

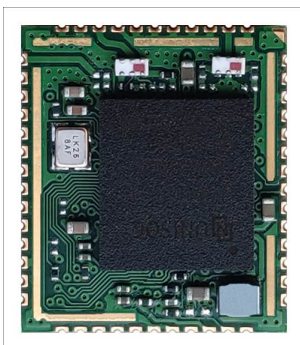


## **BL-M5621DS2A**

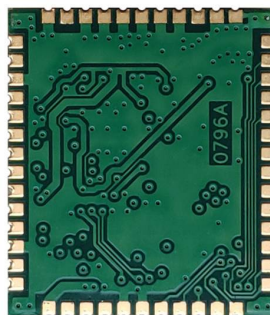
**802.11ac 2T2R 866Mbps WLAN + BT5.0  
Combo SDIO Module Specification**

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Top view



Bottom view

|                                                                               |       |
|-------------------------------------------------------------------------------|-------|
| Module Name: BL-M5621DS2A                                                     |       |
| Module Type: 802.11a/b/g/n/ac 866Mbps WLAN + Bluetooth v5.0 Combo SDIO Module |       |
| Revision: V1.0                                                                |       |
| Customer Approval:                                                            |       |
| Company:                                                                      |       |
| Title:                                                                        |       |
| Signature:                                                                    | Date: |
| BL-link Approval:                                                             |       |
| Title:                                                                        |       |
| Signature:                                                                    | Date: |

## Revision History

| Revision | Summary          | Release Date |
|----------|------------------|--------------|
| 1.0      | Official version | 2021-09-11   |

## 1. Introduction

BL-M5621DS2A is a highly integrated Dual-band WLAN + Bluetooth v5.0 Combo module. It combines a 2T2R Dual-band WLAN subsystem and a Bluetooth v5.0 subsystem. This module compatible IEEE 802.11 a/b/g/n/ac standard and provides the maximum PHY rate up to 866Mbps, it supports BT / BLE dual mode with BT v5.0/v4.2/v2.1 compliant, offers feature-rich and lower cost for STB、OTT、IoT and automotive applications.

### 1.1 Features

Operating Frequency: 2.4~2.4835GHz or 5.15~5.85GHz

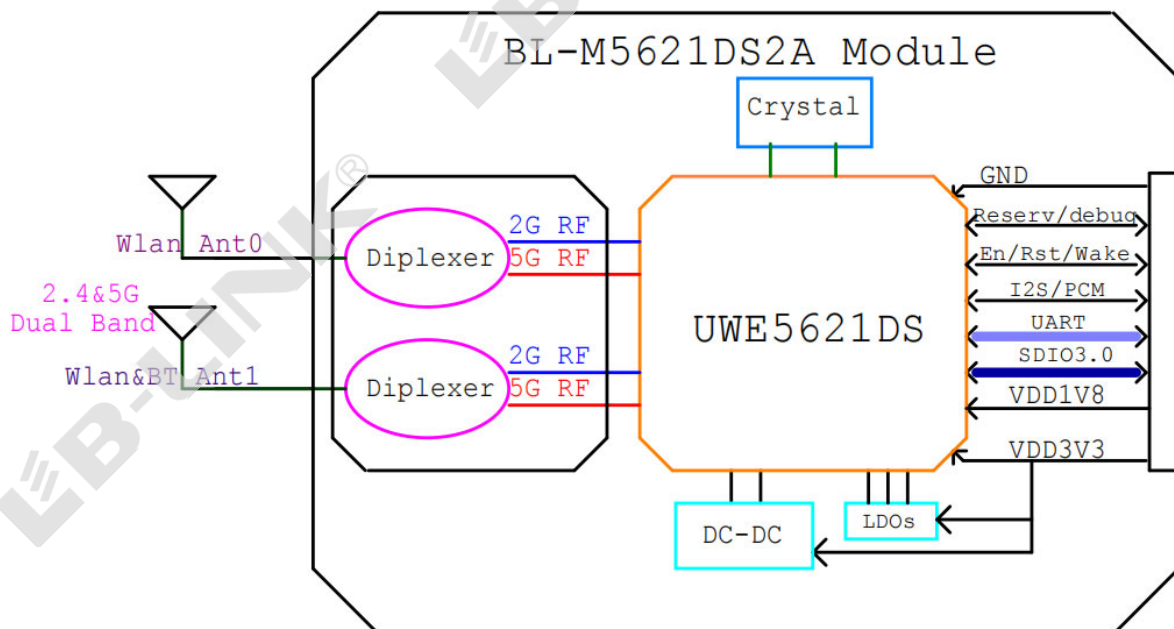
IEEE 802.11 a/b/g/n/ac 2T2R with 20/40/80Mhz bandwidth

Support MU-MIMO DL and Beamformee

Support BT Classic and BT Low Energy dual mode concurrent operation

High-speed 4-wire UART and SDIO 3.0 Interface for WLAN and BT

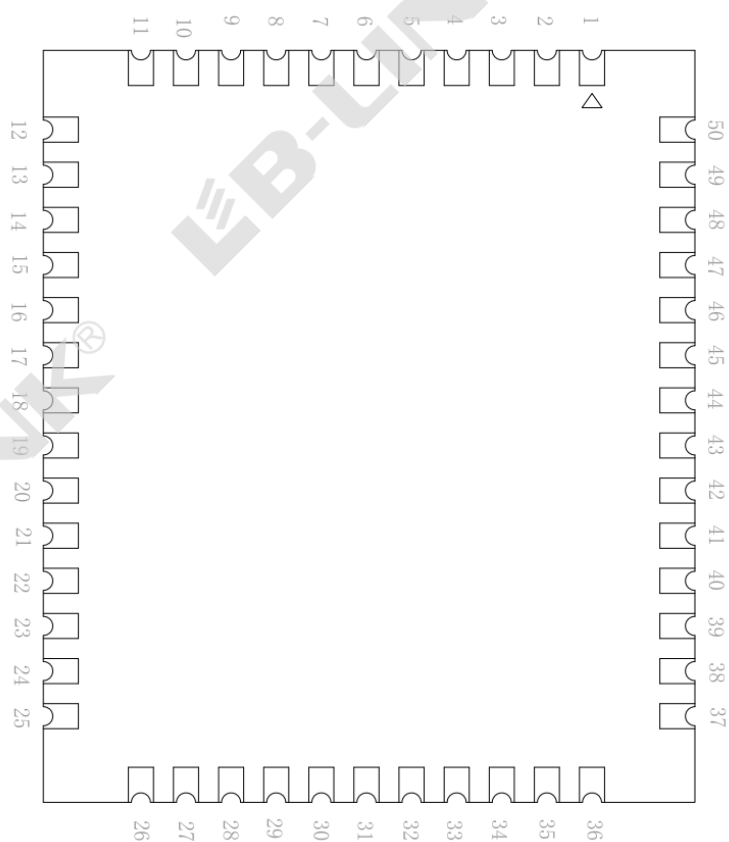
### 1.2 Block Diagram



## 1.3 General Specifications

|                       |                                                               |
|-----------------------|---------------------------------------------------------------|
| Module Name           | BL-M5621DS2A 866Mbps WLAN + BT5.0 Combo SDIO Module           |
| Chipset               | UWE5621DS                                                     |
| WLAN Standard         | IEEE 802.11 a/b/g/n/ac                                        |
| BT Specification      | Bluetooth Core Specification v5.0/4.2/2.1                     |
| Host Interface        | SDIO3.0 for WLAN & Bluetooth (Reserved UART interface for BT) |
| Antenna               | Half hole PAD for external WLAN and BT Antennas               |
| Dimension             | 13.0*15.0*1.80mm (L*W*H)                                      |
| Power Supply          | DC 3.3V and DC 1.8V                                           |
| 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 | Level | Module Pin Description                                                                                                                                                                                |
|-----|----------------|------|-------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1   | GND            | RF   |       | RF Ground for WLAN_ANT0                                                                                                                                                                               |
| 2   | WL_ANT0        | RF   |       | 2.4G / 5G RF PAD for WLAN_ANT0                                                                                                                                                                        |
| 3   | GND            | RF   |       | RF Ground for WLAN_ANT0                                                                                                                                                                               |
| 4   | GND            | RF   |       | RF Ground                                                                                                                                                                                             |
| 5   | GND            | RF   |       | RF Ground                                                                                                                                                                                             |
| 6   | GND            | RF   |       | RF Ground                                                                                                                                                                                             |
| 7   | GND            | RF   |       | RF Ground                                                                                                                                                                                             |
| 8   | GND            | RF   |       | RF Ground for WL_ANT1&BT_ANT                                                                                                                                                                          |
| 9   | WL_ANT1&BT_ANT | RF   |       | BT/2.4G/5G share RF PAD for WLAN_ANT1&BT_ANT                                                                                                                                                          |
| 10  | GND            | RF   |       | RF Ground for WL_ANT1&BT_ANT                                                                                                                                                                          |
| 11  | GND            | RF   |       | RF Ground                                                                                                                                                                                             |
| 12  | BT_ANT         | RF   |       | NC (Reserved for "BT-Standalone" output RF PAD ,then PIN9 become "2.4G/5G RF PAD for WLAN_ANT1" by different hardware strap in the module. If you need 3ANTs application , please contact our sales ) |
| 13  | ESMCLK         | O    | 1.8V  | Reserved for test purpose : connect to external SPI FLASH_Pin6" CLK" ,can be left float                                                                                                               |
| 14  | ESMCSN         | O    | 1.8V  | Reserved for test purpose : connect to external SPI FLASH_Pin1" CS#" ,can be left float                                                                                                               |
| 15  | WL_DIS_N       | I    | 1.8V  | Chip enable input,active high, can externally shutdown/power on the PMU of Module,do not be floating!                                                                                                 |
| 16  | WL_WAKE_HOST   | I/O  | 1.8V  | Function1 : GPIO28 used for "WLAN wake up Host" output;<br>Function2 : reserved for test purpose : ESMD3,connect to external SPI FLASH_pin7" HLD#/RST#/IO3" ,can be left float                        |
| 17  | SD_CMD         | I/O  | 1.8V  | SDIO command,I/O;<br>SDIO BT/WLAN control and data interface                                                                                                                                          |
| 18  | SD_CLK         | I    | 1.8V  | SDIO clock,input                                                                                                                                                                                      |
| 19  | SD_D3          | I/O  | 1.8V  | SDIO data3,I/O                                                                                                                                                                                        |
| 20  | SD_D2          | I/O  | 1.8V  | SDIO data2,I/O                                                                                                                                                                                        |
| 21  | SD_D0          | I/O  | 1.8V  | SDIO data0,I/O                                                                                                                                                                                        |
| 22  | SD_D1          | I/O  | 1.8V  | SDIO data1,I/O                                                                                                                                                                                        |

|    |          |     |      |                                                                                                                          |
|----|----------|-----|------|--------------------------------------------------------------------------------------------------------------------------|
| 23 | GND      | P   |      | Ground for Power and I/O                                                                                                 |
| 24 | GPIO1    | I/O | 1.8V | GPIO1,if not use,can be left float                                                                                       |
| 25 | ESMD0    | I/O | 1.8V | Reserved for test purpose : connect to external SPI<br>FLASH_Pin5" DI/IO0" can be left float                             |
| 26 | ESMD1    | I/O | 1.8V | Reserved for test purpose : connect to external SPI<br>FLASH_Pin2" DO/IO1" ,can be left float                            |
| 27 | PCM_SYNC | I/O | 1.8V | PCM sync signal or I2S L/R clock,I/O;<br>PCM/I2S interface reserved for BT,if not use,can be left float                  |
| 28 | PCM_IN   | I   | 1.8V | PCM/I2S data input                                                                                                       |
| 29 | PCM_OUT  | O   | 1.8V | 1、 Strap Pin,internal pull Low by 2.2K resistor,do not pull High during power on!<br>2、 PCM/I2S data output;             |
| 30 | PCM_CLK  | I   | 1.8V | PCM/I2S clock input                                                                                                      |
| 31 | GND      | P   |      | Ground for Power and I/O                                                                                                 |
| 32 | GND      | P   |      | Ground for Power and I/O                                                                                                 |
| 33 | ESMD2    | I/O | 1.8V | Reserved for test purpose : connect to external SPI<br>FLASH_Pin3" WP#/IO2" ,can be left float                           |
| 34 | VDD1V8   | P   |      | 1.8V supply for SDIO/PCM/PCM/GPIO and other I/O                                                                          |
| 35 | RF_CTL4  | I/O | 1.8V | Strap Pin,internal pull Low by 1K resistor,can be left float,do not pull High during power on!                           |
| 36 | VDD3V3   | P   |      | 3.3V main supply                                                                                                         |
| 37 | RF_CTL5  | I/O | 1.8V | Strap Pin,internal pull High,can be left float,do not pull Low during power on!                                          |
| 38 | BT_DIS_N | I   | 1.8V | NC (Internal pull High,reserved for "Reset_n" input)                                                                     |
| 39 | GND      | P   |      | Ground for Power and I/O                                                                                                 |
| 40 | U0TXD    | O   | 1.8V | UART0 TXD output;<br>UART0 interface reserved for BT,if not use,can be left float                                        |
| 41 | U0RXD    | I   | 1.8V | UART0 RXD input;                                                                                                         |
| 42 | U0RTS    | O   | 1.8V | UART0 RTS output ;                                                                                                       |
| 43 | U0CTS    | I   | 1.8V | UART0 CTS input;                                                                                                         |
| 44 | SD_RESET | I/O | 1.8V | 1、 GPIO13 used for "SDIO system reset" input;<br>2、 Reserved for test purpose : U2TXD,UART2 TXD output,can be left float |
| 45 | GPIO2    | I/O | 1.8V | Strap Pin,internal pull High,can be left float,do not pull Low during power on!                                          |
| 46 | U1TXD    | O   | 1.8V | Reserved for test purpose : UART1 TXD output,can be left float                                                           |

|    |              |     |      |                                                                                                                    |
|----|--------------|-----|------|--------------------------------------------------------------------------------------------------------------------|
| 47 | U1RXD        | I   | 1.8V | Reserved for test purpose : UART1 RXD input,can be left float                                                      |
| 48 | GND          | P   |      | Ground for Power and I/O                                                                                           |
| 49 | HOST_WAKE_BT | I/O | 1.8V | 1、GPIO12 used for “Host wake up BT” input.<br>2、Reserved for test purpose : U2XD,UART2 RXD input,can be left float |
| 50 | BT_WAKE_HOST | I/O | 1.8V | 1、GPIO73 used for “BT wake up Host” output.<br>2、Reserved for test purpose :Interrupt output,can be left float     |

P: Power or Ground; I/O: In/Output; I: Input; O:Output; RF: Analog RF Port or RF Ground;

### 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    | /     |
| Supply Voltage                | VDD3V3 | 3.15 | 3.3 | 3.45 | V     |
|                               | VDD1V8 | 1.7  | 1.8 | 1.98 | V     |

#### 3.2 Current Consumption

| Conditions : VDD3V3=3.3V、VDD1V8=1.8V ; Ta:25°C ; |                          |                         |       |
|--------------------------------------------------|--------------------------|-------------------------|-------|
| Use Case                                         | VDD3V3 Current           |                         |       |
|                                                  | Typ ( I <sub>RMS</sub> ) | Max ( I <sub>pp</sub> ) | Units |
| 2.4G 11b 1Mbps TX @ 18dBm (1TX RF test)          | 257                      | 344                     | mA    |
| 2.4G 11b 1Mbps RX (1RX RF test)                  | 58                       | 88                      | mA    |
| 2.4G 11g 6Mbps TX@18dBm (1TX RF test)            | 236                      | 336                     | mA    |
| 2.4G 11g 6Mbps RX (1RX RF test)                  | 64                       | 88                      | mA    |
| 2.4G 11n HT20 MCS8 TX@18dBm (2TX RF test)        | 369                      | 512                     | mA    |
| 2.4G 11n HT20 MCS8 RX (2RX RF test)              | 48                       | 61                      | mA    |
| 2.4G 11n HT40 MCS15 TX@14dBm (2TX RF test)       | 288                      | 536                     | mA    |

|                                           |     |     |    |
|-------------------------------------------|-----|-----|----|
| 2.4G 11n HT40 MCS15 RX (2RX RF test)      | 48  | 63  | mA |
| 5G 11a 6Mbps TX @ 17dBm (1TX RF test)     | 327 | 456 | mA |
| 5G 11a 6Mbps RX (1RX RF test)             | 77  | 104 | mA |
| 5G 11n HT20 MCS8 TX@17dBm (2TX RF test)   | 523 | 720 | mA |
| 5G 11n HT20 MCS8 RX (2RX RF test)         | 86  | 100 | mA |
| 5G 11n HT40 MCS15 TX@14dBm (2TX RF test)  | 410 | 760 | mA |
| 5G 11n HT40 MCS15 RX (2RX RF test)        | 87  | 100 | mA |
| 5G 11ac VHT80 MCS9 TX@14dBm (2TX RF test) | 398 | 760 | mA |
| 5G 11ac VHT80 MCS9 RX (2RX RF test)       | 92  | 120 | mA |

## 4. WLAN & Bluetooth RF Specifications

### 4.1 2.4G WLAN RF Specification

| Conditions : VDD3V3=3.3V 、 VDD1V8=1.8V; Ta:25°C                                           |                  |                                                                                                                                                                                                                                                                                         |            |
|-------------------------------------------------------------------------------------------|------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|
| Features                                                                                  |                  | Description                                                                                                                                                                                                                                                                             |            |
| WLAN Standard                                                                             |                  | IEEE 802.11b/g/n , CSMA/CA                                                                                                                                                                                                                                                              |            |
| Frequency Range                                                                           |                  | 2.4~2.4835GHz (2.4GHz ISM Band)                                                                                                                                                                                                                                                         |            |
| Channels                                                                                  |                  | Ch1~Ch13 (For 20MHz Channels)                                                                                                                                                                                                                                                           |            |
| Modulation                                                                                |                  | 802.11b (DSSS): CCK, DQPSK, DBPSK;<br>802.11g (OFDM): BPSK, QPSK, QAM16, QAM64;<br>802.11n (OFDM): BPSK, QPSK, QAM16, QAM64;                                                                                                                                                            |            |
| Data Rate                                                                                 |                  | 802.11b: 1, 2, 5.5, 11Mbps;<br>802.11g: 6, 9, 12, 18, 24, 36, 48, 54Mbps;<br>802.11n (HT20): MCS0~MCS7(1T1R_SISO) 6.5~72.2Mbps;<br>802.11n (HT20): MCS8~MCS15(2T2R_MIMO) 13~144.4Mbps;<br>802.11n (HT40): MCS0~MCS7(1T1R) 13.5~150Mbps;<br>802.11n (HT40): MCS8~MCS15(2T2R) 27~300Mbps; |            |
| Frequency Tolerance                                                                       |                  | ±20ppm                                                                                                                                                                                                                                                                                  |            |
| 2.4G Transmitter Specifications (WL_ANT0 and WL_ANT1&BT_ANT , TX Power Levels Calibrated) |                  |                                                                                                                                                                                                                                                                                         |            |
| TX Rate                                                                                   | TX Power ( dBm ) | TX Power Tolerance ( dB )                                                                                                                                                                                                                                                               | EVM ( dB ) |
| 802.11b@1~11Mbps<br>(The Recommended Target TX Power : ≤18dBm)                            | 18               | ±2                                                                                                                                                                                                                                                                                      | ≤-15       |

|                                       |    |    |      |
|---------------------------------------|----|----|------|
| 802.11g@6Mbps(Target Power:17dBm)     | 17 | ±2 | ≤-15 |
| 802.11g@54Mbps(Target Power:15dBm)    | 15 | ±2 | ≤-25 |
| 802.11n@HT20_MCS0(Target Power:17dBm) | 17 | ±2 | ≤-10 |
| 802.11n@HT20_MCS7(Target Power:14dBm) | 14 | ±2 | ≤-28 |
| 802.11n@HT40_MCS0(Target Power:17dBm) | 17 | ±2 | ≤-10 |
| 802.11n@HT40_MCS7(Target Power:14dBm) | 14 | ±2 | ≤-28 |

#### 2.4G Receiver Specifications (WL\_ANT0 and WL\_ANT1&BT\_ANT)

| RX Rate           | Min Input Level ( dBm ) | Max Input Level ( dBm ) | PER   |
|-------------------|-------------------------|-------------------------|-------|
| 802.11b@1Mbps     | -93                     | -5                      | < 8%  |
| 802.11b@11Mbps    | -86                     | -5                      | < 8%  |
| 802.11g@6Mbps     | -90                     | -5                      | < 10% |
| 802.11g@54Mbps    | -74                     | -5                      | < 10% |
| 802.11n@HT20_MCS0 | -90                     | -5                      | < 10% |
| 802.11n@HT20_MCS7 | -72                     | -5                      | < 10% |
| 802.11n@HT40_MCS0 | -88                     | -5                      | < 10% |
| 802.11n@HT40_MCS7 | -69                     | -5                      | < 10% |

## 4.2 5G WLAN RF Specification

| Conditions: VDD33=3.3V, VDD1V8=1.8V; Ta:25°C |                                                                                                                                              |
|----------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------|
| Features                                     | Description                                                                                                                                  |
| WLAN Standard                                | IEEE 802.11a/n/ac, CSMA/CA                                                                                                                   |
| Frequency Range                              | 5.15~5.25GHz; 5.25~5.35GHz; 5.47~5.73GHz;<br>5.735~5.835GHz (5GHz ISM Band)                                                                  |
| Channels                                     | Ch36, Ch40, Ch44, Ch48; Ch52~Ch64;<br>Ch100~Ch140; Ch149~Ch165 (For 20MHz Channels)                                                          |
| Modulation                                   | 802.11a (OFDM): BPSK, QPSK, QAM16, QAM64;<br>802.11n (OFDM): BPSK, QPSK, QAM16, QAM64;<br>802.11ac (OFDM): BPSK, QPSK, QAM16, QAM64, QAM256; |

|                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                           |            |
|------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|------------|
| Date Rate                                                                                | 802.11a: 6, 9, 12, 18, 24, 36, 48, 54Mbps;<br>802.11n (HT20): MCS0~MCS7(1T1R_SISO) 6.5~72.2Mbps;<br>802.11n (HT20): MCS8~MCS15(2T2R_MIMO) 13~144.4Mbps;<br>802.11n (HT40): MCS0~MCS7(1T1R) 13.5~150Mbps;<br>802.11n (HT40): MCS8~MCS15(2T2R) 27~300Mbps;<br>802.11ac (VHT20): MCS0~MCS8(1T1R) 6.5~86.7Mbps;<br>802.11ac (VHT20): MCS0~MCS8(2T2R) 13~173.3Mbps;<br>802.11ac (VHT40): MCS0~MCS9(1T1R)13.5~200Mbps;<br>802.11ac (VHT40): MCS0~MCS9(2T2R)27~400Mbps;<br>802.11ac (VHT80): MCS0~MCS9(1T1R)29.3~433.3Mbps;<br>802.11ac (VHT80): MCS0~MCS9(2T2R)58.5~866.7Mbps; |                           |            |
| Frequency Tolerance                                                                      | ≤ ±20ppm                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                           |            |
| 5G Transmitter Specifications (WL_ANT0 and WL_ANT1&BT_ANT) , TX Power Levels Calibrated) |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                           |            |
| TX Rate                                                                                  | TX Power ( dBm )                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | TX Power Tolerance ( dB ) | EVM ( dB ) |
| 802.11a@6Mbps<br>(The Recommended Target TX Power : ≤17dBm)                              | 17                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | ±2                        | ≤-10       |
| 802.11a@54Mbps(Target Power:15dBm)                                                       | 15                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | ±2                        | ≤-25       |
| 802.11n@HT20_MCS0(Target Power:17dBm)                                                    | 17                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | ±2                        | ≤-13       |
| 802.11n@HT20_MCS7(Target Power:14dBm)                                                    | 14                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | ±2                        | ≤-28       |
| 802.11n@HT40_MCS0(Target Power:17dBm)                                                    | 17                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | ±2                        | ≤-13       |
| 802.11n@HT40_MCS7(Target Power:14dBm)                                                    | 14                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | ±2                        | ≤-28       |
| 802.11ac@VHT20_MCS0(Target Power:17dBm)                                                  | 17                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | ±2                        | ≤-13       |
| 802.11ac@VHT20_MCS8(Target Power:13dBm)                                                  | 13                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | ±2                        | ≤-32       |
| 802.11ac@VHT80_MCS0(Target Power:17dBm)                                                  | 17                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | ±2                        | ≤-13       |
| 802.11ac@VHT80_MCS9(Target                                                               | 13                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | ±2                        | ≤-32       |

| Power:13dBm)                                                        |                         |                         |       |
|---------------------------------------------------------------------|-------------------------|-------------------------|-------|
| <b>5G Receiver Specifications (WL_ANT0 &amp;WL_ANT1&amp;BT_ANT)</b> |                         |                         |       |
| RX Rate                                                             | Min Input Level ( dBm ) | Max Input Level ( dBm ) | PER   |
| 802.11a@6Mbps                                                       | -90                     | -5                      | < 10% |
| 802.11a@54Mbps                                                      | -73                     | -5                      | < 10% |
| 802.11n@HT20_MCS0                                                   | -90                     | -5                      | < 10% |
| 802.11n@HT20_MCS7                                                   | -71                     | -5                      | < 10% |
| 802.11n@HT40_MCS0                                                   | -88                     | -5                      | < 10% |
| 802.11n@HT40_MCS7                                                   | -68                     | -5                      | < 10% |
| 802.11ac@VHT80_MCS0                                                 | -84                     | -5                      | < 10% |
| 802.11ac@VHT80_MCS9                                                 | -57                     | -5                      | < 10% |

### 4.3 Bluetooth RF Specification

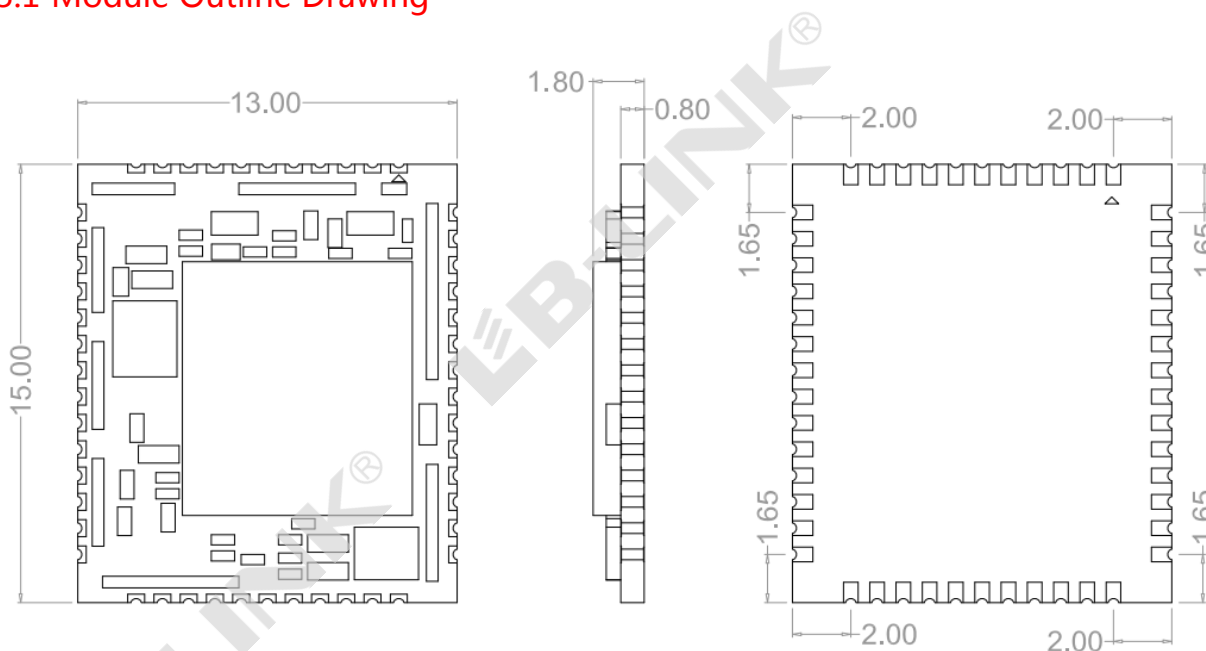
|                                                      |                                                                                                                                                                                                |             |             |
|------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|-------------|
| Conditions: VDD33=3.3V、VDD1V8=1.8V; Ta:25℃           |                                                                                                                                                                                                |             |             |
| Features                                             | Description                                                                                                                                                                                    |             |             |
| Bluetooth Specification                              | Bluetooth Core Specification v5.0/4.2/2.1                                                                                                                                                      |             |             |
| Frequency Range                                      | 2.4~2.4835GHz (2.4GHz ISM Band)                                                                                                                                                                |             |             |
| Channels                                             | Bluetooth Classic: Ch0~Ch78 (For 1MHz Channels);<br>Bluetooth Low Energy: Ch0~Ch39 (For 2MHz Channels);                                                                                        |             |             |
| Power Classes                                        | Bluetooth Classic: Class1;<br>Bluetooth Low Energy: Class1.5;                                                                                                                                  |             |             |
| Date Rate & Modulation                               | BR_1Mbps: GFSK;<br>EDR_2Mbps: $\pi/4$ -DQPSK;<br>EDR_3Mbps: 8DPSK;<br>LE_125Kbps: GFSK (Coded_S=8);<br>LE_500Kbps: GFSK (Coded_S=2);<br>LE_1Mbps: GFSK (Uncoded);<br>LE_2Mbps: GFSK (Uncoded); |             |             |
| Bluetooth Transmitter Specifications(WL_ANT1&BT_ANT) |                                                                                                                                                                                                |             |             |
| Items                                                | Min ( dBm )                                                                                                                                                                                    | Typ ( dBm ) | Max ( dBm ) |
| TX Power                                             |                                                                                                                                                                                                |             |             |
| BR_1M                                                | 4                                                                                                                                                                                              | 8           | 12          |

| (The Recommended Target TX Power :<br>≤8dBm)                                |        |          |        |
|-----------------------------------------------------------------------------|--------|----------|--------|
| EDR_2/3M (Target Power:6dBm)                                                | 2      | 6        | 10     |
| LE_125K/500K/1M/2M(Target<br>Power:4dBm)                                    | 0      | 4        | 8      |
| Items                                                                       | Min    | Typ      | Max    |
| <b>BR_1M (DH1) Modulation Characteristics</b>                               |        |          |        |
| Δf1avg                                                                      | 140KHz | 164.9KHz | 175KHz |
| Δf2avg                                                                      | /      | 146.7KHz | /      |
| Δf2max                                                                      | 115KHz | 153.5KHz | /      |
| Δf2avg/Δf1avg                                                               | 0.8    | 0.89     | /      |
| Items                                                                       | Min    | Typ      | Max    |
| <b>EDR_3M(3DH5) EDR Carrier Frequency Stability and Modulation Accuracy</b> |        |          |        |
| ωi                                                                          | -75KHz | -1.79KHz | +75KHz |
| ωi+ωo                                                                       | -75KHz | -1.95KHz | +75KHz |
| ωo                                                                          | -10KHz | 0.04KHz  | +10KHz |
| 8DPSK RMS DEVM                                                              | /      | 0.022    | 0.13   |
| 8DPSK DEVM                                                                  | /      | 0.057    | 0.25   |
| Items                                                                       | Min    | Typ      | Max    |
| <b>LE_1M Modulation Characteristics</b>                                     |        |          |        |
| Δf1avg                                                                      | 225KHz | 251.6KHz | 275KHz |
| Δf2avg                                                                      | /      | 220.2KHz | /      |
| Δf2max                                                                      | 185KHz | 227.9KHz | /      |
| Δf2avg/Δf1avg                                                               | 0.8    | 0.87     | /      |
| Items                                                                       | Min    | Typ      | Max    |
| <b>LE_2M Modulation Characteristics</b>                                     |        |          |        |
| Δf1avg                                                                      | 450KHz | 502.3KHz | 550KHz |
| Δf2avg                                                                      | /      | 439KHz   | /      |
| Δf2max                                                                      | 370KHz | 446.8KHz | /      |
| Δf2avg/Δf1avg                                                               | 0.8    | 0.874    | /      |

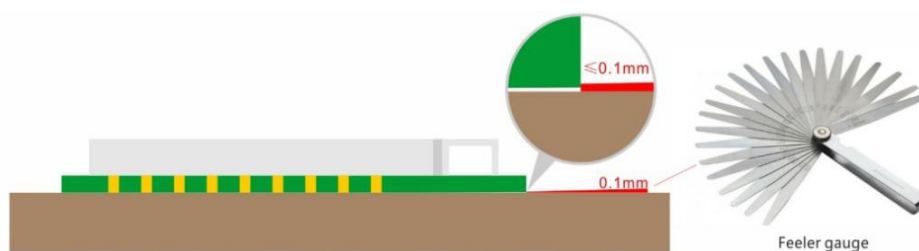
| Bluetooth Receiver Specifications(WL_ANT1&BT_ANT) |                   |               |                     |              |
|---------------------------------------------------|-------------------|---------------|---------------------|--------------|
| Items                                             | Sensitivity       |               | Maximum Input Level |              |
|                                                   | Input Level(Typ ) | BER           | Input Level(Typ )   | BER          |
| BR_1M (DH1)                                       | -90 dBm           | $\leq 0.1\%$  | -5 dBm              | $\leq 0.1\%$ |
| EDR_3M (3DH5)                                     | -80 dBm           | $\leq 0.01\%$ | -5 dBm              | $\leq 0.1\%$ |
|                                                   | Input Level (Typ) | PER           | Input Level (Typ)   | PER          |
| LE_125K                                           | -93 dBm           | $\leq 5\%$    | -5 dBm              | $\leq 5\%$   |
| LE_1M                                             | -91 dBm           | $\leq 5\%$    | -5 dBm              | $\leq 5\%$   |
| LE_2M                                             | -88 dBm           | $\leq 5\%$    | -5 dBm              | $\leq 5\%$   |

## 5. Mechanical Specifications

### 5.1 Module Outline Drawing

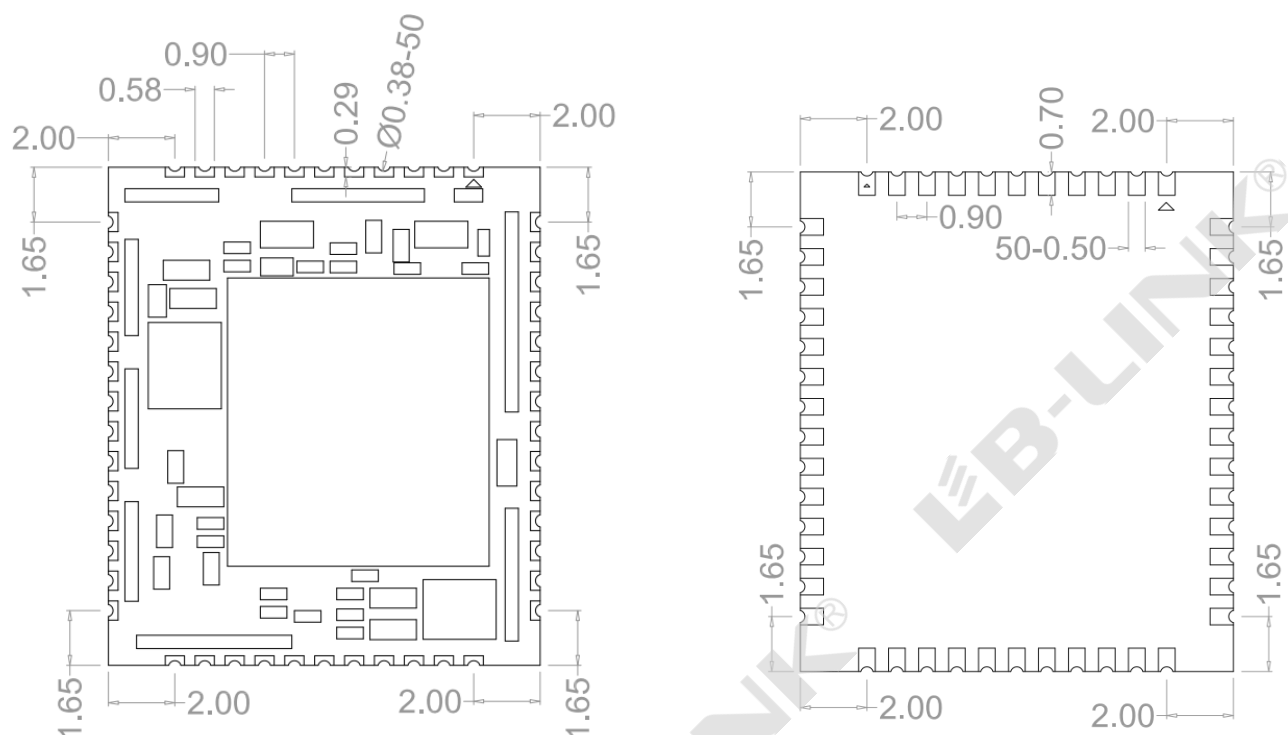


Module dimension: 13.0\*15.0\*1.80mm(L\*W\*H; Tolerance:  $\pm 0.2\text{mm}$ )



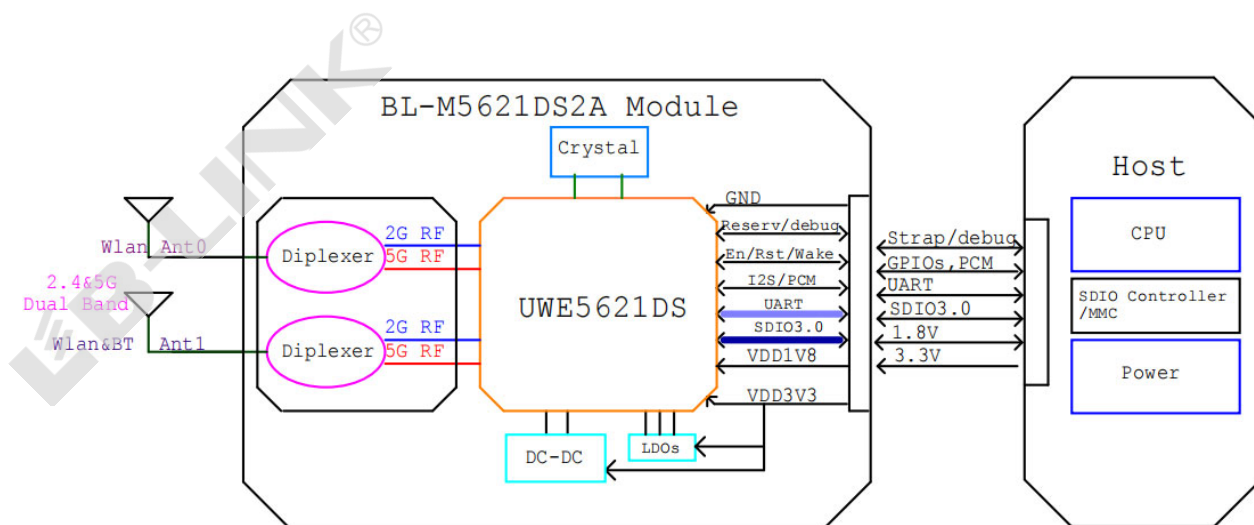
Module Bow and Twist :  $\leq 0.1\text{mm}$

## 5.2 Mechanical Dimensions



## 6. Application Information

### 6.1 Typical Application Circuit



## 6.2 HW Application Note

### 6.2.1 Routing the SDIO Bus

- The SDIO 3.0 Interface support SDIO Default Speed(25MHz)/High Speed(50MHz)/
- UHS(SDR12/25/50/104,208MHz Max) /UHS(DDR50,50MHz Max)Mode, please observe the following
- design guide:
- Isolate she SDIO bus particularly the SDIO clock from noisy signals .
- Keep SD\_CLK line away from SD\_CMD and SD\_D0~3 lines.
- Trace as short as possible,should not have stubs,avoid across different levels as soon as possible.
- Good ground shielding for every SDIO line,and each line must have reference level as ground plane.
- 50~65Ω characteristic impedance is recommended.

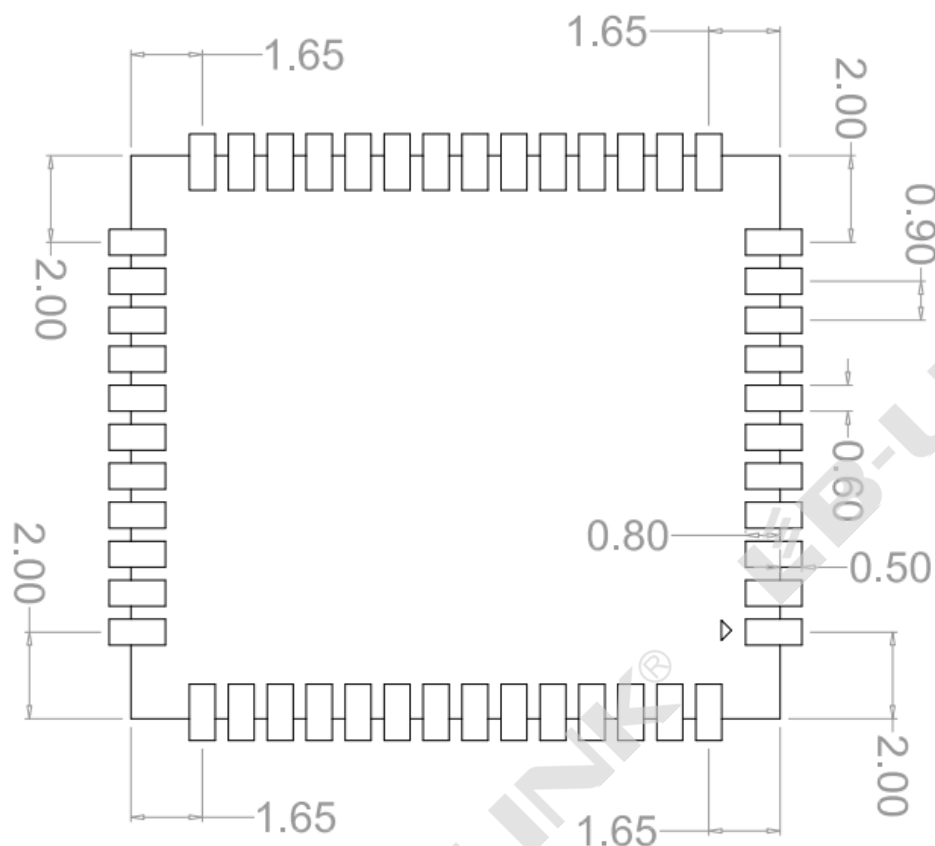
### 6.2.2 Routing the RF Trace

- "WL\_ANT0" / "WL\_ANT1&BT\_ANT" are 2.4G&5.8GHz RF signals,please observe the following design guide :
- Ensure that the RF trace characteristic impedance of the bottom board is kept at 45~65Ω for good matching
- with the BL-M5621DS2A Module.
- RF traces should be well surrounded by ground.
- Keep noisy lines away from RF traces and place more ground vias along RF traces.

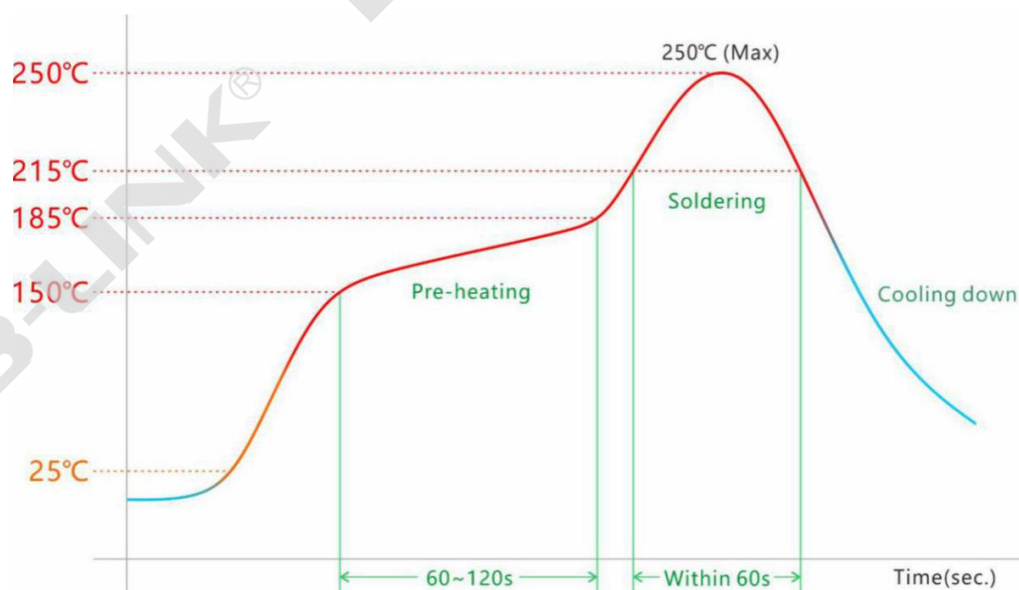
### 6.2.3 VDD3V3 and VDD1V8 Power requirement

- 3.3V Main Power supply : DC 3.15~3.45V & Ripple Voltage <120mV , Maximum RMS current  $\geq 1.2A$  and Maximum Peak current  $\geq 1.8A$  ;For achieve fast transient response ,a current mode buck converter recommended.
- 1.8V I/O Power supply : DC 1.7~1.98V & Ripple Voltage <60mV , Maximum RMS current  $\geq 100mA$  and a LDO converter recommended.

### 6.3 Recommend PCB Layout Footprint



### 6.4 Reflow Soldering Standard Conditions



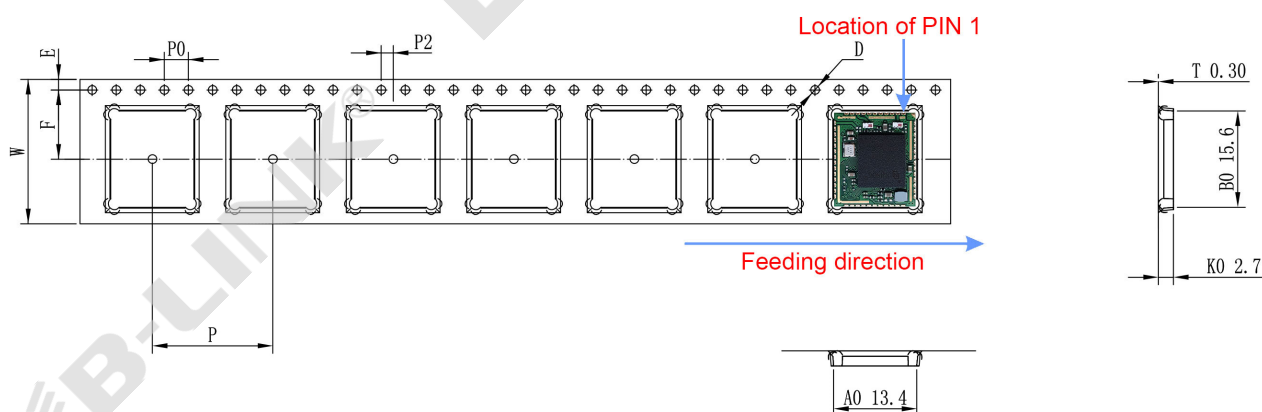
Please use the reflow within 2 times.  
Set up the highest temperature within 250°C.

## 7. Key Components Of Module

| No. | Parts    | Specification        | Manufacturer                                       | Note |
|-----|----------|----------------------|----------------------------------------------------|------|
| 1   | Chipset  | UWE5621DS            | UNISOC Technologies Inc.                           |      |
| 2   | PCB      | BL-M5621DS2A         | Shenzhen Tie Fa Technology CO. LTD                 |      |
|     |          |                      | Guangdong KINGSHINE ELECTRONICS CO., LTD           |      |
|     |          |                      | Quzhou Sunlord Electronics CO., LTD                |      |
| 3   | Crystal  | 26MHz-9pF-10ppm-2016 | Lucki Electronics Co., Ltd                         |      |
|     |          |                      | Shenzhen Kaiyuexiang Electronics Co., Ltd          |      |
|     |          |                      | Chengde Oscillator Electronic Technology Co., Ltd. |      |
| 4   | Diplexer | SLFD18-5R950G-04T    | ShenZhen Sunlord Electronics Co.,Ltd               |      |
|     |          | DP1608-A2455CKH0T    | Advanced Ceramic X Corp.                           |      |

## 8. Package and Storage Information

### 8.1 Package Dimensions



| ITEM | W         | A0        | B0        | K0       | E        | F        | P         | P0       | P2       | D        | T         |
|------|-----------|-----------|-----------|----------|----------|----------|-----------|----------|----------|----------|-----------|
| DIM  | 24.00±0.3 | 13.40±0.1 | 15.60±0.1 | 2.70±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. 1000 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 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 ( 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**