



## TPL3135 BLE Module Datasheet

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## **TPL3135 BLE Module Datasheet**

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# 1、 Introduction

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TPL3131 is a BLE 5.4 low power Bluetooth module, which can be widely used in short distance wireless Bluetooth communication. It has the characteristics of small size, low power consumption, strong anti-interference ability and long transmission distance.

The other main features of the module are as follows:

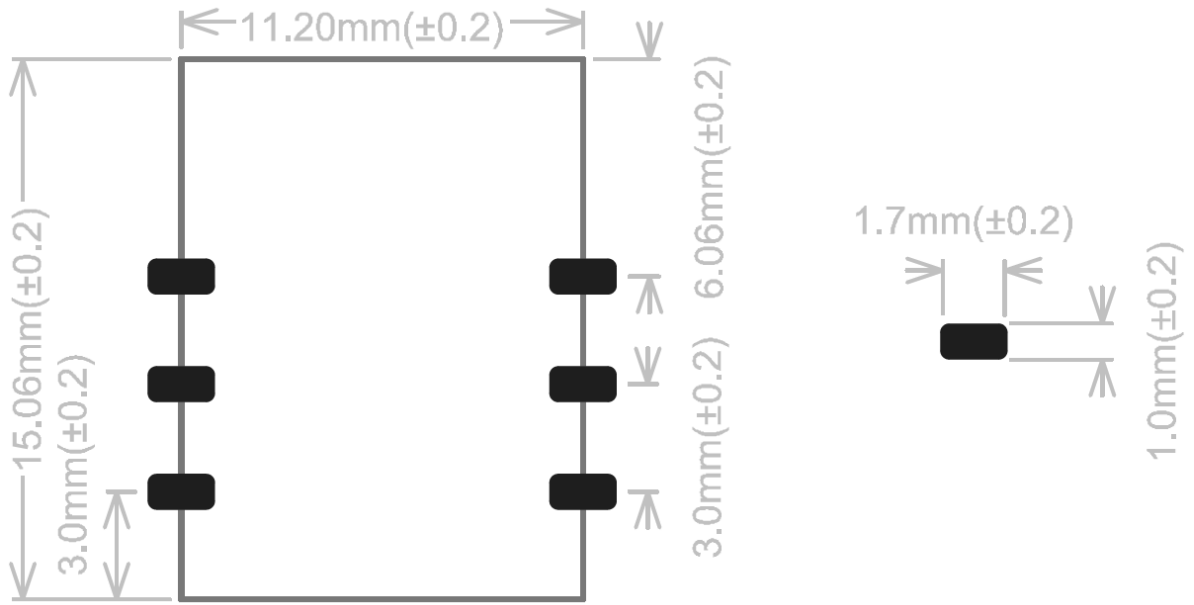
- compliant with Bluetooth 5.4 standard, which can support various Profile configurations.
- Support low power Bluetooth data transparent transmission
- Support AT command control
- Support online OTA upgrade module firmware
- Ultra small package

# 2、 Module Parameters

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Item	Parameters
Module Name	TPL3131
Package	SMT (Stamp Hole)
Size	11.2x15.06(mm)
Voltage Range	VBAT( 2.7V~5.5V) 或 VCC ( 1.9V~3.5V)
Wireless Standard	Bluetooth 5.4
Frequency Range	2402~2480MHz
Sensitivity	-92dBm
Default Communication interface	UART
FLASH Size	256KB
RAM Size	32KB
Operating current	3.5mA
Sleep current	3uA
Shutdown current	200nA
GPIO Number	2
Work Temperature	-20°C~+85°C
Storage Temperature	-60°C~+150°C

### 3、Module Size

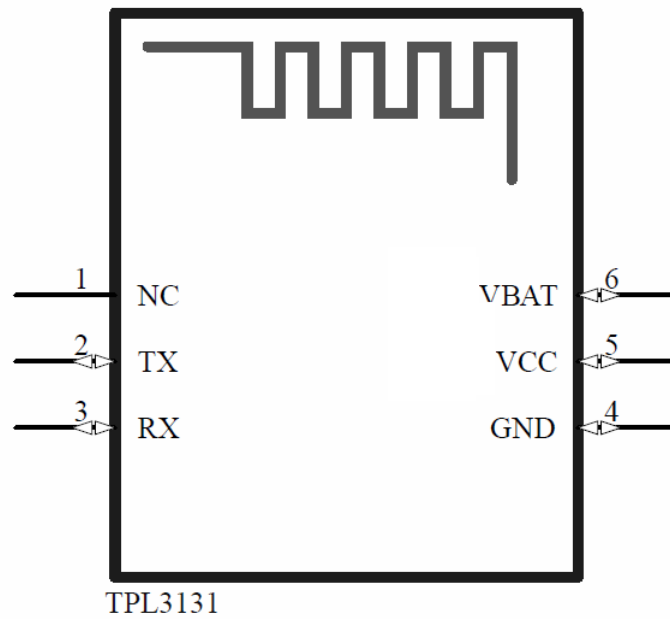


Top View



Side view

## 4、 Pin Definition



Number	Name	Pin	Function	Notes
1	NC	NC	NC	Not connected
2	TX	UART_TX	Serial port transmission	
3	RX	UART_RX	Serial port receiving	
4	GND	Ground	Power 'Ground'	
5	VCC	VCC	Power supply( 1.9V~3.5V)	Two AA batteries/button cell batteries are recommended. When powered by VBAT, it outputs 3.3V voltage externally.
6	VBAT	VBAT	Power supply ( 2.7V~5.5V)	5V/3.3V power supply, 4.2V lithium battery, three dry cells recommended for use

Explanation:

- When powered by VBAT, the VCC pin outputs 3.3V externally and can only be used as a signal source, with a maximum output current of 10mA.

## 5、Reference Design

The TPL3131 module can be powered through either the VBAT pin or the VCC pin. The VBAT pin supports 2.7-5.5V, and it is recommended to use the VBAT pin for 5V and 3.3V systems. The VCC pin supports 1.9V-3.5V, and it is recommended to use the VCC pin when powering with two dry batteries or button batteries.

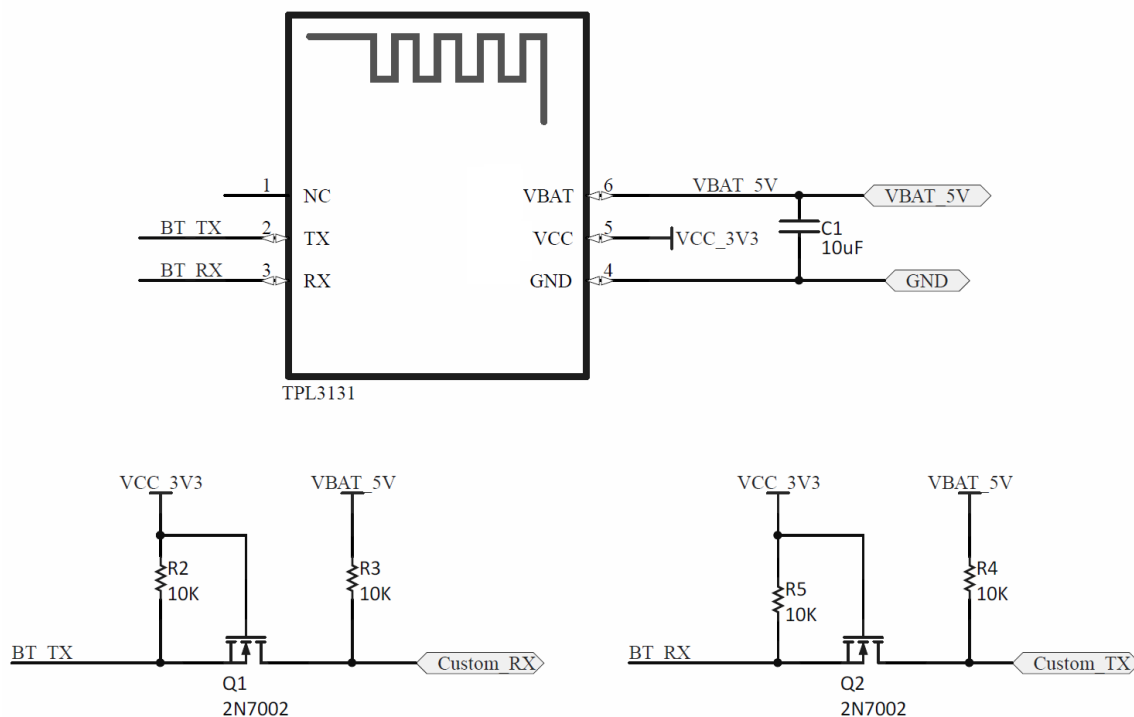
### 5.1、VBAT Power Supply Reference Design

For 5V or 3.3V system power supply, the VBAT power supply pin is used. When the VBAT power supply is greater than 3.3V, the TPL3131 chip serial port level is 3.3V. When the VBAT power supply is less than 3.3V, the TPL3131 chip serial port level equals the VBAT voltage.

When connected to an MCU with 3.3V level IO, UART can be connected in series with a 100Ω resistor.

When connecting to an MCU with 5V level IO, it is recommended to use a level conversion circuit. The schematic provides a 3.3V to 5V conversion circuit using MOSFETs. Among them, the MCU serial ports Custom\_Tx and Custom\_Rx used for Bluetooth communication are at 5V level.

When the VBAT pin is powered, the internal LDO of the chip will be activated, and VCC outputs a 3.3V voltage externally.

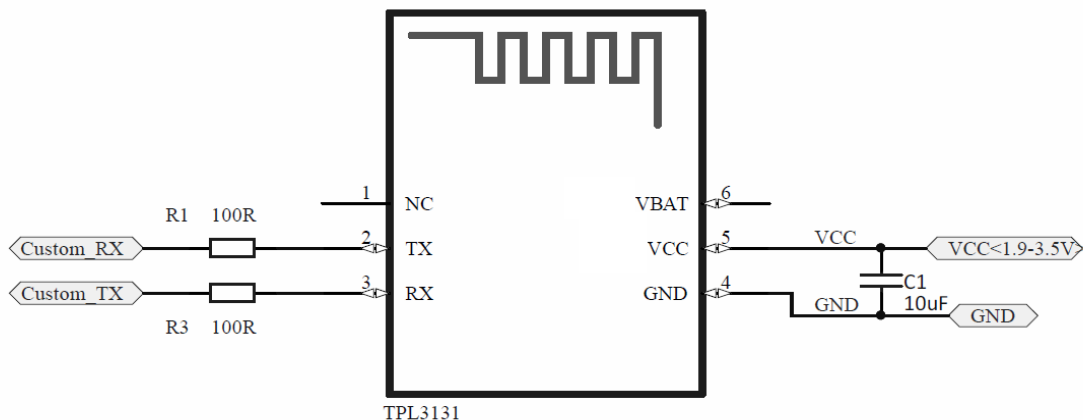


说明:

- In the diagram, VCC\_3V3 is the voltage output externally converted by the internal LDO of the chip. The customer only needs to provide 5V voltage from VBAT.
- The circuit with two 2N7002 MOSFETs is a serial port level conversion circuit designed, and it can be replaced with other conversion circuits.
- The TPL3131 serial port IO level is 3.3V. It is recommended to use a conversion circuit when connecting to a 5V level.
- If a modular power-off method is used to control shutdown power consumption, it is recommended to disconnect the GND circuit to prevent leakage current due to voltage differences at the IO interfaces.

## 5.2、VCC Power Supply Reference Design

Two dry batteries or button batteries are recommended to power via the VCC pin, and the MCU serial ports Custom\_Tx and Custom\_Rx used for Bluetooth communication need to be equal to or lower than the VCC voltage.



说明:

- The VCC (1.9V~3.5V) pin is powered, and the VBAT is left floating and not connected.
- The TX and RX of the chip need to be cross-connected with the main control MCU, and the series-connected resistors R1 and R3 in between can be added according to requirements.
- If using a module power-off method to control shutdown power consumption, it is recommended to disconnect the GND circuit to prevent leakage current caused by voltage differences at the IO interface.

## 6、 Hardware Design Considerations

### 6.1、 Module placement requirements on the bottom plate

(1) In order to meet the performance of the antenna on board, it is forbidden to place metal parts around the antenna, away from high frequency devices. Avoid using metal in the product housing and keep metal screw inside away from the RF part of the module.

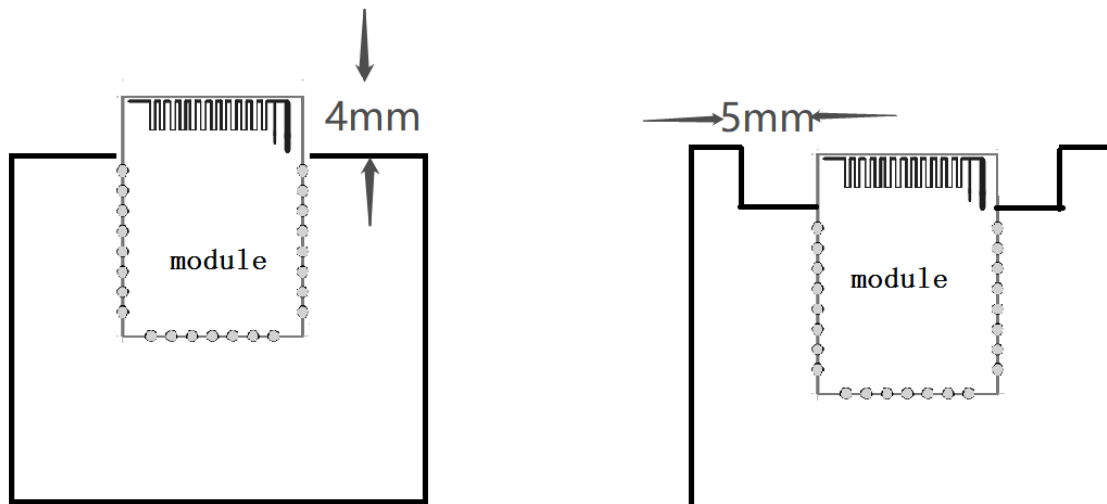
(2) Pay attention to the layout of the module on the soleplate, and minimize the impact of the soleplate on the performance of the module PCB antenna.

The following are suggested:

Option 1: Place the module at the edge of the motherboard and the antenna area extends beyond the edge of the motherboard.

Option 2: Place the module at the edge of the motherboard, which empties an area at the antenna position.

Option 3: If the above scheme is limited and cannot be implemented, make sure that the area of the module PCB antenna and the area of 5 mm extension need to be cleared (copper, wiring and placement of components are strictly prohibited).



## 6.2、 Power supply requirements

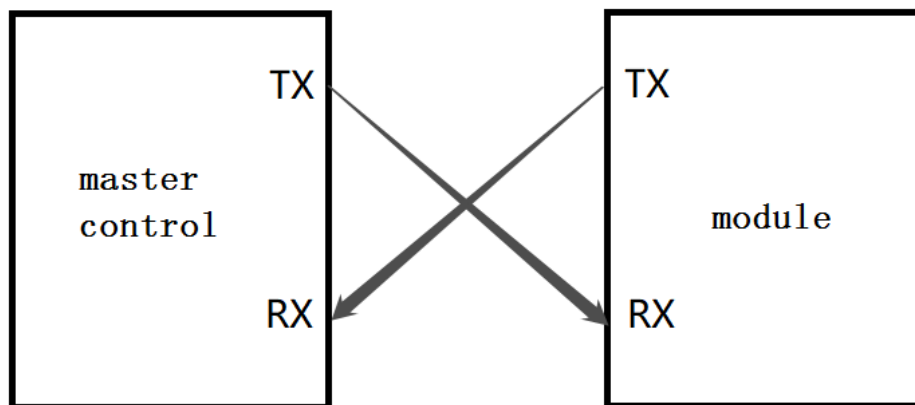
(1) It is recommended to use DC regulator power supply to supply power to the module. The power ripple factor is as small as possible and the module needs to be grounded reliably. Please note that the correct connection between the positive and negative poles of the power supply, such as reverse connection may cause permanent damage to the module.

(2) Check the power supply to ensure that between the recommended supply voltage, if the maximum value is exceeded, the module will be permanently damaged; check the power supply stability, the voltage should not fluctuate significantly and frequently;

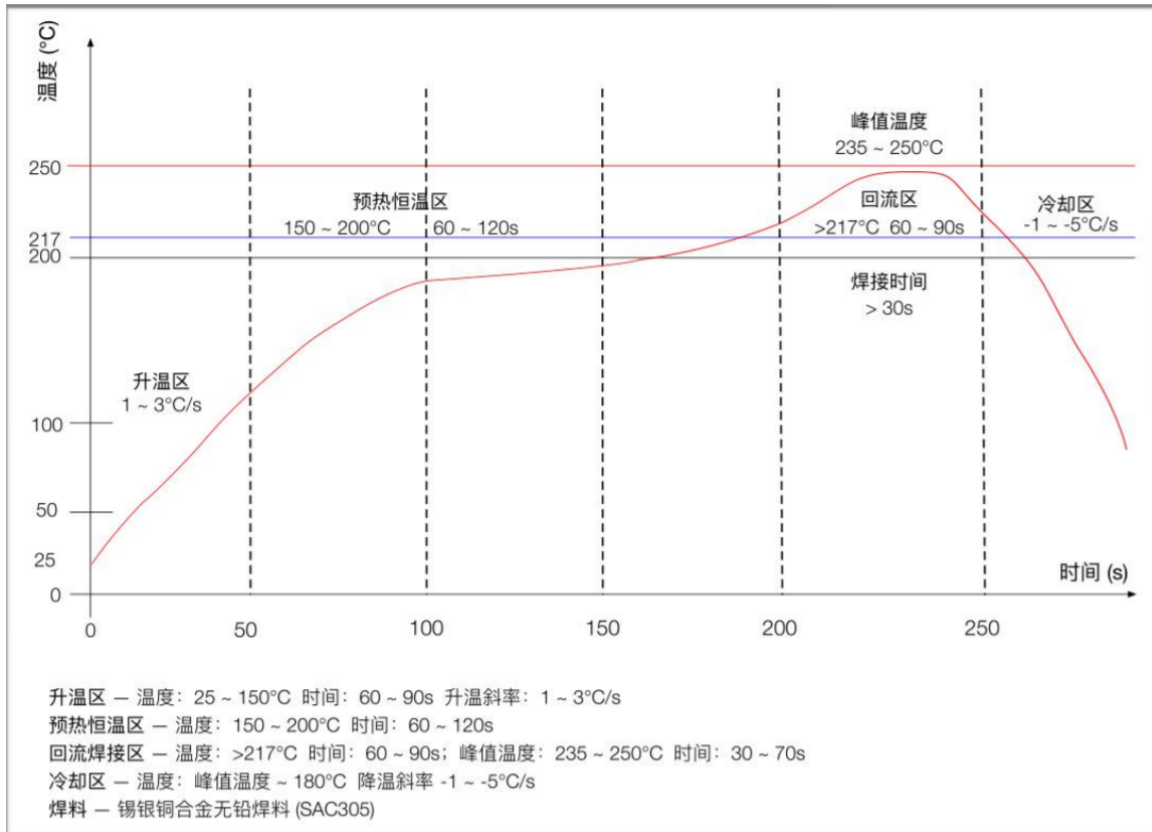
(3) Recommend 3.3V voltage for VBAT, LDO power supply is recommended; if using DC-DC, ripple control is recommended within 30mV. The DC-DC power supply circuit suggests reserving the position of the dynamic response capacitance to optimize the output ripple when the load varies greatly.

## 6.3、 UART Communication

UART communication between module and master MCU through serial port supports full duplex transmission and reception of TX and RX.



# 7、Reflow Profile



## 8、 Revision History

Data	Description	Revision
2025-9-27	Initial Release	V1.0
2026-1-22	Increase current parameter	V1.1
2026-1-29	Modification of Reference Circuit Description	V1.2
2026-3-3	Errata	V1.3

### FCC Statement

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

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. 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 FCCID:2BG7T-TPL3131

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 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 or individual which installs the 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