Shenzhen Zopu Digital Technology Co., Ltd.

ZP-8251

Bluetooth Module Specification

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1 Product Introduction

The ZP-8251 is a BLE5.1 Bluetooth LE5.0 (Low Energy Bluetooth) module developed and manufactured by Zopu Digital. It is designed based on the TELINK-SEMI Bluetooth LE chip TLSR825F512ET24 and supports BLE5.0.

The module leads out the original main pins of the chip in the form of peripheral stamp holes. The module is equipped with an onboard antenna and an antenna IPEX interface, allowing users to freely choose between using the onboard antenna or an external antenna

2 Product Features

- Power supply: 1.8 - 3.6V, typical value 3.3V

- Fast and stable Bluetooth - serial port transparent transmission, with a serial port baud rate of up to 921600

- Built - in 32 - bit high - performance processor

- Operating temperature range: 40 - 85 °C

- Supports low - power mode, custom connection and broadcast intervals. The current for sending broadcasts at an 800ms interval is as low as 40μA

- The maximum Bluetooth transmission power can reach 1.44dBm

- Supports OTA Bluetooth wireless firmware upgrade for the module and wireless configurat ion of module parameters

- The default onboard antenna can improve the transmission distance, and an external antenna can also be selected

- Built - in Watchdog for reliable long - term operation

- Ultra - small size: 22.5mm (length) × 13mm (width) × 0.8mm (height)

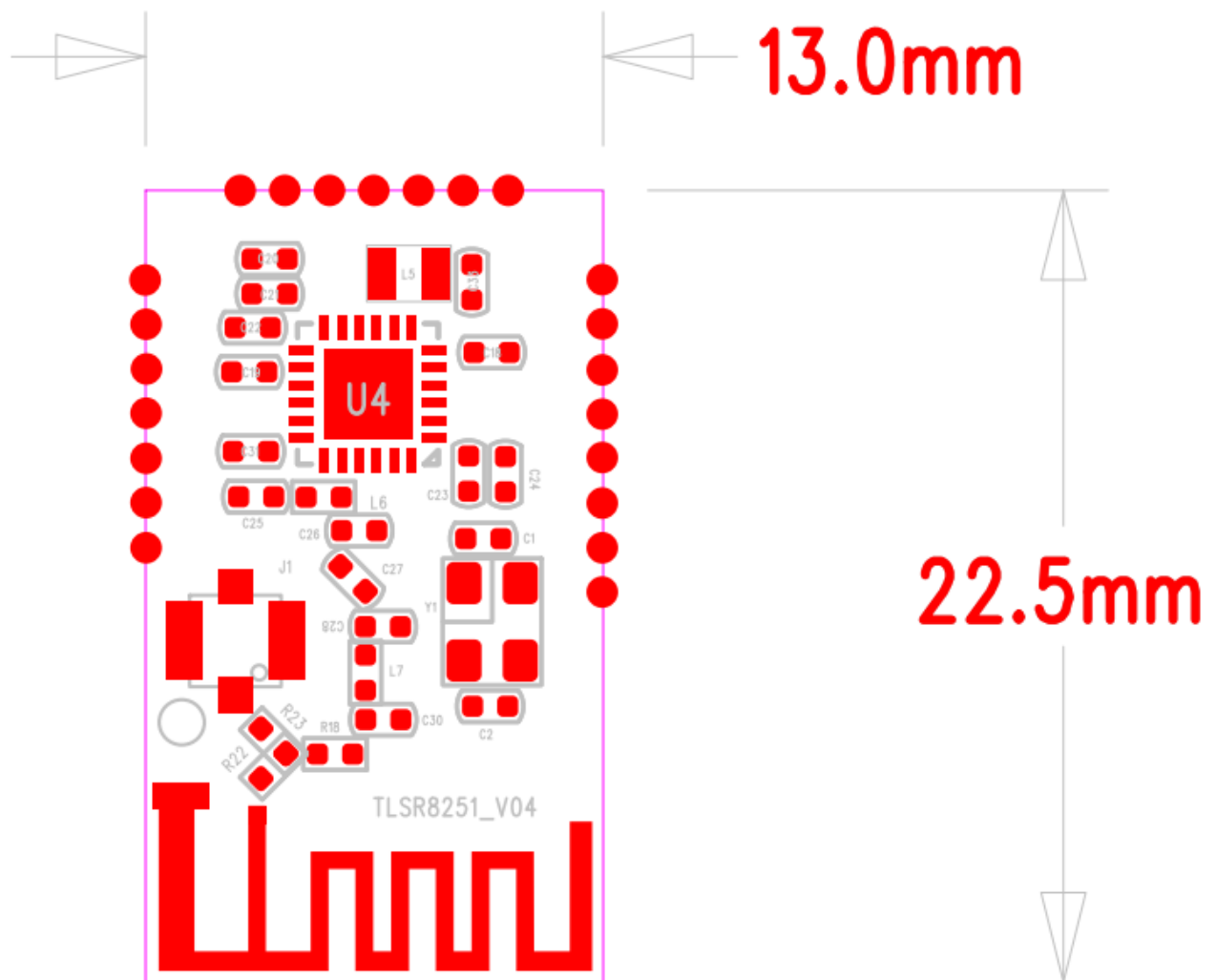# 3.Module Description

3.1Module Dimensions

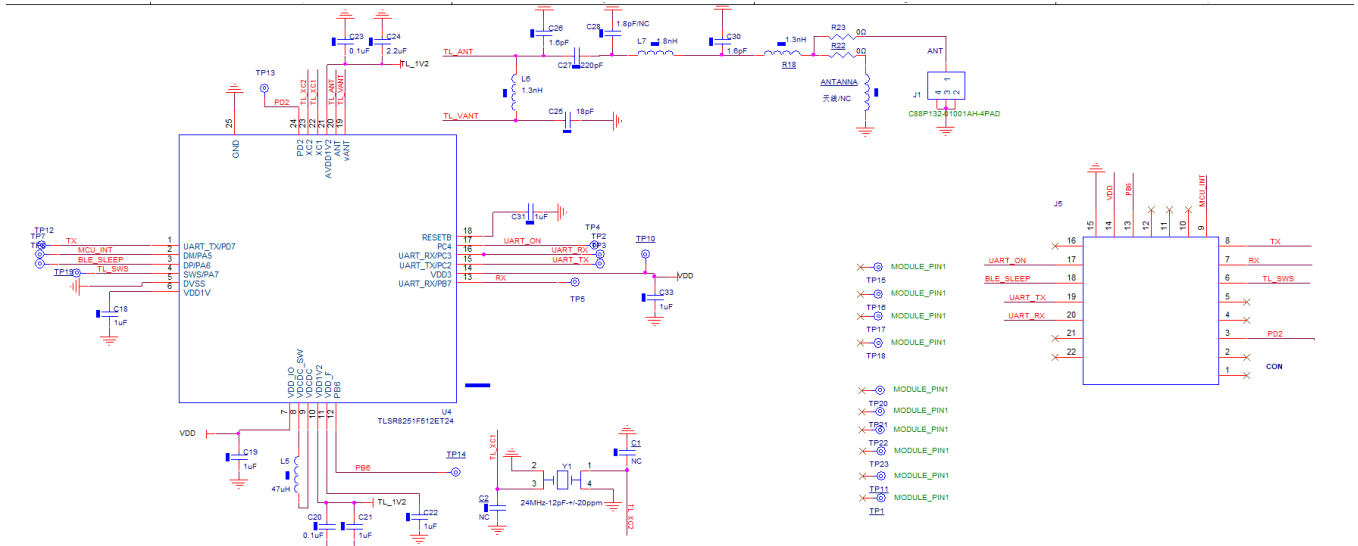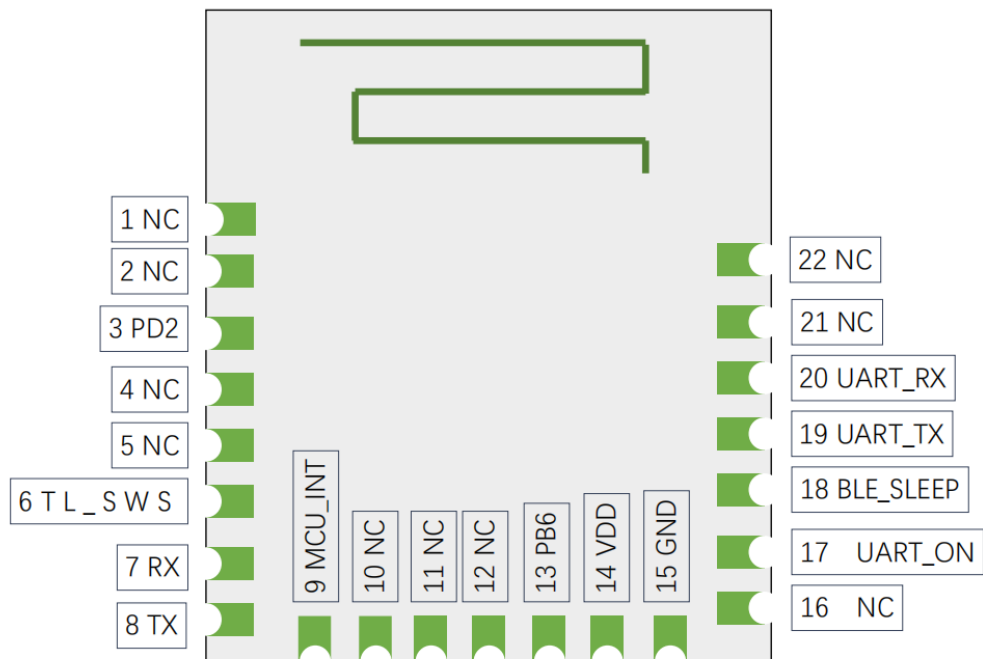Figure 1 Outline and Dimension Schematic Diagram

3.2 Module Schematic Diagram

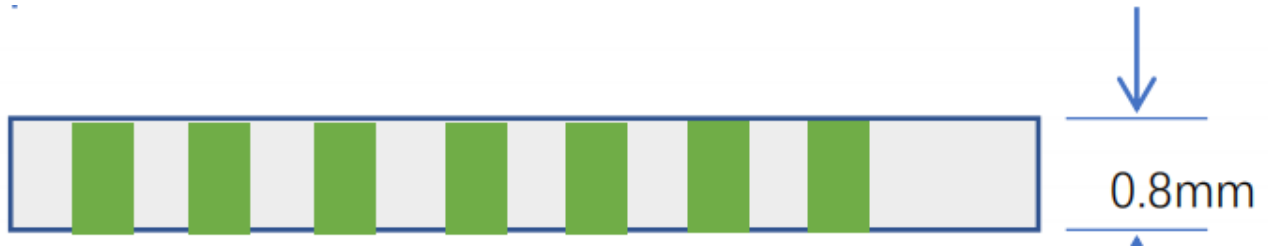

Figure 2 Module Schematic Diagram

3.3 Pin Description

Figure 3 Module Pin Layout and Thickness Diagram

4 Pin Definition

Pin	Symbol	IO Type	Function
1	GND	GND	Power ground
2	MIC_BIAS	-	Reserved function
3	PD2	-	Reserved function
4	NC	-	Reserved function
5	NC	-	Reserved function
6	TL_SWS	I	Programming pin
7	RX	I	Module serial port input
8	TX	O	Module serial port output
9	MCU_INT	O	Connected to MCU
10	NC	-	Reserved function
11	NC	-	Reserved function
12	NC	-	Reserved function
13	PD6	-	Reserved function
14	VDD	-	Power input DC3.3/2.5V
15	GND	GND	Power ground
16	NC	-	Reserved function
17	UART_ON	I	Serial port switch
18	BLE_SLEEP	I	Module sleep function
19	UART_TX	O	Debug serial port output
20	UART_TX	I	Debug serial port input
21	NC	-	Reserved function
22	NC	-	Reserved function

Table 1 Pin Definition Table

5 Performance and Electrical Parameters

Power Supply and Power Consumption	Power Supply Input Requirements	DC 1.8 - 3.6V, typical value 3.3V, power supply capacity > 80mA
	IO Output	Voltage 2.9 - 3.3V, maximum output current 8mA
	Average Operating Current (Adjustable)	The average operating current is jointly determined by the set transmission power, connection interval and broadcast interval, and can be adjusted. The reference value under the default settings is as follows: Transmission Power: 0dBm, Broadcast Interval: 800ms, Typical Current: 40µA
Serial Port Parameters	Baud Rate	1200,2400,4800,9600,14400,19200,38400, 57600,115200,230400,460800,921600
	Data Bits	8
	Stop Bits	1
Bluetooth Parameters	Frequency	2402～2480MHz
	Maximum Transmission Power	1.44dBm
	Receiver Sensitivity	-97dBm
	Specification Standards	Bluetooth V5.0 (LE Mode) MSK, FSK, GFSK, O-QPSK CPM
	Bandwidth	2MHz
	Antenna Impedance	50
	Connection Interval	7.5～4000ms
	Operating Mode	Defaults to broadcast mode upon power - on
	Master - Slave Mode	Slave mode
Operating Environment	Operating Temperature	-40 ~ 8 5 ℃
Size and Package	Outline Dimensions	22.5mm (length) × 13mm (width) × 0.8mm (height)

Table 2 Performance and Electrical Parameter Table

6 Revision Record

Date	Version	Modification Content
2025-03-19	0.1	Initial version

7 Technical Support and Contact Information

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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 1: 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.

NOTE 2: Any changes or modifications to this unit not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

The device has been evaluated to meet general RF exposure requirement. The device can be used in portable exposure condition without restriction.

1) Must use a ROD antenna with gain not exceeding 2.97dBi.
2) Should be installed so that the end user cannot modify the antenna;
3) Feed line should be designed in 50ohm.
Fine tuning of return loss etc. can be performed using a matching network
ANT Manufacturer: Dongguan Yihai Communications Technology
Limited; Model Name: SY-Q804131BR002C-L01

Frequency (MHz)	Antenna Type	Antenna Gain (dBi)
2402-2480	ROD Antenna	Antenna MAX: 2.97dBi

Notice to OEM integrator

Must use the device only in host devices that meet the FCC RF exposure category of mobile, The device has been evaluated to meet general RF exposure requirement. The device can be used in portable exposure condition without restriction.

The end user manual shall include FCC Part 15 compliance statements related to the transmitter as show in this manual.

Host manufacturer is responsible for compliance of the host system with module installed with all other applicable requirements for the system such as Part 15 B.

Host manufacturer is strongly recommended to confirm compliance with FCC requirements for the transmitter when the module is installed in the host.

Must have on the host device a label showing Contains FCC ID: 2AY57-ZP-8251