



GROM ZBee3 ZigBee Module Wireless Data Transmission Instructions

[Home](#) » [GROM](#) » GROM ZBee3 ZigBee Module Wireless Data Transmission Instructions 

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Contents

- 1 Introduction
 - 1.1 Summary
 - 1.2 Applications
 - 1.3 Key Features
 - 1.4 Advantage
 - 1.5 Abbreviations and Acronyms
 - 1.6 Related Documents
- 2 Specifications
 - 2.1 Electrical Characteristics
 - 2.2 Pin Configuration
 - 2.3 Antenna Specifications
- 3 Ordering Information
- 4 Contact Us
- 5 FCC Statement
- 6 Documents / Resources
- 7 Related Posts

Introduction

Summary

ZBee3 is an ultra-compact, low-power, high-sensitivity 2.4 GHz IEEE 802.15.4/ ZigBee module, which can be used for wireless sensing, control and data acquisition applications.

Applications

ZBee3 module is compatible with IEEE 802.15.4/ ZigBee stack that supports a self-healing, self-organizing mesh network, while optimizing network traffic and minimizing power consumption.

The applications include but not limited to:

- Building automation & monitoring
- Environmental monitoring
- Security
- Industrial monitoring
- Automated meter reading (AMR)

Key Features

- Size: 19.3 x 13.6 x 3.0mm
- Output power: MAX 20dBm
- High RX sensitivity : -102dBm
- Outperforming link budget : 122dB
- Communication distance : SMA antenna: 800~1000m (Visual distance);
Ceramic antenna 200~300m (Visual distance)
- Low power consumption
 - Sleep mode : <5.0μA
 - RX mode: 9.4mA@2.4 GHz (250 kbps O-QPSK DSSS)
 - TX mode: 33.8mA@10dBm 185mA@20dBm
- Ample memory resources:
 - Flash: 1024K bytes RAM: 96K bytes
- Wide range of interfaces (both analog and digital):
 - 20 x GPIO
 - 12-bit 1 Msps SAR ADC
 - 3 x USART transceiver
 - 2 x I2C
 - IEEE 802.15.4 compliant transceiver
 - Optional antenna reference designs

Advantage

- Small package for small devices
- Leading link budget
- 4 PCB board, good ESD/EMC protection ability.
- Ample memory for software application

- Mesh networking capability
- ISM worldwide license-free operation

Abbreviations and Acronyms

ADC Analog-to -Digital Converter
 API Application Programming Interface
 DC Direct Current
 DTR Data Terminal Ready
 DIP Duap In-line package
 EEPROM Electrically Erasable Programmable Read-Only Memory
 ESD Electrostatic Discharge
 GPIO General Purpose Input/Output
 HAL Hardware Abstraction Layer
 HVAC Heating, Ventilating and Air Conditioning
 HW Hardware
 TWI Inter-Integrated Circuit
 IEEE Institute of Electrical and Electronics Engineers
 IRQ Interrupt Request
 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
 MCU Microcontroller Unit. In this document it also means the processor, which is the core of ZigBee module
 NWK Network layer
 OEM Original Equipment Manufacturer
 OTA Over-The-Air upgrade
 PCB Printed Circuit Board
 PER Package Error Ratio
 PHY Physical layer
 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
 SW Software
 TX Transmitter
 UART Universal Asynchronous Receiver/Transmitter
 USART Universal Synchronous/Asynchronous Receiver/Transmitter
 USB Universal Serial Bus
 ZigBeePRO Wireless networking standards targeted at low-power applications
 802.15.4 The IEEE 802.15.4-2003 standard applicable to low-rate wireless PAN

Related Documents

1. IEEE Std 802.15.4-2003 IEEE Standard for Information technology – Part 15.4 Wireless Medium Access Control (MAC) and Physical Layer (PHY) Specifications for Low-Rate Wireless Personal Area Networks (LR-WPANs)
2. ZigBee Specification. ZigBee Document 053474r17, October 19, 2007

Specifications

Electrical Characteristics

Absolute Maximum Ratings

Table 2-1. Absolute Maximum Ratings

Parameters	Min	Max
Power supply range VCC	1.75V	3.8V
Pin working voltage range(exclude ADC pin)	-0.3V	VDD_PADS+0.3
Max driving current of all I/O		200 mA
Max RX RF level		+10 dBm

Note:

Absolute Maximum Ratings are the values beyond which damage to the module may occur. Under no circumstances must the absolute maximum ratings given in this table be violated. Stresses beyond those listed under “Absolute Maximum Ratings” may cause permanent damage to the module.

Test Conditions

Table 2-2. Test conditions (unless otherwise stated), VCC = 3.3V, Tamp = 25°C

Parameters	Range	Unit
TX current (@20dBm)	200	mA
RX current	9.4	mA
Sleeping current	<5.0	μA

RF Characteristics

Table 2-3. RF Characteristics

Parameters	Test Conditions	Range	Unit
Frequency Band		2400~2483.5	MHz
Numbers of Channels		16	
Channel Interval		5	MHz
Transmitter Output Power		-20 to +20	dBm
Receive Sensitivity (90%)		-104	dBm
Max data transmit speed		250	kbps
TX Output/ RX Input Nominal Impedance		50	Ω

Microcontroller Characteristics

Table 2-4. Microcontroller Characteristics

Parameters	Test Conditions	Range	Unit
On-chip Flash Memory size		512K~1024K	bytes
On-chip RAM size		64K~96K	bytes
Operation Frequency		80	MHz

Module Interfaces characteristics

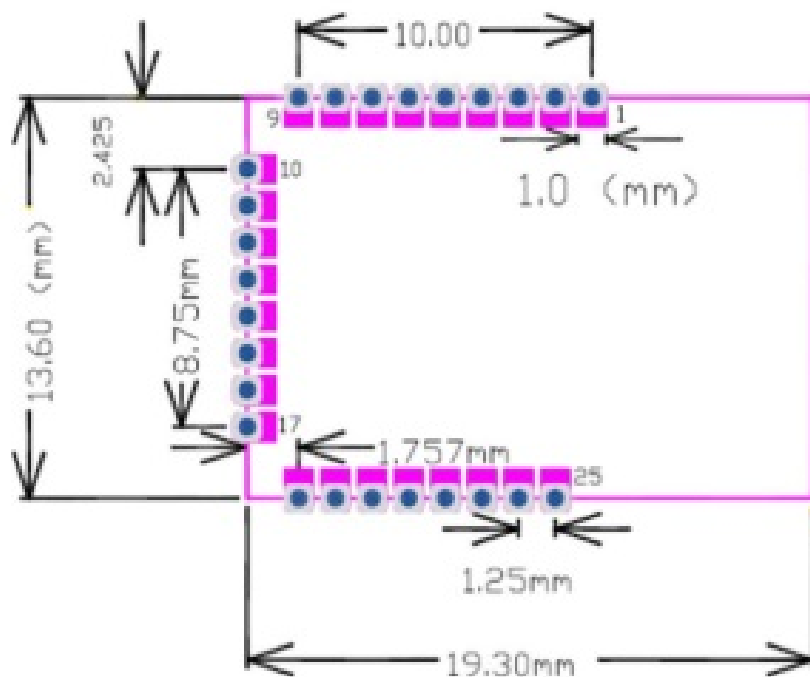
Table 2-5. Module Interfaces characteristics

Parameters	Test Conditions	Range	Unit
UART Maximum Baud Rate		230400	bps
Analog input impedance		>1	MΩ
Analog input current		0 – VREF	V
I2C Maximum Clock		1	MHz
Real Time Oscillator Frequency		32.768	KHz

Physical/Environmental Characteristics**Table 2-6. Physical/Environmental Characteristics**

Parameter	Value	Remark
Size (L*W*H)	19.3×13.6×3.0mm	
Working temp.	-40°C to +85°C	
Operating Relative Humidity Range	<= 95%RH	

Pin Configuration**Picture 2-1. Size**



Picture 2-1: Size (mm)

Picture 2-2. Pin Configuration

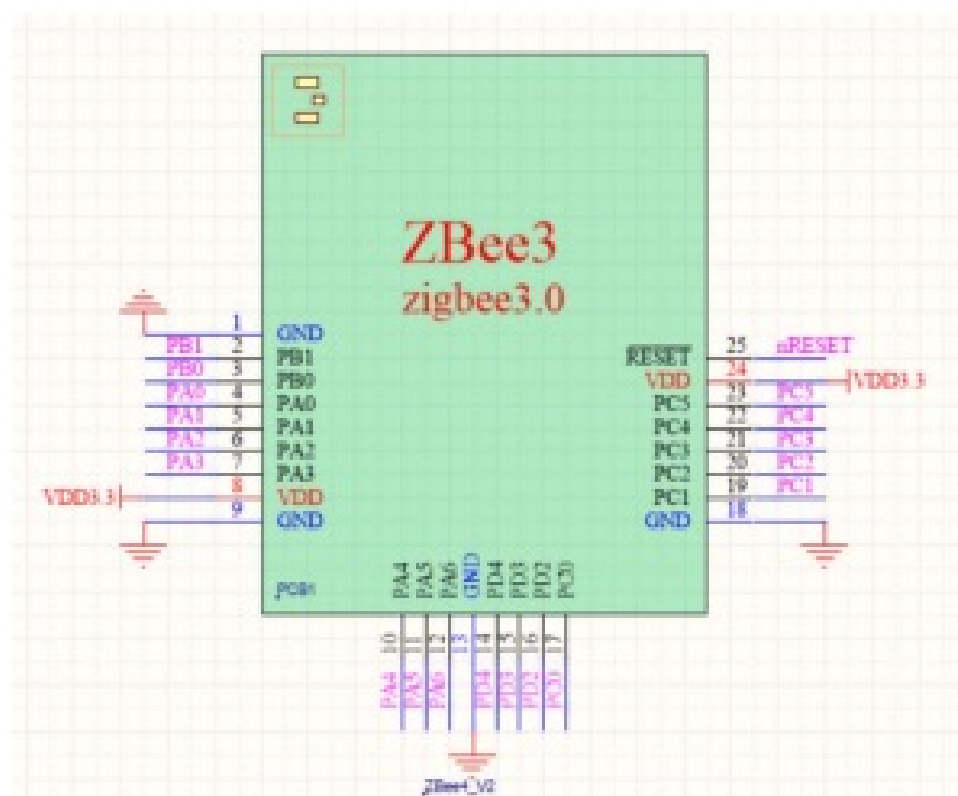


Table 2-7. Pin instruction

Module Pin No.	Pin No.	Signal	Direction	Description

1		GND	–	Ground
2	15	PB01	I/O	Digital I/O
		EM4WU3	I	
3	16	PB00	I/O	Digital I/O
4	17	PA00	I/O	Digital I/O
5	18	PA01	I/O	Digital I/O
		SWCLK	I	
6	19	PA02	I/O	Digital I/O
		SWDIO	I/O	
7	20	PA03	I/O	Digital I/O
		SWV	O	
		TDO	O	
		TRACEDATA 0		

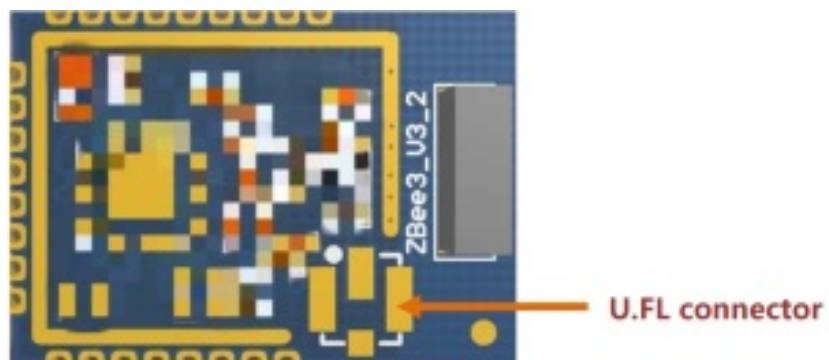
8		3.3V	–	DC supply 1.8~3.6V
9		GND	–	Ground
10	21	PA04	I/O	Digital I/O
		TDI		
		TRACECLK		
11	22	PA05	I/O	Digital I/O
		EM4WU0		
12	23	PA06	I/O	Digital I/O
13		GND	–	Ground
14	28	PD04	I/O	Digital I/O
15	29	PD03	I/O	Digital I/O
16	30	PD02	I/O	Digital I/O
		EM4WU9	I	
17	1	PC00	I/O	Digital I/O

18		GND	–	Ground
19	2	PC01	I/O	Digital I/O
20	3	PC02	I/O	Digital I/O
21	4	PC03	I/O	Digital I/O
22	5	PC04	I/O	Digital I/O
23	6	PC05	I/O	Digital I/O
		EM4WU7	I	
24		3.3V	–	DC supply 1.8~3.6V
25	9	RESETn	I	Reset Pin

Antenna Specifications

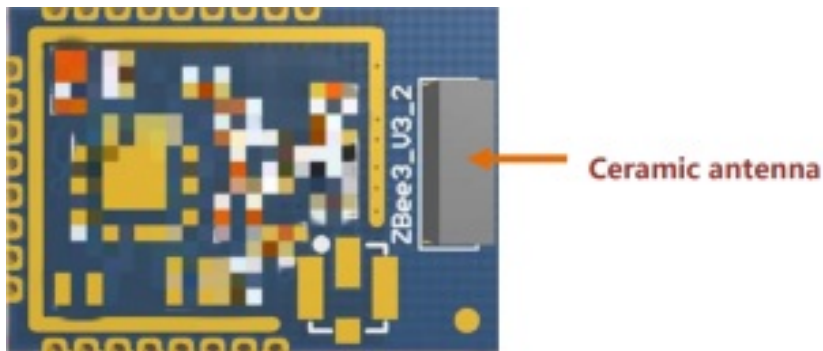
Use U.FL to connect external antenna:

Picture 2-3. U.FL connector



Integrated ceramic antenna:

Picture 2-4. Ceramic antenna



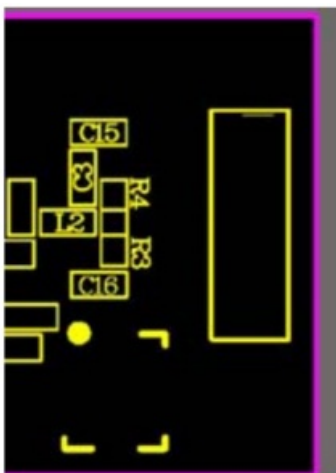
Attention when using ceramic antenna

1. Please avoid installing the module in a complete metal enclosure.
2. Please avoid placing high profile components/metal next to antenna 1 cm at least, suggest more than 2.7 cm .
3. ZigBee module should not be placed next to consumer electronics which might interfere with ZigBee's RF frequency band, like transformer.

User should try to avoid other components or line interfere ceramic antenna when designing board

- Wires or other components avoid surrounding ceramic antenna
- Ceramic antenna should be extended to the board
- Don't use metal shell to cover the PCB antenna

Picture 2-4. Components Location



*****Soldering way for convert ceramic antenna to U.FL:

U.FL soldering way C3=2.7nh, R4=NC, R3=2.7pF, C16=2.7nh

Ordering Information

Product Type

	ZBee	3	S	2F8	C
ZBee=Zigbee					
Product Serial					
3=Zigbee serial (3)					
Package Type					
S=SMD					
Chip Model					
1F4 = EFR32MG21A010F512IM32-B					
1F8 = EFR32MG21A010F768IM32-B					
1F8 =EFR32MG21A010F1024IM32-B					
2F4 = EFR32MG21A020F512IM32-B					
2F6 = EFR32MG21A020F768IM32-B					
2F8 = EFR32MG21A020F1024IM32-B (Default)					
Antenna					
U=U.FL connector					
C=Ceramic antenna (Default)					

Contact Us

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FCC Statement

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

Chip antenna with Antenna gain 2dBi Integral antenna(SMA antenna connector)with Antenna gain 2dBi

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

The modular can be installed or integrated in mobile or fix devices only. This modular cannot be installed in any portable device without further certificate (such as C2CP with SAR). 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. This modular must be installed and operated with a minimum distance of 20 cm between the radiator and user body.

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: 2AZEG-ZBEE3S2F8C Or Contains FCC ID: 2AZEG-ZBEE3S2F8C "

When the module is installed inside another device, the user manual of the host must contain below warning statements;

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.

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- 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.

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 of the host device which install this 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 result comply with FCC part 15C : 15.247 and 15.209 & 15.207 ,15B Class B requirement, then the host can be sold legally

Add: Room800,Building3#,Longtan Rd 16#,Cangqian street, Hangzhou City, China. 311121
Website www.gromiot.com



Documents / Resources

	<p>GROM ZBee3 ZigBee Module Wireless Data Transmission [pdf] Instructions ZBEE3S2F8C, 2AZEG-ZBEE3S2F8C, 2AZEGZBEE3S2F8C, ZBee3, ZigBee Module Wireless Data Transmission</p>
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