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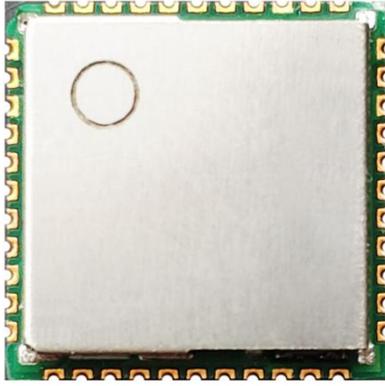
# **BL-M4211LT1**

**802.11n 72.2Mbps WLAN  
IoT Module Specification**

**SHENZHEN BILIAN ELECTRONIC CO., LTD**

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(Top View)



(Bottom View)

Module Name: BL-M4211LT1

Module Type: 802.11b/g/n 72.2Mbps low power consumption IoT module

Revision: V1.1

Customer Approval:

Company:

Title:

Signature:

Date:

Approval:

Title:

Signature:

Date:

## Revision History

Revision	Summary	Release Date	Revised By
1.0	Official release	2022-08-15	
1.1	Update the specification version	2023-04-10	Ch

## 1. Introduction

The BL-M4211LT1 low power consumption IoT module is designed base on AiW4211L, which is a highly integrated, high performance, and low cost 1T1R IEEE802. 11 b/g/n internet of thing (IoT) module. It supports 20 MHz standard bandwidth and 5 MHz/10 MHz narrow bandwidth, provides the highest PHY rate up to 72.2Mbps. This module integrates a high-performance 32-bit microprocessor, supports UART, SDIO2.0 slave interfaces with clock frequency up to 50 MHz for device communication. BL-M4211LT1 is applicable to smart home appliances, intelligent lock, low-power cameras, switch buttons and other smart wireless devices.

### 1.1 Features

Operating Frequencies: 2.4~2.4835GHz

IEEE Standards: IEEE 802.11b/g/n

Wireless PHY rate can reach up to 72.2Mbps

Embedded SRAM:352KB

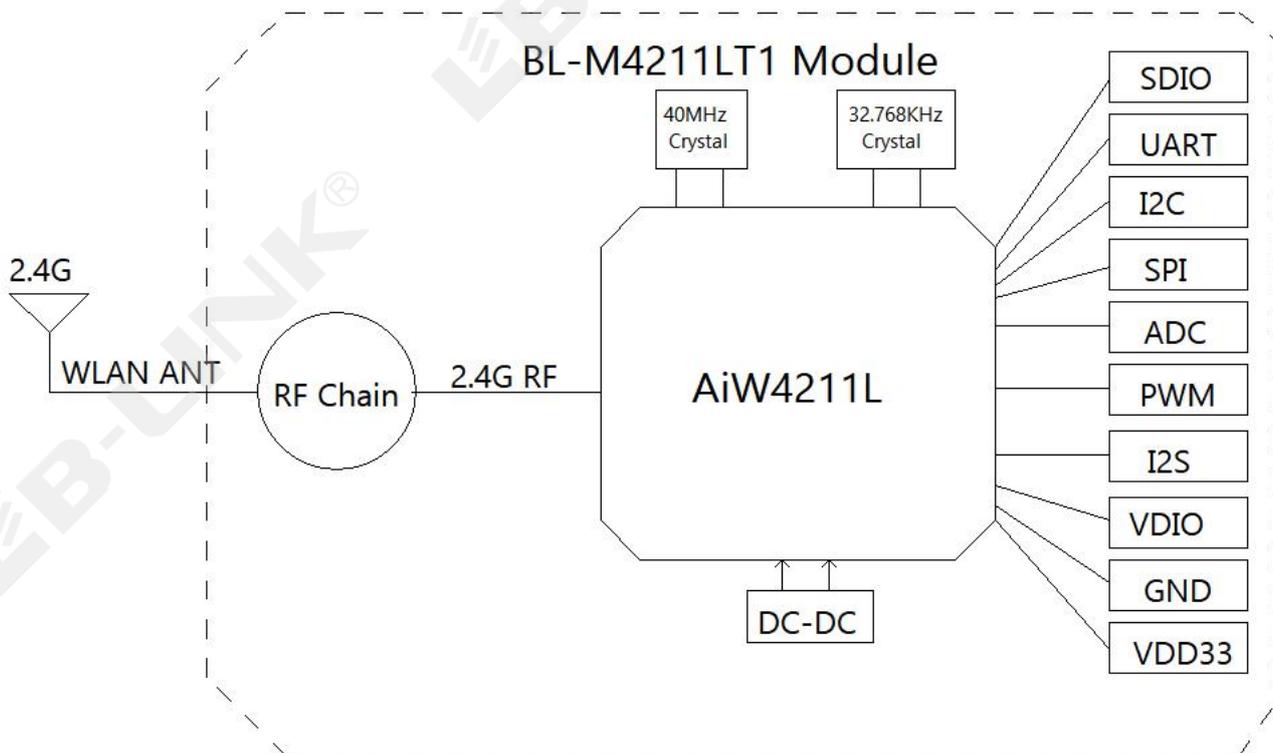
Embedded Flash : 2MB

Provides variety of peripheral interfaces including SDIO,UART,I2S, I2C, SPI, PWM, ADC

Connect to the external antenna through half hole pad

Main Power Supply: DC3.3V±0.2V ;I/O power voltage VDIO DC 3.3V±0.2V or 1.8V±0.1V

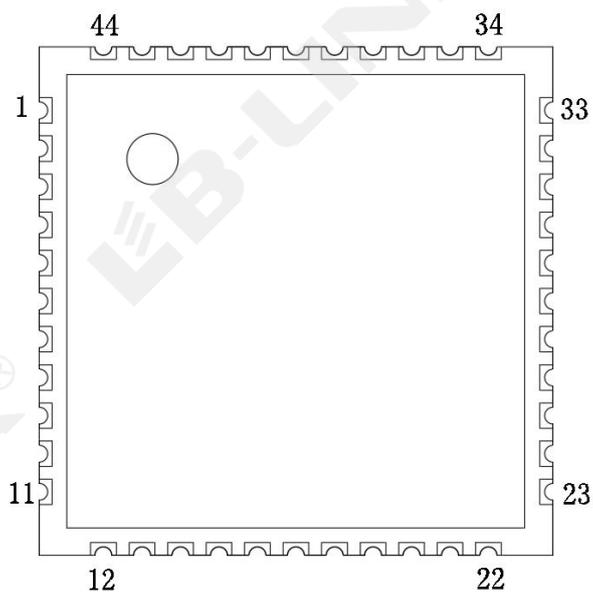
### 1.2 Block Diagram



## 1.3 General Specifications

Module Name	BL-M4211LT1
Chipset	AiW4211L
WLAN Standards	IEEE802.11b/g/n/, 1T1R, 2.4G, 72.2Mbps
Host Interface	SDIO
Antenna	Connect to the external antenna through half hole pad
Dimension	12*12*2.1mm (L*W*H)
Power Supply	DC 3.3V±0.2V @ 450 mA (Max) main power DC 3.3V±0.2V or 1.8V±0.1V I/O power
Operation Temperature	-40°C to +85°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		Ground for RF
2	WLAN ANT	RF		RF pad for WLAN ANT
3	GND	RF		Ground for RF

4	NC	--		No Connection
5	NC	--		No Connection
6	GPIO6	I/O	VDIO	1: GPIO6
				2: Host to wake up device
7	GPIO8	I/O	VDIO	GPIO8
8	NC	--		No Connection
9	VDD33	P		Main power supply 3.3V
10	NC	--		No Connection
11	NC	--		No Connection
12	PWR_ON	I/O	VDIO	1: Power enable, active high when module work. Module has pulled high with 100K.
				2: If not use left it floating.
13	GPIO2	I/O	VDIO	GPIO2
14	GPIO9	I/O	VDIO	1: GPIO9
				2: SDIO_D2
15	GPIO10	I/O	VDIO	1: GPIO10
				2: SDIO_D3
16	GPIO11	I/O	VDIO	1: GPIO11
				2: SDIO_CMD
17	GPIO12	I/O	VDIO	1: GPIO12
				2: SDIO_CLK
18	GPIO13	I/O	VDIO	1: GPIO13
				2: SDIO_D0
19	GPIO14	I/O	VDIO	1: GPIO14
				2: SDIO_D1
20	GND	P		GND Connection
21	NC	--		No Connection
22	VDIO	P		Supply voltage for I/O, 3.3V or 1.8V is alternative
23	NC	--		No Connection
24	NC	--		No Connection
25	NC	--		No Connection
26	NC	--		No Connection
27	NC	--		No Connection
28	NC	--		No Connection
29	NC	--		No Connection

30	NC	--		No Connection
31	GND	P		GND Connection
32	NC	--		No Connection
33	GND	P		GND Connection
34	NC	--		No Connection
35	NC	--		No Connection
36	GND	P		GND Connection
37	GPIO3	I/O	VDIO	1: GPIO3
				2: UART_LOG_TX(for software download or test use)
38	GPIO4	I/O	VDIO	1: GPIO4
				2: UART_LOG_RX(for software download or test use)
39	WL_RST	I/O	VDIO	1: GPIO7
				2: WLAN reset signal active low
40	GPIO5	I/O	VDIO	1: GPIO5
				2: Device to wake-up host
41	NC	--		No Connection
42	NC	--		No Connection
43	NC	--		No Connection
44	NC	--		No Connection

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

2.2 The GPIO pin' s MUX function can be referred to Pin Function Group Table in the following .

Pin No	Fun=0	Fun=1	Fun=2	Fun=3	Fun=4	Fun=5	Fun=6	Fun=7	Fun=8
1	GPIO0	UART1_TXD	SPI1_CLK	PWM3_OUT	I2C1_SDA	RTC_OSC_32K	RTC32K_XOUT	RESERVED	
2	GPIO1	UART1_RXD	SPI1_RXD	PWM4_OUT	I2C1_SCL	RESERVED	RTC32K_XIN	RESERVED	
3	GPIO2	UART1_RTS	SPI1_TXD	PWM2_OUT	RESERVED	SSI_CLK	RESERVED	RESERVED	
4	UART_LOG_TXD	UART1_CTS	SPI1_CS1	PWM5_OUT	I2C1_SDA	SSI_DATA	GPIO3	RESERVED	
5	UART_LOG_RXD	RESERVED	RESERVED	PWM1_OUT	I2C1_SCL	RESERVED	GPIO4	ADC1	

6	UART1_RXD	GPIO5	I2S0_MCK	PWM2_OUT	RESERVE D	BT_STATUS	SPI0_CS1	ADC2	
7	UART1_TXD	GPIO6	I2S0_TX	PWM3_OUT	RESERVE D	COEX_SWITC H	SPI0_CLK	RESERVE D	
8	UART1_CTS	GPIO7	I2S0_CLK	PWM0_OUT	RESERVE D	BT_ACTIVE	SPI0_RXD	ADC3	
9	UART1_RTS	GPIO8	I2S0_WS	PWM1_OUT	RESERVE D	WLAN_ACTI VE	SPI0_TXD	RESERVE D	
10	GPIO9	UART2_RTS	SPI0_TXD	PWM0_OUT	I2C0_SCL	I2S0_MCK	SDIO_D2	ADC4	
11	GPIO10	UART2_CTS	SPI0_CLK	PWM1_OUT	I2C0_SDA	I2S0_TX	SDIO_D3	RESERVE D	
12	GPIO11	UART2_TXD	SPI0_RXD	PWM2_OUT	RESERVE D	I2S0_RX	SDIO_CMD	ADC5	
13	GPIO12	UART2_RX D	SPI0_CS1	PWM3_OUT	RESERVE D	I2S0_CLK	SDIO_CLK	ADC0	
14	GPIO13	UART2_RTS	UART0_LOG_T XD	PWM4_OUT	I2C0_SDA	I2S0_WS	SDIO_D0	ADC6	SSI_DAT A
15	GPIO14	UART2_CTS	UART0_LOG_R XD	PWM5_OUT	I2C0_SCL	RESERVED	SDIO_D1	RESERVE D	SSI_CL K

### 3. Electrical and Thermal Specifications

#### 3.1 Recommended Operating Conditions

Parameters		Min	Typ	Max	Units
Ambient Operating Temperature		-40	25	85	°C
External Antenna VSWR			1.7	2	/
Supply Voltage	VDD33	3.1	3.3	3.5	V
	VDIO	1.7	1.8	1.9	V
		3.1	3.3	3.5	V

#### 3.2 Current Consumption

Conditions : VDD33=3.3V ;VDIO=3.3V Ta:25°C	
Use Case	VDD33 Current (average)

	Typ	Max	Units
Ultra deep sleep mode	5	/	uA
DTIM1 (Delivery traffic indication map 1)	0.9	/	mA
DTIM2	0.4	/	mA
DTIM3	250	/	uA
2.4G 11b 11Mbps TX@17dBm (RF-Test)	292	/	mA
2.4G 11b 11Mbps RX (RF-Test)	47	/	mA

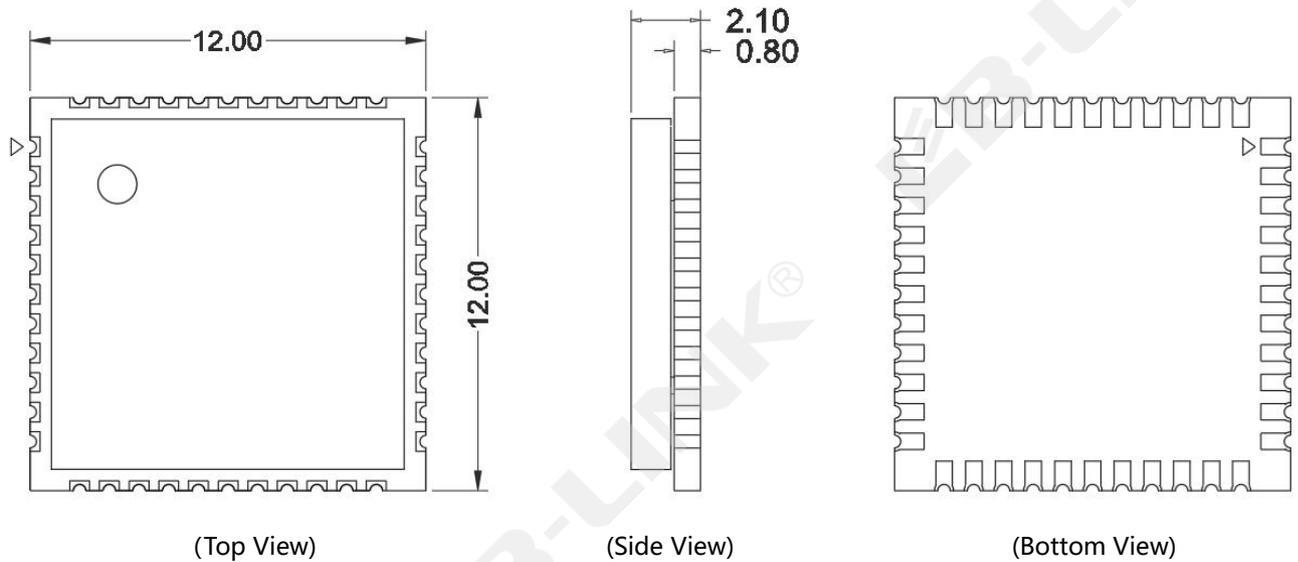
## 4. WLAN RF Specifications

Conditions : VDD33=3.3V ; Ta:25°C			
Features	Description		
WLAN Standard	IEEE 802.11b/g/n		
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; 802.11n (OFDM): BPSK, QPSK, QAM16, QAM64;		
Data Rate	802.11b: 1, 2, 5.5, 11Mbps; 802.11g: 6, 9, 12, 18, 24, 36, 48, 54Mbps; 802.11n (HT20): MCS0~MCS7 6.5~72.2Mbps;		
Frequency Tolerance	≤±20ppm		
2.4G Transmitter Specifications			
TX Rate	TX Power (dBm)	TX Power Tolerance (dBm)	EVM (dB)
802.11b@1~11Mbps	17	±2	≤-10
802.11g@6Mbps	17	±2	≤-15
802.11g@54Mbps	15	±2	≤-25
802.11n@HT20_MCS0	17	±2	≤-10
802.11n@HT20_MCS7	15	±2	≤-28
2.4G Receiver Specifications			
RX Rate	Min Input Level (Typ dBm)	Max Input Level (Typ dBm)	PER
802.11b@1Mbps	-98	-10	< 8%
802.11b@11Mbps	-90	-10	< 8%
802.11g@6Mbps	-92	-10	< 10%

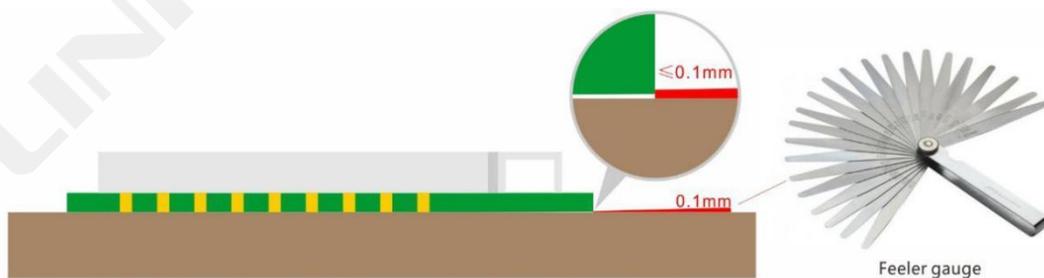
802.11g@54Mbps	-75	-10	< 10%
802.11n@HT20_MCS0	-90	-10	< 10%
802.11n@HT20_MCS7	-73	-10	< 10%

## 5. Mechanical Specifications

### 5.1 Module Outline Drawing

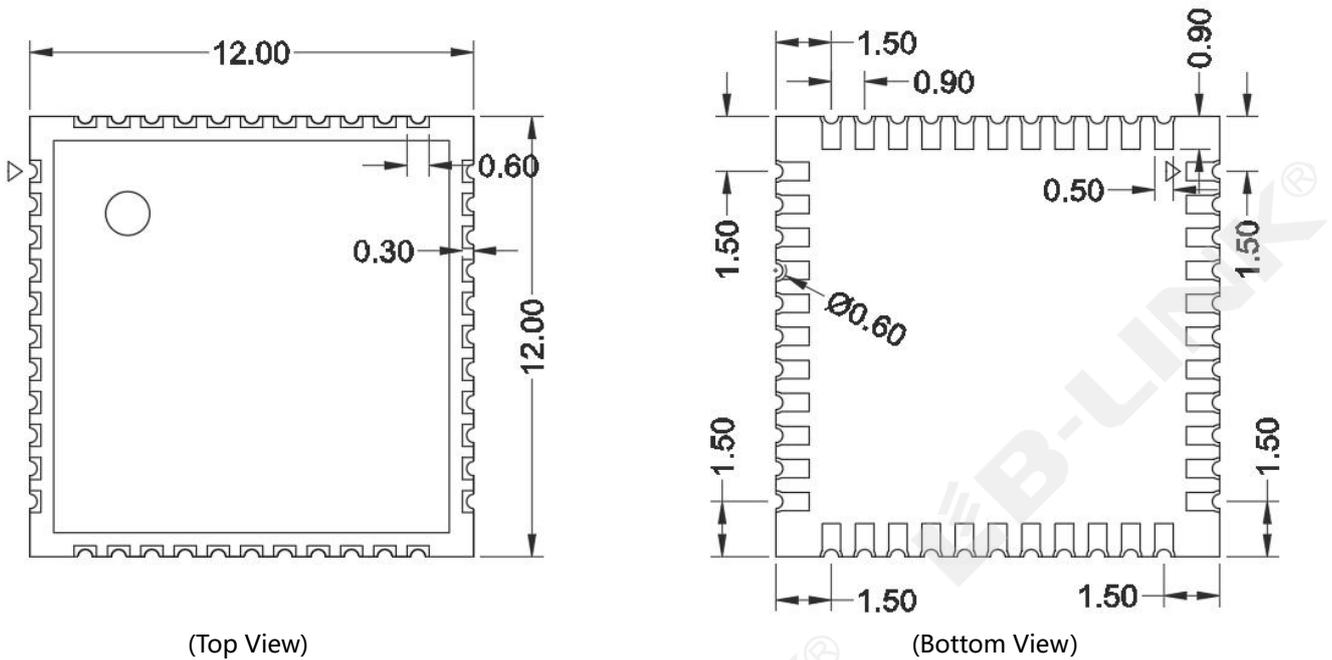


Module dimension: 12\*12\*2.1mm(L\*W\*H; Tolerance:  $\pm 0.15\text{mm}$ )



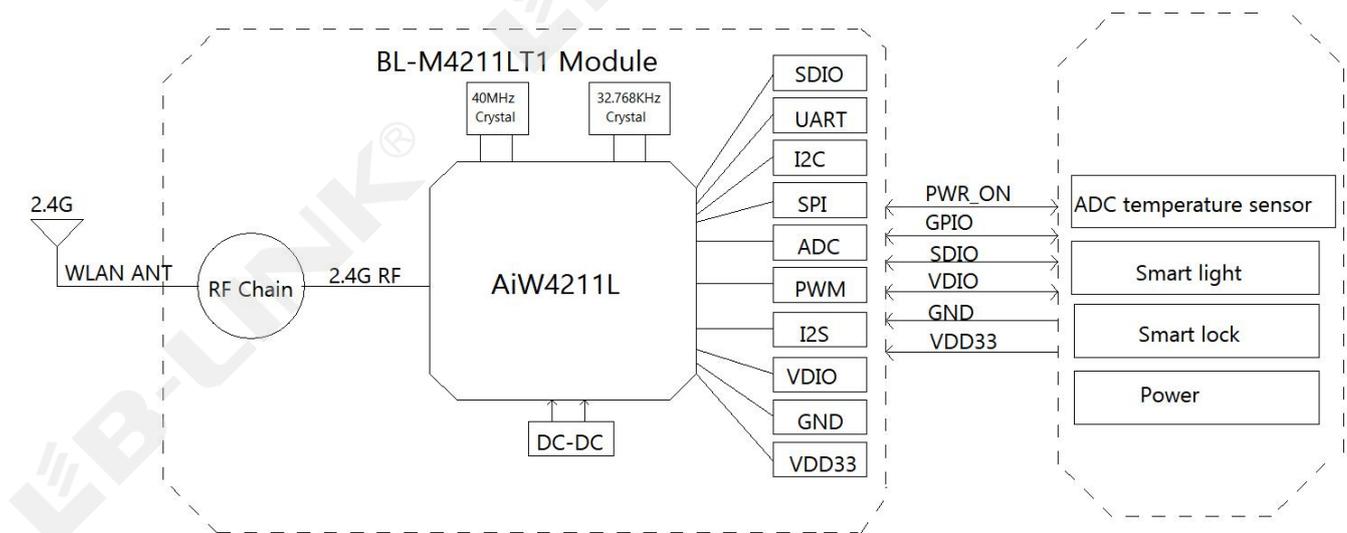
Module Bow and Twist:  $\le 0.1\text{mm}$

## 5.2 Mechanical Dimensions

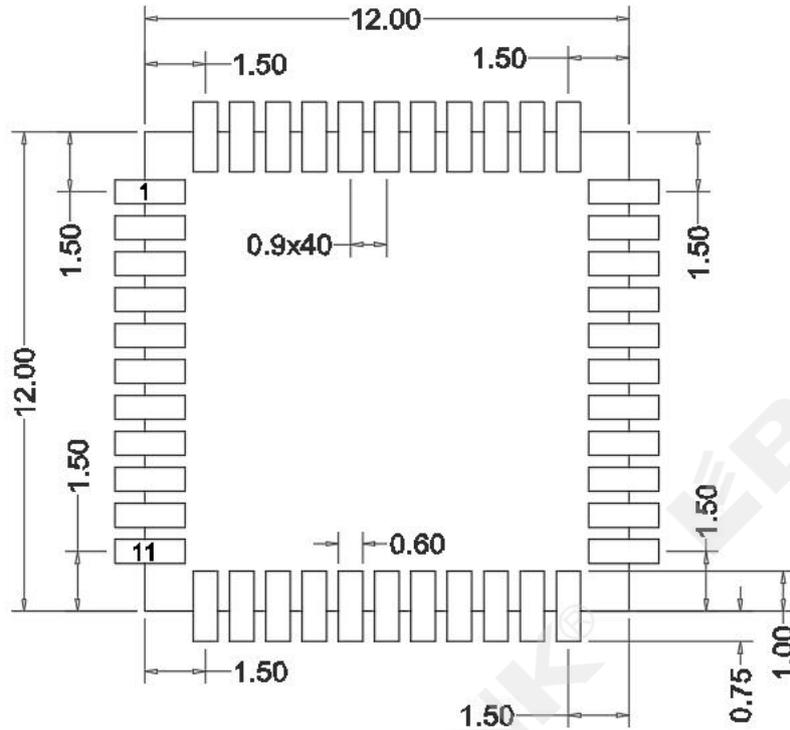


## 6. Application Information

### 6.1 Typical Application Circuit

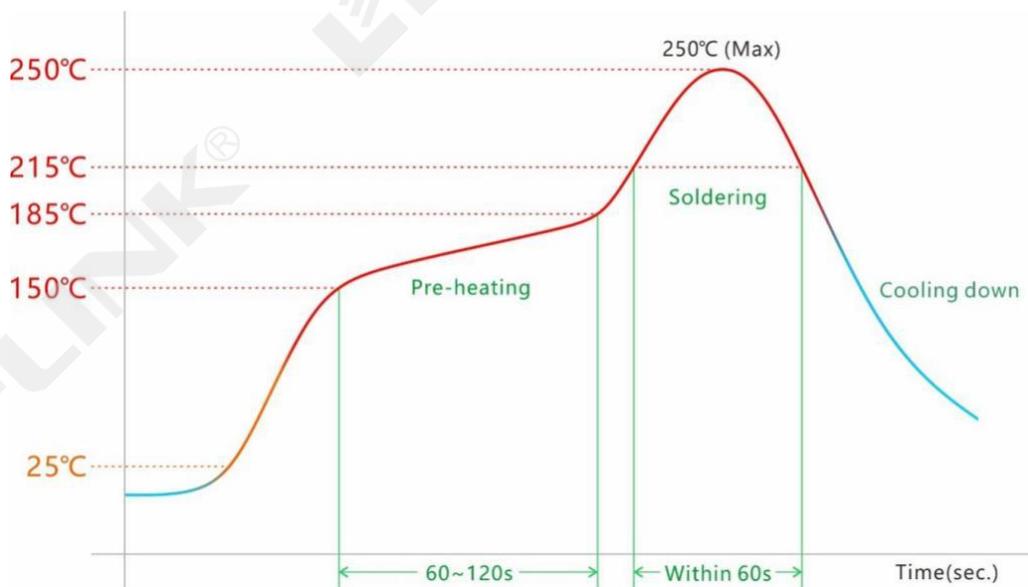


6.2 Recommend PCB Layout Footprint



(Design size: mm)

6.3 Reflow Soldering Standard Condition



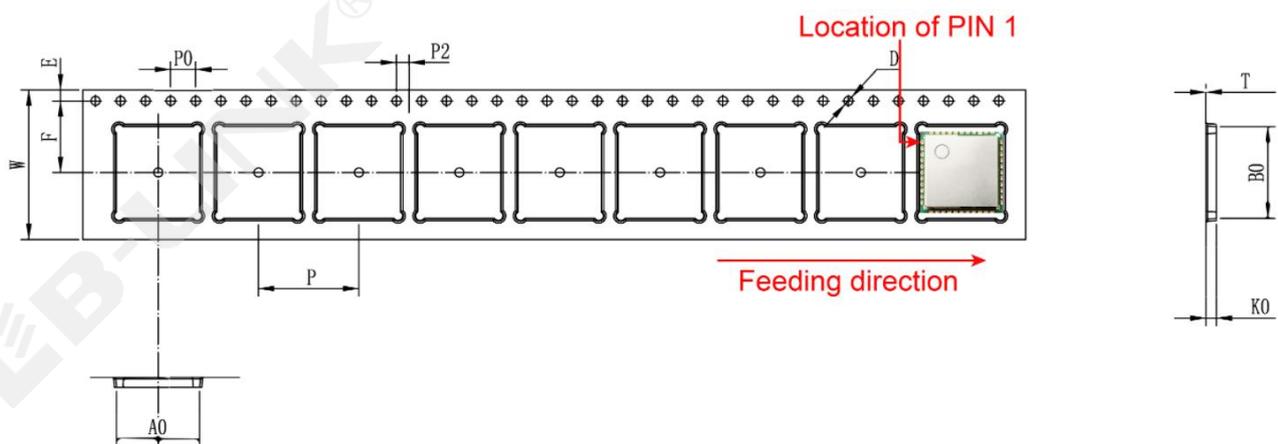
Please use the reflow within 2 times.  
Set up the highest temperature within 250°C.

## 7. Key Components Of Module

No.	Parts	Specification	Manufacturer	Note
1	Chipset	AiW4211L	Chengdu Aiqi Technology CO.,LTD	
2	PCB	BL-M3861LT1	Quzhou Sunlord Electronics Co.,Ltd	
			MILLION SOURCE PRINTED CIRCUIT BOARD CO.,LTD	
			SHEN ZHEN QILI ELECTRON CO.,LTD	
3	Crystal	40MHz-2520	HUBEI TKD CRYSTAL ELECTRONIC SCIENCE AND TECHNOLOGY CO.,LTD	
			LUCKI CM ELECTRONICS CO.,LTD	
			Chengde oscillator Electronic Technology CO.,LTD	
		32.768KHz-3215	HUBEI TKD CRYSTAL ELECTRONIC SCIENCE AND TECHNOLOGY CO.,LTD	
			Chengde oscillator Electronic Technology 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	12.50±0.1	12.50±0.1	2.40±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:

- 1,000 modules per roll and 5,000 modules per box.
- Outer box size: 37.5\*36\*29cm.
- 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).
- Put 1 package of dry agent (20g) and 1 humidity card in each anti-static vacuum bag.
- 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**