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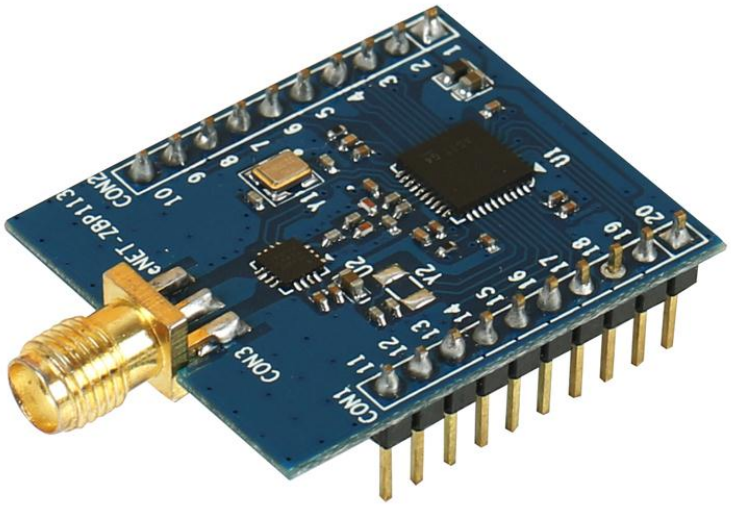

User Manual

V1.0 – August 16,2014

BestU

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Version Updated:

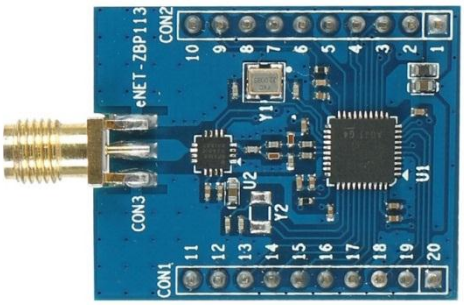
Version	Updated Date	Description
1.0	2014-08-16	Released

Catalogue

1 Product Overview

1.1 Product Description

eNet-ZBP113 module is a ZigBee embedded wireless module which is based on TI CC2530F256 and designed by BestU. The features of the chip, such as low power, excellent performance of a leading RF transceiver, SoC for IEEE 802.15.4 with 8051MCU, TI Z-Stack™ protocol stack and etc. make it a robust and complete ZigBee RF4CE remote-control solution.

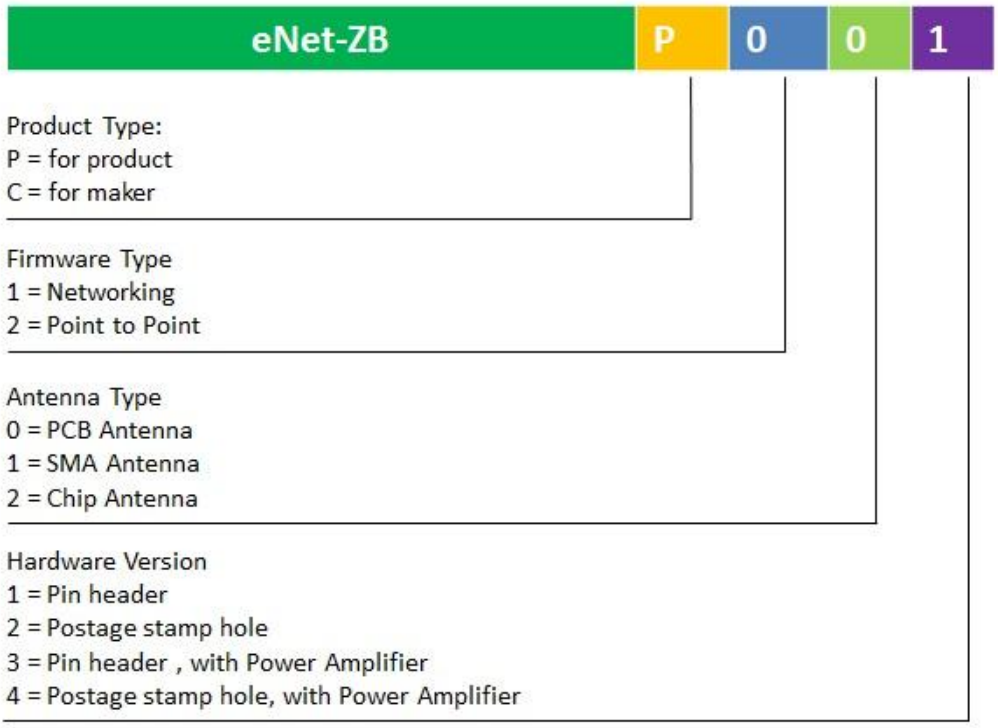


eNet-ZBP113 module operates in the unlicensed 2.4GHz ISM(Industrial, Scientific and Medical) band with data rate up to 250kb/s. Sixteen channels are allocated in the 2.4 GHz band, with each channel requiring 5 MHz of bandwidth. Self-organizing network and easy to use are the main features of eNet-ZBP113module. It is not necessary for you to understand complex ZigBee protocol. All the processing part of ZigBee protocol can be done internally by eNet-ZBP113 module. What you only need to do is to sending and receiving data via serial port, which can shorten lead time of product tremendously. Meanwhile eNet-ZBP113 module has the advantage of low-power and low-cost. As a consequence, eNet-ZBP113 module is the best choice for remote monitoring application, such as smart home, smart grid, industrial automation and security monitoring and etc.

BestU provides two kinds of ZigBee application protocols within the eNet-ZBP113 module, one for networking communication protocol, another for point-to-point communication protocol.

The eNet-ZB series modules are named according to their hardware and software features in the

following form:



1.2 Package List

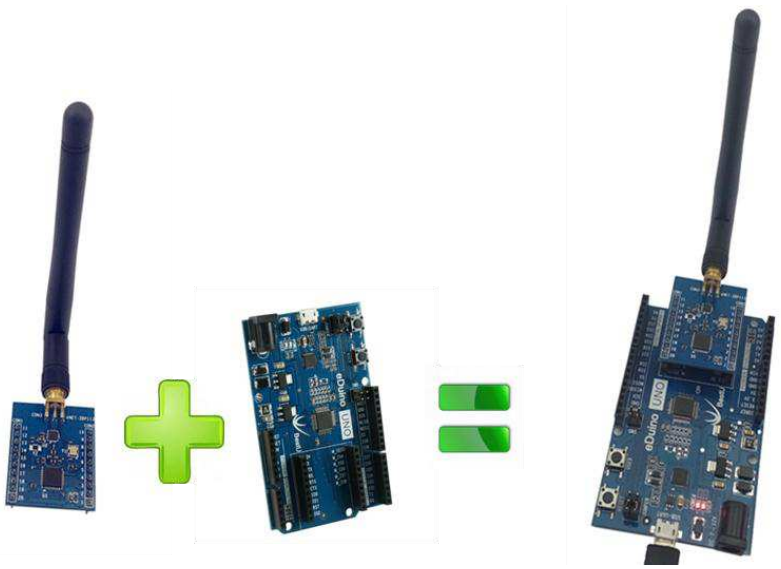
Table 1-1 Package list

Product Name	eNet-ZBP113
Standard Configuration	1) eNet-ZBP113 * 1 2) 2.4G Antenna *1
Optional Accessories	1) eDuino UNO 2) eNet-Test-A base board

1.3 Development Kits

There are two available development kits for eNet-ZBP113, eDuino UNO wireless kit and Simple Wireless kit.

1.3.1 eDuino UNO Wireless Kit



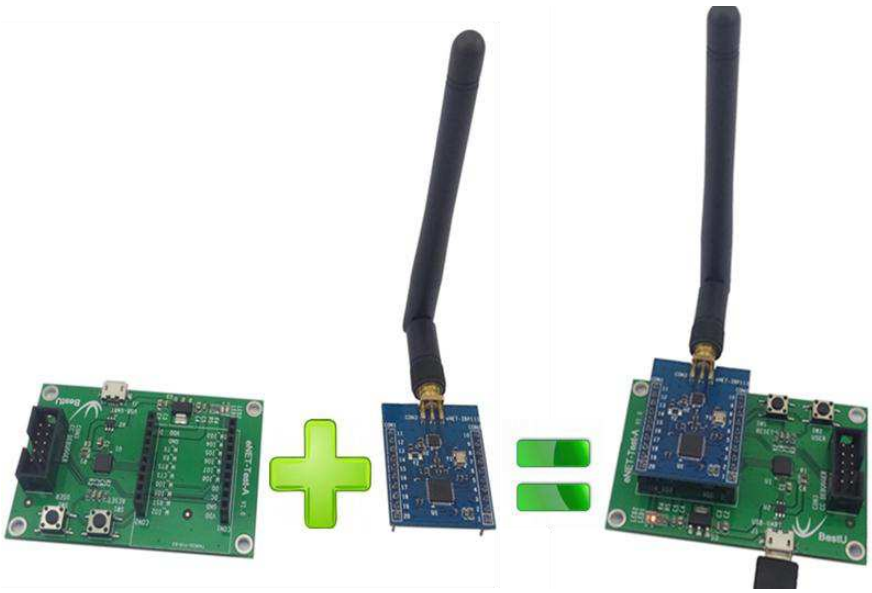
eNet-ZBP113 eDuino UNO eDuino UNO kit

What's included in the eDuino UNO kit:

Table 1-2 Package List of eDuino UNO Kit

Part Description	Quantity / PCS
eNet-ZBP113	1
2.4GHz Antenna(2.5dBi)	1
eDuino UNO	1
Jumper	2

1.3.2 Simple Wireless Kit



eNet-Test-A eNet-ZBP113 Simple Wireless kit

What's included in the Simple Wireless kit:

Table 1-3 Package List of Simple Wireless Kit

Part Description	Quantity / PCS
eNet-ZBP113	1
2.4GHz Antenna(2.5dBi)	1
eNet-Test-A	1

2 Hardware Feature

2.1 Dimensions

UNIT: mm

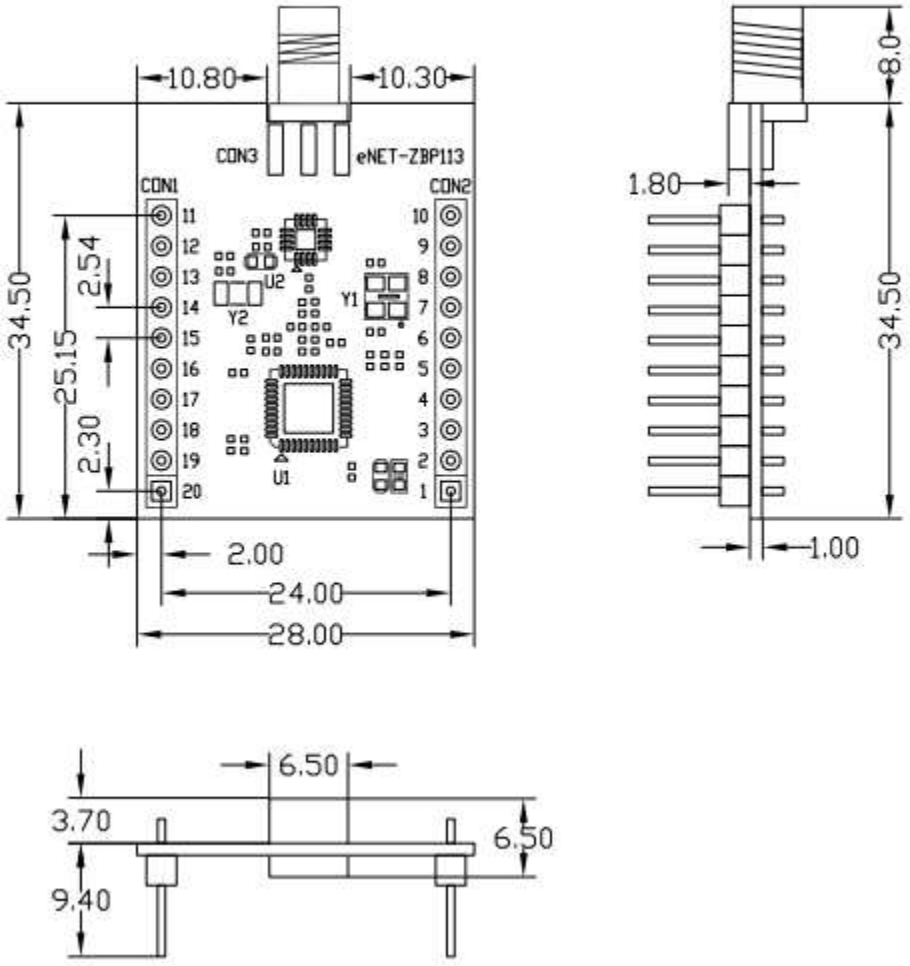


Figure 2-1 Dimensions

2.2 Pin-Out

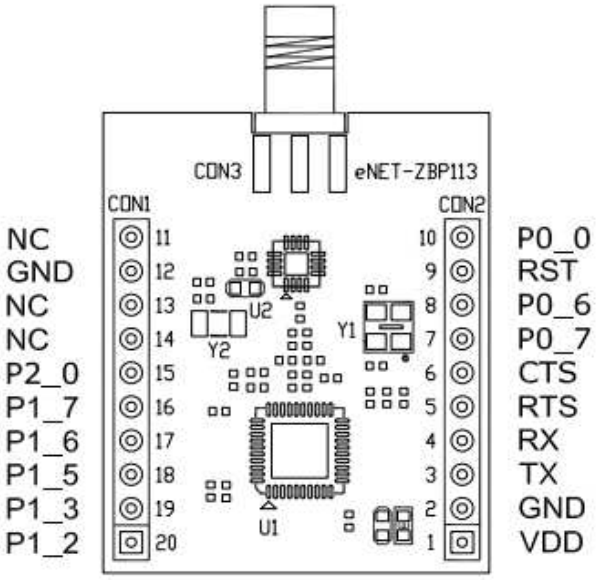


Figure 2-2 Pin out diagram

Table 2-1 Pin out description

Pin NO	Pin Name	Direction	Function	Remark
1	VDD	—	3.3V Power	
2	GND	—	GND	
3	TX	O	TXD	TTL （3.3V）
4	RX	I	RXD	TTL （3.3V）
5	RTS	—	NC	Reserve
6	CTS	—	NC	Reserve
7	P0_7	O	Communication State	1HZ square wave output
8	P0_6	O	Network Connection State	1HZ square wave output in specific case
9	RST	I	RST	Reserve.
10	P0_0	—	NC	Reserve
11	NC	—		
12	GND	—		
13	NC	—		
14	NC	—		
15	P2_0	—	NC	Reserve

16	P1_7	—	NC	Reserve
17	P1_6	—	NC	Reserve
18	P1_5	—	NC	Reserve
19	P1_3	—	NC	Reserve
20	P1_2	—	NC	Reserve

Note: The reserved pins mentioned above do not need to pay attention in actual case. Only need to connect RX, TX, VDD and GND.

- P0_6 & P0_7 Output Specification
  - When configured as Coordinator

    P0_6 outputs high level after reset. If ZigBee protocol working regularly, P0_6 outputs 1HZ square wave.

    P0_7 outputs low level after reset. It will output a high level when receive data (The hold time is determined by the total receive time of a package data).
  - When configured as Router or End Devices

    P0_6 outputs high level after reset. If the module has connected to a network, P0_6 will output 1HZ square wave.

    P0_7 outputs low level after reset. It will output a high level when receive data (The holding time is determined by the total receive time of a package data).
- Serial port default settings:
  - Default baud rate: 38400bps

    Recommended configuration: 38400bps

    Baud rate range: 1200~38400bps.
  - Parity**:** None
  - Data: 8bit
  - Stop: 1bit
- Serial port data sending limitation

  Max package size: 256 Byte.

2.3 Product Specification

Table 2-2 Product Specification

Typical DC Character（VDD=3.3V @ +25°C）		Remark
mA(TXD)	120mA(Max)	
mA(RXD)	40mA(Max)	
mA(Standby)	35 mA(Max)	
Typical RF Character		
Frequency Range	2.405GHz~2.480GHz	
RF Channel Quantities	16	
TX Rate	250Kbps(Max)	
RX sensitivity	-97dBm	
TX Power	10-20 dBm	Adjustable.20dBm default
Output Impedance	50 ohm	
Typical Networking Character		
Wireless Protocol	ZigBee 2007	
Network Node	65535(Max)	
Configured Node	Coordinator / Router	
Network Topology	Mesh Network（MESH）	
Distance	1600 meters	Visible, open transmission distance

2.4 Electric Property

2.4.1 Absolute Ratings

Table 2-3 Absolute Ratings

Parameter	Min	Max	Remark
Supply Voltage	-0.3V	3.6V	
Pin	-0.3V	VDD+0.6V	
Temp Range	-40℃	85℃	

2.4.2 Operating Ratings

Table 2-4 Operating Ratings

Parameter	Min	Max	Remark
Supply Voltage	2.7V	3.3V	
Temp Range	-40℃	85℃	
Humidity Range	0%	90%	No Condensation

2.5 Typical Application

eNet-ZB serials modules provide transparent data transmission through serial port. The typical application as below:

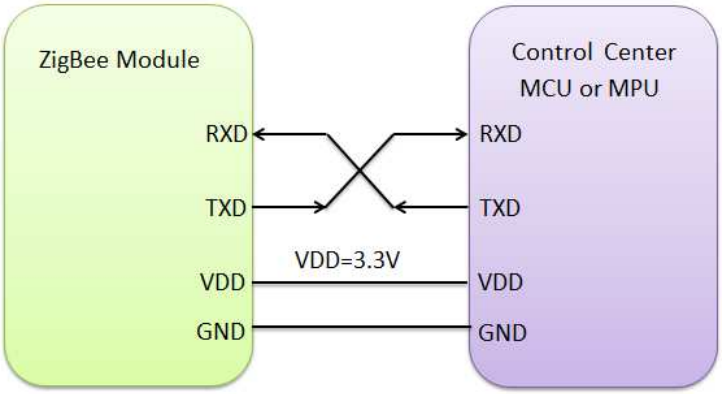


Figure 2-3 Typical Application Diagram

3 Configuration

eNet-ZBP113 provides convenient and efficient configuration methods. Users can reconfigure parameters with configuration commands or with configuration software tool on PC. The module will work with new parameters after reset.

3.1 Configuration command

Configuration commands are need if you want to change the configuration with using a MCU or MPU. Please refer to *Figure 2-3 Typical Application Diagram* and *4.2 configuration command description.*

3.2 Configuration software

1) To connect the module with Serial Port. Click ***Connect*** button.

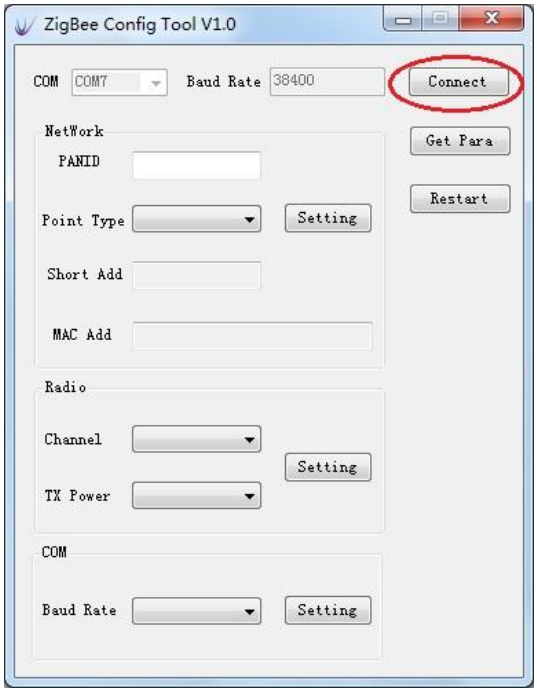


Figure 3-1 Connect the Module

2) Get the parameters from the Module.

Click the ***Get Para*** to get the current parameters of the module.

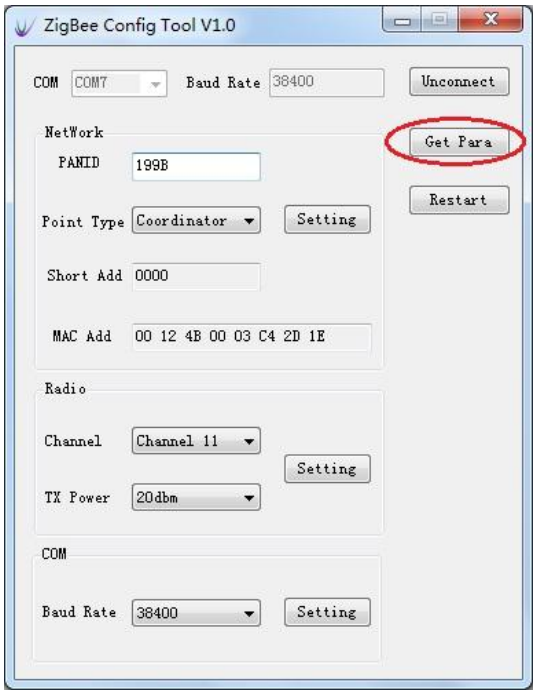


Figure 3-2 Get the parameters

3) Set the ***Network*** parameters.

Set the ***PANID*** or change the ***Point type***. Click ***Setting*** button to finish the setting.

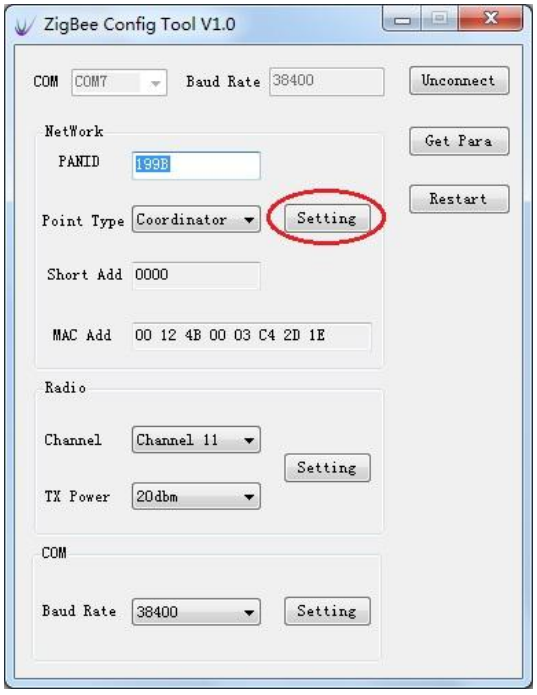


Figure 3-3 Set the network parameters

4) Set the ***Radio*** parameters.

Set the ***Channe***l or ***TX Power*** and click ***Setting*** to finish the setting.

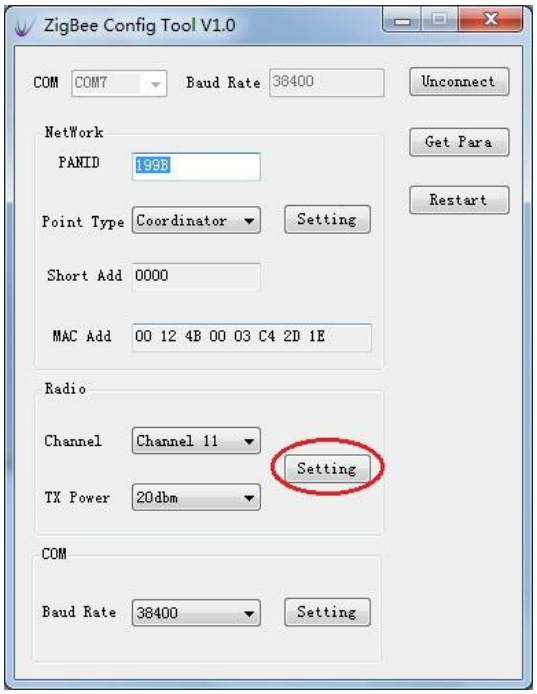


Figure 3-4 Set the Radio parameters

5) Set the ***COM*** parameters.

Set the ***Baud Rate*** and click the ***Setting*** to finish the Setting.

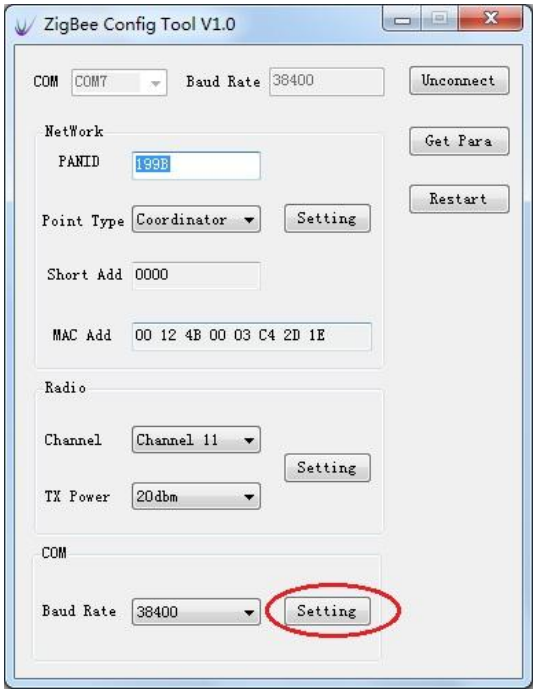


Figure 3-5 Set the UART parameters

6) ***Restart*** the module.

Click the ***Restart*** to make the module work with the parameters set by steps before after restart.

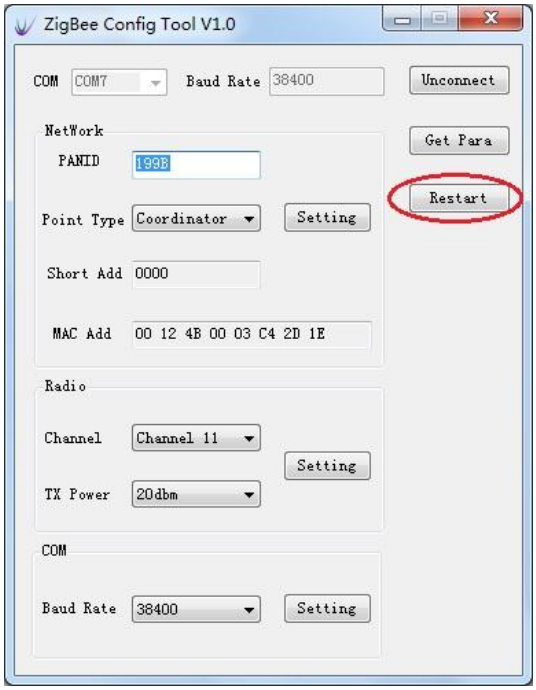


Figure 3-6 Restart module

7) Connect the module. Click ***Get Para*** and check the parameters is right .

4 Configuration Command

4.1 Configuration Command Format

Configuration Command is composed of **Beginning Characters**, **Length**, **Control Field**, **Data** and **Checksum**.

Beginning Characters	Length	Control Field	Data	Parity

Figure 4-1 Configuration Command Format

1) **Beginning Characters**: Consists of 1byte, 0xFE by default.

2) **Length**: Consists of 1byte.It's the number of byte of Control Field and Data.

3) **Control Field**: It consists of 1byte and indicates the current command type. The configuration command list of eNet-ZB module is shown as below.

Table 4-1 Configuration Command List

NO.	Control Field（HEX）	Description
1	0x01	Read PANID
2	0x41	Set PANID
3	0x02	Read device type
4	0x42	Set device type
5	0x03	Read Short Address
6	0x04	Read communication channel
7	0x44	Set communication channel
8	0x05	Read Serial port baud rate
9	0x45	Set Serial port baud rate
10	0x06	Read user ID
11	0x46	Set user ID
12	0x07	Read transmission mode
13	0x47	Set transmission mode
14	0x08	Read transmission power

NO.	Control Field（HEX）	Description
15	0x48	Set transmission power
16	0x09	Read device MAC address
17	0x4A	Reset system

4) **Data**: There are many kinds of command. For more details, refer to *4.2 Configuration Command description*.

5) **Checksum**: it's octal arithmetic sum of **Beginning Character**, **Length**, **Control Field** and **User ID**.

4.2 Configuration Command Description

4.2.1 Set PANID (0x41)

This command is used to set PANID. The format of this command is as below:

Table 4-2 PANID Command format

Name	Length(Byte)	Description
PANID_H	1	High Byte of current PANID
PANID_L	1	Low Byte of current PANID

Example: The PANID need to be set as 0x199B.

Send: FE 03 41 19 9B F6

Right Response: FE 02 C1 00 C1

Error Response: FE 02 C1 01 C2

4.2.2 Read PANID (0x01)

This command is used to set PANID. For the format of this command, refer to *Table 4-2 PANID Command format*.

Example: The current PANID is 0x199B.

Send: FE 01 01 00

Response: FE 03 81 19 9B 36

4.2.3 Set Device Type (0x42)

This command is used to configure device type (Coordinator or Router). The format of this command is as below:

Table 4-3 Device Type

Name	Length(Byte)	Description
Device Type	1	0x00: Coordinator
		0x01: Router

Example: The module needs to be set as Coordinator.

Send: FE 02 42 00 42

Right Response: FE 02 C2 00 C2

Error Response: FE 02 C2 01 C3

4.2.4 Read Device Type (0x02)

This command is used to read current device type. For the format of this command, refer to Table *4-3 Device Type*.

Example: The module is Router type.

Send: FE 01 02 01

Response: FE 02 82 01 83

4.2.5 Read Device Short Address (0x03)

This command is used to read current short address. The format of this command is as follow:

Table 4-4 Short Address

Name	Length(Byte)	Description
ADDR_H	1	Current Network short address high byte
ADDR_L	1	Current Network short address low byte

Example: The device's network short address is 0x1ED6.

Send: FE 01 03 02

Response: FE 03 83 1E D6 78

4.2.6 Set Communication Channel (0x44)

This command is used to configure communication channel (there are 16 channels, which from 11 to 26, located in 2.4GHz band). The format of this command is as follow:

Table 4-5 Communication Channel

Name	Length(Byte)	Description
Channel	4	0x00000800 Channel 11, 2405MHz
		0x00001000 Channel 12, 2410MHz
		0x00002000 Channel 13, 2415MHz
		0x00004000 Channel 14, 2420MHz
		0x00008000 Channel 15, 2425MHz
		0x00010000 Channel 16, 2430MHz
		0x00020000 Channel 17, 2435MHz
		0x00040000 Channel 18, 2440MHz
		0x00080000 Channel 19, 2445MHz
		0x00100000 Channel 20, 2450MHz
		0x00200000 Channel 21, 2455MHz
		0x00400000 Channel 22, 2460MHz
		0x00800000 Channel 23, 2465MHz
		0x01000000 Channel 24, 2470MHz
		0x02000000 Channel 25, 2475MHz
		0x04000000 Channel 26, 2480MHz

Example: Set the communication channel as20.

Send: FE 05 44 00 00 10 00 57

Right Response: FE 02 C4 00 C4

Error Response: FE 02 C4 01 C5

4.2.7 Read Communication Channel (0x04)

This command is used to read current communication channel. For the format of return data, refer to *Table 4-5 Communication Channel.*

Example: The current communication channel is 21.

Send: FE 01 04 03

Response: FE 05 84 00 00 20 00 A7

4.2.8 Set Serial Port Rate (0x45)

This command is used to set UART rate. The format of this command is as follow:

Table 4-6 Serial Port Rate

Name	Length(Byte)	Description
Serial Port Badu Rate	1	0x00:Baud Rate 9600
		0x01:Baud Rate 19200
		0x02:Baud Rate 38400
		0x03:Baud Rate 57600
		0x04:Baud Rate 115200

Example: Set Serial Rate as 115200.

Send: FE 02 45 04 49

Right Response: FE 02 C5 00 C5

Error Response: FE 02 C5 01 C6

4.2.9 Read Serial Rate (0x05)

This command is used to read current serial rate. For the format of this command, refer to *Table 4-6 Serial Port Rate*.

Example: Current Serial Rate is 115200.

Send: FE 01 05 04

Response: FE 02 85 04 89