



# **BL-R8189RM2**

**802.11n 150Mbps SDIO**

**WLAN Module Specification**

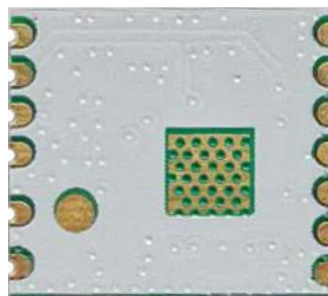
**SHENZHEN BILIAN ELECTRONIC CO., LTD**

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Web: [www.b-link.net.cn](http://www.b-link.net.cn)



Top view



Bottom view

|                                            |       |
|--------------------------------------------|-------|
| Module Name: BL-R8189RM2                   |       |
| Module Type: 802.11b/g/n 150Mbps SDIO WLAN |       |
| Revision: V1.0                             |       |
| Customer Approval:                         |       |
| Company:                                   |       |
| Title:                                     |       |
| Signature:                                 | Date: |
| BL-link Approval:                          |       |
| Title:                                     |       |
| Signature:                                 | Date: |

## Revision History

| Revision | Summary         | Release Date |
|----------|-----------------|--------------|
| V1.0     | Initial release | 2020-09-20   |
|          |                 |              |
|          |                 |              |
|          |                 |              |
|          |                 |              |

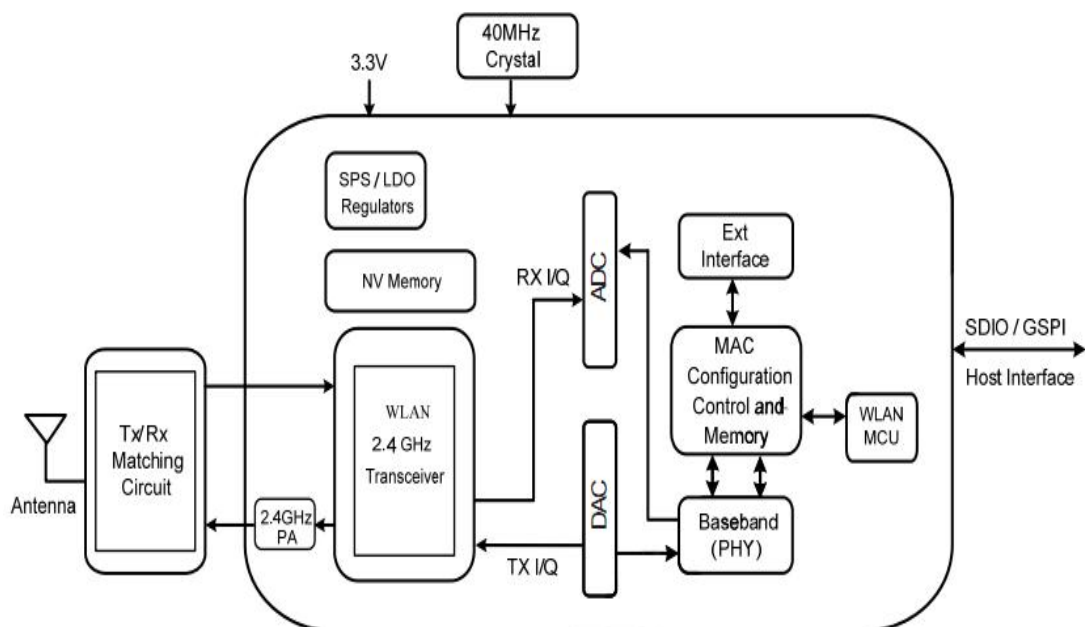
## 1. Introduction

BL-R8189RM2 product Accord with FCC CE and is 150 wireless SDIO adapter which has lower power consumption, high linearity output power, accords with IEEE802.11B/G/N, and supports IEEE802.11i safety protocol, along with IEEE 802.11e standard service quality. It connects with other wireless device which accorded with these standards together, supports the new data encryption on 64/128 bit WEP and safety mechanism on WPA-PSK/WPA2-PSK, WPA/WPA2. Its wireless transmitting rate rises 150M, equivalent to 10 times of common 11b product. The inner AI high gain ceramics antenna adapts different kinds of work environment. It's easy and convenient to link to wireless network for the users using desktop, laptop and other device that needs connect to wireless network.

### 1.1 Features

- WLAN Operating Frequencies: 2.4~2.4835GHz
- IEEE Standards: IEEE 802.11b/g/n
- Wireless data rate can reach up to 150Mbps
- Connect to the external antenna through the half hole
- Power Supply: VDD 3.3V±0.2V

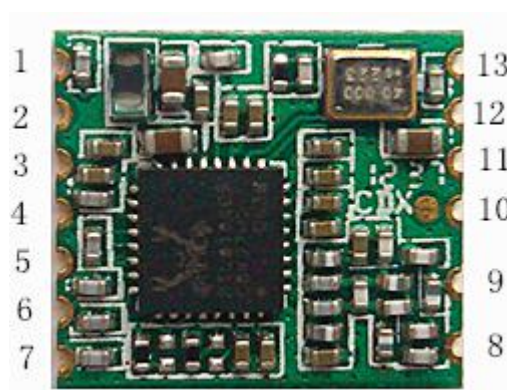
### 1.2 Block Diagram



## 1.3 General Specifications

|                       |                                                       |
|-----------------------|-------------------------------------------------------|
| Module Name           | BL-R8189RM2 WiFi Module                               |
| Chipset               | RTL8189ES                                             |
| WiFi Standards        | IEEE 802.11b, IEEE 802.11g, IEEE 802.11n              |
| Host Interface        | SDIO 1.1/ 2.0/ 3.0                                    |
| Antenna               | Connect to the external antenna through the half hole |
| Dimension             | 14*12.5*1.52mm (LxWxH), Tolerance: +/-0.15mm          |
| Power Supply          | 3.3V +/-0.2V@360mA                                    |
| 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 | Description                   | Supply |
|----|----------|------|-------------------------------|--------|
| 1  | SDIO_CMD | I/O  | SDIO command/GSPI data input  |        |
| 2  | SDIO_D3  | I/O  | SDIO data 3 /GSPI chip select |        |
| 3  | SDIO_D2  | I/O  | SDIO data 2                   |        |
| 4  | SDIO_D1  | I/O  | SDIO data 1 /GSPI data out    |        |
| 5  | SDIO_D0  | I/O  | SDIO data 0 /GSPI data output |        |
| 6  | SDIO_CLK | I/O  | SDIO clock /GSPI clock        |        |
| 7  | GND      | P    | Ground                        |        |

|    |      |     |                        |  |
|----|------|-----|------------------------|--|
| 8  | GND  | P   | Ground                 |  |
| 9  | ANT  | RF  | WLAN radio antenna pad |  |
| 10 | WAKE | I/O | WLAN wake              |  |
| 11 | VIO  | I/O | Power supply for I/O   |  |
| 12 | VCC  | I/O | VDD3.3V for digital IO |  |
| 13 | CS   | I/O | Power down select      |  |

P: Power, I: Input, O: Output, I/O: In/Output, RF: Analog RF Port

### 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 (Voltage Standing Wave Ratio) |     | --  | --  | --  |       |
| Supply Voltage                                      | VDD | 3.1 | 3.3 | 3.5 | V     |

#### 3.2 Digital I/O 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     |

### 4. WiFi RF Specifications

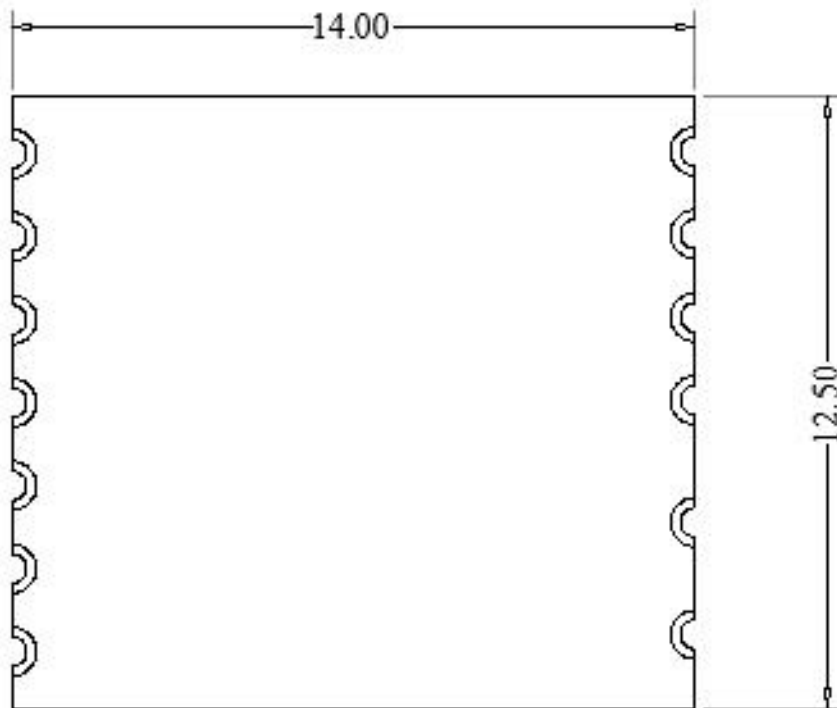
#### 4.1 2.4G WiFi RF Specification

| Conditions : VDD=3.3V ; Ta:25°C |                                          |
|---------------------------------|------------------------------------------|
| Features                        | Description                              |
| WLAN Standard                   | IEEE 802.11b, IEEE 802.11g, IEEE 802.11n |
| Frequency Range                 | 2.4~2.4835GHz (2.4GHz ISM Band)          |

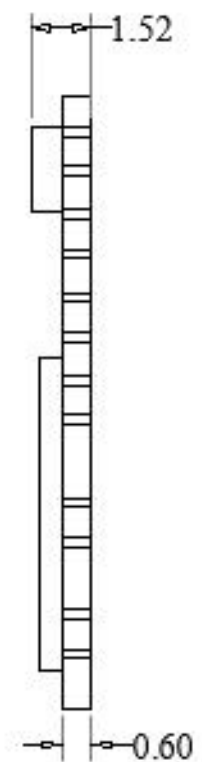
|                                        |                                                                                                                                                                                       |                       |        |
|----------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|--------|
| Channels                               | Ch1~Ch11                                                                                                                                                                              |                       |        |
| Modulation                             | 802.11b (DSSS): DBPSK, DQPSK, CCK;<br>802.11g (OFDM): BPSK, QPSK, 16QAM, 64QAM;<br>802.11n (OFDM): BPSK, QPSK, 16QAM, 64QAM;                                                          |                       |        |
| Date 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 (HT40): MCS0~MCS7(1T1R_SISO) 13.5~150Mbps; |                       |        |
| Frequency Tolerance                    | ≤ ±25ppm                                                                                                                                                                              |                       |        |
| 2.4G Transmitter Specifications (Ant0) |                                                                                                                                                                                       |                       |        |
| TX Rate                                | TX Power                                                                                                                                                                              | TX Power Tolerance    | EVM    |
| 802.11b@1~11Mbps                       | 17dBm                                                                                                                                                                                 | ±1.5dBm               | ≤-10dB |
| 802.11g@6Mbps                          | 16dBm                                                                                                                                                                                 | ±1.5dBm               | ≤-10dB |
| 802.11g@54Mbps                         | 14dBm                                                                                                                                                                                 | ±1.5dBm               | ≤-25dB |
| 802.11n@HT20_MCS0                      | 16dBm                                                                                                                                                                                 | ±1.5dBm               | ≤-10dB |
| 802.11n@HT20_MCS7                      | 14dBm                                                                                                                                                                                 | ±1.5dBm               | ≤-28dB |
| 802.11n@HT40_MCS0                      | 15dBm                                                                                                                                                                                 | ±1.5dBm               | ≤-10dB |
| 802.11n@HT40_MCS7                      | 13dBm                                                                                                                                                                                 | ±1.5dBm               | ≤-28dB |
| 2.4G Receiver Specifications (Ant0)    |                                                                                                                                                                                       |                       |        |
| RX Rate                                | Min Input Level (Typ)                                                                                                                                                                 | Max Input Level (Typ) | PER    |
| 802.11b@1Mbps                          | -92dBm                                                                                                                                                                                | -5dBm                 | < 8%   |
| 802.11b@11Mbps                         | -86dBm                                                                                                                                                                                | -5dBm                 | < 8%   |
| 802.11g@6Mbps                          | -88dBm                                                                                                                                                                                | -10dBm                | < 10%  |
| 802.11g@54Mbps                         | -72dBm                                                                                                                                                                                | -10dBm                | < 10%  |
| 802.11n@HT20_MCS0                      | -87dBm                                                                                                                                                                                | -10dBm                | < 10%  |
| 802.11n@HT20_MCS7                      | -68dBm                                                                                                                                                                                | -10dBm                | < 10%  |
| 802.11n@HT40_MCS0                      | -85dBm                                                                                                                                                                                | -10dBm                | < 10%  |
| 802.11n@HT40_MCS7                      | -65dBm                                                                                                                                                                                | -10dBm                | < 10%  |

## 5. Mechanical Specifications

### 5.1 Module Outline Drawing

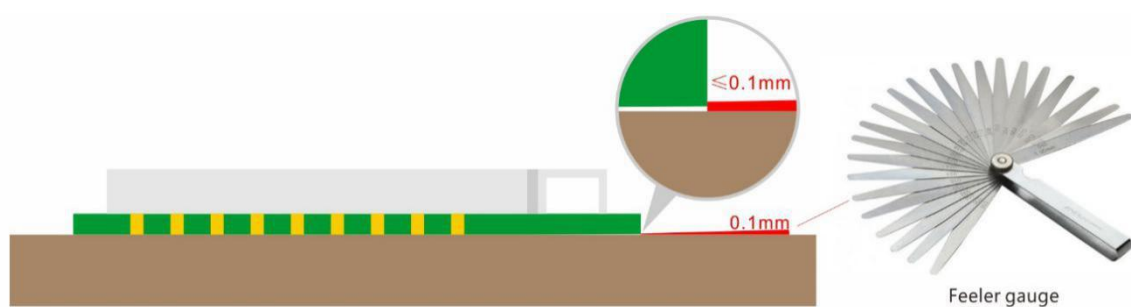


Top view



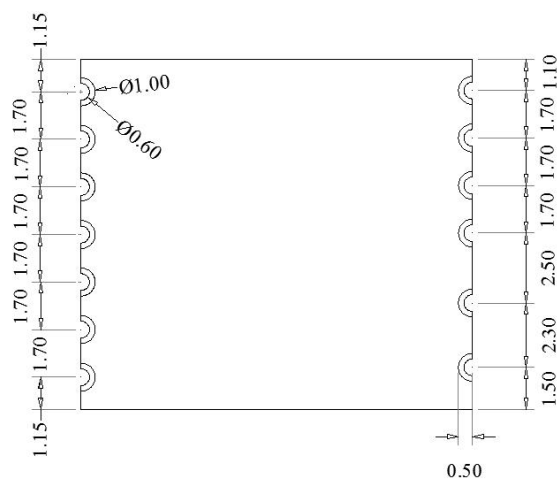
Side view

Module dimension: 14.0mm\*12.5mm\*1.52mm (L\*W\*H , Tolerance:  $\pm 0.15\text{mm}$ )

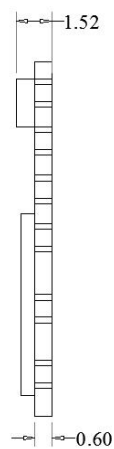


Module Bow and Twist:  $\leq 0.1\text{mm}$

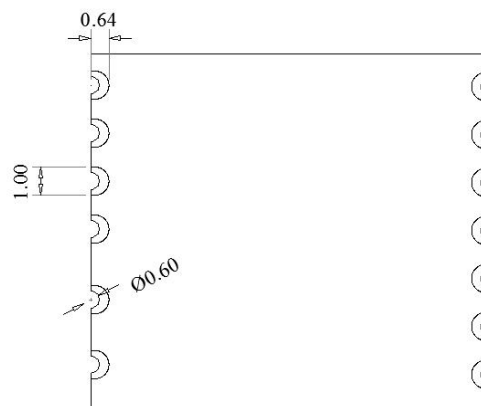
## 5.2 Mechanical Dimensions



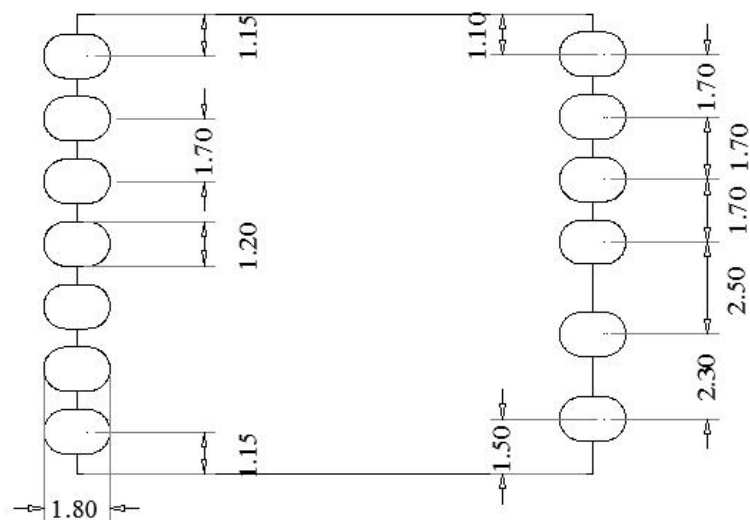
Top view



Side view



Bottom view



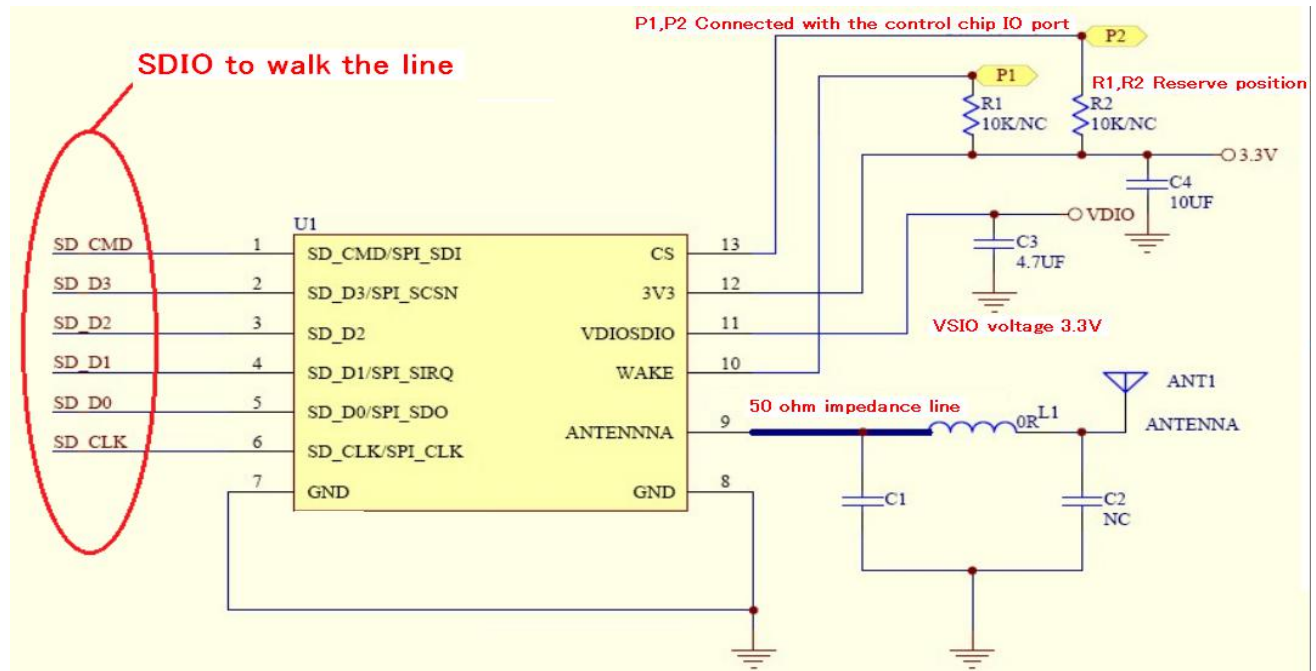
Top view

Reference PCB layout package design

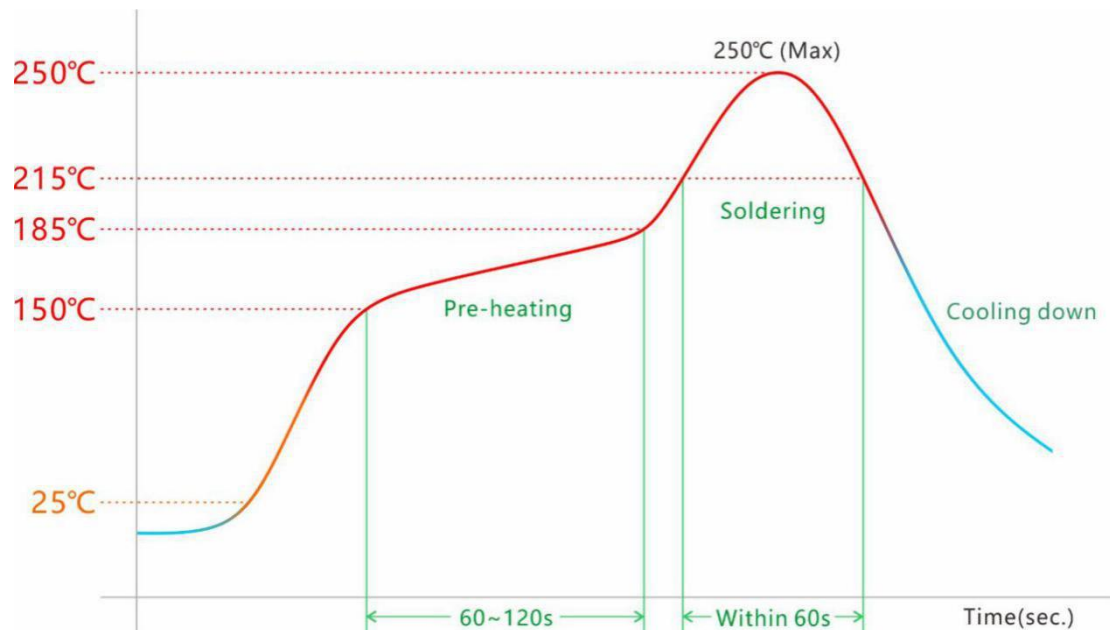


## 6. Application Information

### 6.1 Typical Application Circuit



### 6.2 Reflow Soldering Standard Conditions



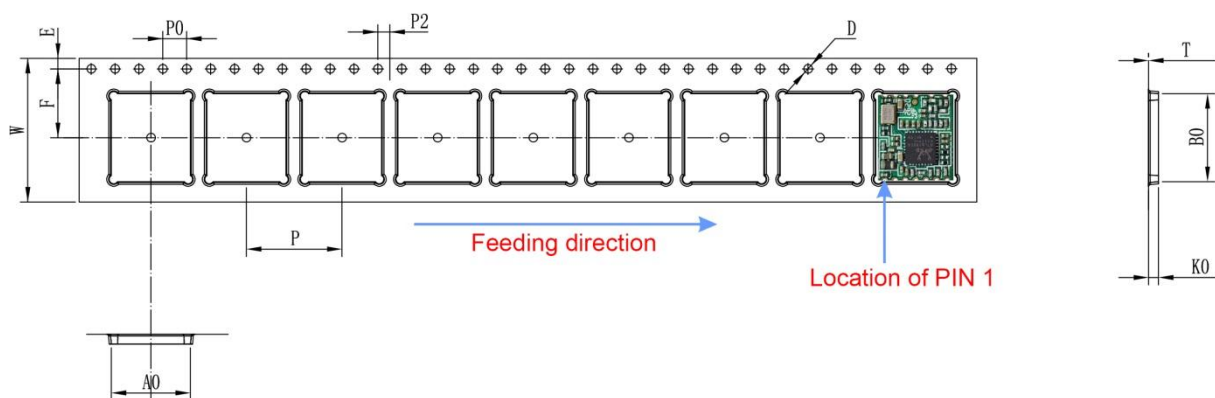
Please use the reflow within 2 times.  
Set up the highest temperature within 250°C.

## 7. Key Components Of Module

| No. | Parts   | Specification    | Manufacturer                               | Note |
|-----|---------|------------------|--------------------------------------------|------|
| 1   | Chipset | RTL8189ES        | Realtek                                    |      |
| 2   | PCB     | BL-M8189RM2      | Shen Zhen Tie Fa Technology limited        |      |
|     |         |                  | Guangdong KINGSHINE ELECTRONICS CO., LTD   |      |
|     |         |                  | Quzhou Sunlord Electronics Co., Ltd        |      |
| 3   | Crystal | 40MHz-15pF-15ppm | HUBEI TKD ELECTRONICS TECHNOLOGY CO., LTD. |      |
|     |         |                  | LUCKI CM ELECTRONICS CO., LTD              |      |

## 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 | 12.85±0.1 | 14.30±0.1 | 1.85±0.1 | 1.75±0.1 | 11.5±0.1 | 16.00±0.1 | 4.00±0.1 | 2.00±0.1 | 01.5±0.1 | 0.30±0.05 |



Package specification:

1. 2000 modules per roll and 10,000 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: -45°C to +85°C

Storage humidity: 10% to 95% RH (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:**

The Module is a static-sensitive electronic device.

Do not operate or store near strong electrostatic fields.

Take proper ESD precautions!

## 9. FCC Statement

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation

This device 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 device 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 device does cause harmful interference to radio or television reception, which can be determined by turning the device 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 device and receiver.
- Connect the device 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

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

### FCC Radiation Exposure Statement

The antennas used for this transmitter must be installed to provide a separation distance of at least 20 cm from all persons and must not be co-located for operating in conjunction with any other antenna or transmitter.