Company：OE Technology (Shenzhen) Co., Ltd.
Product Description：Bluetooth Module
Model No.：RL61A1

1：Product introduction

1.1：Product Overview

Ou Yi Technology RL61A1 series smart module is a wireless communication module with mesh networking function. It is mainly used in smart light control, home/hotel automation control, consumer electronics, industrial control, etc., to meet the requirements of low power consumption, low delay, and short-range wireless data communication.

1.2：Product features

- Maximum receiving sensitivity：≥-91dBm
- Maximum transmitting power≤10dBm
- Voltage input range: 2.5 V ～ 3.3 V
- Modular operating temperature applied to intelligent lighting：-40℃ ～ +85℃
- Powerconsumption：Sleepmodeaslowas6uA
- Support for Mesh
- Various peripheral device interfaces Maximum 6 channel PWM output
  2 UART external communication interfaces
  Maximum of 14 customizable GPIOs for switching input and relay control output
- Support point-to-point and point-to-multipoint communication

1.3：Product parameters

Category	Item	Parameter
Wireless parameters	Frequency range	2.4G
	Receiving sensitivity	Minimum-91dBm
	Type of antenna	PCB antenna
Hardware parameters	Data interface	PWM
		UART
	Working voltage	3.3V
	Power supply current	≥80mA
	Low power current	≤6uA
	Transmission distance（mesh）	Outdoorspace100m
	Working temperature	-40℃ ～ +85℃
	Module size	15.5x12x2.0mm

Table 1: Technical specifications of RL61A1 seriesmodules

1.4：Product application

- Home/Hotel/Building Automation
- Intelligent light control system
- Industrial control
- Low power wireless sensor networks

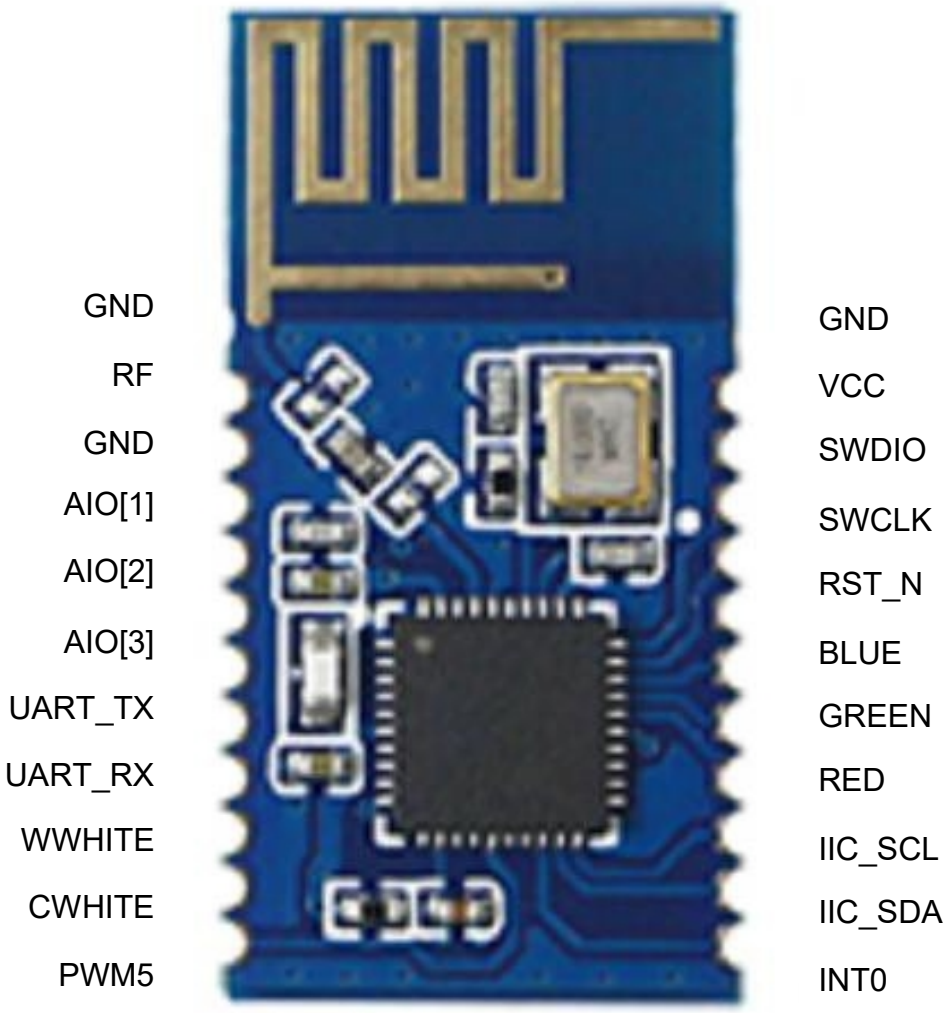
2： Product Hardware Introduction

2.1 Module shape and interface

2.1.1 OE-B01 external copper wire antenna universal Bluetooth module

2.1.1.1 Pin description

The shape of the module is as follows, with 22 external pins. Please refer to the table for detailed pin functions.



Pin	Pin function	Detailed description
1	GND	Modular input
2	RF	The outer connecting foot of Bluetooth can be selected

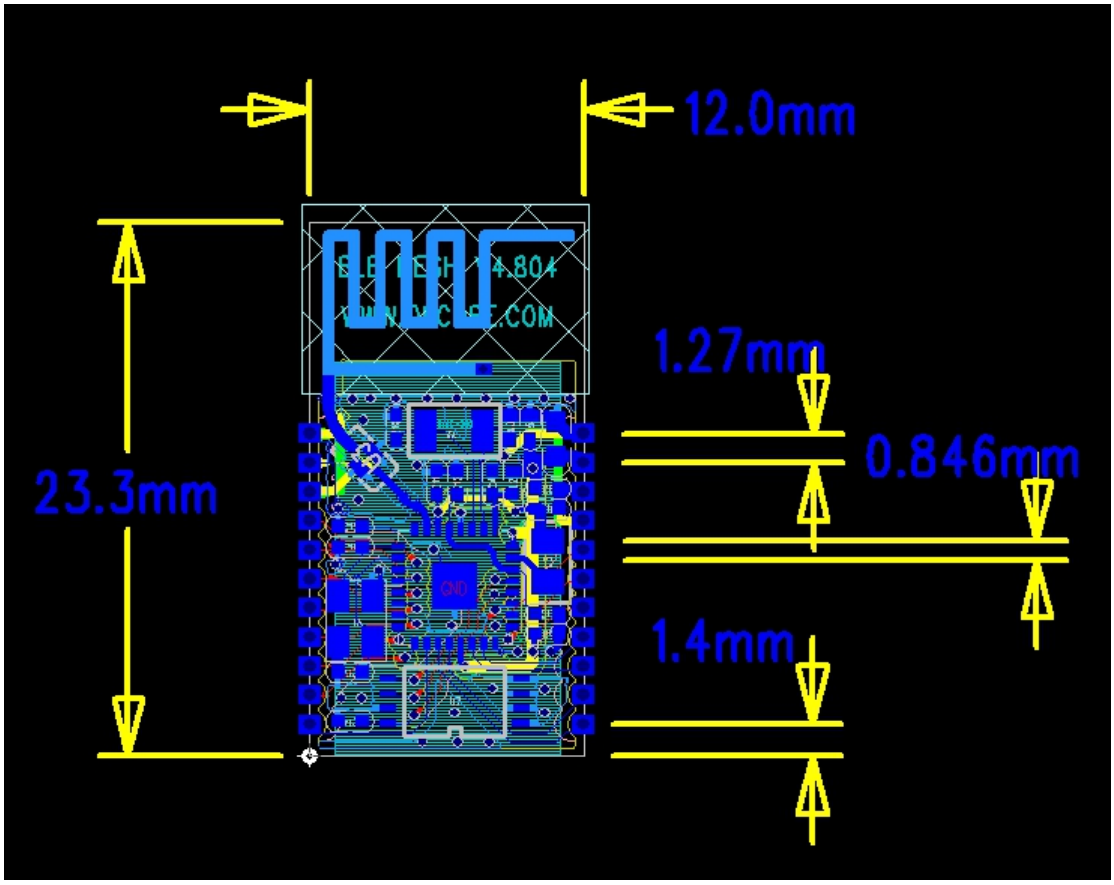
		according to the actual situation. The reserved welding pad can be used to directly weld the copper wire antenna
3	GND	Modular input
4	AIO[1]	Customizable analog IO pin;
5	AIO[2]	Customizable analog IO pin;
6	AIO[3]	Customizable analog IO pin;
7	UART_TX	Module serial port, can be customized as GPIO function;
8	UART_RX	Module serial port, can be customized as GPIO function;
9	WWHITE	Warm-white PWM output, high efficiency; Can be customized as GPIO function
10	CWHITE	Cold white PWM output, high efficiency; Can be customized as GPIO function
11	PWM5	Reserved PWM output pin, can be customized for GPIO function
12	INT0	The system interrupt input port can be customized as GPIO function if low power mode is not used
13	IIC_SDA	Can be customized as GPIO function;
14	IIC_SCL	Can be customized as GPIO function;
15	RED	Red PWM output, high efficiency; Can be customized as GPIO function
16	GREEN	Green PWM output, high efficiency; Can be customized as GPIO function
17	BLUE	Blue PWM output, high efficiency; Can be customized as GPIO function
18	RST_N	System reset pin, internal default pull-up, if not necessary, please suspend or reserve TestPoint
19	SWCLK	Module debug port, suspended or reserved TestPoint
20	SWDIO	Module debug port, suspended or reserved TestPoint
21	VCC	3.3V DC power input
22	GND	Modular input

Table 2: Pin description of the RL61A1 Bluetooth module

Note 1: Pin numbers start from the first on the upper left of the module and are arranged counterclockwise.

Note 2: The function and pin definitions of this module will vary slightly when used as different devices, refer to the detailed documentation for the corresponding firmware.

- **PCB** package size



PCB package size is shown in the figure above, module size is 23.3*12mm, pin spacing is 1.27mm, pin pin width is 0.846mm.

2.2 Suggestions for using module PCB

- It is recommended to use LDO to supply 3.3V DC and provide the driving capacity of at least 80mA peak current. It is recommended to place a 10uF capacitor at the module power inlet.
- In PCB layout planning, BLE modules should be placed away from magnetic field sources such as transformers and coils.
- Antenna areas should be kept PCB design clear and not protected by any enclosure. Antennas must be at least 10mm away from metal or tall components.
- If there are other special requirements, the module can be customized.

FCC Modular Usage Statement

2.2 List of applicable FCC rules

List the FCC rules that are applicable to the modular transmitter. These are the rules that specifically establish the bands of operation, the power, spurious emissions, and operating fundamental frequencies. DO NOT list compliance to unintentional-radiator rules (Part 15 Subpart B) since that is not a condition of a module grant that is extended to a host manufacturer. See also Section 2.10 below concerning the need to notify host manufacturers that further testing is required.3

Explanation: This module meets the requirements of FCC part 15C (15.249).it specifically establish the Conducted Emission, Radiated Spurious Emission, Field strength of fundamental, Band Edge Emission, 20dB Bandwidth.

2.3 Summarize the specific operational use conditions

Describe use conditions that are applicable to the modular transmitter, including for example any limits on antennas, etc. For example, if point-to-point antennas are used that require reduction in power or compensation for cable loss, then this information must be in the instructions. If the use condition limitations extend to professional users, then instructions must state that this information also extends to the host manufacturer's instruction manual. In addition, certain information may also be needed, such as peak gain per frequency band and minimum gain, specifically for master devices in 5 GHz DFS bands.

Explanation: The EUT has one PCB antenna, the antenna cannot be replaced by other authorized antennas.

2.4 Limited module procedures

If a modular transmitter is approved as a "limited module," then the module manufacturer is responsible for approving the host environment that the limited module is used with. The manufacturer of a limited module must describe, both in the filing and in the installation instructions, the alternative means that the limited module manufacturer uses to verify that the host meets the necessary requirements to satisfy the module limiting conditions.

A limited module manufacturer has the flexibility to define its alternative method to address the conditions that limit the initial approval, such as: shielding, minimum signaling amplitude, buffered modulation/data inputs, or power supply regulation. The alternative method could include that the limited module manufacturer reviews detailed test data or host designs prior to giving the host manufacturer approval. This limited module procedure is also applicable for RF exposure evaluation when it is necessary to demonstrate compliance in a specific host. The module manufacturer must state how control of the product into which the modular transmitter will be installed will be maintained such that full compliance of the product is always ensured. For additional hosts other than the specific host originally granted with a limited module, a Class II permissive change is required on the module grant to register the additional host as a specific host also approved with the module.

Explanation: The module is a limited single module, Any modifications made to the module will void the Grant of Certification, this module is limited to OEM installation only and must not be sold to end-users, end-user shall have no manual instructions to remove or install the device, only software or operating procedure shall be placed in the end-user operating manual of final products. shielded.

2.6 RF exposure considerations

It is essential for module grantees to clearly and explicitly state the RF exposure conditions that permit a host product manufacturer to use the module. Two types of instructions are required for RF exposure information: (1)to the host product manufacturer, to define the application conditions(mobile, portable – xx cm from a person's body); and (2) additional text needed for the host product manufacturer to provide to end users in their end-product manuals. If RF exposure statements and use conditions are not provided, then the host product manufacturer is required to take responsibility of the module through a change in FCC ID (new application).

Explanation: This module complies with FCC RF radiation exposure limits set forth for an uncontrolled environment." This module is designed to comply with the FCC statement, FCC ID is: 2AZ5M-RL61A1.

2.7 Antennas

A list of antennas included in the application for certification must be provided in the instructions. For modular transmitters approved as limited modules, all applicable professional installer instructions must be included as part of the information to the host product manufacturer. The antenna list shall also identify the antenna types (monopole, PIFA, dipole, etc. (note that for example an “omni-directional antenna” is not considered to be a specific “antenna type”)). For situations where the host product manufacturer is responsible for an external connector, for example with an RF pin and antenna trace design, the integration instructions shall inform the installer that unique antenna connector must be used on the Part 15 authorized transmitters used in the host product.

The module manufacturers shall provide a list of acceptable unique connectors.

Explanation: The EUT has one PCB antenna, the antenna cannot be replaced by other authorized antennas, and the gain of each replacement antenna is no more than 1dBi

2.8 Label and compliance information

Grantees are responsible for the continued compliance of their modules to the FCC rules. This includes advising host product manufacturers that they need to provide a physical or e-label stating “Contains FCC ID” with their finished product. See Guidelines for Labeling and User Information for RF Devices – KDB Publication 784748.

Explanation: The host system using this module, should have label in a visible area indicated the following texts: "Contains FCC ID: 2AZ5M-RL61A1.

2.9 Information on test modes and additional testing requirements

Additional guidance for testing host products is given in KDB Publication 996369 D04 Module Integration Guide. Test modes should take into consideration different operational conditions for a stand-alone modular transmitter in a host, as well as for multiple simultaneously transmitting modules or other transmitters in a host product. The grantee should provide information on how to configure test modes for host product evaluation for different operational conditions for a stand-alone modular transmitter in a host, versus with multiple, simultaneously transmitting modules or other transmitters in a host. Grantees can increase the utility of their modular transmitters by providing special means, modes, or instructions that simulates or characterizes a connection by enabling a transmitter. This can greatly simplify a host manufacturer’s determination that a module as installed in a host complies with FCC requirements.

Explanation: OE Technology (ShenZhen) Co., Ltd. can increase the utility of our modular transmitters by providing instructions that simulates or characterizes a connection by enabling a transmitter.

2.10 Additional testing, Part 15 Subpart B disclaimer

The grantee should include a statement that the modular transmitter is only FCC authorized for the specific rule parts (i.e., FCC transmitter rules) listed on the grant, and that 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 circuity), 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.

Explanation: The module without unintentional-radiator digital circuity, so the module does not require an evaluation by FCC Part 15 Subpart B. The host shoule be evaluated by the FCC Subpart B.

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

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.

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