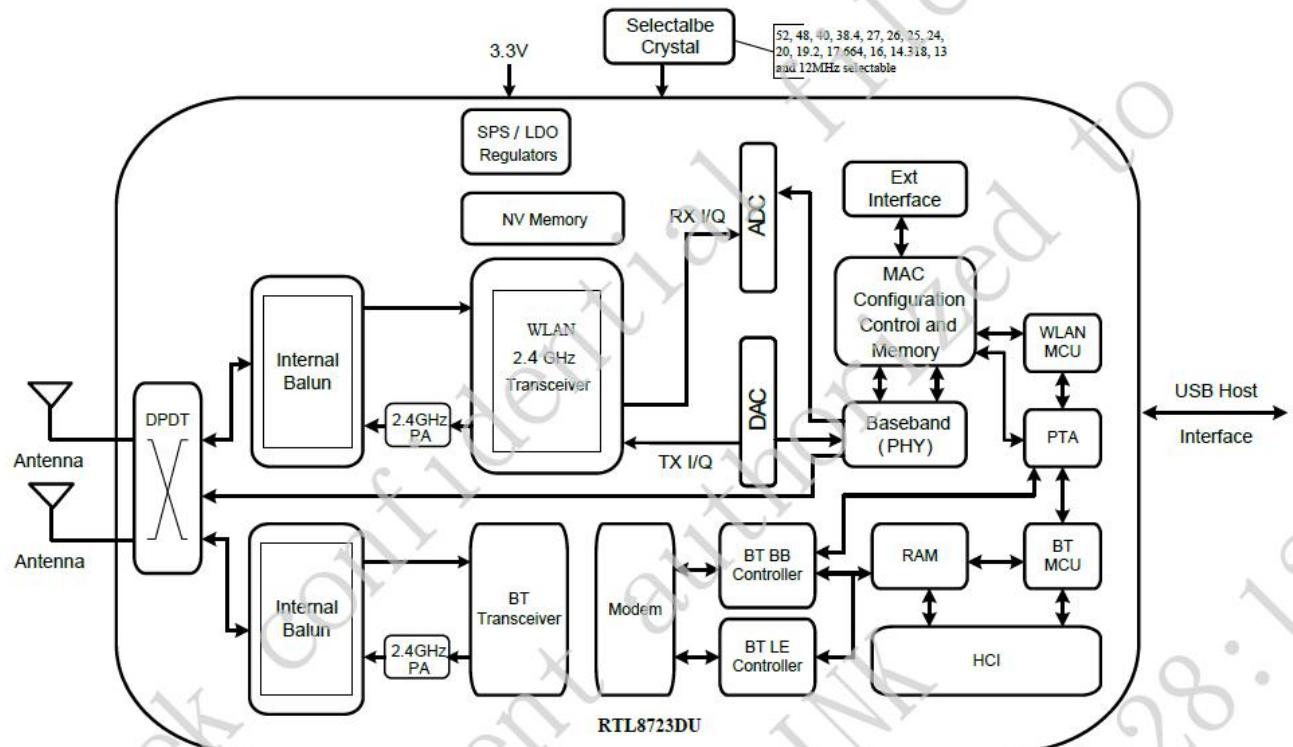


Figure 1. Single-Band 11n (1x1) and Integrated Bluetooth Controller Solution with Antenna Diversity

Figure 3      RTL8723DU block diagram

## 3. Product Technical Specifications

### 3.1 General Specifications

Item	Description
Product Name	BL-M8723DU1
Main Chip	RTL8723DU-CG
Host Interface	USB2.0
IEEE Standards	IEEE 802.11b/g/n B T: Compatible with Bluetooth v2.1,v4.2 Systems
Operating Frequencies	BT:2.402~2.48GHz(BT)/WIFI:2.412~2.472GHz(USA 11Channels, Europe and others 13 channels)
Modulation	<b>WiFi:</b> 802.11b: CCK, DQPSK, DBPSK 802.11g: 64-QAM,16-QAM, QPSK, BPSK



	802.11n: 64-QAM,16-QAM, QPSK, BPSK <b>BT:</b> 8DPSK, $\pi/4$ DQPSK, GFSK
Working Mode	Infrastructure, Ad-Hoc
Wireless Data Rate	<b>WIFI:</b> 802.11b: 1, 2 ,5.5,11 802.11g: 6,9,12,18,24,36,48,54 802.11n: MCS0~7, HT20 reach up to 72.2Mbps, HT40 reach up to 150Mbps <b>BT:</b> 1 Mbps for Basic Rate 2,3 Mbps for Enhanced Data Rate
Rx Sensitivity	WIFI:-94dBm (Min) BT: -89dBm (Min)
TX Power	WIFI:16.93dBm (Max) BT: 4.85dBm (Max)
Antenna Type	Connect to the external antenna through the half hole
Dimension(L*W*H)	(PCB) 12.2mm*12.9mm*0.8mm (L*W*H) , Tolerance: $\pm 0.15$ mm
Power Supply	3.3V $\pm 0.2$ V
Power Consumption	Standby 80mA@3.3V (Max) TX mode 330mA@3.3V (Max)
Clock Source	40MHz
Working Temperature	-10° C to +50° C
Storage Temperature	-40° C to +70° C

**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.

### 3.2 DC Power Consumption

Vcc=3.3V, Ta = 25 °C, unit: mA				
Supply current	Typ.		Max	
Standby (RF disabled)	75		80	
<b>802.11b</b>				
Supply current	Typ.	Max.	Typ.	Max.
TX mode	320	330	285	300
Rx mode	89	90	90	92
<b>802.11g</b>				
Supply current	Typ.	Max.	Typ.	Max.
TX mode	260	270	190	205
Rx mode	89	90	92	95

<b>802.11n HT20</b>	MCS0		MCS7	
Supply current	Typ.	Max.	Typ.	Max.
TX mode	250	260	185	200
Rx mode	89	91	92	96
<b>802.11n HT40</b>	MCS0		MCS7	
Supply current	Typ.	Max.	Typ.	Max.
TX mode	240	250	180	190
Rx mode	90	92	95	99

### 3.3 RF Specifications

TX Constellation Error(EVM)	802.11b: <-20dB@11Mbps 802.11g:<-28dB@54Mbps 802.11n-HT20: <-28dB@72.2Mbps 802.11n-HT40:< -28dB@150Mbps
Receiver Minimum Input Sensitivity@PER	1Mbps: -92dBm@PER<8%; 11Mbps:-85dBm@PER<8%; 54Mbps:-72dBm@PER<10%; 150Mbps:-66dBm@PER<10%; BT: -89dBm@1Mbps -85dBm@2Mbps -83dBm@3Mbps

## 4. Pin Assignments

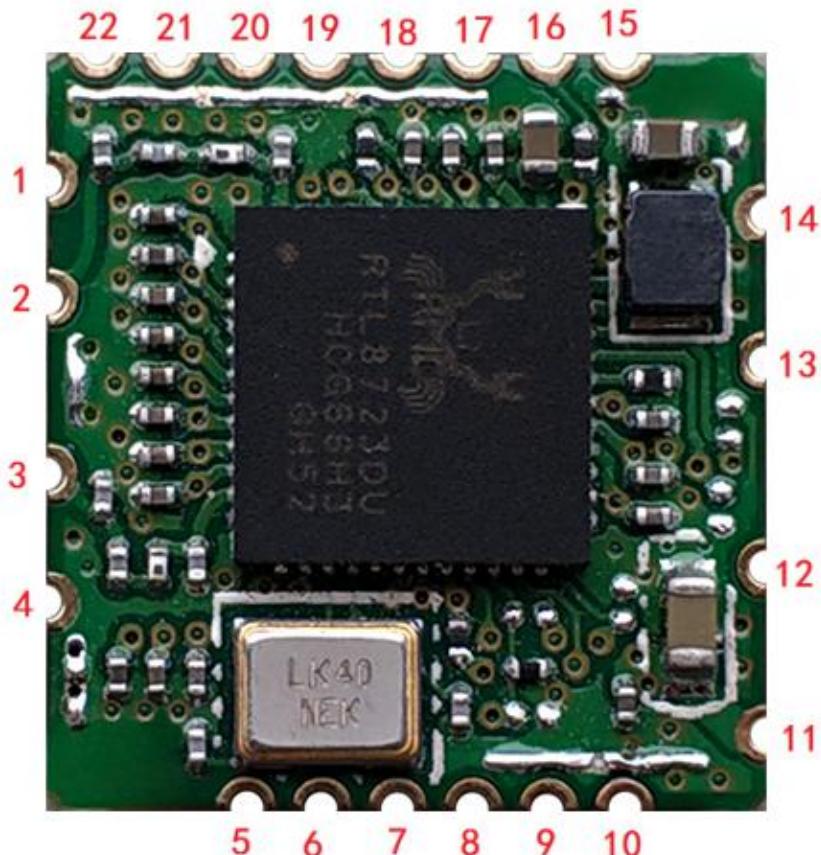


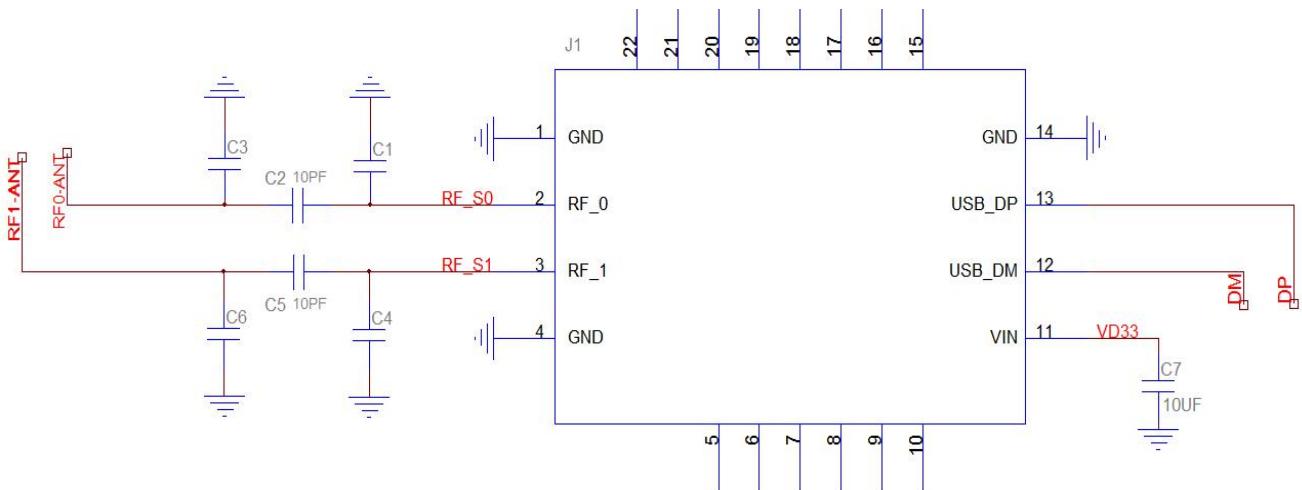
Figure 4 Pin Assignments (Top view)

Pin No.	Pin Name	Description
1	GND	Ground
2	RF-S0	WLAN/BT RF TX/RX signal port 0
3	RF-S1	WLAN/BT RF TX/RX signal port 1 (No signal transmission)
4	GND	Ground
5	BT_PCM_IN	General Purpose Input/Output Pin
6	BT_PCM_OUT	General Purpose Input/Output Pin
7	BT_PCM_SYNC	General Purpose Input/Output Pin
8	BT_PCM_CLK	General Purpose Input/Output Pin
9	BT_WAKE_HST	Chip wakeup host
10	HST_WAKE_BT	host wakeup Chip
11	VDD33	The power input 3.3V

12	DM	High-Speed USB D- Signal
12	DP	High-Speed USB D+ Signal
14	GND	Ground
15	N	No attributes
16	WL_DIS#	This Pin Can Externally Shutdown the RTL8723DU WLAN function when WL_DISn is Pulled Low. When this pin deasserted, USB interface will be disabled. The WLAN Radio-off function with host interface remaining connected.
17	BT_DIS#	This Pin Can Externally Shutdown the RTL8723DU BT function when BT_DISn is Pulled Low. This pin can also support the BT Radio-off function with host interface remaining connected.
18	N	No attributes
19	HST_WAKE_WL	General Purpose Input/Output Pin
20	WL_WAKE_HST	General Purpose Input/Output Pin
21, 22	N	No attributes

## 5. Peripheral Schematic Reference Design

Circuit reference pictures were designed



Note: 1. Pls reserve a “pi” circuit for antenna matching.

2. The RF circuit needs to keep  $50 \Omega$  impedance.
3. The USB differential pair needs to keep  $90 \Omega$  impedance.
4. reserved filter capacitance for 3.3 V power input

## 6. Mechanical Specifications

PCB Module dimension: Typical ( L\*W \* H): 12.2mm\*12.9mm\*0.8mm Tolerance : +/-0.15mm

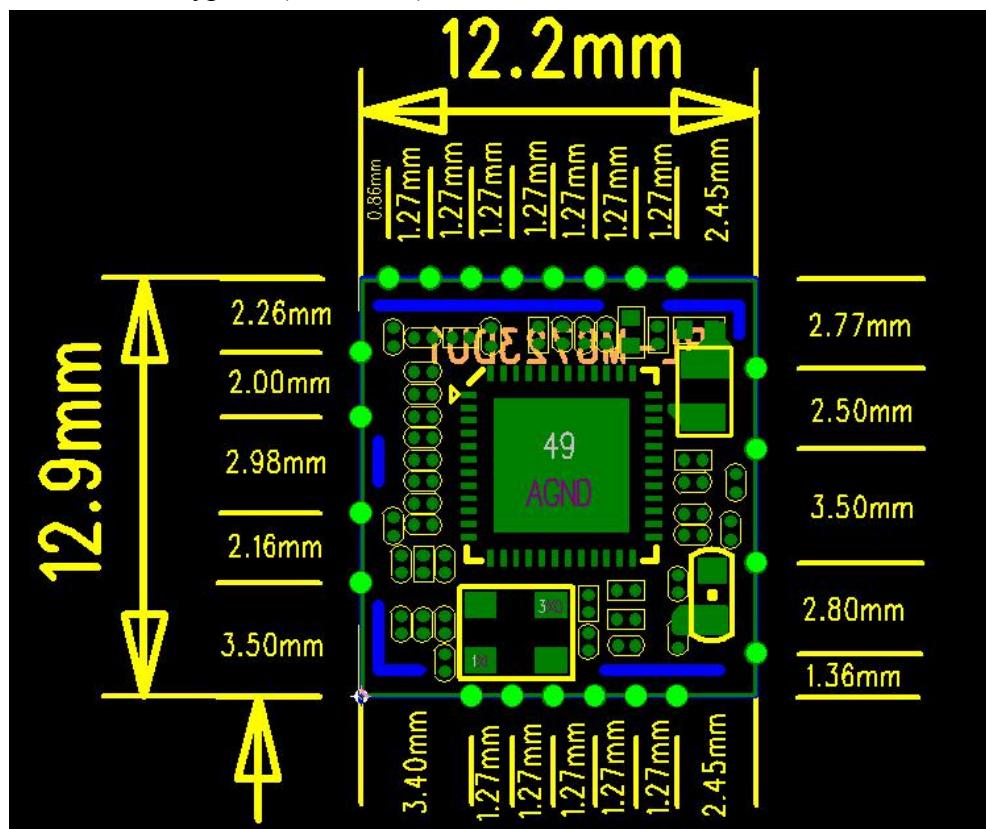


Figure 5

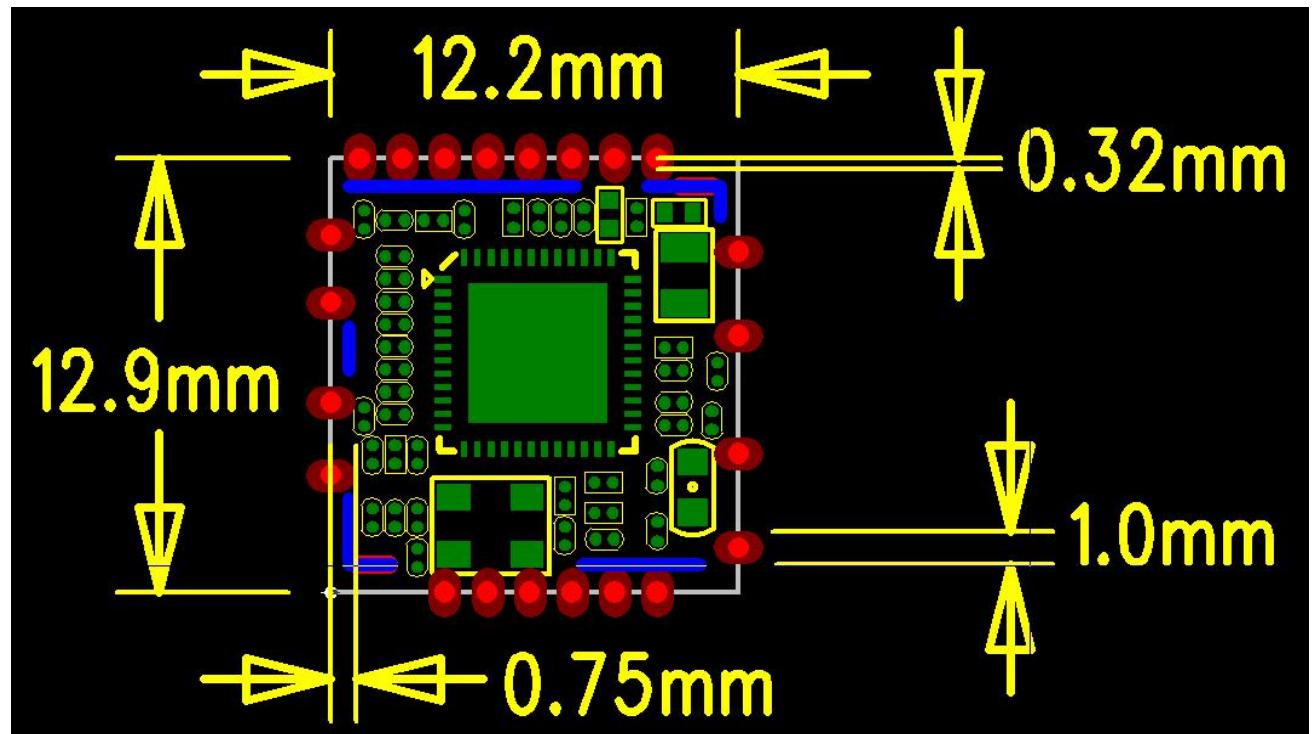


Figure 6

## 7. Others

### 7.1 Package Information



Figure 7 Package Information

### 7.2 Storage Temperature and Humidity

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%.

## 8. Typical Solder Reflow Profile

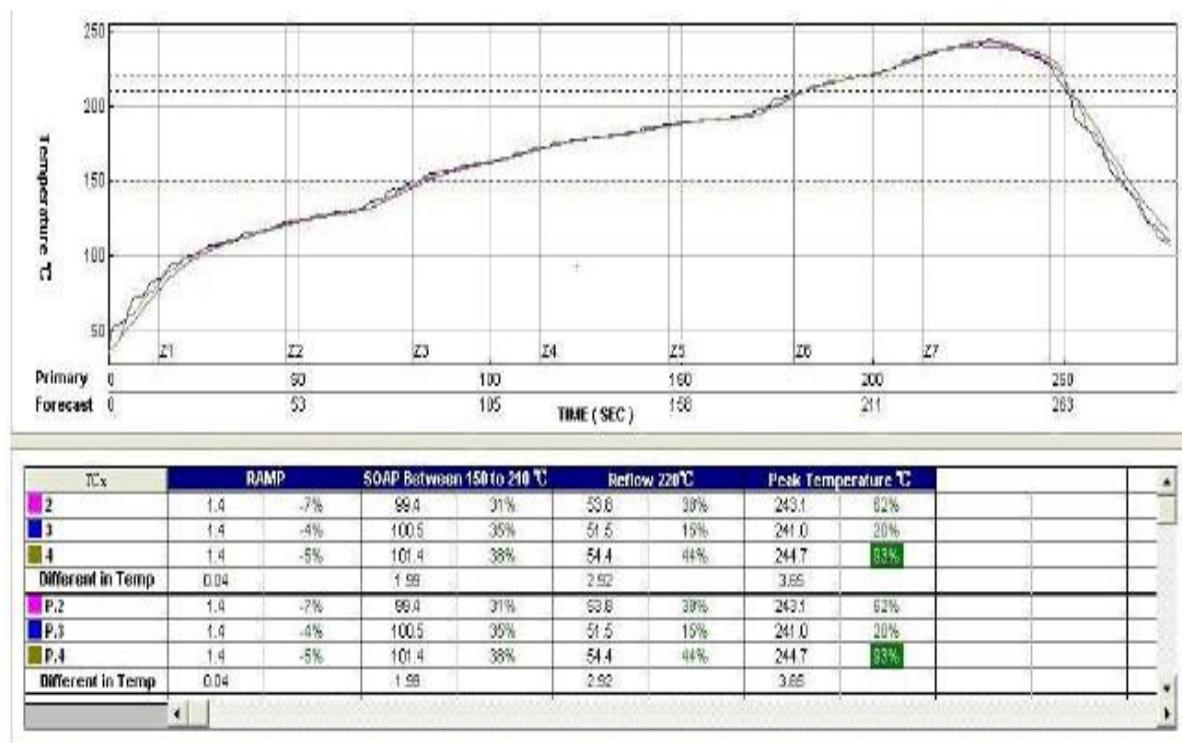


Figure 7

### **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.

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

NOTE: 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 important announcement

Important Note:

### **Radiation Exposure Statement**

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20cm between the radiator and your body.

This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

Country Code selection feature to be disabled for products marketed to the US/Canada.

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

1. The antenna must be installed such that 20 cm is maintained between the antenna and users, and
2. The transmitter module may not be co-located with any other transmitter or antenna,
3. For all products market in US, OEM has to limit the operation channels in CH1 to CH11 for 2.4G band by supplied firmware programming tool. OEM shall not supply any tool or info to the end-user regarding to Regulatory Domain change. (if modular only test Channel 1-11)

As long as the three conditions above are met, further transmitter testing 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.

### **Important Note:**

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.

### **End Product Labeling**

The final end product must be labeled in a visible area with the following" Contains FCC ID: **2AL6KBL-M8723DU1** "

### **Manual Information to the End User**

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.

# Integration instructions for host product manufacturers according to KDB 996369 D03 OEM Manual v01

## 2.2 List of applicable FCC rules

CFR 47 FCC PART 15 SUBPART C has been investigated. It is applicable to the modular transmitter

## 2.3 Specific operational use conditions

This module is stand-alone modular. If the end product will involve the Multiple simultaneously transmitting condition or different operational conditions for a stand-alone modular transmitter in a host, host manufacturer have to consult with module manufacturer for the installation method in end system.

## 2.4 Limited module procedures

This module is Limited single modular without shielding, host manufacturer have to consult with module manufacturer for the module limiting conditions when integrate the module in the host. module manufacturer should reviews detailed test data or host designs prior to giving the host manufacturer approval.

## 2.5 Trace antenna designs

Not applicable

## 2.6 RF exposure considerations

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20cm between the radiator & your body.

## 2.7 Antennas

This radio transmitter **2AL6KBL-M8723DU1** has been approved by Federal Communications Commission to operate with the antenna types listed below, with the maximum permissible gain indicated. Antenna types not included in this list that have a gain greater than the maximum gain indicated for any type listed are strictly prohibited for use with this device.

Model	Type	Connector	Peak gain ( dBi )				
			2400-2483.5 MHz	5150-5250 MHz	5250-5350 MHz	5470-5725 MHz	5800 MHz
2400-2483.5 MHz	PIFA/ Dipole	/	2.0 dBi	/	/	/	/

## 2.8 Label and compliance information

The final end product must be labeled in a visible area with the following " Contains FCC ID:2AVEDBL-M7668BU2" .

## 2.9 Information on test modes and additional testing requirements

Host manufacturer which install this modular with limit modular approval should perform the test of radiated emission and spurious emission according to FCC part 15C:15.247 and 15.209 requirement, only if the test result comply with FCC part 15.247 and 15.209 requirement, then the host can be sold legally.

## 2.10 Additional testing, Part 15 Subpart B disclaimer

Host manufacturer is responsible for compliance of the host system with module installed with all other applicable requirements for the system such as Part 15 B.