

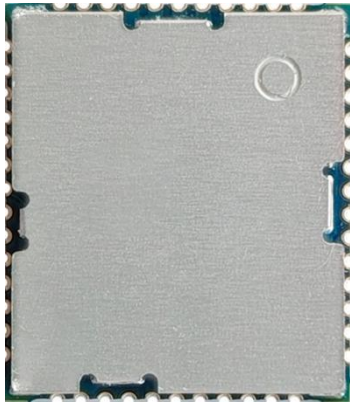


## **BL-M8852BP2**

**802.11ax 1200Mbps WLAN + BT v5.2**  
**PCI-E Module Specification**

**SHENZHEN BILIAN ELECTRONIC CO., LTD**

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(Top View)



(Bottom View)

|                                                                                    |       |
|------------------------------------------------------------------------------------|-------|
| Module Name: BL-M8852BP2                                                           |       |
| Module Type: 802.11a/b/g/n/ac/ax 1200Mbps WLAN + Bluetooth v5.2 Combo PCI-E Module |       |
| Revision: V1.1.1                                                                   |       |
| Customer Approval:                                                                 |       |
| Company:                                                                           |       |
| Title:                                                                             |       |
| Signature:                                                                         | Date: |
| Approval:                                                                          |       |
| Title:                                                                             |       |
| Signature:                                                                         | Date: |

## Revision History

| Revision | Summary          | Release Date | Revised By |
|----------|------------------|--------------|------------|
| 1.1.0    | Initial release  | 2026-01-21   | Zjh        |
| 1.1.1    | Official version | 2026-02-26   | Zjh        |
|          |                  |              |            |
|          |                  |              |            |

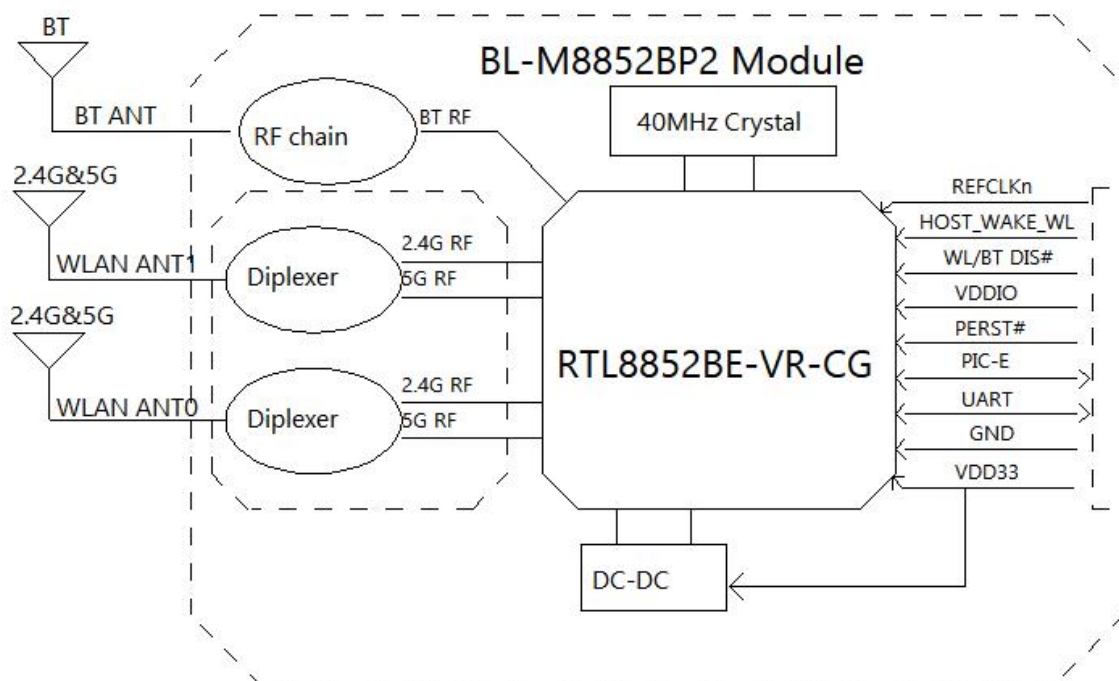
## 1. Introduction

BL-M8852BP2 is a highly integrated Dual-band WLAN+Bluetooth Combo module. It combines a 2T2R Dual-band WLAN subsystem with PCI Express interface controllers and a Bluetooth v5.2 subsystem with UART interface controller. The module compatible IEEE 802.11a/b/g/n/ac/ax standard and provides the maximum PHY rate up to 1201Mbps, it supports Bluetooth dual mode with v5.2/v4.2/v2.1 compliant. The module provides a complete solution for high-performance integrated WALN and Bluetooth devices such as OTT Boxes, Set-top Boxes, HD Cameras, etc.

### 1.1 Features

- Operating Frequencies: 2.4~2.4835GHz or 5.15~5.85GHz
- Support Dual-band 2T2R mode with 20/40/80Mhz bandwidth
- Support 802.11ax with OFDMA and MU-MIMO
- Dual Mode Bluetooth support : Simultaneous LE and BR / EDR

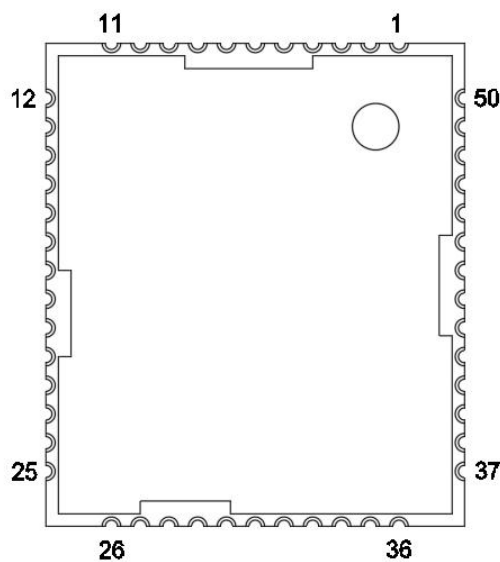
### 1.2 Block Diagram



## 1.3 General Specifications

|                       |                                                              |
|-----------------------|--------------------------------------------------------------|
| Module Name           | BL-M8852BP2                                                  |
| Chipset               | RTL8852BE-VR-CG                                              |
| WLAN Standards        | IEEE802.11a/b/g/n/ac/ax                                      |
| BT Specification      | Bluetooth Core Specification v5.2/4.2/2.1                    |
| Host Interface        | PCI Express 2.1 for WLAN & UART for Bluetooth                |
| Antenna               | Connect to the external antennas through half hole pad       |
| Dimension             | 15.1*13.1*2.2mm (L*W*H)                                      |
| Power Supply          | VDD33=3.3V±0.2V@1200 mA (Max)<br>VDDIO=3.3V±0.2V / 1.8V±0.1V |
| 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 | I/O Level | Module Pin Description               |
|----|-----------|------|-----------|--------------------------------------|
| 1  | GND       | RF   |           | RF Ground                            |
| 2  | WLAN ANT1 | RF   |           | RF Pad for 2.4G / 5G RF to WLAN_ANT1 |

|    |              |     |       |                                                                                                                                                                                                                           |
|----|--------------|-----|-------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 3  | GND          | RF  |       | RF Ground                                                                                                                                                                                                                 |
| 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                                                                                                                                                                                                                 |
| 9  | WLAN ANT0    | RF  |       | RF Pad for 2.4G / 5G RF to WLAN_ANT0                                                                                                                                                                                      |
| 10 | GND          | RF  |       | RF Ground                                                                                                                                                                                                                 |
| 11 | GND          | RF  |       | RF Ground                                                                                                                                                                                                                 |
| 12 | PERST#       | I   | VDD33 | PCI Express Reset active low input. When the PERST# is asserted at power-on state, the module returns to a pre-defined reset state and is ready for initialization and configuration after the de-assertion of the PERST# |
| 13 | NC           | -   |       | NC                                                                                                                                                                                                                        |
| 14 | NC           | -   |       | NC                                                                                                                                                                                                                        |
| 15 | WL_DIS#      | I   | VDDIO | WL_DIS# can be defined as the WLAN Radio-off function with host interface remaining connected. When this pin is pulled low, WLAN function will be Radio-off. Shared with GPIO9. Internal pull High by 100K resistor       |
| 16 | WAKE#        | O/D | VDD33 | Power Management Event active low open drain output. Used to reactivate the PCI Express bus main power rails and reference clock. This WAKE# can be shared with BT wake up host function via side band signals            |
| 17 | NC           | -   |       | NC                                                                                                                                                                                                                        |
| 18 | HOST_WAKE_WL | I   | VDDIO | The Host wakes up WLAN controller in remote Wake up Mode. Suggest configuring the control pin in platform side as open-drain output. Shared with GPIO12                                                                   |
| 19 | PCM_OUT      | O   | VDDIO | PCM data output. Shared with GPIO1                                                                                                                                                                                        |
| 20 | PCM_IN       | I   | VDDIO | PCM data input. Shared with GPIO0                                                                                                                                                                                         |
| 21 | PCM_SYNC     | I/O | VDDIO | PCM Frame Sync signal. Shared with GPIO2                                                                                                                                                                                  |
| 22 | PCM_CLK      | I/O | VDDIO | PCM Clock signal. Shared with GPIO3                                                                                                                                                                                       |
| 23 | GND          | P   |       | Ground                                                                                                                                                                                                                    |
| 24 | NC           | -   |       | NC                                                                                                                                                                                                                        |
| 25 | NC           | -   |       | NC                                                                                                                                                                                                                        |
| 26 | NC           | -   |       | NC                                                                                                                                                                                                                        |

|    |              |     |       |                                                                                                                                                                                |
|----|--------------|-----|-------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 27 | GND          | P   |       | Ground                                                                                                                                                                         |
| 28 | NC           | -   |       | NC                                                                                                                                                                             |
| 29 | NC           | -   |       | NC                                                                                                                                                                             |
| 30 | GND          | P   |       | Ground                                                                                                                                                                         |
| 31 | NC           | -   |       | NC                                                                                                                                                                             |
| 32 | GND          | P   |       | Ground                                                                                                                                                                         |
| 33 | REFCLKn      | AI  |       | PCI Express 100MHz differential reference clock input                                                                                                                          |
| 34 | VDDIO        | P   |       | Power supply for some digital IO, 3.3V or 1.8V                                                                                                                                 |
| 35 | REFCLKp      | AI  |       | PCI Express 100MHz differential reference clock input                                                                                                                          |
| 36 | VDD33        | P   |       | DC 3.3V power supply                                                                                                                                                           |
| 37 | CLKREQ#      | O/D | VDD33 | Reference Clock Request open drain output, it used to request for the the reference clock. It also used by L1 PM substates                                                     |
| 38 | BT_DIS#      | I   | VDDIO | BT_DIS# can externally shut down the module BT function when its pulled Low, and UART interface will be also disabled. Shared with GPIO11. Internal pull High by 100K resistor |
| 39 | GND          | P   |       | Ground                                                                                                                                                                         |
| 40 | UART_TX      | O   | VDDIO | High-speed UART data output                                                                                                                                                    |
| 41 | UART_RX      | I   | VDDIO | High-speed UART data input                                                                                                                                                     |
| 42 | UART_RTS     | O   | VDDIO | High-speed UART RTS output                                                                                                                                                     |
| 43 | UART_CTS     | I   | VDDIO | High-speed UART CTS input                                                                                                                                                      |
| 44 | PERn         | AI  |       | PCI Express device receive differential pair for WLAN                                                                                                                          |
| 45 | PERp         | AI  |       | PCI Express device receive differential pair for WLAN                                                                                                                          |
| 46 | PETn         | AO  |       | PCI Express device transmit differential pair for WLAN ( AC coupling capacitors are integrated on module )                                                                     |
| 47 | PETp         | AO  |       | PCI Express device transmit differential pair for WLAN ( AC coupling capacitors are integrated on module )                                                                     |
| 48 | BT_ANT       | RF  |       | RF Pad for BT RF to BT_ANT                                                                                                                                                     |
| 49 | HOST_WAKE_BT | I   | VDDIO | The Host wakes up BT controller. Shared with GPIO7                                                                                                                             |
| 50 | BT_WAKE_HOST | O   | VDDIO | BT to wake up the Host. Shared with GPIO14                                                                                                                                     |

P: Power or Ground; I/O: digital In/Output; O/D:Open Drain digital Output;

AI/O: Analog In/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 | 2.1 |       |
| Supply Voltage                | VDD33      | 3.1 | 3.3 | 3.5 | V     |
|                               | VDDIO/3.3V | 3.1 | 3.3 | 3.5 | V     |
|                               | VDDIO/1.8V | 1.7 | 1.8 | 1.9 | V     |

### 3.2 Digital 3.3V IO DC Specifications

| Symbol | Parameter           | Min  | Typ | Max  | Units |
|--------|---------------------|------|-----|------|-------|
| VIH    | Input High Voltage  | 2.0  | 3.3 | 3.6  | V     |
| VIL    | Input Low Voltage   | --   | 0   | 0.9  | V     |
| VOH    | Output High Voltage | 2.97 | --  | 3.3  | V     |
| VOL    | Output Low Voltage  | 0    | --  | 0.33 | V     |

### 3.3 Digital 1.8V IO DC Specifications

| Symbol | Parameter           | Min  | Typ | Max  | Units |
|--------|---------------------|------|-----|------|-------|
| VIH    | Input High Voltage  | 1.7  | 1.8 | 3.6  | V     |
| VIL    | Input Low Voltage   | --   | 0   | 0.8  | V     |
| VOH    | Output High Voltage | 1.62 | --  | 1.8  | V     |
| VOL    | Output Low Voltage  | 0    | --  | 0.18 | V     |

### 3.4 Current Consumption

| Conditions : VDD33=3.3V ; Ta:25°C                            |                        |                         |       |
|--------------------------------------------------------------|------------------------|-------------------------|-------|
| Use Case                                                     | VDD33 Current          |                         |       |
|                                                              | Typ(I <sub>RMS</sub> ) | Max(I <sub>Peak</sub> ) | Units |
| 2.4G WLAN TCP throughput TX 352Mbps(Linux Drive, BT disable) | 542                    | 873                     | mA    |
| 2.4G WLAN TCP throughput RX 343Mbps(Linux Drive, BT disable) | 331                    | 868                     | mA    |

|                                                            |     |      |    |
|------------------------------------------------------------|-----|------|----|
| 5G WLAN TCP throughput TX 786Mbps(Linux Drive, BT disable) | 568 | 945  | mA |
| 5G WLAN TCP throughput RX 712Mbps(Linux Drive, BT disable) | 352 | 943  | mA |
| 2.4G 11b 11Mbps TX@18dBm(1TX RF test)                      | 451 | 505  | mA |
| 2.4G 11g 6Mbps TX@18dBm(1TX RF test)                       | 185 | 214  | mA |
| 2.4G 11n HT20_MCS15 TX@17dBm(2TX RF test)                  | 348 | 812  | mA |
| 2.4G11ax HE_SU 40M_MCS11 TX@15dBm(2TX RF test)             | 557 | 925  | mA |
| 2.4G 11ax HE_SU 40M_MCS11 RX(2RX RF test)                  | 204 | 253  | mA |
| 5G 11a 6Mbps TX@18dBm(1TX RF test)                         | 471 | 613  | mA |
| 5G 11n HT20_MCS7 TX@16dBm(1TX RF test)                     | 286 | 551  | mA |
| 5G 11ac VHT80_MCS0 TX@17dBm(2TX RF test)                   | 524 | 1065 | mA |
| 5G 11ac VHT80_MCS9 TX@16dBm(2TX RF test)                   | 346 | 974  | mA |
| 5G 11ax HE_SU 80M_MCS0 TX@16dBm(2TX RF test)               | 492 | 982  | mA |
| 5G 11ax HE_SU 80M_MCS11 TX@15dBm(2TX RF test)              | 368 | 958  | mA |
| 5G 11ax HE_SU 80M_MCS11 RX (2RX RF test)                   | 205 | 273  | mA |
| BT BR_1M TX@5dBm (BT RF test, WLAN disable)                | 261 | 322  | mA |
| BT BR_1M RX Active (BT RF test, WLAN disable)              | 225 | 295  | mA |
| BT EDR_3M TX@5dBm (BT RF test, WLAN disable)               | 276 | 322  | mA |
| BT EDR_3M RX Active (BT RF test, WLAN disable)             | 235 | 295  | mA |
| BT LE_1M TX@5dBm (BT RF test, WLAN disable)                | 252 | 322  | mA |

## 4. WALN & Bluetooth RF Specifications

### 4.1 2.4G WLAN RF Specification

| Conditions : VDD33=3.3V ; Ta:25°C |                                    |
|-----------------------------------|------------------------------------|
| Features                          | Description                        |
| WLAN Standard                     | IEEE 802.11b/g/n/ax                |
| Frequency Range                   | 2.4~2.4835GHz (2.4GHz ISM Band)    |
| Channels                          | Ch1~Ch13 (For 20MHz Channels)      |
| Modulation                        | 802.11b (DSSS): CCK, DQPSK, DBPSK; |

|                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|---------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                     | 802.11g (OFDM): BPSK, QPSK, QAM16, QAM64;<br>802.11n (OFDM): BPSK, QPSK, QAM16, QAM64;<br>802.11ax (OFDMA): BPSK, BPSK_DCM, QPSK, QPSK_DCM, QAM16, QAM16_DCM, QAM64, QAM256, QAM1024;                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| 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;<br>802.11ax (HE_MU,26~242RU): MCS0~MCS11(1T1R) 0.4~143.4Mbps;<br>802.11ax (HE_MU,26~242RU): MCS0~MCS11(2T2R) 0.8~286.8Mbps;<br>802.11ax (HE_SU, non-OFDMA 20MHz): MCS0~MCS11(1T1R) 3.6~143.4Mbps;<br>802.11ax (HE_SU, non-OFDMA 20MHz): MCS0~MCS11(2T2R) 7.3~286.8Mbps;<br>802.11ax (HE_SU, non-OFDMA 40MHz): MCS0~MCS11(1T1R) 7.3~286.8Mbps;<br>802.11ax (HE_SU,non-OFDMA 40MHz): MCS0~MCS11(2T2R) 14.6~573.5Mbps; |
| Frequency Tolerance | $\leq \pm 20\text{ppm}$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |

**2.4G Transmitter Specifications (ANT0 & ANT1. TX power tolerance calibrated, customers can define the target TX power by modifying configuration file of the driver software. Customers must define the TX power same or lower than recommended Target TX Power as below)**

| TX Rate                  | Recommended Target TX Power (dBm) | TX Power Tolerance (dBm) | EVM (dB)   |
|--------------------------|-----------------------------------|--------------------------|------------|
| 802.11b@1~11Mbps         | 18                                | $\pm 2$                  | $\leq -15$ |
| 802.11g@6Mbps            | 18                                | $\pm 2$                  | $\leq -15$ |
| 802.11g@54Mbps           | 17                                | $\pm 2$                  | $\leq -25$ |
| 802.11n@HT20_MCS0        | 18                                | $\pm 2$                  | $\leq -10$ |
| 802.11n@HT20_MCS7        | 17                                | $\pm 2$                  | $\leq -28$ |
| 802.11n@HT40_MCS0        | 17                                | $\pm 2$                  | $\leq -10$ |
| 802.11n@HT40_MCS7        | 16                                | $\pm 2$                  | $\leq -28$ |
| 802.11ax@HE_SU 20M_MCS0  | 16                                | $\pm 2$                  | $\leq -15$ |
| 802.11ax@HE_SU 20M_MCS11 | 15                                | $\pm 2$                  | $\leq -35$ |
| 802.11ax@HE_SU 40M_MCS0  | 16                                | $\pm 2$                  | $\leq -15$ |
| 802.11ax@HE_SU 40M_MCS11 | 15                                | $\pm 2$                  | $\leq -35$ |

**2.4G Receiver Specifications (ANT0&ANT1)**

| RX Rate | Min Input Level (Typ.dBm) | Max Input Level (Typ.dBm) | PER |
|---------|---------------------------|---------------------------|-----|
|---------|---------------------------|---------------------------|-----|

|                          |     |    |       |
|--------------------------|-----|----|-------|
| 802.11b@1Mbps            | -94 | -5 | < 8%  |
| 802.11b@11Mbps           | -90 | -5 | < 8%  |
| 802.11g@6Mbps            | -93 | -5 | < 10% |
| 802.11g@54Mbps           | -75 | -5 | < 10% |
| 802.11n@HT20_MCS0        | -92 | -5 | < 10% |
| 802.11n@HT20_MCS7        | -73 | -5 | < 10% |
| 802.11n@HT40_MCS0        | -91 | -5 | < 10% |
| 802.11n@HT40_MCS7        | -70 | -5 | < 10% |
| 802.11ax@HE_SU 20M_MCS0  | -90 | -5 | < 10% |
| 802.11ax@HE_SU 20M_MCS11 | -62 | -5 | < 10% |
| 802.11ax@HE_SU 40M_MCS0  | -89 | -5 | < 10% |
| 802.11ax@HE_SU 40M_MCS11 | -60 | -5 | < 10% |

## 4.2 5G WLAN RF Specification

| Conditions: VDD33 = 3.3V; Ta:25°C |                                                                                                                                                                                                                                                                                                             |
|-----------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Features                          | Description                                                                                                                                                                                                                                                                                                 |
| WLAN Standard                     | IEEE 802.11a/n/ac/ax                                                                                                                                                                                                                                                                                        |
| Frequency Range                   | 5.15~5.25GHz; 5.25~5.35GHz; 5.47~5.725GHz;<br>5.725~5.850GHz (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;<br>802.11ax (OFDMA): BPSK, BPSK_DCM, QPSK, QPSK_DCM, QAM16,<br>QAM16_DCM, QAM64, QAM256, QAM1024;                                                              |
| Data 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; |

|                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|---------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                     | 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;<br>802.11ax (HE_MU,26~484RU): MCS0~MCS11(1T1R) 0.4~286.8Mbps;<br>802.11ax (HE_MU,26~484RU): MCS0~MCS11(2T2R) 0.8~573.5Mbps;<br>802.11ax (HE_SU, non-OFDMA 20MHz): MCS0~MCS11(1T1R) 3.6~143.4Mbps;<br>802.11ax (HE_SU, non-OFDMA 20MHz): MCS0~MCS11(2T2R) 7.3~286.8Mbps;<br>802.11ax (HE_SU, non-OFDMA 40MHz): MCS0~MCS11(1T1R) 7.3~286.8Mbps;<br>802.11ax (HE_SU,non-OFDMA 40MHz): MCS0~MCS11(2T2R) 14.6~573.5Mbps;<br>802.11ax (HE_SU,non-OFDMA 80MHz): MCS0~MCS11(1T1R) 15.3~600.4Mbps;<br>802.11ax (HE_SU, non-OFDMA 80MHz): MCS0~MCS11(2T2R) 30.6~1201Mbps; |
| Frequency Tolerance | $\leq \pm 20\text{ppm}$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |

**5G Transmitter Specifications (ANT0 & ANT1. TX power tolerance calibrated, customers can define the target TX power by modifying configuration file of the driver software. Customers must define the TX power same or lower than recommended Target TX Power as below)**

| TX Rate                | Recommended Target TX Power (dBm) | TX Power Tolerance (dBm) | EVM (dB)   |
|------------------------|-----------------------------------|--------------------------|------------|
| 802.11a@6Mbps          | 18                                | $\pm 2$                  | $\leq -10$ |
| 802.11a@54Mbps         | 17                                | $\pm 2$                  | $\leq -25$ |
| 802.11n@HT20_MCS0      | 17                                | $\pm 2$                  | $\leq -13$ |
| 802.11n@HT20_MCS7      | 16                                | $\pm 2$                  | $\leq -28$ |
| 802.11n@HT40_MCS0      | 17                                | $\pm 2$                  | $\leq -13$ |
| 802.11n@HT40_MCS7      | 16                                | $\pm 2$                  | $\leq -28$ |
| 802.11ac@VHT20_MCS0    | 17                                | $\pm 2$                  | $\leq -13$ |
| 802.11ac@VHT20_MCS8    | 16                                | $\pm 2$                  | $\leq -30$ |
| 802.11ac@VHT80_MCS0    | 17                                | $\pm 2$                  | $\leq -13$ |
| 802.11ac@VHT80_MCS9    | 16                                | $\pm 2$                  | $\leq -32$ |
| 802.11ax@HE_SU80_MCS0  | 16                                | $\pm 2$                  | $\leq -13$ |
| 802.11ax@HE_SU80_MCS11 | 15                                | $\pm 2$                  | $\leq -35$ |

**5G Receiver Specifications (ANT0&ANT1)**

| RX Rate | Min Input Level (Typ.dBm) | Max Input Level (Typ.dBm) | PER |
|---------|---------------------------|---------------------------|-----|
|---------|---------------------------|---------------------------|-----|

|                        |     |    |       |
|------------------------|-----|----|-------|
| 802.11a@6Mbps          | -91 | -5 | < 10% |
| 802.11a@54Mbps         | -74 | -5 | < 10% |
| 802.11n@HT20_MCS0      | -92 | -5 | < 10% |
| 802.11n@HT20_MCS7      | -72 | -5 | < 10% |
| 802.11n@HT40_MCS0      | -89 | -5 | < 10% |
| 802.11n@HT40_MCS7      | -69 | -5 | < 10% |
| 802.11ac@VHT80_MCS0    | -85 | -5 | < 10% |
| 802.11ac@VHT80_MCS9    | -60 | -5 | < 10% |
| 802.11ax@HE_SU80_MCS0  | -86 | -5 | < 10% |
| 802.11ax@HE_SU80_MCS11 | -58 | -5 | < 10% |

### 4.3 Bluetooth RF Specification

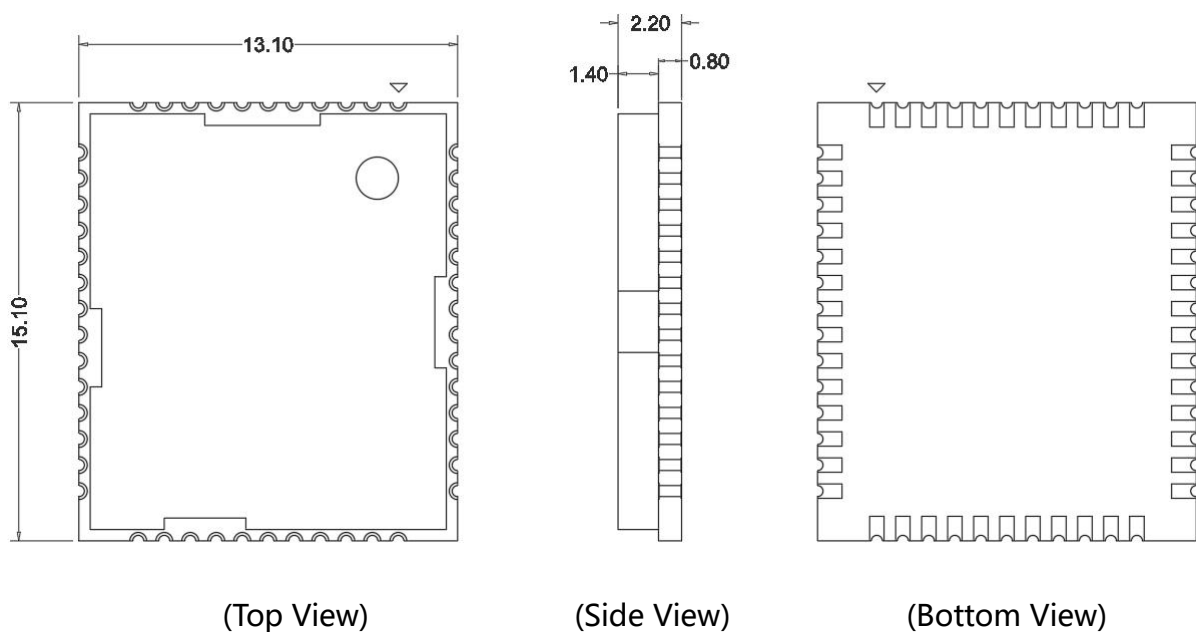
| Conditions: VDD33=3.3V; Ta:25°C               |                                                                                                                                                                                                |           |           |
|-----------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|-----------|
| Features                                      | Description                                                                                                                                                                                    |           |           |
| Bluetooth Specification                       | Bluetooth Core Specification v5.2/4.2/2.1                                                                                                                                                      |           |           |
| 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;                                                                                                                                  |           |           |
| Data 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 (BT ANT) |                                                                                                                                                                                                |           |           |
| Items                                         | Min (dBm)                                                                                                                                                                                      | Typ (dBm) | Max (dBm) |
| TX Power                                      |                                                                                                                                                                                                |           |           |
| BR_1M                                         | 0                                                                                                                                                                                              | 5         | 10        |
| EDR_2/3M                                      | 0                                                                                                                                                                                              | 5         | 10        |

|                                                                      |                  |           |                     |     |
|----------------------------------------------------------------------|------------------|-----------|---------------------|-----|
| LE_125K/500K/1M/2M                                                   | 0                | 5         | 10                  |     |
| Items                                                                | Min              | Typ       | Max                 |     |
| BR_1M (DH1) Modulation Characteristics                               |                  |           |                     |     |
| Δf1avg                                                               | 140KHz           | 162.48KHz | 175KHz              |     |
| Δf2avg                                                               | 115KHz           | 152.11KHz | 175KHz              |     |
| Δf2max                                                               | 115KHz           | 160.83KHz | /                   |     |
| Δf2avg/Δf1avg                                                        | 0.8              | 0.93      | /                   |     |
| Items                                                                | Min              | Typ       | Max                 |     |
| EDR_3M(3DH5) EDR Carrier Frequency Stability and Modulation Accuracy |                  |           |                     |     |
| ωi                                                                   | -75KHz           | -16.57KHz | +75KHz              |     |
| ωi+ωo                                                                | -75KHz           | -16.62KHz | +75KHz              |     |
| ωo                                                                   | -10KHz           | -0.07KHz  | +10KHz              |     |
| 8DPSK RMS DEVM                                                       | /                | 0.037     | 0.13                |     |
| 8DPSK DEVM                                                           | /                | 0.082     | 0.25                |     |
| Items                                                                | Min              | Typ       | Max                 |     |
| LE_1M Modulation Characteristics                                     |                  |           |                     |     |
| Δf1avg                                                               | 225KHz           | 252.15KHz | 275KHz              |     |
| Δf2avg                                                               | 185KHz           | 230.44KHz | 275KHz              |     |
| Δf2max                                                               | 185KHz           | 223.41KHz | /                   |     |
| Δf2avg/Δf1avg                                                        | 0.8              | 0.91      | /                   |     |
| Items                                                                | Min              | Typ       | Max                 |     |
| LE_2M Modulation Characteristics                                     |                  |           |                     |     |
| Δf1avg                                                               | 450KHz           | 499.54KHz | 550KHz              |     |
| Δf2avg                                                               | 370KHz           | 495.81KHz | 550KHz              |     |
| Δf2max                                                               | 370KHz           | 478.32KHz | /                   |     |
| Δf2avg/Δf1avg                                                        | 0.8              | 0.99      | /                   |     |
| Bluetooth Receiver Specifications (BT ANT)                           |                  |           |                     |     |
| Items                                                                | Sensitivity      |           | Maximum Input Level |     |
|                                                                      | Input Level(dBm) | BER       | Input Level(dBm)    | BER |

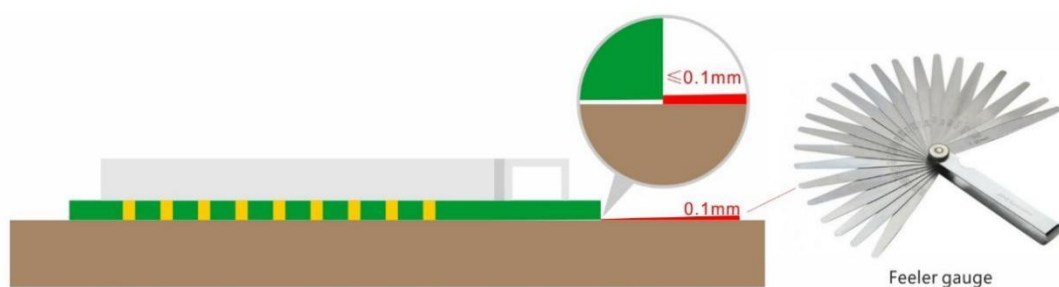
| BR_1M (DH1)   | -70               | $\leq 0.1\%$  | -5                | $\leq 0.1\%$ |
|---------------|-------------------|---------------|-------------------|--------------|
| EDR_2M(DH1)   | -70               | $\leq 0.01\%$ | -10               | $\leq 0.1\%$ |
| EDR_3M (3DH5) | -65               | $\leq 0.01\%$ | -5                | $\leq 0.1\%$ |
|               | Input Level (dBm) | PER           | Input Level (dBm) | PER          |
| LE_125/500K   | -70               | $\leq 5\%$    | -5                | $\leq 5\%$   |
| LE_1M         | -70               | $\leq 5\%$    | -5                | $\leq 5\%$   |
| LE_2M         | -65               | $\leq 5\%$    | -5                | $\leq 5\%$   |

## 5. Mechanical Specifications

### 5.1 Module Outline Drawing

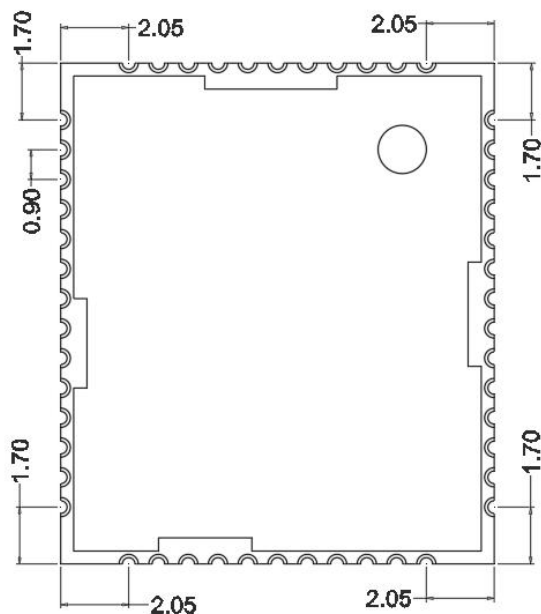


Module dimension: 15.1\*13.1\*2.2mm(L\*W\*H; Tolerance:  $\pm 0.3\text{mm}_L/W$ ,  $\pm 0.2\text{mm}_H$ )

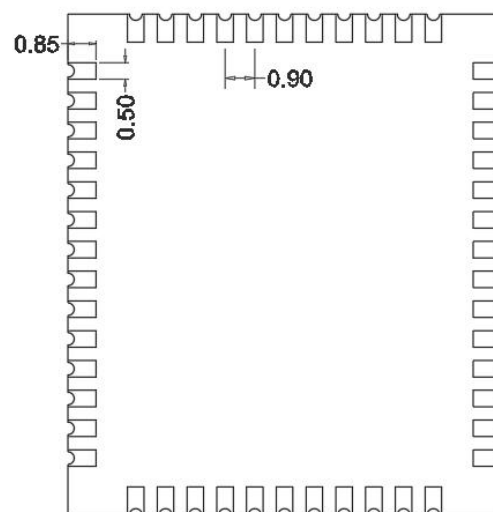


Module Bow and Twist:  $\leq 0.1\text{mm}$

## 5.2 Mechanical Dimensions



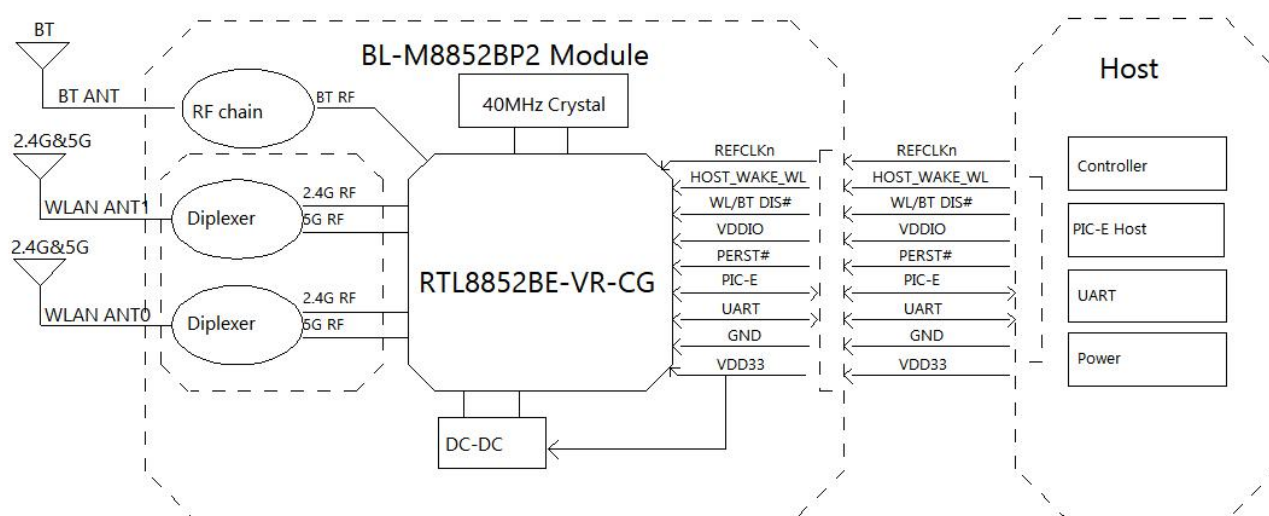
(Top View)



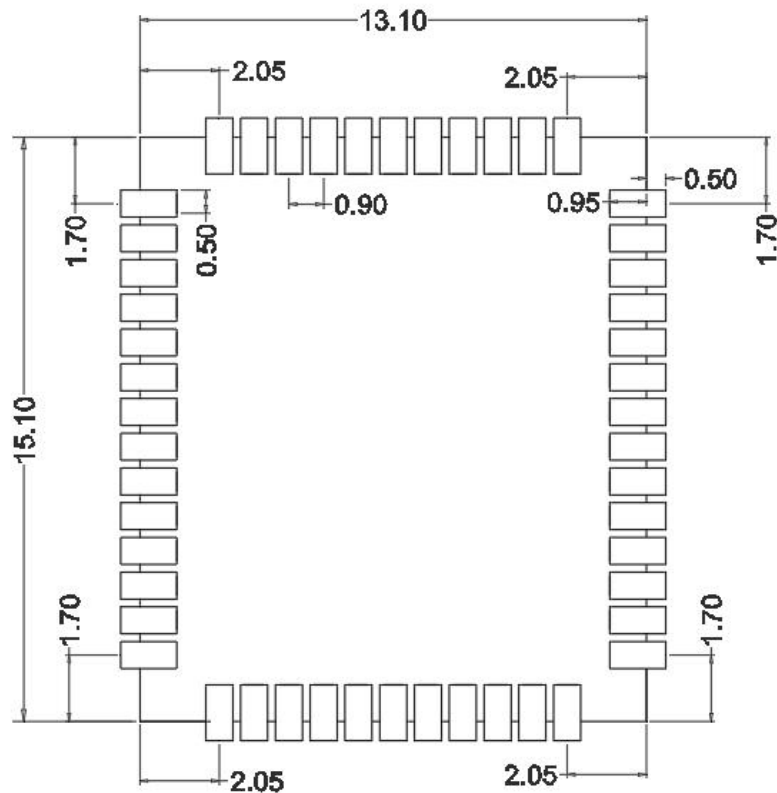
(Bottom View)

## 6. Application Information

### 6.1 Typical Application Circuit

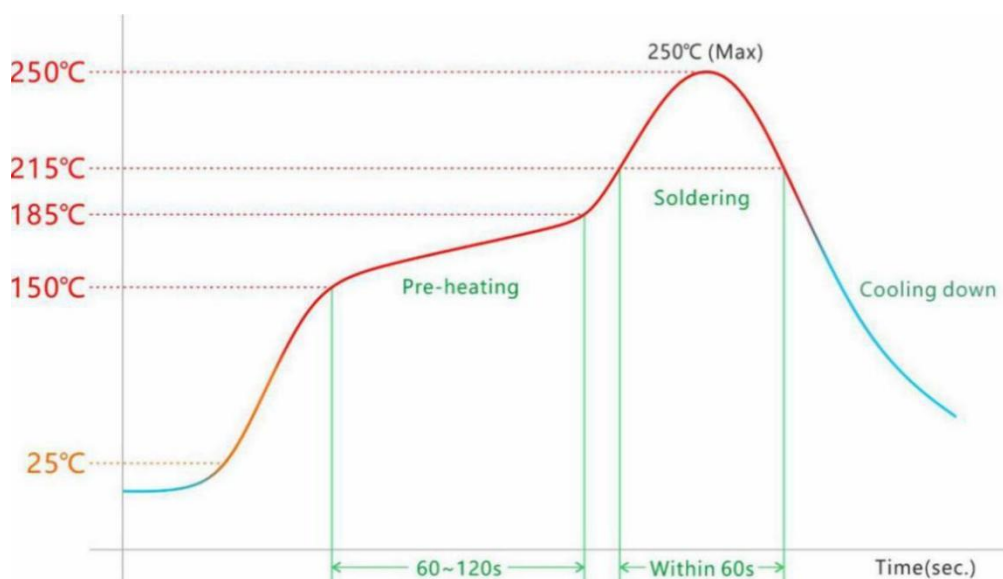


## 6.2 Recommend PCB Layout Footprint



(Design Unit: mm)

## 6.3 Reflow Soldering Standard Conditions



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

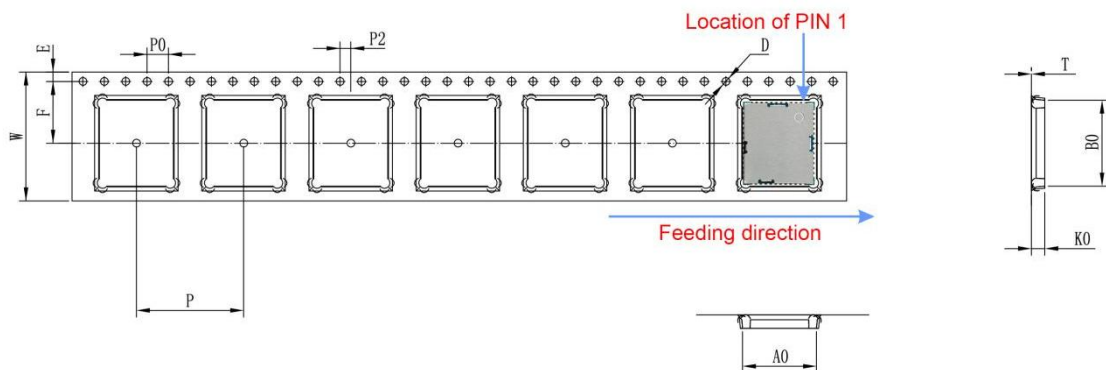
## 7. Key Components Of Module

| No. | Parts          | Specification   | Manufacturer                                              | Note |
|-----|----------------|-----------------|-----------------------------------------------------------|------|
| 1   | Chipset        | RTL8852BE-VR-CG | Realtek Semiconductor Corp.                               |      |
| 2   | PCB            | BL-M8852BP2     | ShenZhen Tie Fa Technology Limited                        |      |
|     |                |                 | Huizhou Dayawan Kexiang Technology Circuit Board Co., Ltd |      |
|     |                |                 | Quzhou Sunlord Electronics Co.,Ltd                        |      |
|     |                |                 | SHEN ZHEN QILI ELECTRON CO., LTD                          |      |
| 3   | Crystal        | 40MHz-2016      | JinHua East Crystal Electronic CO.,LTD                    |      |
|     |                |                 | Chengde Oscillator Electronic Technology Co., Ltd.        |      |
| 4   | Diplexer       | 1608            | JIA XING GLEAD ELECTRONICS CO.,LTD                        |      |
|     |                |                 | Dongguan Hekang Electronics Co.,LTD                       |      |
| 5   | Power inductor | 2.2uH           | Shenzhen Jialan Microelectronics Co., Ltd                 |      |

Note: To ensure supply chain stability, certified alternative components with potential cosmetic variations have been utilized. The physical appearance of the module shall be governed by the final delivered unit.

## 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 | 01.5±0.1 | 0.30±0.05 |



## Package specification:

1. 1,000 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**

The Module is designed to comply with the FCC statement. FCC ID is 2AL6K-BLM8852BP2. The host system using Module, should have label indicated it contain modular's FCC ID: 2AL6K-BLM8852BP2. This radio module must not installed to collocate and operating simultaneously with other radios in host system additional testing and equipment authorization may be required to operating simultaneously with other radio.

The Module and its antenna must not be co-located or operating in conjunction with any other transmitter or antenna within a host device.

The modular must be installed in the host that assign by Company name: Shenzhen Bilian Electronic Co.,Ltd., Model no.: BL-M8852BP2 if other host types used would need further evaluation and possible C2PC if they are not significantly similar to the one tested The WIFI Module is designed for a compact PCB design. It should be installed and operated with host or other minimum distance of 20 centimeters between the radiator and your body." To comply with FCC regulations limiting both maximum RF output power and human exposure to RF radiation, the maximum antenna gain including cable loss in a mobile-only exposure condition must not exceed 2 dBi in BT, 3 dBi in 2.4G WIFI, 3 dBi in the 5G WIFI. The module uses FPC antenna and Copper tube antenna, these antennas are sold with the module.

#### Notice to OEM integrator

The end user manual shall include all required regulatory information/warning as show in this manual. The OEM integrator is responsible for testing their end-product for any additional compliance requirements required with this module installed. If the final product contains circuits of other FCC PART 15 Subparts, the final host product still requires Part 15 Subpart B compliance testing with the modular transmitter installed The intended use is generally not for the general public. It is generally for industry/commercial use. The connector is within the transmitter enclosure and can only be accessed by disassembly of the transmitter that is not normally required, the user has no access to the connector. Installation must be controlled. Installation requires special training.

This device complies with Part 15 of the FCC Rules.

This equipment should be installed and operated with a minimum distance of 20 cm between the radiator and your body.

## 2.2

This module has been assessed against the following FCC rule parts: CFR 47 FCC Part 15 C (15.247. DTS) and CFR 47 FCC Part 15 E (NII). It is applicable to the modular transmitter

## 2.3

This radio transmitter Module 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.

The concrete contents to check are the following three points.

- 1) Maximum antenna gains are shown in item 2.7 below.
  - 2) Should be installed so that the end user cannot modify the antenna
  - 3) Feed line should be designed in 50ohm
- Fine-tuning of return loss etc. can be performed using a matching network.  
The antenna shall not be accessible for modification or change by the end user.

## 2.4

The module complies with FCC Part 15.247 / Part 15.407 and apply for Single module approval.

## 2.5

Trace antenna designs: applicable.

Any deviation(s) from the defined parameters of the antenna trace, as described by the instructions, require that the host product manufacturer must notify the module grantee that they wish to change the antenna trace design. in this case, a Class II permissive change application is required to be filed by the grantee, or the host manufacturer can take responsibility through the change in FCC ID (new application) procedure followed by a Class II permissive change application.

The device must be professionally installed.

The intended use is generally not for the general public.

It is generally for industry/commercial use.

The connector is within the transmitter enclosure and can only be accessed by disassembly of the transmitter that is not normally required.

The user has no access to the connector.

Installation must be controlled.

Installation requires special training.

## 2.6

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

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

## 2.7

The following antennas have been certified for use with this module.

Only antennas of the same type with equal or lower gain may also be used with this module.

Other types of antennas and/or higher gain antennas may require the additional authorization for operation. The installer should use unique antenna connector and 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. The manufacturer of module will inform installer to meet with the FCC part 15.203 in the warning part.

Antenna Specification list below:

BT:

Antenna type: FPC Antenna

The max antenna gain (in dBi):

BR+EDR: 2 dBi

BLE: 2 dBi

2.4G WIFI:

Antenna type: Copper tube antenna

The max antenna gain (in dBi):

3 dBi for antenna 1

3 dBi for antenna 2

#### 5G WIFI:

Antenna type: Copper tube antenna

The max antenna gain (in dBi):

3 dBi for antenna 1

3 dBi for antenna 2

#### 2.8

Please notice that if the FCC identification number is not visible when the module is installed inside another device, then the outside of the device into which the module is installed must also display a label referring to the enclosed module. This exterior label can use wording such as "Contains FCC ID: 2AL6K-BLM8852BP2 "; any similar wording that expresses the same meaning may be used.

#### 2.9

Testing of the host product with all the transmitters installed - referred to as the composite investigation test- is recommended, to verify that the host product meets all the applicable FCC rules. The radio spectrum is to be investigated with all the transmitters in the final host product functioning to determine that no emissions exceed the highest limit permitted for any one individual transmitter as required by Section 2.947(f). The host manufacturer is responsible to ensure that when their product operates as intended it does not have any emissions present that are out of compliance that were not present when the transmitters were tested individually.

If the modular transmitter has been fully tested by the module grantee on the required number of channels, modulation types, and modes, it should not be necessary for the host installer to re-test all the available transmitter modes or settings. It is recommended that the host product manufacturer, installing the modular transmitter, perform some investigative measurements to confirm that the resulting composite system does not exceed the spurious emissions limits or band edge limits (e.g., where a different antenna may be causing additional emissions). The testing should check for emissions that may occur due to the intermixing of emissions with the other transmitters, digital circuitry, or due to physical properties of the host product (enclosure). This investigation is especially important when integrating multiple modular transmitters where the certification is based on testing each of them in a stand-alone configuration.

#### 2.10

Any company of the host device which install this modular should perform the test of radiated & conducted emission and spurious emission etc. according to FCC Part 15C: 15.247 and 15.209 & 15.207, part 15E: 15.407, part 15B: class B requirement, only if the test result comply with FCC part 15C: 15.247 and 15.209 & 15.207 part 15 E 15.407, 15B class B requirement. Then the host can be sold legally.

The host product manufacturer is responsible for compliance to any other FCC rules that apply to the host not covered by the modular transmitter grant of certification, If the grantee markets their product as being Part 15 Subpart B compliant (when it also contains unintentional-radiator digital circuitry), then the grantee shall provide a notice stating that the final host product still requires Part 15 Subpart B compliance testing with the modular transmitter installed.

## **FCC Statement**

1. 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.

(2) This device must accept any interference received, including interference that may cause undesired operation.

2. 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.

The device has been evaluated to meet general RF exposure requirement. This equipment should be installed and operated with a minimum distance of 20 cm between the radiator and your body.

## **ISED Statement**

This device contains licence-exempt transmitter(s)/receiver(s) that comply with Innovation, Science and Economic Development Canada's licence-exempt RSS(s). Operation is subject to the following two conditions:

1. This device may not cause interference.

2. This device must accept any interference, including interference that may cause undesired operation of the device.

The device has been evaluated to meet general RF exposure requirement. This equipment should be installed and operated with a minimum distance of 20 cm between the radiator and your body.

L'émetteur/récepteur exempt de licence contenu dans le présent appareil est conforme aux CNR d'Innovation, Sciences et Développement économique Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes :

- 1) L'appareil ne doit pas produire de brouillage;
- 2) L'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

Le dispositif a été évalué pour répondre aux exigences générales d'exposition aux ondes radiofréquence

s.Cet équipement doit être installé et utilisé avec une distance minimale de 20 cm entre le radiateur et votre corps.

Operations in the 5.15-5.25GHz band are restricted to indoor usage only.

Les opérations dans la bande 5.15-5.25GHz sont limitées à une utilisation à l'intérieur seulement.

The Module is designed to comply with the ISED statement. IC is 20944-BLM8852BP2. The host system using Module, should have label indicated it contain modular's IC: 20944-BLM8852BP2. This radio module must not installed to collocate and operating simultaneously with other radios in host system additional testing and equipment authorization may be required to operating simultaneously with other radio.

The Module and its antenna must not be co-located or operating in conjunction with any other transmitter or antenna within a host device.

This radio transmitter [IC: 20944-BLM8852BP2] has been approved by Innovation, Science and Economic Development Canada 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.

The modular must be installed in the host that assign by Company name: Shenzhen Bilian Electronic Co.,Ltd., Model no.: BL-M8852BP2. If other host types used would need further evaluation and possible C2PC if they are not significantly similar to the one tested The WIFI Module is designed for a compact PCB design. It should be installed and operated with host or other minimum distance of 20 centimeters between the radiator and your body. To comply with ISED regulations limiting both maximum RF output power and human exposure to RF radiation, the maximum antenna gain including cable loss in a mobile-only exposure condition must not exceed 2 dBi in BT, 3 dBi in 2.4G WIFI, 3 dBi in the 5G WIFI. The module uses FPC antenna and Copper tube antenna, these antennas are sold with the module.