



# EW-BLED-33 BLES

## Standard Module

### Specification

V1.0

## About this manual

《 EW-Bled -33 Module Specification 》 provides an introduction to the basic functions of the EW-BLED-33 module, including the electrical specifications, RADIO frequency performance, pin size, and reference schematic design of the module. Readers can refer to this document for a detailed understanding of the overall functional parameters of the module.

## Change of History

Rev. information

Rev.	Date	Change of history	Editor
V1.0	2021.9.23	Initial release	Tony



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# 1. Profile

## 1.1 Features

The EW-Bled -33 is a small, low-cost Bluetooth BLE5.1standardized module developed by Shanghai Electronics Way Co., Ltd.

The features of this module are as follows。

- Using Freq chip fr8018h chip Built-in high performance32-bit MCU, 512KB Flash, 48KB RAM
- Meet Bluetooth 5.1 standard, support 1 Mbps, 500 Kbps, 125 Kbps rate
- Transmitting power: Maximum +10dBm (minimum to -20dbm)
- Receiving sensitivity: The receiving sensitivity reaches -94dbm in 125Kbps mode
- Support UART, SPI, I2C, I2S, ADC, PWM and other interfaces
- Support FTMS protocol, can be customized according to customer communication protocol
- Support true random number generator
- Support master and slave multiple connections, up to 16 connections
- The module has passed BQB, SRRC, FCC certification
- On-board high performance PCB antenna
- Stamp hole pin, easy and reliable to weld
- Ultra-small package: 11.2x16mm
- Ultra wide supply voltage: 1.8V-4.3V
- Working temperature: -40°C ~ +105°C

Ew-bled-33 module only needs to connect VCC, GND, TX and Rx to complete the data transmission and communication function. It can also be used according to

Customers need to customize specific communication protocols and customization functions in specific application environments. After the module configuration is completed, the relevant software can be used

Test the function of communication data. Users conduct Bluetooth connection and communication test through common mobile phone Bluetooth communication test tools. In addition,

Ew-bled-33 module can also be used as MCU in the fields of fitness equipment, small household appliances, smart home and industrial control instruments;

Yiwei company has been engaged in the Bluetooth field for many years and has strong R & D strength. It can easily realize the interconnection, data transmission and other applications of users' Bluetooth devices. On the basis of ew-bled-33 standard module, our company can customize the Bluetooth module that meets the customer's use specifications according to the customer's requirements, and provide corresponding software and hardware support

## 1.2 Application scope

Fitness equipment: Treadmill, Fitness bike, Elliptical machine, etc;

## 2. Electronic data

### Absolute Maximum Ratings

Rating		Min	Max	Unit
Supply Voltage	VCC	1.8	4.3	V
I/O Voltage	ALDO_OUT	2.1	3.5	V
Storage Temperature	Tstr	-20	85	°C

#### Note:

The electrical characteristics listed are target specifications for reference only.

Some of the data may be updated based on actual test results.

The voltage values shown are based on GND in the module. Any voltage exceeding the "maximum rating" may be applied to the device and cause permanent damage.

Item	Symbol	Min	Typ.	Max	Unit
Supply Voltage	VCC	1.8	3.3	4.3	V
I/O Voltage	ALDO_OUT	2.1	2.9	3.5	V
Operating Temperature	Topr	-20	-	85	°C

(Recommended Operating Conditions)

Operation Mode	Average	Maximum	Unit
TX peek current(0 dB)		9	mA
RX peek current		12.8	mA
Deep sleep current(include 48K retention RAM)	12		µ A
Power off	5		µ A

(Power Consumption)

## (Audio CODEC)

<b>Digital to Analogue Converter(Mono)</b>					
PARAMETER	CONDITIONS	MIN	TYP	MAX	UNIT
Resolution	-	-	-	20	Bits
Sampling frequency	The synchronized clock	8		48	kHz
SNR (Signal to Noise Ratio)	Fin=1kHz B/W=20Hz—20KHz A-Weighted THD_N<0.01% Fs(8K,16K,32K,44.1K,48K)		92		dB
Digital Gain	Digital Gain	-48		32	dB
Analogue Gain	Analog Gain Resolution =	0		-30	dB
Output voltage	VDDA=2.9V		1500		mV
Stopband attenuation		65			dB
<b>Analog to Digital Converter(Mono)</b>					
PARAMETER	CONDITIONS	MIN	TYP	MAX	UNIT
Resolution	-	-	-	16	Bits
Sampling frequency	The synchronized clock	8		48	kHz
Signal to Noise Ratio	A-weighted		79		dBFS
	W/O weighting		79		dBFS
Digital Gain	Digital Gain	-48		32	dB
Analogue Gain	Analog Gain Resolution =	0		30	dB

### 3. Pins definition

#### 3.1 Pins layout

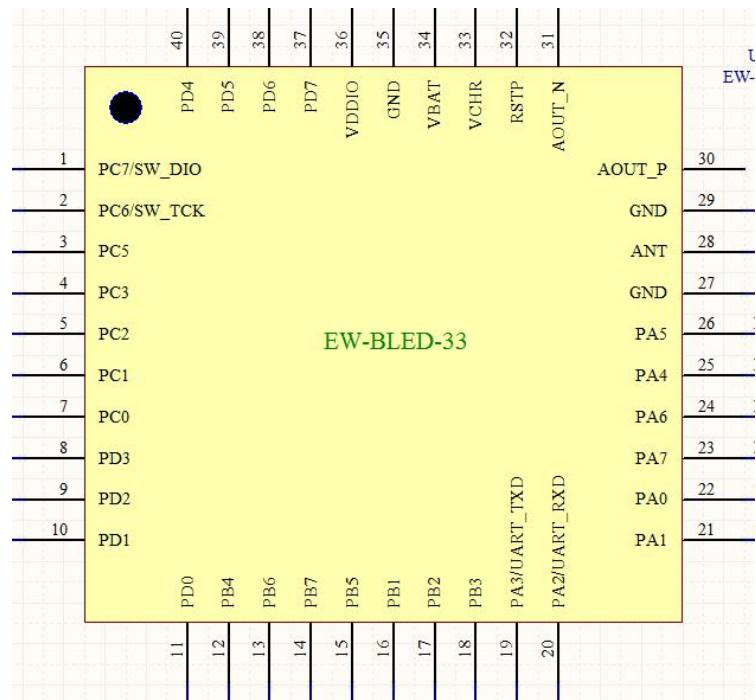


Figure 3-1 Module pins diagram

Note: Figure 3-1 Pin functionality can be redefined by pin reuse



### 3.2 Pins definition

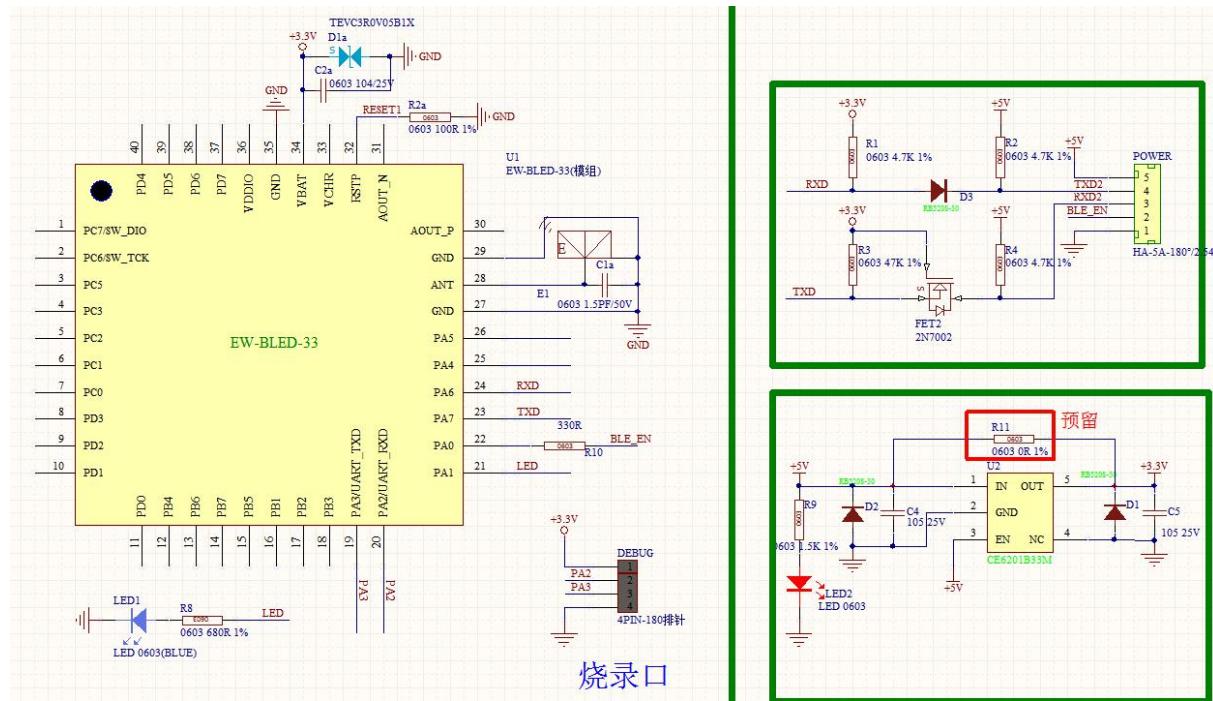
PIN #	引脚名	类型	描述
1	PC7	DIO	SDA1/I2SDIN/PWM5_P/SSPDIN/UTXD0/UTXD1/SWDIO/P DMDAT/PWM4_N
2	PC6	DIO	SCL1/I2SDOUT/PWM4_P/SSPDOUT/URXD0/URX D1/SWTCK/PDMCLK/PWM5_N
3	PC5	DIO	SDA0/I2SFRM/PWM5_P/SSPCSN/UTXD0/UTXD1/ SWV/PDMDAT/PWM4_N
4	PC3	DIO	SDA1/I2SDIN/PWM3_P/SSPDIN/UTXD0/UTXD1/S WV/PDMDAT/PWM2_N
5	PC2	DIO	SCL1/I2SDOUT/PWM2_P/SSPDOUT/URXD0/URX D1/SWV/PDMCLK/PWM3_N
6	PC1	DIO	SDA0/I2SFRM/PWM1_P/SSPCSN/UTXD0/UTXD1/ SWV/PDMDAT/PWM0_N
7	PC0	DIO	SCL0/I2SCLK/PWM0_P/SSPCLK/URXD0/URXD1/S WV/PDMCLK/PWM1_N
8	PD3	DIO	SDA1/I2SDIN/PWM3_P/SSPDIN/UTXD0/UTXD1/ WLANRX/PDMDAT/PWM2_N
9	PD2	DIO	SCL1/I2SDOUT/PWM2_P/SSPDOUT/URXD0/URX D1/WLANTX/PDMCLK/PWM3_N
10	PD1	DIO	SDA0/I2SFRM/PWM1_P/SSPCSN/UTXD0/UTXD1/ BLERX/PDMDAT/PWM0_N
11	PD0	DIO	SCL0/I2SCLK/PWM0_P/SSPCLK/URXD0/URXD1/B LETX/PDMCLK/PWM1_N
12	PB4	DIO	SCL0/I2SCLK/PWM4_P/SSPCLK/URXD0/URXD1/ CLKOUT/PDMCLK/PWM5_N
13	PB6	DIO	SCL1/I2SDOUT/PWM2_P/SSPDOUT/URXD0/URX D1/ANTCTL1/PDMCLK/PWM3_N
14	PB7	DIO	SDA1/I2SDIN/PWM3_P/SSPDIN/UTXD0/UTXD1/ CLKOUT/PDMDAT/PWM2_N
15	PB5	DIO	SDA0/I2SFRM/PWM5_P/SSPCSN/UTXD0/UTXD1/ ANTCTL0/PDMDAT/PWM4_N
16	PB1	DIO	SDA0/I2SFRM/PWM1_P/SSPCSN/UTXD0/UTXD1/ BLERX/PDMDAT/PWM0_N
17	PB2	DIO	SCL1/I2SDOUT/PWM2_P/SSPDOUT/URXD0/URX D1/WLANTX/PDMCLK/PWM3_N
18	PB3	DIO	SDA1/I2SDIN/PWM3_P/SSPDIN/UTXD0/UTXD1/ WLANRX/PDMDAT/PWM2_N



19	PA3	DIO	SDA1/I2SDIN/PWM3_P/SSPDIN/UTXD0/UTXD1/ ANTCTL1/PDMDAT/PWM2_N
20	PA2	DIO	SCL1/I2SDOUT/PWM2_P/SSPDOUT/URXD0/URX D1/ANTCTL0/PDMCLK/PWM3_N
21	PA1	DIO	SDA0/I2SFRM/PWM1_P/SSPCSN/UTXD0/UTXD1/ ANTCTL0/PDMDAT/PWM0_N
22	PA0	DIO	SCL0/I2SCLK/PWM0_P/SSPCLK/URXD0/URXD1/ CLKOUT/PDMCLK/PWM1_N
23	PA7	DIO	SDA1/I2SDIN/PWM1_P/SSPDIN/UTXD0/UTXD1/ ANTCTL0/PDMDAT/PWM0_N
24	PA6	DIO	SCL1/I2SDOUT/PWM0_P/SSPDOUT/URXD0/URX D1/CLKOUT/PDMCLK/PWM1_N
25	PA4	DIO	SCL0/I2SCLK/PWM4_P/SSPCLK/URXD0/URXD1/ CLKOUT/PDMCLK/PWM5_N
26	PA5	DIO	SCL0/I2SCLK/PWM4_P/SSPCLK/URXD0/URXD1/ CLKOUT/PDMCLK/PWM5_N
27	GND	GND	Ground
28	ANT	AIO	RF input and output
29	GND	GND	Ground
30	AOUT_P	AO	Speaker output positive
31	AOUT_N	AO	Speaker output negative
32	RSTP	AI	Global reset (high active)
33	VCHR	PWR	Charger supply input
34	VBAT	PWR	Battery positive supply input
35	GND	GND	Ground
36	VDDIO	AO	Analog linear regulator output
37	PD7	DIO	SDA1/I2SDIN/PWM1_P/SSPDIN/UTXD0/UTXD1/ ANTCTL1/PDMDAT/PWM0_N/ADC3
38	PD6	DIO	SCL1/I2SDOUT/PWM0_P/SSPDOUT/URXD0/URX D1/CLKOUT/PDMCLK/PWM1_N/ADC2
39	PD5	DIO	SDA0/I2SFRM/PWM5_P/SSPCSN/UTXD0/UTXD1/ ANTCTL0/PDMDAT/PWM4_N/ADC1
40	PD4	DIO	SCL0/I2SCLK/PWM4_P/SSPCLK/URXD0/URXD1/ ANTCTL0/PDMCLK/PWM5_N/ADC0

## 4. Schematic

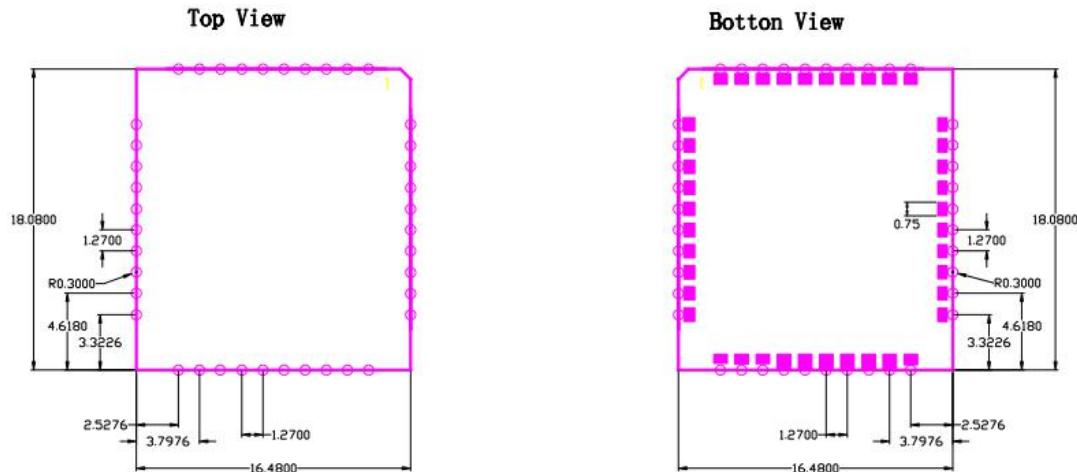
## 4.1 Reference schematic



**Figure 4- 1** Reference schematic

Note: PA6, PA7 for communication business serial port, PA2, PA3 for firmware programming and debugging serial port

## 4.2 Module size



**Figure4-1 Top View (Seen from Top) Bottom View (Seen from Bottom)**



**Figure 4-2 module thickness**

Note: Shanghai Electronics Way Company reserves the right to select components from different suppliers to realize the function of modules. All mechanical, electrical specifications and module certifications are maintained. All dimensions are in mm (mm).

**Figure 4- 3: Module design size**

模块外形尺寸	Length (X)	18.10 ± 0.15 mm
	Width (Y)	16.50± 0.15 mm
PCB 厚度	Height (H)	1.2 ± 0.05 mm
模块总厚度 (PCB 厚度+最高元器件高度)	Height (H)	3.1 mm typical

### 4.3 Attention

Bluetooth works at the frequency of 2.4ghz, so influences of various factors on wireless transceiver should be avoided as far as possible. The following points should be noted:

- Avoid using metal as part of the product housing surrounding the module. If the housing is metal, consider using an external antenna.
- The metal screws inside the product should be kept away from the RF part of the module.
- To maximize RF performance, the user host board layout should follow the following recommendations:
  - 1) Antenna clearance area: there shall be no copper foil routing (package) directly below the antenna area of the user's motherboard(Including power supply, ground and signal layer).
  - 2) Module position: ideally, the module should be arranged in a corner of the user's motherboard, PCB The antenna is located far from the motherboard End. This position minimizes the clearance area of the antenna.

#### 4.4 reference PCB pack

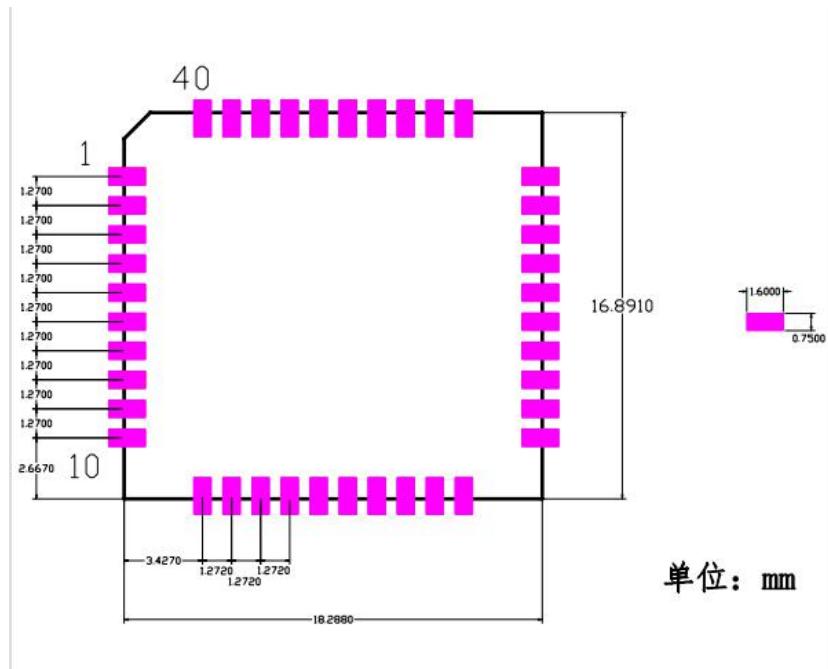


Figure 4- 5: Reference package size

#### 4.5 module photo



## 5. Reflow parameter

Reflow parameter can reference below data:

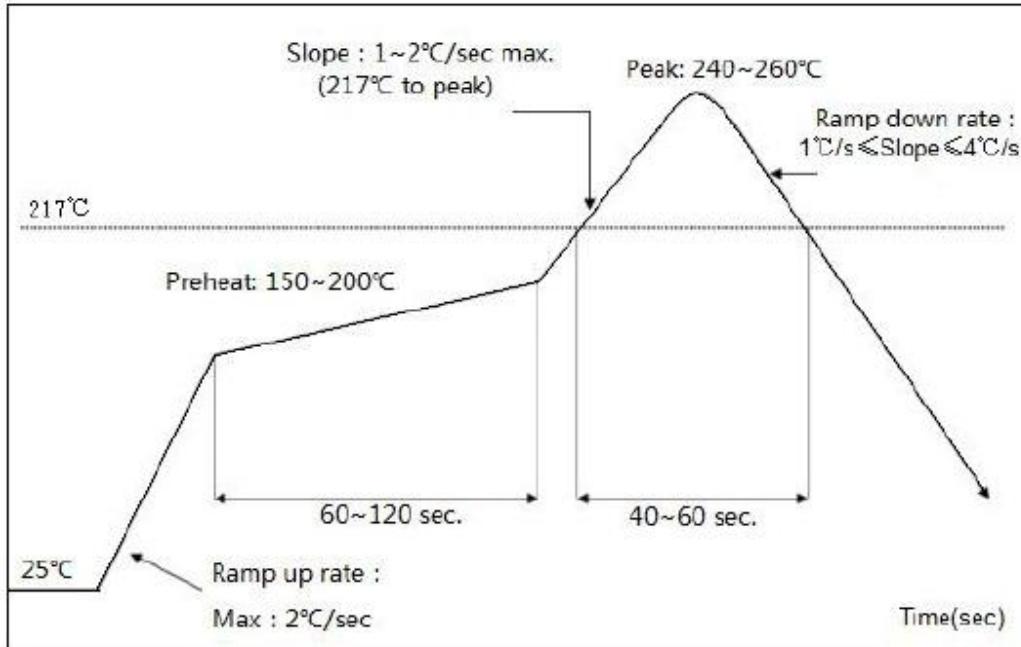


Figure 5-1 Reflow curve

Temperature range	Time	Key parameters
Preheat zone(<150°C)	60-120S	Ramp up rate: $\leq 2S$
Uniform temperature zone(150-200°C)	60-120S	Ramp up rate: $<1S$
Re-circulation zone(>217°C)	40-60S	Peak:240-260°C
Cooling zone		Ramp down rate: $1°C/s \leq Slope \leq 4°C/s$

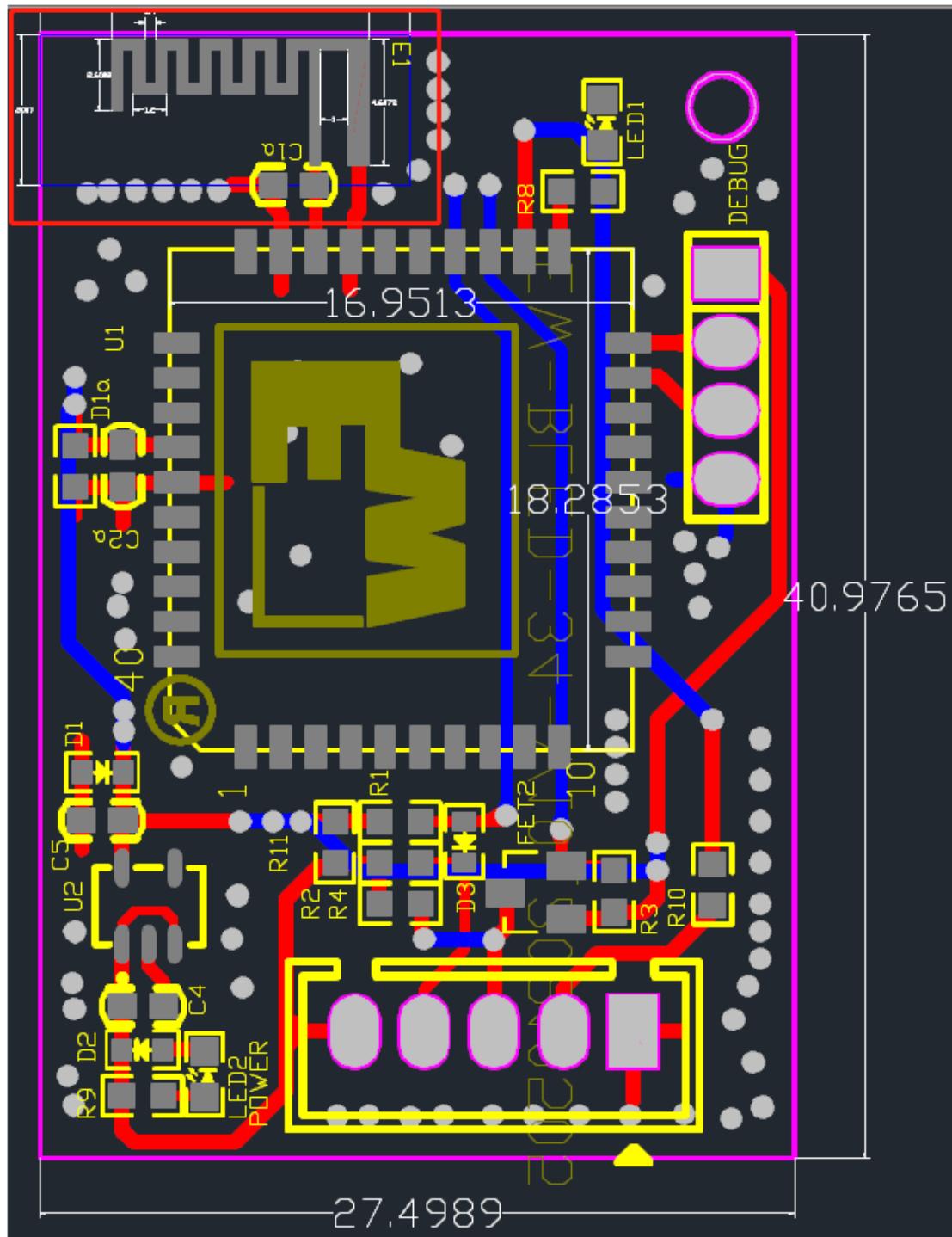
Figure 5-1

Reflow recommendation data

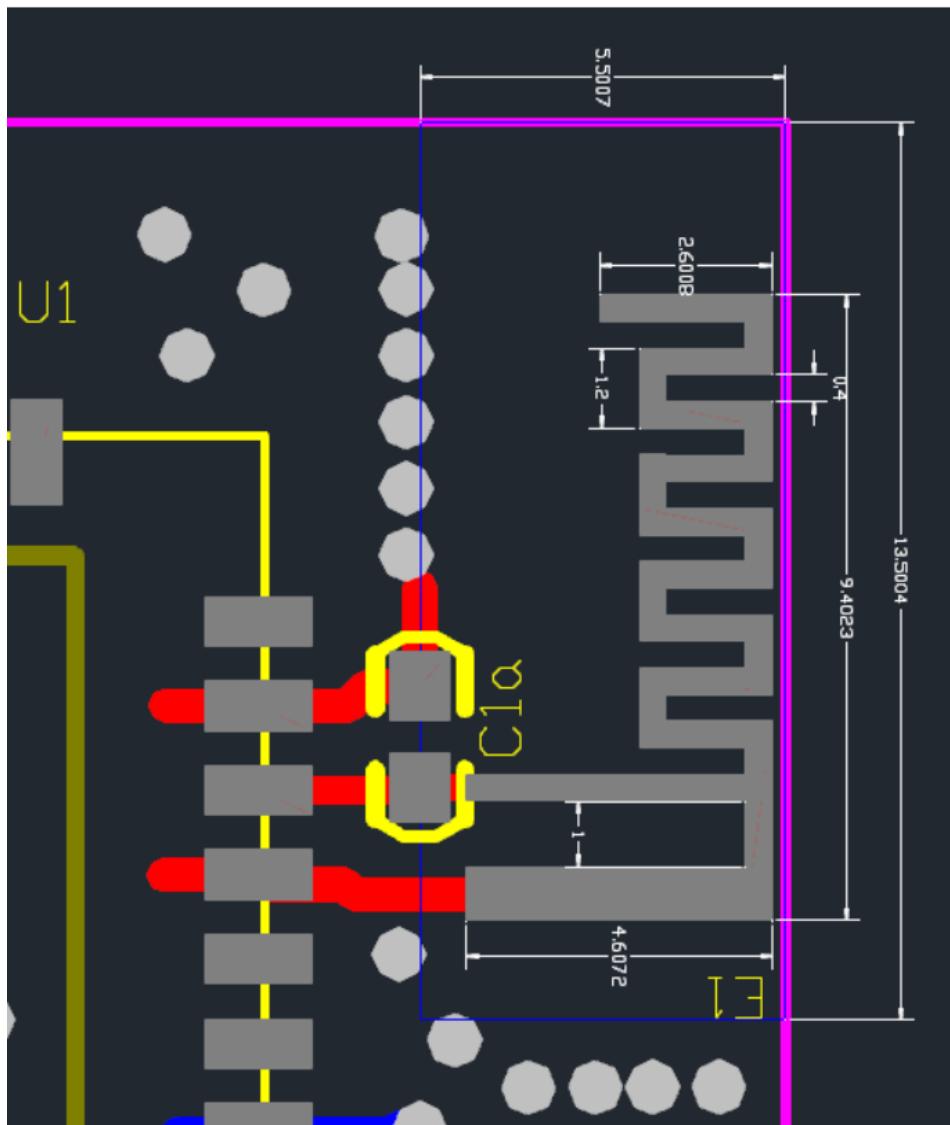
antenna specification

antenna size is 11.20mm\*5.5mm From below

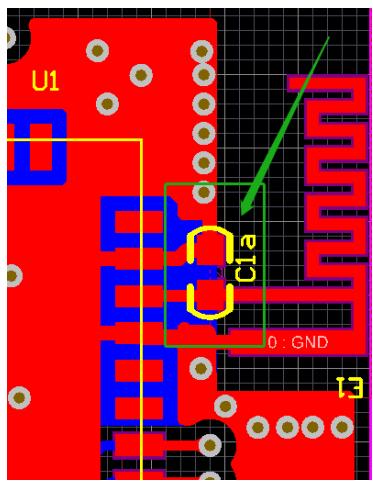
Specification.



Please refer to the chart below for PCB size of RF line terminal.



- 1) Antenna clearance area: there shall be no copper foil routing (package) directly below the antenna area of the user's motherboard (Including power supply, ground and signal layer).
- 2) Module position: ideally, the module should be arranged in a corner of the user's motherboard, PCB The antenna is located far from the motherboard End. This position minimizes the clearance area of the antenna.



C1a is the antenna matching capacitance, which affects the signal strength. There is no need to paste here

Antenna gain: 0dBi

## FCC Statement

FCC standards: FCC CFR Title 47 Part 15 Subpart C Section 15.247

Trace antenna PCB antenna , Antenna gain 0dBi

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.

Any 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.

We will retain control over the final installation of the modular such that compliance of the end product is assured. In such cases, an operating condition on the limit modular approval for the module must be only approved for use when installed in devices produced by a specific manufacturer. If any hardware modify or RF control software modify will be made by host manufacturer, C2PC or new certificate should be apply to get approval, if those change and modification made by host manufacturer not expressly approved by the party responsible for compliance , then it is illegal.

## FCC Radiation Exposure Statement

This modular complies with FCC RF radiation exposure limits set forth for an uncontrolled environment.

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

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 the following: "Contains Transmitter Module FCC ID: 2AXDJ-EWBLED33 Or Contains FCC ID: 2AXDJ-EWBLED33"

When the module is installed inside another device, the user manual of the host must contain below warning statements;

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.

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.

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

The devices must be installed and used in strict accordance with the manufacturer's instructions as described in the user documentation that comes with the product.

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