



BL-M3201HT1

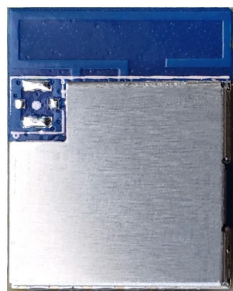
802.11n WLAN+BLE v5.0

IoT Module Specification

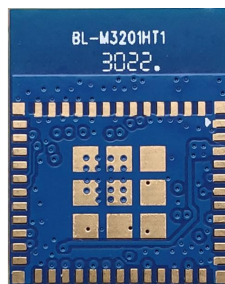
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(Top View)



(Bottom View)

Module Name: BL-M3201HT1	
Module Type: 802.11b/g/n 150Mbps 1T1R WLAN+BLE v5.0 IOT Module	
Revision: V1.0	
Customer Approval:	
Company:	
Title:	
Signature:	Date:
Approval:	
Title:	
Signature:	Date:

Revision History

Revision	Summary	Release Date
0.1	Initial release	2022-12-19
1.0	Official version	2023-01-10

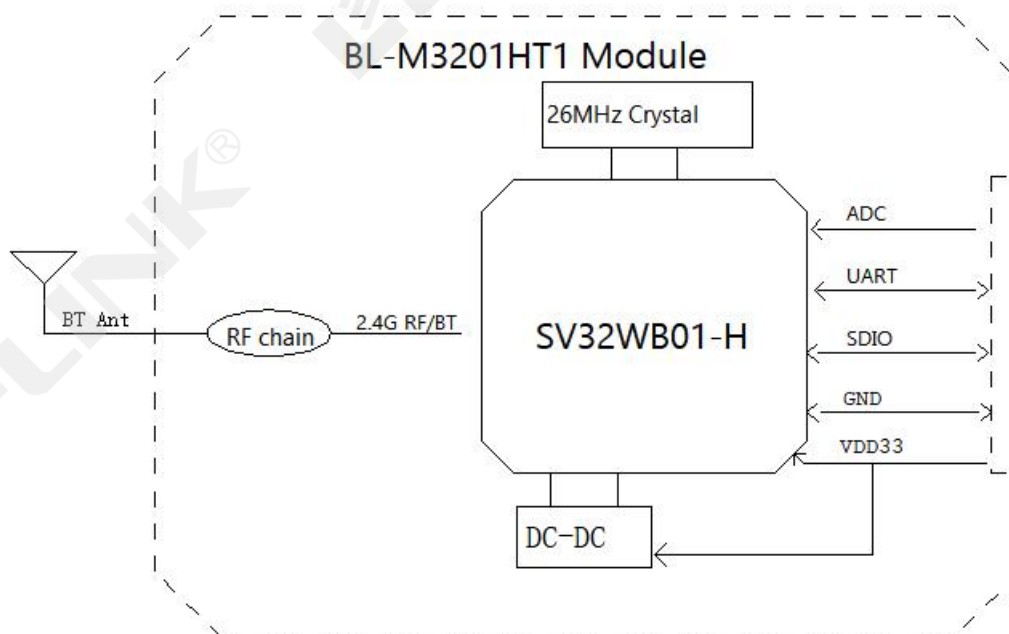
1. Introduction

The BL-M3201HT1 is a fully integrated module with 2.4GHz band 1T1R 11b/g/n WLAN, Bluetooth Low Energy 5.0, MCU, Memory, PMU, and many other functional blocks with rich peripheral interfaces. Its features of small size, multi-functions, high performance, low power consumption and easy software development are ideal for flexible applications of the Internet of things based on WLAN and Bluetooth of communication.

1.1 Features

- Operating Frequencies: 2.4~2.4835GHz
- Host Interface is UART
- IEEE Standards: IEEE 802.11b/g/n
- Wireless PHY rate can reach up to 150Mbps
- Embedded SRAM:384KB
- Embedded Flash:2MB
- Built-in antenna
- Bluetooth 5.0 Low Energy

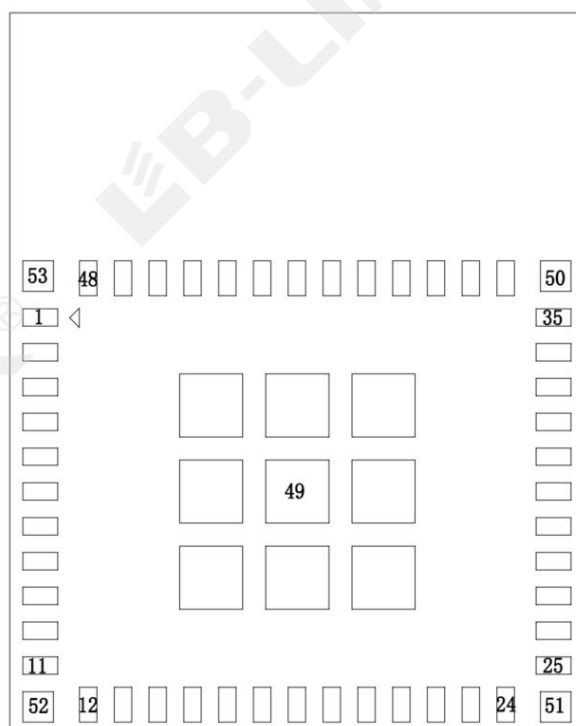
1.2 Block Diagram



1.3 General Specifications

Module Name	BL-M3201HT1 150Mbps WLAN + BLE v5.0 Combo IOT Module
Chipset	SV32WB01-H
WLAN Standards	IEEE802.11b/g/n
Host Interface	UART
Antenna	Built-in antenna
Dimension	13.2*16.6*2.20mm (L*W*H) ±0.15MM
Power Supply	DC 3.3V±0.2V @350mA (Max)
Operation Temperature	-40°C to +85°C
Operation Humidity	10% to 95% RH (Non-Condensing)

2. Pin Assignments



(Perspective Drawing)

2.1 Pin Definition

No	Pin Name	Type	I/O Level	Description
1	GND	RF		RF Ground connections
2	GND	RF		RF Ground connections
3	VDD33	P		3.3V Main power supply
4	NC	/		NC
5	GPIO37-ADC	I/O	VDD33	1.General Purpose I/O GPIO37 2.I2C0_SDA 3.UART2_TXD 4.BT_PTI3 5.WLAN_TX_SW There is no pull-up resistance inside the module
6	GPIO36-ADC	I/O	VDD33	1.General Purpose I/O GPIO36 2.I2C0_SCL 3.UART2_RXD 4.BT_IN_PROCESS 5.BT_SW There is no pull-up resistance inside the module
7	NC	/		NC
8	LDO_EN	I	VDD33	1.LDO_EN enable input. When it pulled down, the module will enter OFF mode. When it pulled up the module will start up. Internal pull-up by 10K resistor and 100nF grounding capacitance
9	NC	/		NC
10	NC	/		NC
11	GND	P		Ground for Power and I/O
12	NC	/		NC
13	GPIO14	I/O	VDD33	1.General Purpose I/O GPIO14 2.PDMTX0_DOUT0 There is no pull-up resistance inside the module
14	GND	P		Ground for Power and I/O
15	NC	/		NC
16	SD_D3-IO18	I/O	VDD33	1.General Purpose I/O GPIO18 2.SD_DATA3 3.SPISLV1_CSN 4.SPIMAS1_CSN There is no pull-up resistance inside the module
17	NC	/		NC
18	SD_CMD-IO19	I/O	VDD33	1.General Purpose I/O GPIO19

				2.SD_CMD 3.DATASPLAVE_MOSI 4.SPISLV1_MOSI 5.SPIMAS1_MOSI There is no pull-up resistance inside the module
19	SD_CLK-IO20	I/O	VDD33	1.General Purpose I/O GPIO20 2.SD_CLK 3.DATASPLAVE_SCLK 4.SPISLV1_MISO 5.SPIMAS1_MISO There is no pull-up resistance inside the module
20	SD_D0-IO21	I/O	VDD33	1.General Purpose I/O GPIO21 2.SD_DATA0 3.DATASPLAVE_MISO 4.SPISLV1_SCLK 5.SPIMAS1_SCLK There is no pull-up resistance inside the module
21	SD_D2-IO17	I/O	VDD33	1.General Purpose I/O GPIO17 2.SD_DATA2 3.UART2_CTS There is no pull-up resistance inside the module
22	GPIO13	I/O	VDD33	1.General Purpose I/O GPIO13 2.Boot strap : Boot form flash: 0 (default, internal pull-down by 10KΩ) Download: 1 (external pull-up to enter flash download mode)
23	SD_D1-IO22	I/O	VDD33	1.General Purpose I/O GPIO22 2.SD_DATA1 3.UART2_RTS There is no pull-up resistance inside the module
24	NC	/		NC
25	NC	/		NC
26	GPIO29-RX2	/	VDD33	1.General Purpose I/O GPIO29 2.ADC3 3.UART1_RXD There is no pull-up resistance inside the module
27	GPIO33-TX2	/	VDD33	1.General Purpose I/O GPIO33 2.UART1_TXD 3.WLAN_TX There is no pull-up resistance inside the module
28	NC	/		NC
29	NC	/		NC
30	GPIO00-RX	I/O	VDD33	1.General Purpose I/O GPIO00 2.AICE_TMSC

				3.ADC0 4.BT_SW 5.UART0_RXD There is no pull-up resistance inside the module
31	GPIO01-TX	I/O	VDD33	1.General Purpose I/O GPIO01 2.AICE_TCKC 3.ADC1 4.WLAN_TX_SW 5.UART0_TXD There is no pull-up resistance inside the module
32	NC	/		NC
33	NC	/		NC
34	NC	/		NC
35	NC	/		NC
36	GND	P		Ground for Power and I/O
37	GND	P		Ground for Power and I/O
38	GND	P		Ground for Power and I/O
39	GND	P		Ground for Power and I/O
40	GND	P		Ground for Power and I/O
41	GND	P		Ground for Power and I/O
42	GND	P		Ground for Power and I/O
43	GND	P		Ground for Power and I/O
44	GND	P		Ground for Power and I/O
45	GND	P		Ground for Power and I/O
46	GND	P		Ground for Power and I/O
47	GND	P		Ground for Power and I/O
48	GND	P		Ground for Power and I/O
49	GND	P		Ground for Power and I/O
50	GND	P		Ground for Power and I/O
51	GND	P		Ground for Power and I/O
52	GND	P		Ground for Power and I/O
53	GND	P		Ground for Power and I/O

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

2.2 Peripheral interfaces@function and signals

Alternate Function	Signal List	Alternate Function	Signal List
		SDIO Slave	SD_DATA2 SD_DATA3

			SD_CMD SD_CLK SD_DATA0 SD_DATA1
UART (0)	GPIO00 UART_RX0 GPIO01 UART_TX0	UART (1)	GPIO29 UART_RX1 GPIO33 UART_TX1
UART (2)	GPIO36 UART_RX2 GPIO37 UART_TX2 GPIO17 UART_CTS2 GPIO22 UART_RTS2	I2C (0)	I2C0_SCL I2C0_SDA
SPI transmission mode (0)	DATASPI_SLAVE_CSN DATASPI_SLAVE_MOSI DATASPI_SLAVE_SCLK DATASPI_SLAVE_MISO	SPI Master (1)	SPIMAS1_CSN SPIMAS1_MOSI SPIMAS1_MISO SPIMAS1_SCLK
SPI Slave (1)	SPISLV1_CSN SPISLV1_MOSI SPISLV1_MISO SPISLV1_SCLK	ADC	ADC0 ADC7 ADC1 ADC3 ADC6

Note:

A:UART0 is the flash download port, and it also use for software debug .

B:UART1/UART2 is a high-speed serial port. The highest baud rate is 4.8Mbps, which can be selected according to the application, and can be used as the communication port with the external master.

C:ADC 12bit, input impedance>1MΩ; Sampling rate 1 MSPS; The maximum input voltage range is 3.3V.

2.3 GPIO Function Multiplexing Description

Name	Boot Strapping ALT0	ALT1	ALT2	ALT3	ALT4	ALT5	ALT6	ALT7
GPIO00	AICE_TMSC	ADC0	BT_SW	UART0_RXD				GPIO00
GPIO01	AICE_TCKC	ADC1	WIFI_TX_SW	UART0_TXD				GPIO01
GPIO13	GPIO13							GPIO13
GPIO14	GPIO14			PDMTX0_DOUT0				GPIO14
GPIO17	GPIO17	SD_DATA2	UART2_NCTS					GPIO17
GPIO18	GPIO18	SD_DATA3		DATASPI_SLAVE_CSN	SPISLV1_CSN	SPIMAS1_CSN		GPIO18
GPIO19	GPIO19	SD_CMD		DATASPI_SLAVE_MOSI	SPISLV1_MOSI	SPIMAS1_MOSI		GPIO19
GPIO20	GPIO20	SD_CLK		DATASPI_SLAVE_SCLK	SPISLV1_MISO	SPIMAS1_MISO		GPIO20
GPIO21	GPIO21	SD_DATA0		DATASPI_SLAVE_MISO	SPISLV1_SCLK	SPIMAS1_SCLK		GPIO21
GPIO22	GPIO22	SD_DATA1	UART2_NRTS					GPIO22
GPIO29	GPIO29	ADC3			UART1_RXD			GPIO29
GPIO33	GPIO33				UART1_TXD	WIFI_TX		GPIO33
GPIO36	GPIO36	ADC6	I2C0_SCL	UART2_RXD		BT_IN_PROCESS	BT_SW	GPIO36
GPIO37	GPIO37	ADC7	I2C0_SDA	UART2_TXD		BT_PT13	WIFI_TX_SW	GPIO37

3. Electrical and Thermal Specifications

3.1 Recommended Operating Conditions

Parameters		Min	Typ	Max	Units
Ambient Operating Temperature		-40	25	85	°C
Supply Voltage	VDD33	3.1	3.3	3.5	V
Antenna Specifications					
Items	Frequency Range	Gain(max)	VSWR	Polarization	
Built-in antenna	2.4~2.4835GHz	0.5dBi	2.5	Linear polarization	

3.2 Current Consumption

Conditions : VDD33=3.3V ; Ta:25°C			
Use Case	VDD33 Current (average)		
	Typ	Max	Units
2.4G WLAN throughput 20Mbps	220	230	mA
2.4G 11b@1Mbps TX@17dBm (RF test)	212	230	mA
2.4G 11n@20M MCS0 TX@17dBm (RF test)	185	230	mA
2.4G 11n@40M MCS7 TX@14dBm (RF test)	168	230	mA
2.4G 11n@40M MCS7 RX (RF test)	41	45	mA
2.4G BT LE 1M TX@5dBm (RF test)	148	168	mA
2.4G BT LE 1M RX (RF test)	38	42	mA

4. WLAN RF & Bluetooth Specifications

4.1 2.4G WLAN RF Specification

Conditions : VDD33=3.3V ; Ta:25°C	
Features	Description
WLAN Standard	IEEE 802.11b/g/n
Frequency Range	2.4~2.484GHz (2.4GHz ISM Band)

Channels	Ch1~Ch13 (For 20MHz Channels)
Modulation	802.11b (DSSS): DBPSK, DQPSK, CCK; 802.11g (OFDM): BPSK, QPSK, 16QAM, 64QAM; 802.11n (OFDM): BPSK, QPSK, 16QAM, 64QAM;
Date Rate	802.11b: 1, 2, 5.5, 11Mbps; 802.11g: 6, 9, 12, 18, 24, 36, 48, 54Mbps; 802.11n (HT20): MCS0~MCS7(1T1R_SISO) 6.5~72.2Mbps; 802.11n (HT40): MCS0~MCS7(1T1R_SISO) 13.5~150Mbps;
Frequency Tolerance	$\leq \pm 20\text{ppm}$

2.4G Transmitter Specifications

TX Rate	Recommended Target TX Power(dBm)	TX Power Tolerance(dBm)	EVM(dB)
802.11b@1~11Mbps	17	± 2	≤ -10
802.11g@6Mbps	17	± 2	≤ -10
802.11g@54Mbps	14	± 2	≤ -25
802.11n@HT20_MCS0	17	± 2	≤ -10
802.11n@HT20_MCS7	14	± 2	≤ -28
802.11n@HT40_MCS0	17	± 2	≤ -10
802.11n@HT40_MCS7	14	± 2	≤ -28

2.4G Receiver Specifications

RX Rate	Min Input Level(Typ dBm)	Max Input Level(Typ dBm)	PER
802.11b@1Mbps	-92	-10	< 8%
802.11b@11Mbps	-85	-10	< 8%
802.11g@6Mbps	-88	-15	< 10%
802.11g@54Mbps	-70	-15	< 10%
802.11n@HT20_MCS0	-88	-15	< 10%
802.11n@HT20_MCS7	-68	-15	< 10%
802.11n@HT40_MCS0	-86	-15	< 10%
802.11n@HT40_MCS7	-65	-15	< 10%

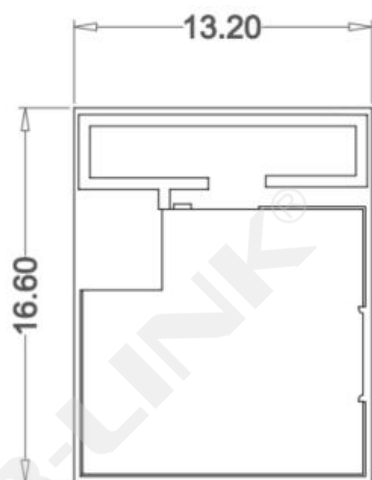
4.2 Bluetooth RF Specification

Conditions: VDD33 = 3.3V; Ta:25°C	
Features	Description
Bluetooth Specification	Bluetooth Low Energy 5.0
Frequency Range	2.4~2.4835GHz(2.4GHz ISM Band)

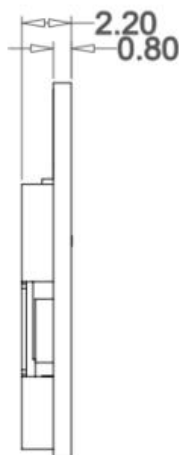
Channels	Bluetooth Low Energy: Ch0~Ch39 (For 2MHz Channels);			
Power Classes	Bluetooth Low Energy: Class1.5;			
Date Rate & Modulation	LE_1Mbps: GFSK (Uncoded);			
Bluetooth Transmitter Specifications				
Items	Min(dBm)	Typ(dBm)	Max(dBm)	
TX Power				
LE_1M	1	5	9	
Bluetooth Receiver Specifications				
Items	Sensitivity		Maximum Input Level	
	Input Level(dBm)	PER	Input Level(dBm)	PER
LE_1M	-88dBm	≤5%	-10dBm	≤5%

5. Mechanical Specifications

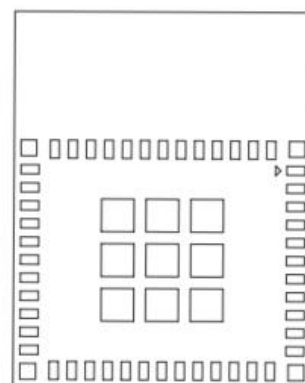
5.1 Module Outline Drawing



(Top View)

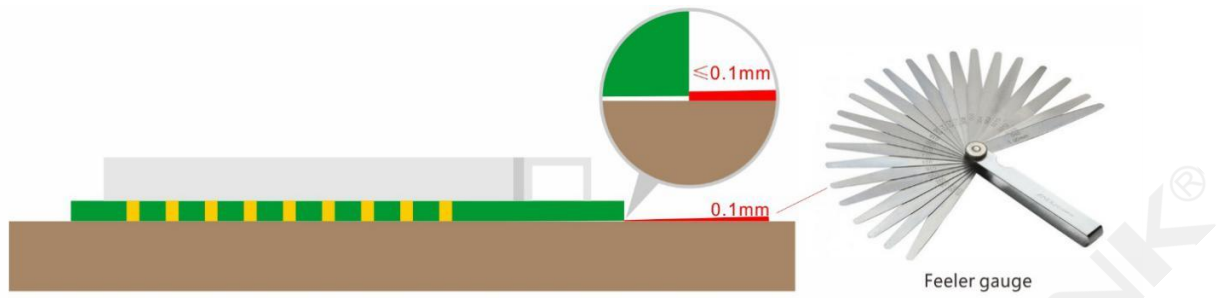


(Side View)



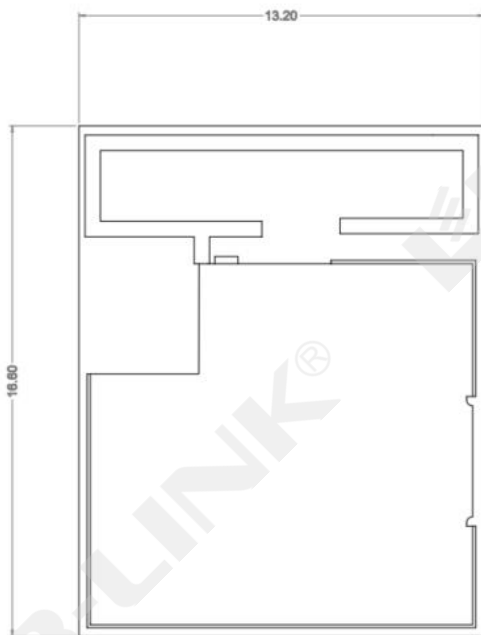
(Bottom View)

Module dimension: 13.20*16.60*2.20mm (L*W*H; Tolerance: ±0.15mm)

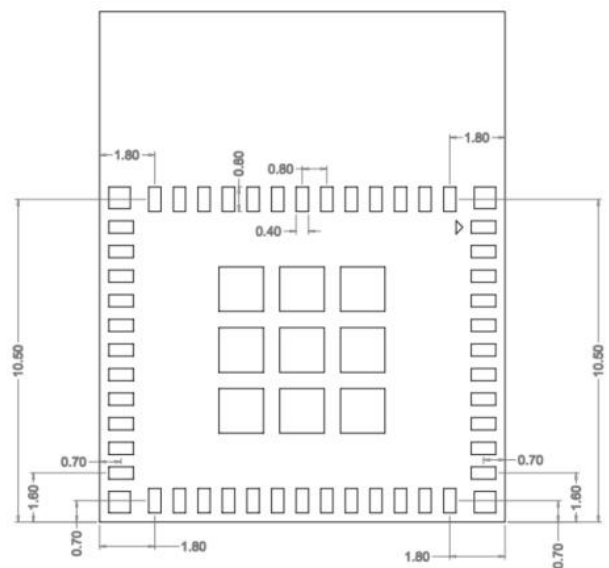


Module Bow and Twist: $\leq 0.1\text{mm}$

5.2 Mechanical Dimensions



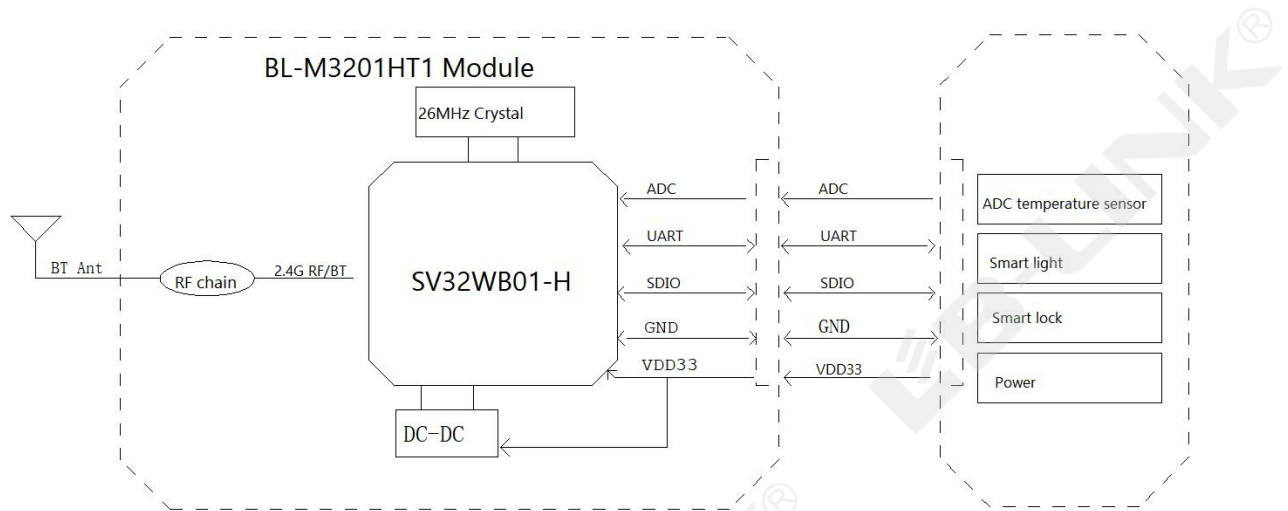
(Top View)



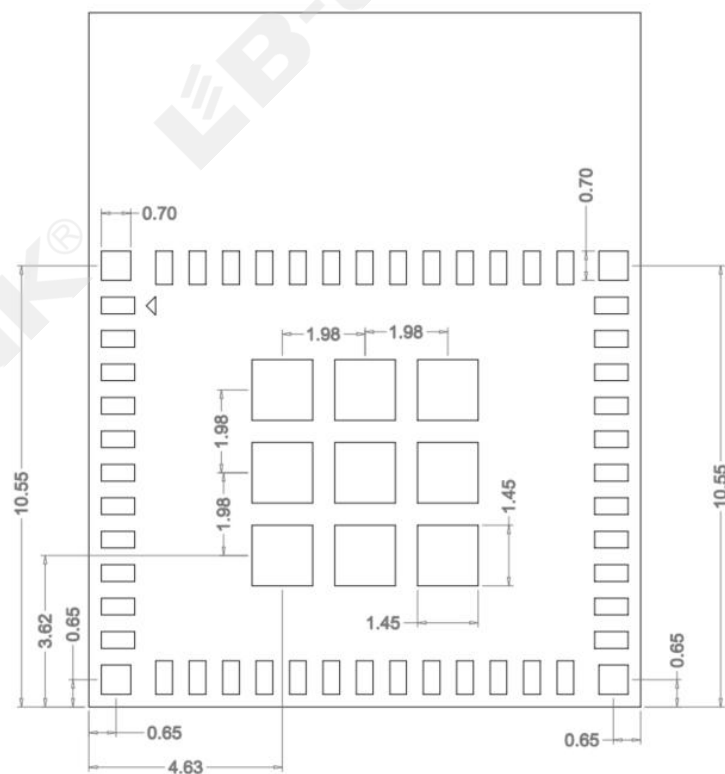
(Bottom View)

6. Application Information

6.1 Typical Application Circuit

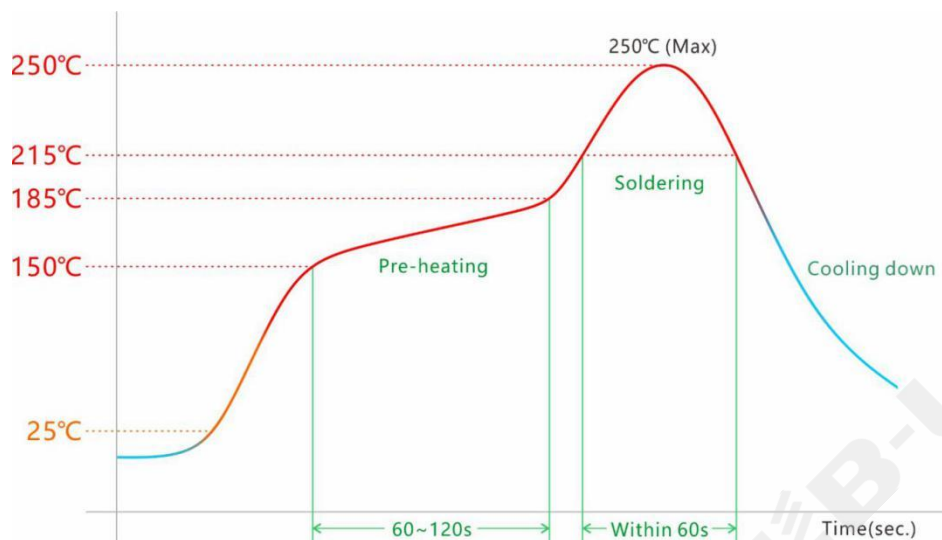


6.2 Recommend PCB Layout Footprint



(Design Size: mm)

6.3 Reflow Soldering Standard Conditions



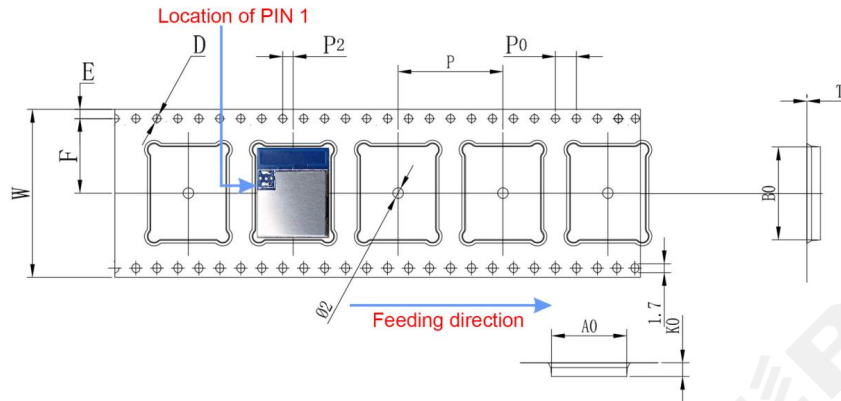
Please use the reflow within 2 times.
Set up the highest temperature within 250°C.

7. Key Components Of Module

No.	Parts	Specification	Manufacturer	Note
1	Chipset	SV32WB01-H	Shenzhen iComm Semiconductor CO.,LTD	
2	PCB	BL-M3201HT1	ShenZhen Tie Fa Technology Limited Guangdong KINGSHINE ELECTRONICS CO., LTD MILLION SOURCE PRINTED CIRCUIT BOARD CO.,LTD Quzhou Sunlord Electronics CO., LTD SHEN ZHEN QILI ELECTRON CO.,LTD	
3	Crystal	26MHz	HUBEI TKD CRYSTAL ELECTRONIC SCIENCE AND TECHNOLOGY CO.,LTD JinHua East Crystal Electronic CO.,LTD Chengde oscillator Electronic 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	32.00±0.3	13.80±0.1	17.20±0.1	2.70±0.1	1.75±0.1	14.2±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 36mm (with a width of 32mm carrying belt).
- Put 1 package of dry agent (20g) and 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% 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:

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