REXENSE

瑞瀛产品规格书

REX3PT581

V1.0

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1. Product Introduction

1.1.Introduction

REX3PT581 is a small, high-sensitivity and low-power Zigbee module.Based on the RT51 chip, it provides a complete, high-performance, low-power and low-cost Zigbee wireless communication system, which complies with the IEEE802.15.4 specification and Zigbee 3.0 standard.

The module has built-in PA, integrated 32-bit RISC MCU, Zigbee3.0 wireless communication, 64KB SRAM, 1024KB built-in Flash, 14-bit ADC, 6-channel PWM, an orthogonal decoder (QDEC) and rich GPIO resources.

The REX3PT581 module complies with FCC, IC and CE regulations. It can be applied to equipment in many different environments, and complies with RoHS regulations. At the same time, the company also provides a complete set of development and evaluation kits. Users can choose different versions of kits for testing and development according to their own needs.

1.2.Application

Rexense REX3PT581 module complies with IEEE802.15.4 specification and Zigbee 3.0 standard.

- Transparent transmission: Users can develop programs according to our UART protocols program.
- Customization: our company can provide customers with reliable and safe applications according to their specific application programs.
- Standard Zigbee 3.0 function

Applications of modules include, but are not limited to:

- Smart home
- Building and Automation Monitoring
- Inventory management
- Industrial Monitoring
- Smart transportation
- Smartphone and tablet accessories
- Remote control and 3D glasses
- Sports and Fitness Tracking
- Wearable device

1.3.Main Features

- Dimensions: 18.0mm (L)×15.0mm (W)×2.8mm (H) (with shield)
- High receiving sensitivity: up to -103.5dBm
- Reliable and wide communication range: 1000m (PCB antenna, visual distance)
- Multiple antenna options
- Very low power consumption
  - Sleep mode: 2.9uA
  - Receive mode: 14.9mA
  - Transmission mode: 145mA@20dBm
- Frequency deviation range: ±10ppm @25℃
- Abundant storage resources: 1024K bytes Flash; 64K bytes RAM
- The 14 GPIOs can be configured as multiple functional interfaces according to user needs
  - GPIO
  - External interrupt source
  - 14-bit precision ADC sampling channel
  - USART with hardware flow control
  - SPI/I2C interface
  - PWM output
  - Hardware watchdog

1.4.Product Advantage

- Compact package design, even for small devices.
- Industry-leading link budget
- Excellent battery life
- Abundant storage resources for customer software applications
- Mesh networking capability
- Easy-to-use low-cost development kit
- ISM license-free frequency band

1.5.Abbreviations

ADC	Analog-to -Digital Converter
GPIO	General Purpose Input/Output
HVAC	Heating, Ventilating and Air Conditioning
TWI	Inter-Integrated Circuit
IEEE	Institute of Electrical and Electronics Engineers
ISM	Industrial, Scientific and Medical radio band

JTAG	Digital interface for debugging of embedded device, also known as IEEE 1149.1 standard interface
MAC	Medium Access Control layer
PCB	Printed Circuit Board
RAM	Random Access Memory
RF	Radio Frequency
RTS/CTS	Request to Send/ Clear to Send
RX	Receiver
SMA	Surface Mount Assembly
SPI	Serial Peripheral Interface
TX	Transmitter
UART	Universal Asynchronous Receiver/Transmitter
BLE	Bluetooth Low Energy
SigMesh	Specific Interesting Group Mesh Network Standard

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2. Module Interface

2.1.Packaging Information

Dimensions: 18.0mm (L)×15.0mm (W)×2.8mm (H) (with shield)
(Dimensional tolerance: length and width ±0.25mm, height ±0.15mm)

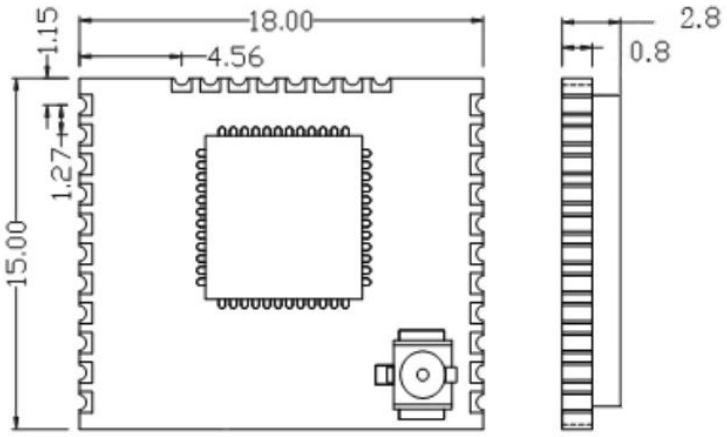

Figure 2-1 Dimensions

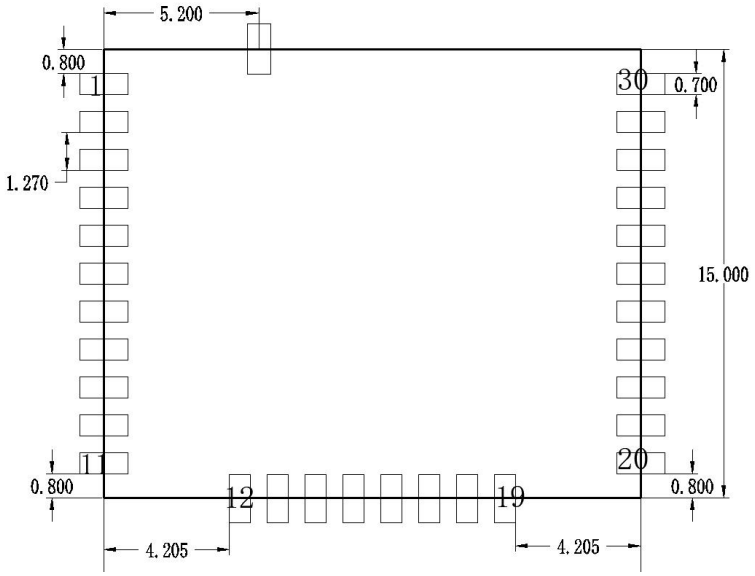

Figure 2-2 Product package diagram

2.2.Pin Definition

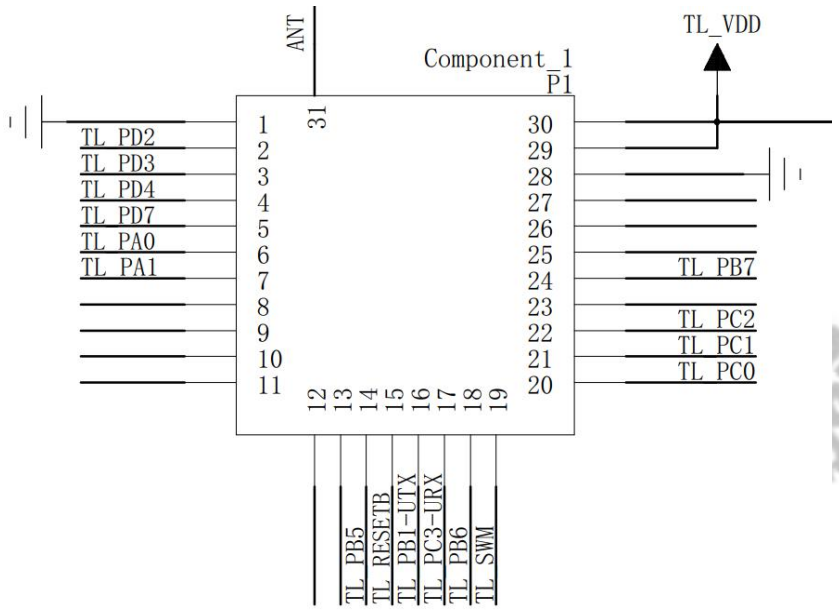

Figure 2-3 Pin configuration diagram

Pin NO.	Pin Signal	Direction
Dorsal view left top to bottom		
1	GND	GND
2	PD2	GPIO;PWM3;SPI_CS
3	PD3	GPIO;PWM1_N
4	PD4	GPIO;PWM2_N
5	PD7	GPIO;SPI_CLK;I2C_SCK
6	PA0	GPIO;PWM0_N
7	PA1	GPIO
8	NC	/
9	NC	/
10	NC	/
11	NC	/
Back View Bottom Left to Right		
12	NC	/
13	NC	/
14	PB5	GPIO;PWM5;ADC
15	RESET	RESET
16	PB1-TXD	TXD
17	PC3-RXD	RXD
18	PB6	GPIO;ADC;SPI_MISO;I2C_SDA

Pin NO.	Pin Signal	Direction
19	PA7	GPIO;SWM Download port
Dorsal view right side from bottom to top		
20	PC0	GPIO;PWM4_N;I2C_SDA
21	PC1	GPIO;PWM0;PWM1_N;I2C_SCK
22	PC2	GPIO;PWM0;I2C_SDA
23	NC	/
24	PB7	GPIO;ADC;SPI_MOSI
25	NC	/
26	NC	/
27	NC	/
28	GND	GND
29	VCC	VCC
30	VCC	VCC
back view top		
31	RF	RF pin

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3. Technical Specification

3.1.Electrical Specification

Parameter	Min	Max
Module Input Voltage（VCC）	1.8V	3.6V
Pin Voltage (except ADC pin)	-0.3V	VDD_PADS+0.3
ADC Pin Voltage	-3.3V	VCC+0.3V
Chip I/O Drive Current Data	2mA	16 mA

Remark:PB1 support drive strength up to 8mA (8mA when "DS"=1, 4mA when "DS"=0); PB<5:7> support drive strength up to 16mA (16mA when "DS"=1, 12mA when "DS"=0); other GPIOs (PA<0:1>, PC<0:3> and PD<2:4,7>) support drive strength up to 4mA (4mA when "DS"=1, 2mA when "DS"=0).

3.2.Current Specification

Parameter	Average	Max	Unit
Receiving Current	14.9	15.4	mA
Transmitting Current (@20dBm)	145.0	155.6	mA
Sleeping Current	2.9	-	μA

3.3.Processors Specification

Parameter	Value	Unit
On-chip Flash Storage Space	1024K	bytes
On-chip RAM Storage Space	64K 32K(SRAM Retention) + 32K(Without SRAM Retention)	bytes
Working Frequency	48	MHz

3.4.Module Interface Specification

Parameter	Test Condition	Range	Unit
UART Max Baud Rate		1M	bps

Resolution of Analog Channels		14	Bits
Analog Input Impedance		>1	MΩ
Analog Reference Voltage（VREF）		1.2	V
Analog Input Voltage(1/8divider , Single-ended mode)		0-9.6V	V
Analog Input Voltage(1/1divider , Single-ended mode)		0-1.2V	V
I2C Bus Maximum Clock Frequency		400	KHz
GPIO Output Voltage (Logic 0)	-8 / 4 mA	0 ~ 0.2*VDD	V
GPIO Output Voltage (Logic 1)	-8 / 4 mA	0.80*VDD ~ VDD	V
Real Time Clock Frequency		32.768	KHz

3.5.Physical/Ambient Specification

Parameter	Value	Note
Physical Size	18.0*15.0*2.8mm（with shield）	
Weight	<1g	
Working Temperature*	-40°C to +105°C（Default）	
Working Relative Humidity	<95%	

4. RF Specification

4.1.Basic RF Specification

Parameter	Range	Unit
Working Frequency	2400~2483.5	MHz
Number of Frequency Bands	16	
Channel Number	0B~1A	Hex
Channel Spacing	5	MHz
Rated Input/Output Impedance	50	Ω

4.2.Receiving Specification (RX)

Parameter	Min	Typical	Max	Unit
Receiving Sensitivity（PER＜8%）	-103.5	-103.0	-102.0	dBm

5. PCB Antenna Specification

5.1.U.FLconnector

The REX3PT581 is equipped with a 1st generation U.F.L antenna socket for connecting external antennas.

6. FCC Regulations

Important Notice to OEM integrators

1. This module is limited to OEM installation ONLY.
2. This module is limited to installation in mobile or fixed applications, according to Part 2.1091(b).
3. The separate approval is required for all other operating configurations, including portable configurations with respect to Part 2.1093 and different antenna configurations
4. For FCC Part 15.31 (h) and (k): The host manufacturer is responsible for additional testing to verify compliance as a composite system. When testing the host device for compliance with Part
15 Subpart B, the host manufacturer is required to show compliance with Part 15 Subpart B while the transmitter module(s) are installed and operating. The modules should be transmitting and the evaluation should confirm that the module's intentional emissions are compliant (i.e. fundamental and out of band emissions). The host manufacturer must verify that there are no additional unintentional emissions other than what is permitted in Part 15 Subpart B or emissions are complaint with the transmitter(s) rule(s).

The Grantee will provide guidance to the host manufacturer for Part 15 B requirements if needed.

Important Note

notice that any deviation(s) from the defined parameters of the antenna trace, as described by the instructions, require that the host product manufacturer must notify to REXENSE that they wish to change the antenna trace design. In this case, a Class II permissive change application is required to be filed by the USI, or the host manufacturer can take responsibility through the change in FCC ID (new application) procedure followed by a Class II permissive change application.

End Product Labeling

When the module is installed in the host device, the FCC label must be visible through a window on the final device or it must be visible when an access panel, door or cover is easily re-moved. If not, a second label must be placed on the outside of the final device that contains the following text: “Contains FCC ID: 2AOE2REX3P581”

The FCC ID can be used only when all FCC compliance requirements are met.

Antenna Installation

(1) The antenna must be installed such that 20 cm is maintained between the antenna and users,

(2) The transmitter module may not be co-located with any other transmitter or antenna.

(3) Only antennas of the same type and with equal or less gains as shown below may be used with this module.

Other types of antennas and/or higher gain antennas may require additional authorization for operation.

Antenna type	2.4GHz band Peak Gain (dBi)
PCB	1.27

In the event that these conditions cannot be met (for example certain laptop configurations or co-location with another transmitter), then the FCC authorization is no longer considered valid and the FCC ID cannot be used on the final product. In these circumstances, the OEM integrator will be responsible for re-evaluating the end product (including the transmitter) and obtaining a separate FCC authorization.

Manual Information to the End User

The OEM integrator has to be aware not to provide information to the end user regarding how to install or remove this RF module in the user's manual of the end product which integrates this module. The end user manual shall include all required regulatory information/warning as show in this manual.

Federal Communication Commission Interference 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.

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 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.

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

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

List of applicable FCC rules

This module has been tested and found to comply with 15.247 requirements for Modular Approval.

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.

This device is intended only for OEM integrators under the following conditions:
(For module device use)

1) The antenna must be installed such that 20 cm is maintained between the antenna and users, and

2) The transmitter module may not be co-located with any other transmitter or antenna.

As long as 2 conditions above are met, further transmitter test will not be required. However, the OEM integrator is still responsible for testing their end-product for any additional compliance requirements required with this module installed.

Radiation Exposure Statement

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20 cm between the radiator & your body.