



# BL-M8821CS1

## SPECIFICATION

**IEEE 802.11 a/b/g/n/ac 1T1R WLAN with Bluetooth2.1/4.2 with SDIO and  
HS-UART MIXED INTERFACE**

**Version: 1.0**

|                        |             |             |            |
|------------------------|-------------|-------------|------------|
| Customer               |             |             |            |
| Date                   |             |             |            |
| Model Name             | BL-M8821CS1 |             |            |
| Part NO.               |             |             |            |
| Blink Approve Field    |             |             |            |
| ENGINEER               | QC          | SALES       |            |
|                        |             |             |            |
| Customer Approve Field |             |             |            |
| ENGINEER               | QC          | MANUFACTORY | PURCHASING |
|                        |             |             |            |

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## 1. General Description

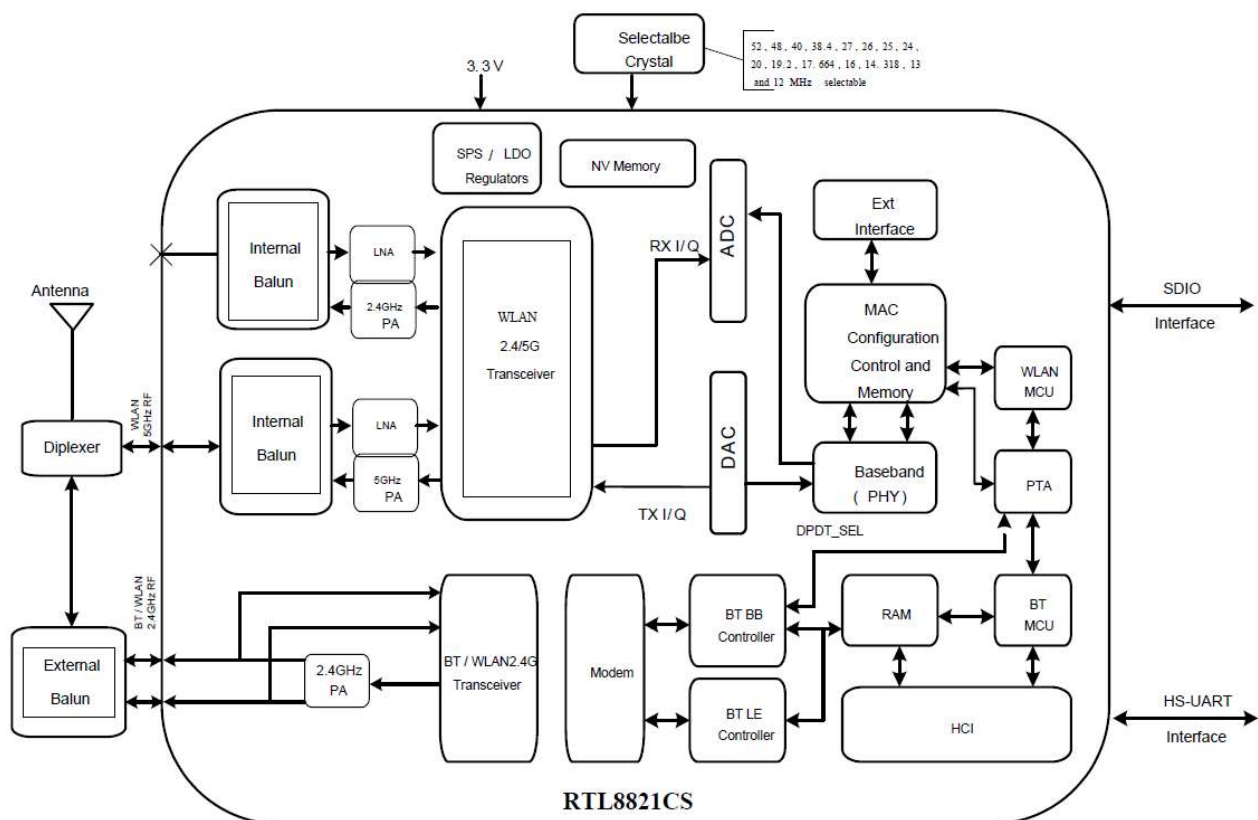
BL-M8821CS1 is a small size and low profile of WiFi+BT combo module with LGA (Land-Grid Array) footprint, board size is 12mm\*12mm with module height of 2.35mm. It can be easily manufactured on SMT process and highly suitable for tablet PC, ultra book, mobile device and consumer products. It provides GSPI/SDIO interface for WiFi to connect with host processor and high speed UART interface for BT. It also has a PCM interface for audio data transmission with direct link to external audio codec via BT controller. The WiFi data rate can go up to 433.3Mbps in theory by using 1stream 802.11a/b/g/n/ac MIMO technology and Bluetooth can support BT2.1+EDR/BT3.0 and BT4.2.

## 2. The range of applying

MID, networking camera, STB GPS, E-book, Hard disk player, Network Radios, PSP, etc, the device which need be supported by wireless networking.

## 3. Product Specification

### 3.1 Function Block diagram



### 3.2 Electrical and Performance Specification

| Item               | Description                                                                                                                                                                                                                                      |
|--------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Product Name       | BL-M8821CS1                                                                                                                                                                                                                                      |
| Major Chipset      | RTL8821CS                                                                                                                                                                                                                                        |
| Host Interface     | SDIO 1.1/ 2.0/ 3.0                                                                                                                                                                                                                               |
| Standard           | <b>WiFi:</b> IEEE802.11a, IEEE802.11b, IEEE802.11g, IEEE802.11n, IEEE802.11ac,<br><b>BT:</b> BT V2.1 BR+EDR, BT V3.0+HS, BT V4.0 LE+ BR/EDR, BT V4.1, BT V4.2                                                                                    |
| Frequency Range    | BT:2.402~2.48GHz(BT)<br>2.4GWIFI:2.412~2.472GHz(USA 11Channels, Europe and others 13 channels)<br>B5GWIFI:5.18~5.24GHz/5.745~5.825GHz                                                                                                            |
| Modulation Type    | <b>Wifi:</b> 802.11b: CCK, DQPSK, DBPSK<br>802.11a/g: 64-QAM, 16-QAM, QPSK, BPSK<br>802.11n: 64-QAM, 16-QAM, QPSK, BPSK<br>802.11ac: 256-QAM, 64-QAM, 16-QAM, QPSK, BPSK<br><b>BT:</b> 8DPSK, $\pi/4$ DQPSK, GFSK                                |
| Working Mode       | Infrastructure, Ad-Hoc                                                                                                                                                                                                                           |
| Data Transfer Rate | <b>Wifi:</b> 802.11b: 11, 5.5, 2, 1 Mbps<br>802.11a/g: 54, 48, 36, 24, 18, 12, 9, 6 Mbps<br>802.11n: MCS 0 to 7 for HT20/HT40<br>802.11ac: MCS 0 to 9 for VHT80<br><b>BT:</b> 1 Mbps for Basic Rate and LE Mode; 2,3 Mbps for Enhanced Data Rate |
| Spread Spectrum    | IEEE 802.11b: DSSS (Direct Sequence Spread Spectrum)<br>IEEE 802.11a/g/n/ac:OFDM (Orthogonal Frequency Division Multiplexing)<br>BT: FHSS(Frequency-Hopping Spread Spectrum)                                                                     |
| Sensitivity @PER   | <b>WiFi:</b> 11ac: mcs9 VHT80: -58dBm@10%PER<br>135M:-68dBm@10%PER<br>54M:-75dBm@10%PER;<br>11M:-86dBm@10%PER;<br>6M: -90dBm@10%PER;<br>1M: -92dBm@10%PER;<br><b>BT:</b> -89dBm@1Mbps, -85dBm@2Mbps, -83dBm@3Mbps;                               |
| RF Power(Typical)  | <b>2.4GWiFi:15.98dBm(Max)</b><br>5.2GWiFi:11.98dBm(Max)<br>5.8GWiFi:9.86dBm(Max)<br><b>BT: 4.96dBm(Max)</b><br>BLE:3.56dBm(Max)                                                                                                                  |
| Antenna type       | Connect to the external antenna through the half hole                                                                                                                                                                                            |
| Dimension(L*W*H)   | 12.0*12.0*2.35mm (LxWxH) , Tolerance: +-0.15mm                                                                                                                                                                                                   |
| Power supply       | 3.3V +/-0.2V                                                                                                                                                                                                                                     |
| Power Consumption  | standby mode 82mA@3.3V ,<br>TX mode 350mA@3.3V                                                                                                                                                                                                   |

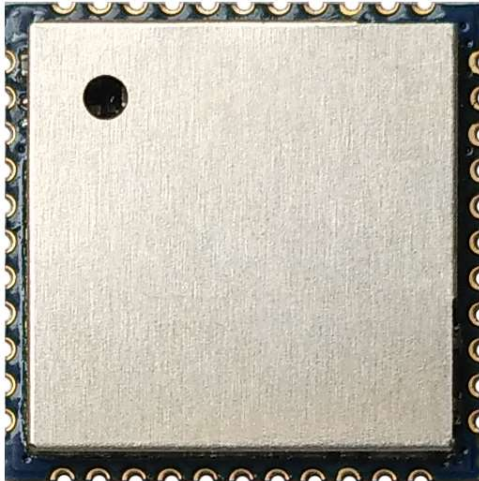
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|---------------------|----------------|
| Working Temperature | -10°C to +50°C |
| Storage temperature | -40°C to +85°C |

### 3.3 Power Supply DC Characteristics

|                               |       |      |        |      |
|-------------------------------|-------|------|--------|------|
| Vcc=3.3V, Ta= 25 °C, unit: mA |       |      |        |      |
| Supply current                | Typ.  |      | Max    |      |
| Standby (RF disabled)         | 82    |      | 89     |      |
|                               |       |      |        |      |
| 802.11b                       | 1Mbps |      | 11Mbps |      |
| Supply current                | Typ.  | Max. | Typ.   | Max. |
| TX mode                       | 350   | 335  | 330    | 320  |
| RX mode                       | 90    | 95   | 92     | 96   |
| 802.11g                       | 6Mbps |      | 54Mbps |      |
| Supply current                | Typ.  | Max. | Typ.   | Max. |
| TX mode                       | 250   | 235  | 120    | 110  |
| RX mode                       | 90    | 94   | 95     | 98   |
| 802.11n HT20                  | MCS0  |      | MCS7   |      |
| Supply current                | Typ.  | Max. | Typ.   | Max. |
| TX mode                       | 240   | 230  | 115    | 105  |
| RX mode                       | 90    | 94   | 98     | 99   |
| 802.11n HT40                  | MCS0  |      | MCS7   |      |
| Supply current                | Typ.  | Max. | Typ.   | Max. |
| TX mode                       | 235   | 225  | 110    | 100  |
| RX mode                       | 90    | 95   | 98     | 99   |
| 802.11ac VHT80                | MCS0  |      | MCS9   |      |
| Supply current                | Typ.  | Max. | Typ.   | Max. |
| TX mode                       | 166   | 155  | 115    | 105  |
| RX mode                       | 90    | 95   | 98     | 99   |

### 3.4 Product Photo

TOP

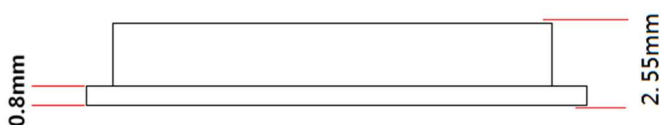
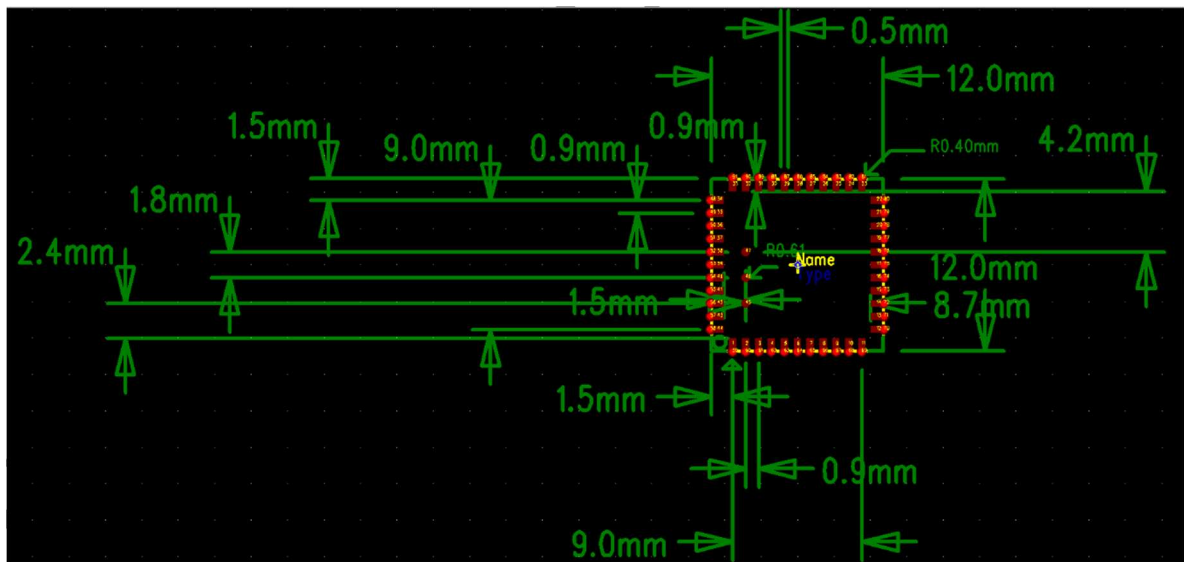


Bottom

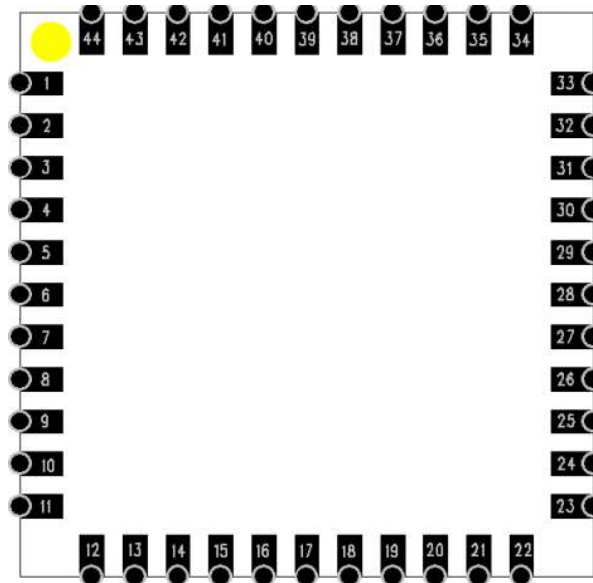


### 3.5 Mechanical Specification

**Tolerance:  $\pm 0.15\text{mm}$**



### 3.6 Product Pin Definition



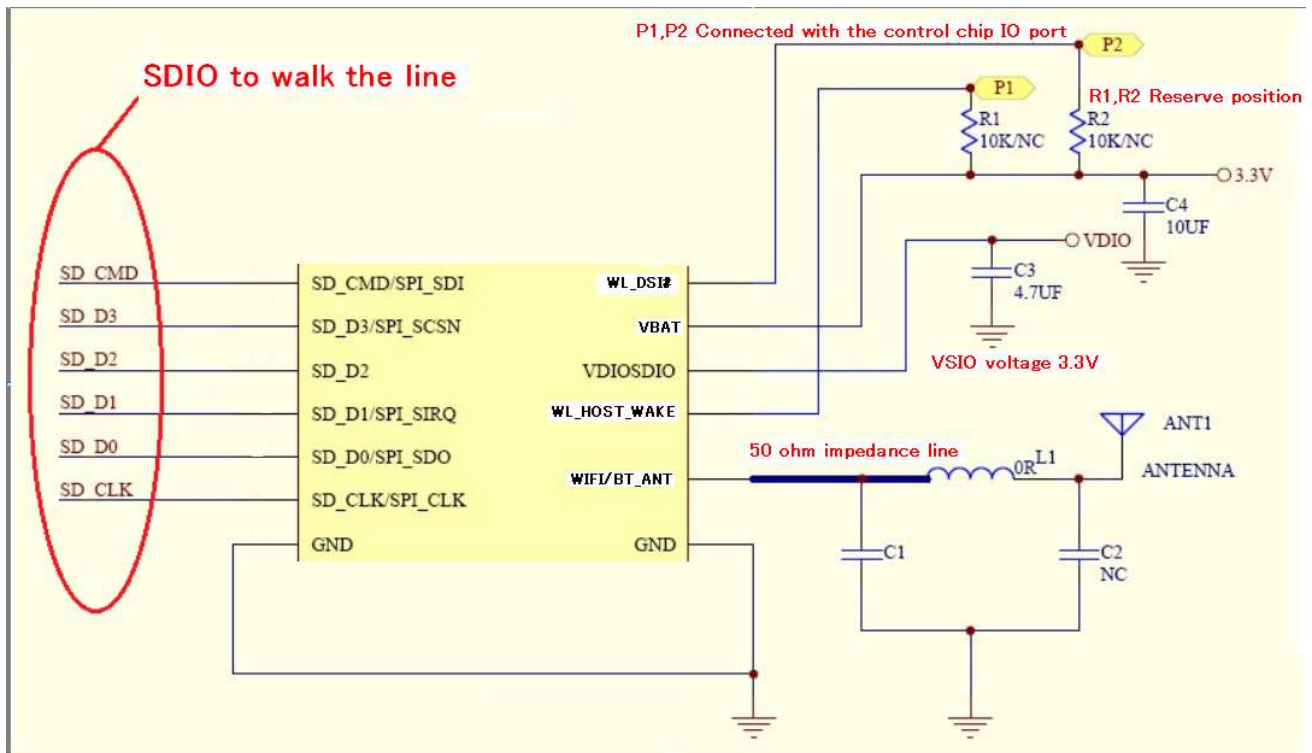
| Pin No: | Function     | Description                                                                                                                                                              |
|---------|--------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1       | GND          | Grond                                                                                                                                                                    |
| 2       | WIFI/BT_ANT  | WIFI/BT_ANT                                                                                                                                                              |
| 3       | GND          | Grond                                                                                                                                                                    |
| 4, 5    | NC           | NC                                                                                                                                                                       |
| 6       | BT_WAKE      | HOST wake-up Bluetooth device                                                                                                                                            |
| 7       | BT_HOST_WAKE | Bluetooth device to wake-up HOST                                                                                                                                         |
| 8       | NC           | NC                                                                                                                                                                       |
| 9       | VABT         | Battery LDO input, 5.5V-2.8V                                                                                                                                             |
| 10, 11  | NC           | NC                                                                                                                                                                       |
| 12      | WL_DSI#      | Shared with GPIO9 This Pin Can Externally Shutdown the RTL8821CS<br>WLAN function when WL_DIS# is Pulled Low. When this pin pulled low, SDIO interface will be disabled. |
| 13      | WL_HOST_WAKE | WLAN to wake-up HOST                                                                                                                                                     |
| 14      | SD_D2        | SDIO data line 2                                                                                                                                                         |
| 15      | SD_D3        | SDIO data line 3                                                                                                                                                         |
| 16      | SD_CMD       | SDIO command line                                                                                                                                                        |
| 17      | SD_CLK       | SDIO CLK line                                                                                                                                                            |
| 18      | SD_D0        | SDIO data line 0                                                                                                                                                         |
| 19      | SD_D1        | SDIO data line 1                                                                                                                                                         |
| 20      | GND          | Grond                                                                                                                                                                    |
| 21      | NC           | NC                                                                                                                                                                       |
| 22      | VDD_IO       | supply voltage for SDIO IO/3.3V                                                                                                                                          |

|                |           |                                                                                                                                                                               |
|----------------|-----------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 23             | NC        | NC                                                                                                                                                                            |
| 24             | SUSCLK_IN | Shared with EECS. External 32K or RTC clock input                                                                                                                             |
| 25             | PCM_DOUT  | PCM Data output                                                                                                                                                               |
| 26             | PCM_CLK   | PCM Clock                                                                                                                                                                     |
| 27             | PCM_DIN   | PCM data input                                                                                                                                                                |
| 28             | PCM_SYNC  | PCM sync signal                                                                                                                                                               |
| 29, 30         | NC        | NC                                                                                                                                                                            |
| 31             | GND       | Grond                                                                                                                                                                         |
| 32             | NC        | NC                                                                                                                                                                            |
| 33             | GND       | Grond                                                                                                                                                                         |
| 34             | BT_DIS#   | Shared with GPIO11 This Pin Can Externally Shutdown the RTL8821CS<br>WLAN function when BT_DIS#is Pulled Low. When this pin pulled low, UART interface will be also disabled. |
| 35             | NC        | NC                                                                                                                                                                            |
| 36             | GND       | Grond                                                                                                                                                                         |
| 37, 38, 39, 40 | NC        | NC                                                                                                                                                                            |
| 41             | UART_RTS  | UART_RTS                                                                                                                                                                      |
| 42             | UART_OUT  | HOST Data output                                                                                                                                                              |
| 43             | UART_IN   | HOST Data input                                                                                                                                                               |
| 44             | UART_CTS  | UART_CTS                                                                                                                                                                      |

## 4. Supported platform

| Operating System                | CPU Framework | Driver |
|---------------------------------|---------------|--------|
| LINUX(kernel2. 6. 35~3. 18. 17) | ARM, MIPSII   | Enable |

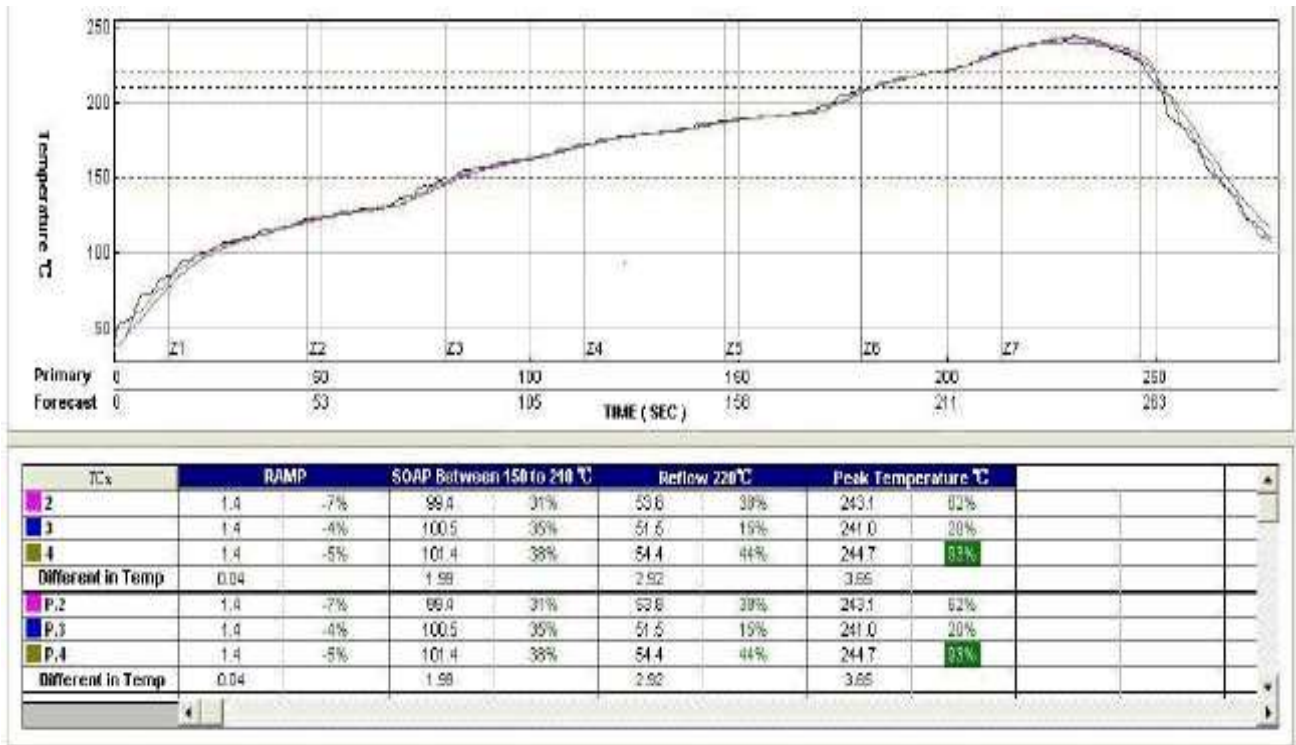
## 5. Peripheral Schematic Reference Design



## 6. Package Information



## 7. Typical Solder ReflowProfile



## 8. Precautions for use

1. Pls handle the module under ESD protection.
2. Reflow soldering shall be done according to the solder reflow profile. Peak temperature 245°C.
3. Products require baking before mounting if humidity indicator cards reads >30% temp <30 degree C, humidity < 70% RH, over 96 hours.  
Baking condition: 125 degree C, 12 hours  
Baking times: 1 time
4. Storage Condition: Moisture barrier bag must be stored under 30 degree 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%.

**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 0cm 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-M8821CS1** "

**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

Not applicable

## 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-M8821CS1** 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 | 5725-5850 MHz |
| 2400-2483.5 MHz | PIFA/ Dipole | /         | 2.0dBi            | /             | /             | /             | /             |
| 2.4GWIFI        | PIFA/ Dipole | /         | 2.0dBi            | /             | /             | /             | /             |
| 5GWIFI          | PIFA/ Dipole | /         | /                 | 2.0dBi        | /             | /             | 2.0dBi        |

## 2.8 Label and compliance information

The final end product must be labeled in a visible area with the following" Contains FCC ID:2AL6KBL-M8821CS1".

## 2.9 Information on test modes and additional testing requirements

Host manufacturer is strongly recommended to confirm compliance with FCC requirements for the transmitter when the module is installed in the host.

## 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.