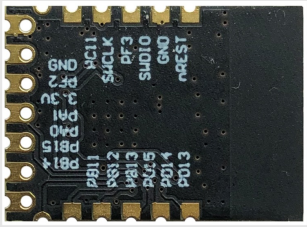
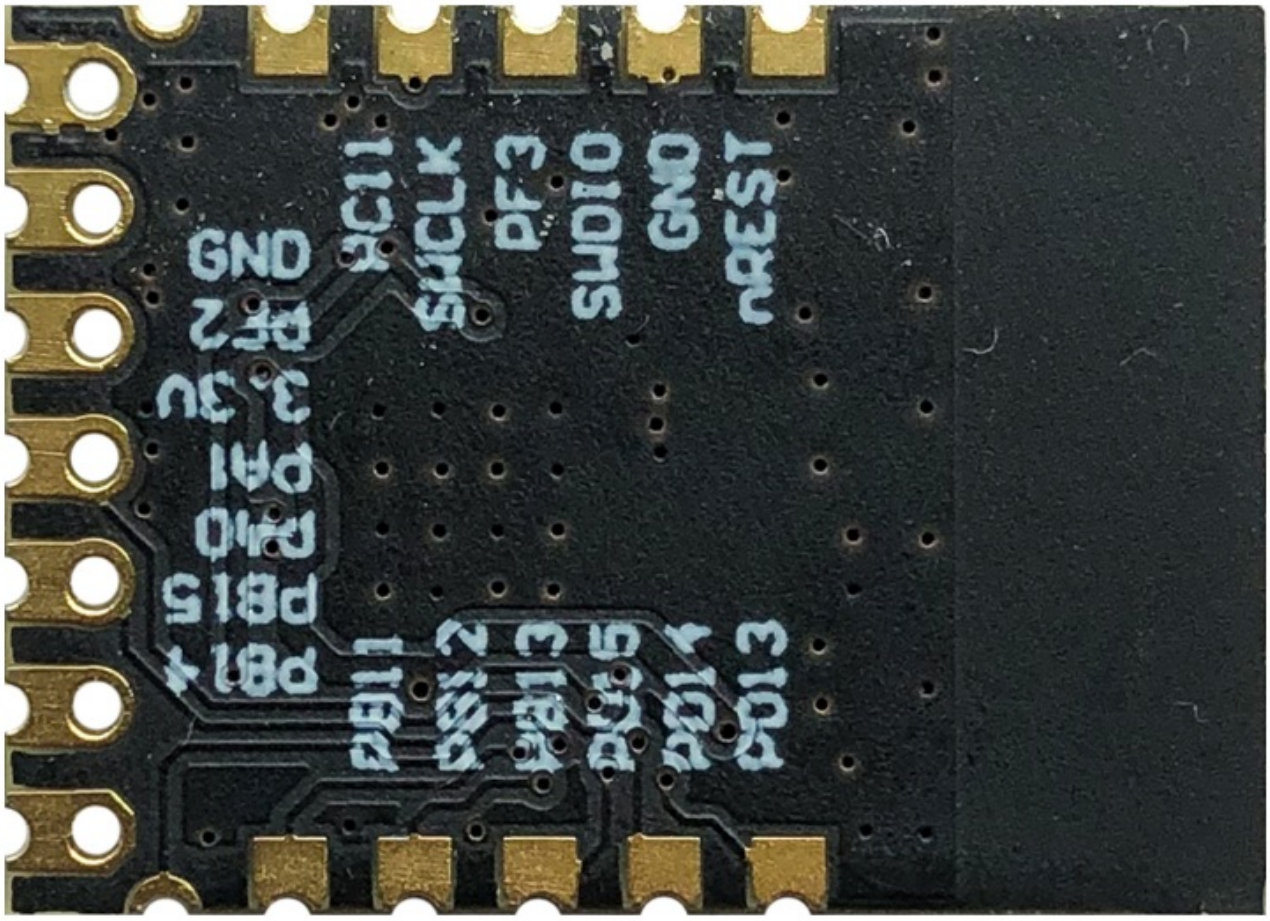


REXENSE REX3B21 Low-Power Zigbee Module User Manual

Contents

RXSENSE

REXENSE REX3B21 Low-Power Zigbee Module



Introduction

REX3B21 is a low-power ZigBee module with high sensitivity and compact in dimension. Based on EFR32 platform of SiliconLabs, this module conforms to IEEE 802.15.4 specification and ZigBee3.0 protocol standard. It has been widely used in applications of smart home, building automation and industrial monitoring. By utilizing this module, much time and energy will be saved during the development work

Application

REX3B21 module conforms to IEEE 802.15.4 specification and ZigBee3.0, supports the mesh network which is self-healing and self-assembling, optimizes the network rate and power consumption. This module supports the setting and configuration as below:

Standard ZigBee 3.0

Application of module, included but not limited to:

- Smart home
- Light control
- Security system
- Air quality monitoring
- Smart lock
- Motorized curtain
- Air-conditioning, heating and ventilation
- Scenario automation
- Building automation and monitoring
- HVAC monitoring and control
- Industrial monitoring
- Wireless meter reading

Main Characteristics

- Dimension 20.4*14.8*2.5mm
- Max output power:14dBm
- Max receiving sensitivity: -102.5dBm(Zigbee)
- Reliable communication distance: 1000m view of sight distance
- Multiple antenna options
- Extreme low power consumption
- Sleep mode <5.0μA
- Receiving mode 9.4mA (Zigbee)

15 GPIOs can be configured for various functional interfaces according to application

- GPIO
- External interrupts
- 12 bytes precision ADC sampling channel
- USART Hardware flow control
- TWI interface
- UART / SPI / I2C interface
- PWM output
- Product Advantage
- Small Package fits small devices well.
- Advanced link budget in the industry
- Outstanding battery longevity
- Rich storage resource for various software application
- Powerful mesh network management ability
- With development kit easy to use and cost-effective

- ISM band license free

Abbreviations

Related Documents

[1] ZigBee 3.0 – The Open, Global Standard for the Internet of Things December 2, 2014

Product Overview

Overview

REX3B21 is a compact IOT module, higher sensitivity and lower power. It conforms to IEEE 802.15.4 and ZigBee 3.0 standard protocol. Based on EFR32 platform of SiliconLabs, this module has outstanding RF characteristics, lower power consumption, and powerful processor core. REX3B21 module conforms to the FCC, ISED, CE, and RoHS, which can be applied to various devices in different environments. At the same time, our company also provides a complete set of development and evaluation kits, users can choose kits of different versions for testing and development according to their requirement

Technical Specification

Parameter	Min	Max
Module input voltage VCC	1.71V	3.8V
Pin voltage (except ADC pin)	-0.3V	VDD_PADS+0.3
ADC Pin voltage	0V	3.3V
Data of maximum drive current of all I/Os		50 mA
Maximum RF signal receiving density of chips		+14 dBm

Power Consumption

Parameter	Range	Unit
Receiving current	9.4	mA
@14dBm Transmitting current	186	mA
Sleeping current	5.0	μA
Transmitting power	14	dBm
99% Receiving sensitivity	-102.5	dBm

RF Electrical Characteristics

Parameter	Range	Unit
Frequency range	2400~2483.5	MHz
Quantity of Channels	16	
Channel spacing	5	MHz
Transmitting power	14	dBm
Receiving sensitivity	-102.5	dBm
Max transmitting rate	250	kbps
Rated Input / Output Impedance	50	Ω

Processor Characteristics

Parameter	
Processor core	32bit ARM®-M33
Max operating frequency	80MHz

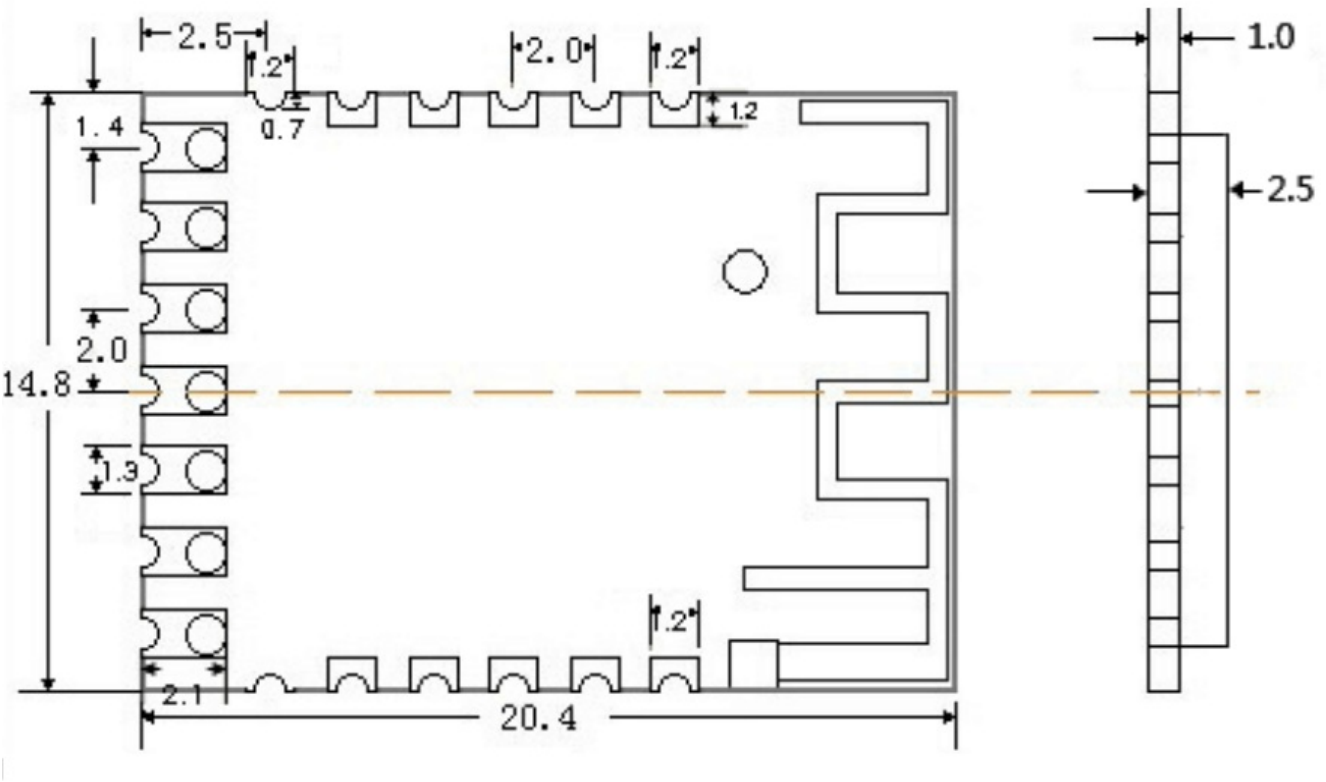
Module Interface Characteristics

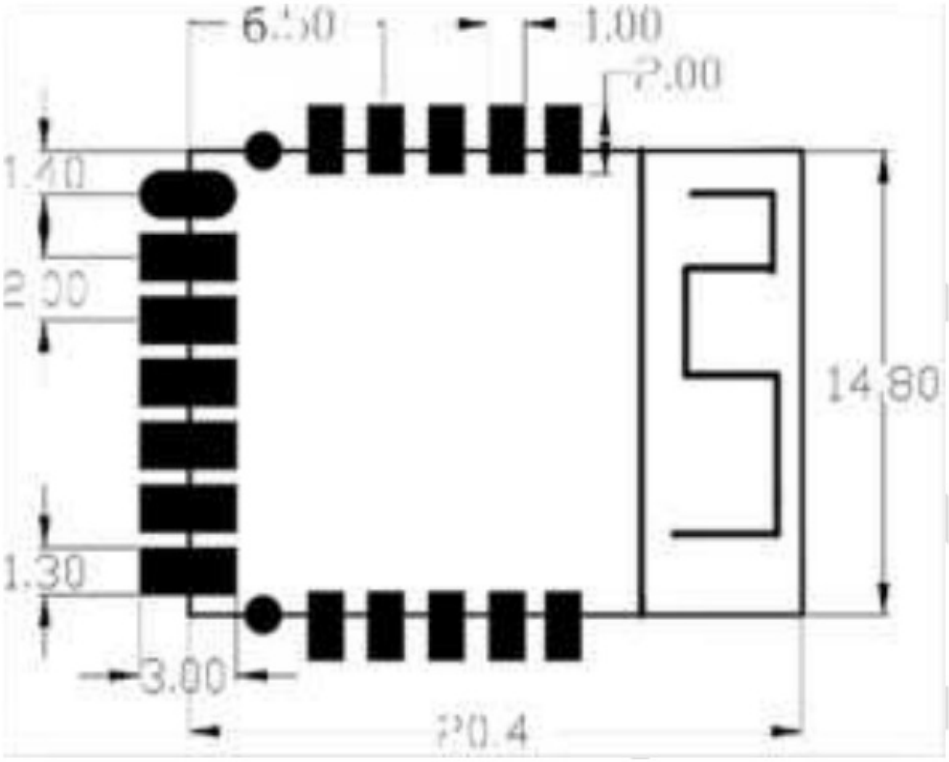
Parameter	Test Conditions	Range	Unit
UART Max baud rate		230400	bps
The resolution / conversion time of the analog channel	Half-duplex mode	12/4096	Bits/μs
Analog input impedance		>1	MΩ
Analog reference voltage (VREF)		3.3	V
Analog input voltage		0 – VREF	V
I2C bus maximum clock frequency		1000	KHz
GPIO output voltage (logic 0)	-8/ 4 mA	0 ~ 0.18*VCC	V
GPIO output voltage (logic 1)	-8/ 4 mA	0.82*VCC ~ VCC	V
Real-time clock frequency		32.768	KHz

Physical/Ambient Characteristics

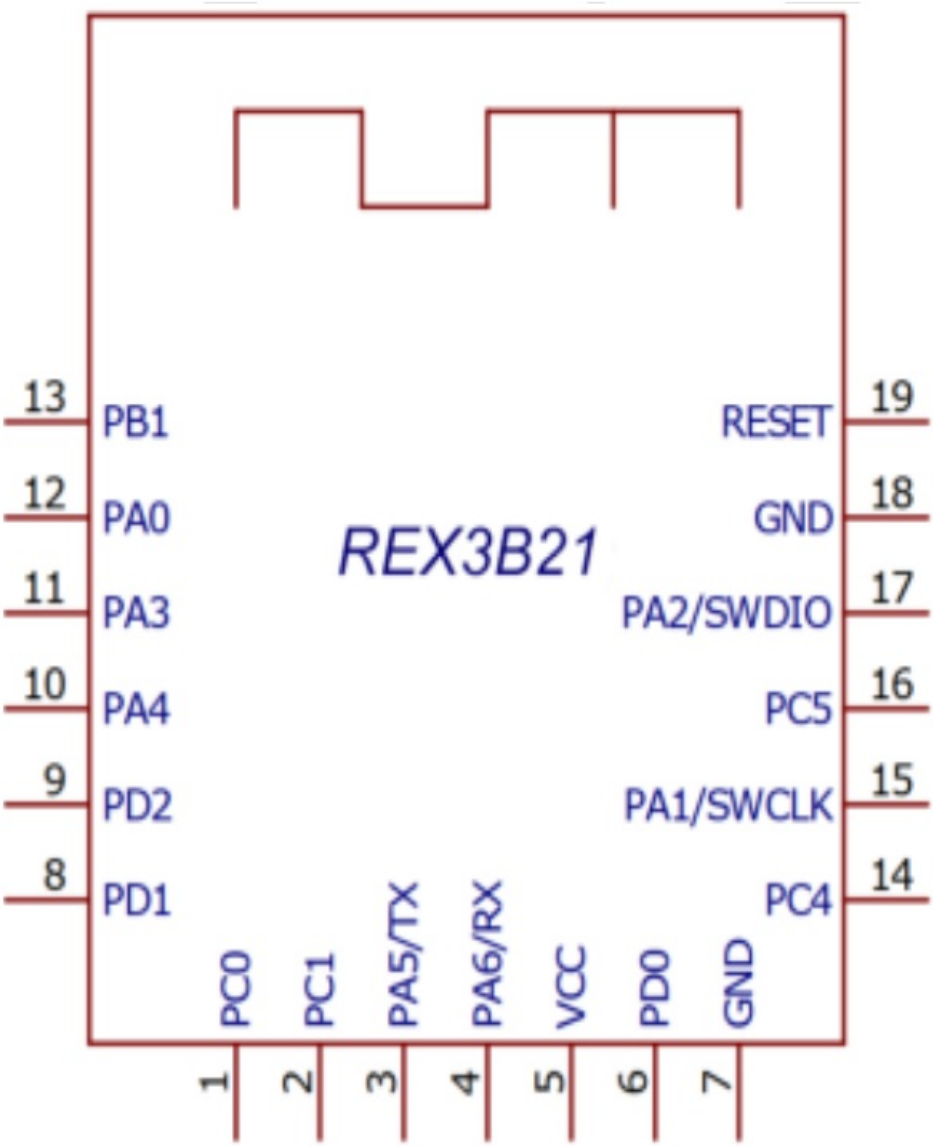
Parameter	Value	Note
Physical size	20.4*14.8*2.5mm	
Weight	<1g	
Working temperature	-40°C to +85°C default	
Relative working Humidity	<95%	

Pin Configuration





Pin Definition



Pin Description

No. of module pins	No. of QFN32 package pins	Pin signal	Direction	Pin specification
1	1	PC0	I/O	GPIO
2	2	PC1	I/O	GPIO
3	22	PA5	I/O	GPIO; TXD
4	23	PA6	I/O	GPIO; RXD
5	10 25 26 27	3.3V	I	VCC
6	32	PD0	I/O	GPIO
7	11 0	GND	I	GND
8	31	PD1	I/O	GPIO
9	30	PD2	I/O	GPIO
10	21	PA4	I/O	GPIO
11	20	PA3	I/O	GPIO
12	17	PA0	I/O	GPIO
13	15	PB1	I/O	GPIO
14	5	PC4	I/O	GPIO
15	18	PA1	IO	GPIO; SWCLK
16	6	PC5	IO	GPIO
17	19	PA2	IO	GPIO; SWDIO
18	11 0	GND	I	GND
19	9	RESET	I	RESET

Antenna Specification

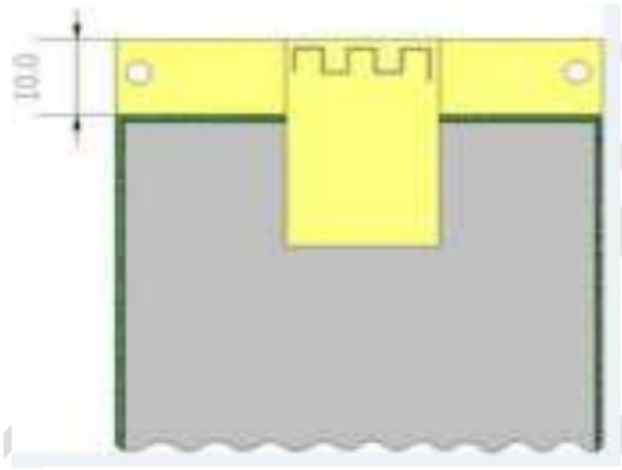
On Board PCB Antenna

REX3B21 has an on board PCB antenna. Notes for using PCB antenna:

- Avoid placing module in a metal shell.
- Keep metal object from the PCB antenna (at least 1cm above, 2.7cm plus recommenthe d).
- Do not keep module nearby the devices with electromagnetic radiation source, such as transformers.

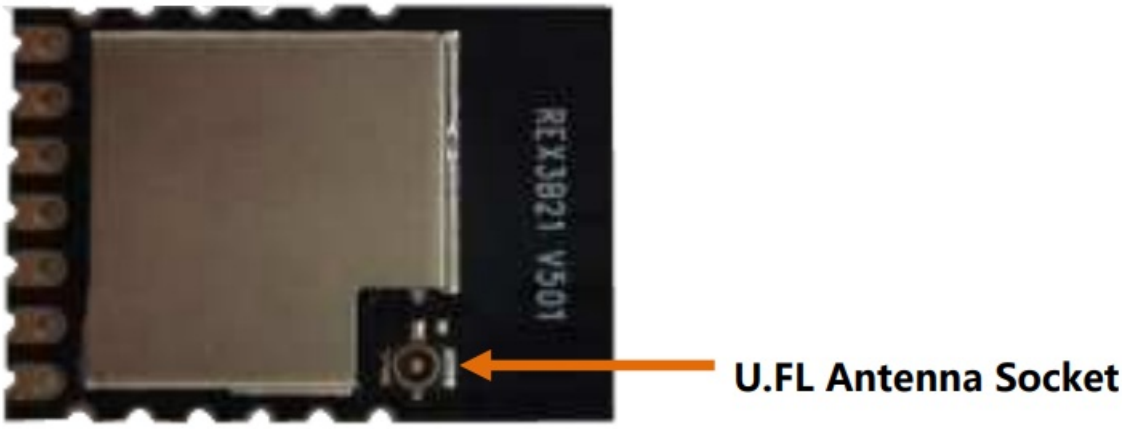
The design of a user's PCB should prevent the module's PCB antenna from the interference of its components, traces and bottom. The basic principles are:

- No traces, bottom around the PCB antenna with no other components placed
- The PCB antenna shall be out of PCB board
- Do not cover the PCB antenna with metal shell

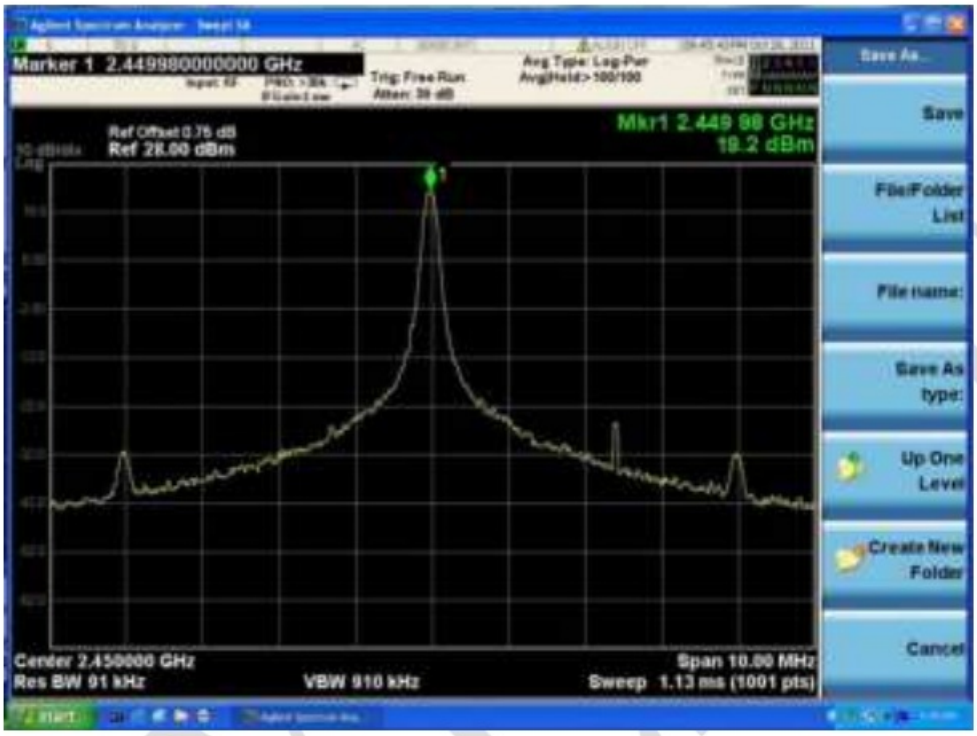


U.FL Antenna Socket

Figure 3-5. U.FL Antenna socket



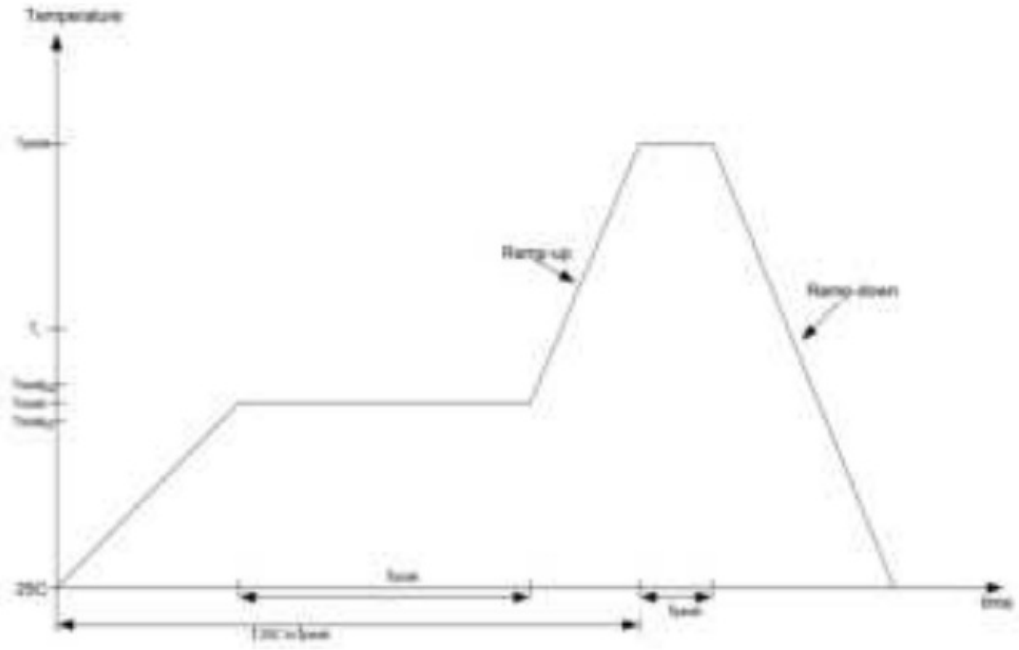
RF Performance



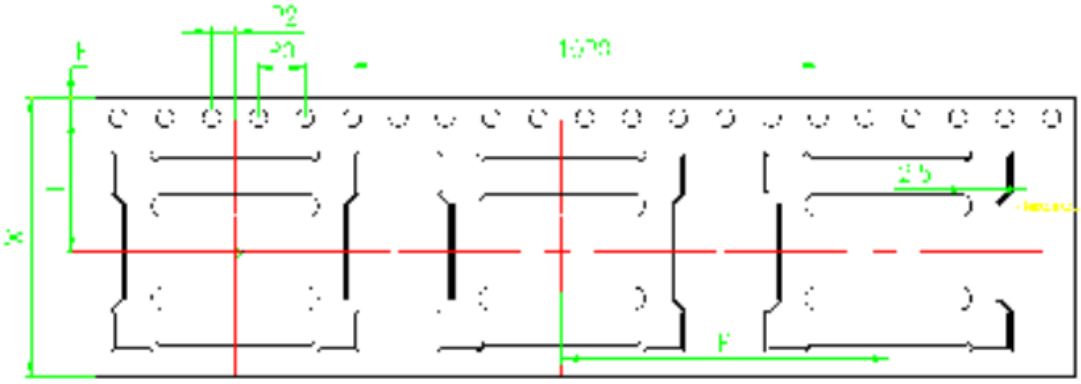
Modulation Signal

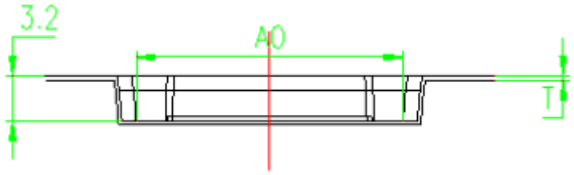
Soldering Temperature for Module

The max temperature for soldering module shall be within 237-245℃ in 20s.

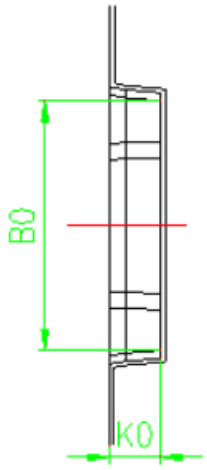


Packing





ITEM	SPEC(mm)
W	32.00±0.30
F	14.5±0.10
P	1.75±0.10
ΦD0	1.5
P0	4.00±0.10
A0	21.00±0.30
B0	15.5±0.30



Ordering Information

Manufacturer REX 3 B 21

REX=REXENSE

Series

3=Zigbee

Packaging Type

M = Mini

B = On board PC**B** antenna **(This)**

P = Full GPIO **P**in

Core

21 = EFR32MG**21**

Contact Us

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- Web **www.rexense.com**

FCC Compliance Notice

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions:

- This device may not cause harmful interference, and
- 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. 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 equipment complies with FCC 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. This equipment should be installed and operated with minimum distance 20cm between the radiator& your body.

ISEDC RSS warning
This device complies with Innovation, Science and Economic Development Canada Compliance licence-exempt RSS standard (s). Operation is subject to the following two conditions:

- this device may not cause interference, and
- this device must accept any interference, including interference that may cause undesired operation of the device.

ISEDC Radiation Exposure Statement:

This equipment complies with ISEDC 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. Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to

operate the equipment. 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: 2AOE2-REX3B21 or Contains FCC ID: 2AOE2-REX3B21” The outside of final products that contains this module device must display a label referring to the enclosed module. This exterior label can use wording such as: “Contains Transmitter Module IC: 22670-REX3B21”,or “Contains IC: 22670-REX3B21”, Any similar wording that expresses the same meaning may be used

Integration instructions for host product manufacturers according to KDB 996369 D03 OEM Manual v01

List of applicable FCC rules
CFR 47 FCC PART 15 SUBPART C has been investigated. It is applicable to the modular.

Specific operational use conditions

This module is stand-alone modular. If the end product will involve the Multiple simultaneously transmitting condition or different operational conditions for a stand-alone modular transmitter in a host, host manufacturer have to consult with module manufacturer for the installation method in end system.

Limited module procedures
Not applicable

Trace antenna designs

Not applicable

RF exposure considerations
To maintain compliance with FCC’s RF Exposure guidelines, this equipment should be installed and operated with minimum distance of 20cm from your body.

Antennas

This radio transmitter FCC ID: 2AOE2-REX3B21 has been approved by FederalCommunications Commission to operate with the antenna types listed below, with the maximum permissible gain indicated. Antenna types not included in this list that have a gain greater than the maximum gain indicated for any type listed are strictly prohibited for use with this device.

Label and compliance information
The final end product must be labeled in a visible area with the following ” Contains FCCID:2AOE2-REX3B21”

Information on test modes and additional testing requirements
Host manufacturer is strongly recommended to confirm compliance with FCC requirements for the transmitter when the module is installed in the host.

Additional testing, Part 15 Subpart B disclaimer
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.

ISED Important Note

In the event that these conditions cannot be met (for example certain laptop configurations or co-location with

another transmitter), then the Canada authorization is no longer considered valid and the ISED 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 Canada authorization. Any company of the host device which install this modular with limit modular approval should perform the test of radiated emission and spurious emission according to RSS-247 and RSSGen requirement, only if the test result complies with RSS-247 and RSS-Gen requirement, then the host can be sold legally.

End Product Labeling
The final end product must be labeled in a visible area with the following: Contains**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.
- This radio transmitter [22670-REX3B21] has been approved by Innovation, Scienceand Economic
- Development Canada to operate with the antenna types listed below, It has an antenna with the maximum antenna gain is 1.78dBi.
- Antenna types not included in this list that have a gain greater than the maximum gain indicated for any type listed are strictly prohibited for use with this device.

Documents / Resources

REXENSE	REXENSE REX3B21 Low-Power Zigbee Module [pdf] User Manual REX3B21, 2AOE2-REX3B21, 2AOE2REX3B21, REX3B21 Low-Power Zigbee Module, Low-Power Zigbee Module

References

- Zhejiang Rexense IoT Technology Co., Ltd_Zhejiang Rexense IoT Technology Co., Ltd