F8L10T LoRa Terminal User Manual

The user manual is suitable for the following model:

F8L10T-N	LoRa data transmission terminal（Without PA）
F8L10T-E	LoRa data transmission terminal（With PA）

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Files Revised Record

Date	Version	Remark	Author
2016-12-19	V1.0.0	Initial version	WSP
2017-02-20	V1.1.0	According to the product line , modify the radio frequency description. Adjust the parameter configuration section with multiple details.	ZDD

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F8L10T
LoRa Terminal
Xiamen Four-Faith Communication Technology Co., Ltd
Online
Act
Power
Operating Voltage
5-36V

Contents

Chapter 1 Brief Introduction of Product

1.1 General

F8L10T LoRa data transmission terminal is a wireless data transmission terminal based on LoRa spread spectrum technology. At the same time using Lora wireless transmission technology for short distance data transmission.

This product adopts industrial grade Lora scheme with high performance, based on embedded real-time operating system as the software platform, while providing RS232 and RS485 (or RS422) interface, can be directly connected to the serial device, realize the transparent data transmission function; low power design, lowest power consumption is less than 5ma@ 12VDC; 5 I/O, can achieve the digital input output, analog input, pulse counting function.

It has been widely used on M2M fields, such as electric power, intelligent trafic, wireless metering, industrial automation, telemetry, water supply, environment protection, weather, and so on.

1.2 Features and Benefits

Design for Industrial Application

- High-powered industrial LoRa chip and MCU
- High-powered industrial 32 bits CPU
- Support low power consumption mode, including multi-sleep and trigger modes to reduce the power dissipation farthest
- Housing: iron, providing IP30 protection
- Power range: DC 5~36V

Stability and Reliability

- Support hardware and software WDT
- RS232/RS485/RS422 port: 15KV ESD protection
- Power port: reverse-voltage and overvoltage protection
- Antenna port: lightning protection(optional)

Standard and Convenience

- Adopt terminal block interface, convenient for industrial application
- Support standard RS232 and RS485(or RS422) port that can connect to serial devices directly
- TTL logic level RS232 interface can be customized, ADC interface can be customized
- Support intellectual mode, enter into communication state automatically when powered

- Provide management software for remote management
- Support several work modes
- Convenient configuration and maintenance interface

High-performance

- Support Lora wireless short-range data transmission capabilities, with self-organizing network capabilities
- Relay routing and terminal device functionality
- Network capacity: 65000 nodes (typical number of 300)
- Send mode flexible: Broadcast send or destination address send mode optional
- Supply 5 I/O channels, can achieve the analog input of the 3 channels, the digital input and output of the 2 channels; compatible with the pulse count function of the 2 channels

1.3 Working Principle

The principle chart of the LoRa Terminal is as following:

1.4 Specifications

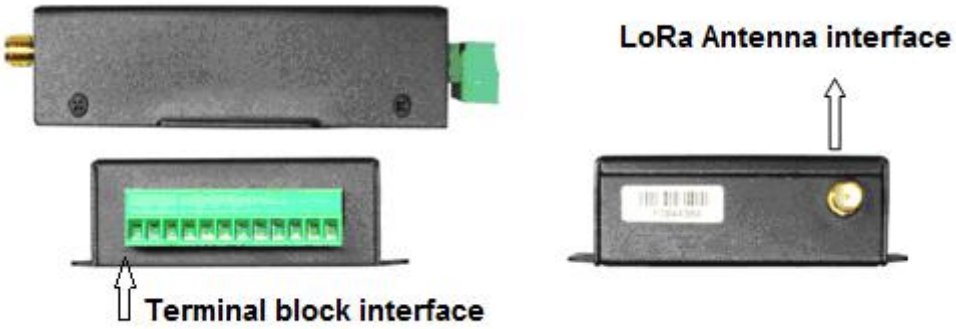
LoRa Specification

Item	Content
Module	Industrial LoRa module
Communication Frequency Band	The product family supports a wide range of frequency bands around the world (433/470/780/868/915 MHz)
Indoor/Urban Communication Distance	F8L10T-N:1km F8L10T-E:2km
Outdoor/Visual Communication Distance	F8L10T-N:3.5km F8L10T-E:11.5km
Bandwidth	6 level adjustable（0.3、0.6、1.0、1.8、3.1、5.5Kbps）
TX Power	F8L10T-N:20dBm(100mW) F8L10T-E:30dBm(1W)
RX Sensitivity	-140dBm
Channel Number	32

Hardware System

Item	Content
CPU	Industrial 32bits CPU
FLASH	128KB
RAM	16KB

Interface type

Item	Content
Serial	1 RS232 port and 1 RS485(orRS422) port, 15KV ESD protection Data bits: 8 Stop bits: 1, 2 Parity: none, even, odd, space, mark Baud rate: 300、600、1200、2400、4800、9600、19200、38400、57600、115200bps
Indicator	“Power”, “ACT”, "Online”
Antenna	LoRa : Standard SMA female interface, 50 ohm, lighting protection(optional)
Power	Terminal block interface, reverse-voltage and overvoltage protection
	

Power supply

Item	Content
Standard Power	DC 12V/0.5A
Power range	DC 5~36V

Consumption

Item	Working condition	Consumption
F8L10T-N	Sleep	3.1～3.2mA@12 VDC
	Receive data	13.2～13.4mA@12 VDC
	Transmit data	60.3～61.2mA@12 VDC
	Sleep	7.3～7.4mA@5 VDC
	Receive data	26.1～26.2mA@5 VDC
	Transmit data	107.3～115.1mA@5 VDC
F8L10T-E	Sleep	3.1～3.3mA@12 VDC
	Receive data	13.2～13.4mA@12 VDC
	Transmit data	110-125mA@12 VDC
	Sleep	7.2～7.4mA@5 VDC
	Receive data	26.3～26.5mA@5 VDC
	Transmit data	210～213mA@5 VDC

Physical Characteristics

Item	Content
Housing	Iron, providing IP30 protection
Dimensions	91x58.5x22 mm
Weight	205g

Environmental Limits

Item	Content
Operating Temperature	-40~+85ºC（-40~+185℉）
Storage Temperature	-40~+125ºC（-40~+257℉）
Operating Humidity	95% (unfreezing)

Chapter 2 Installation Introduction

2.1 General

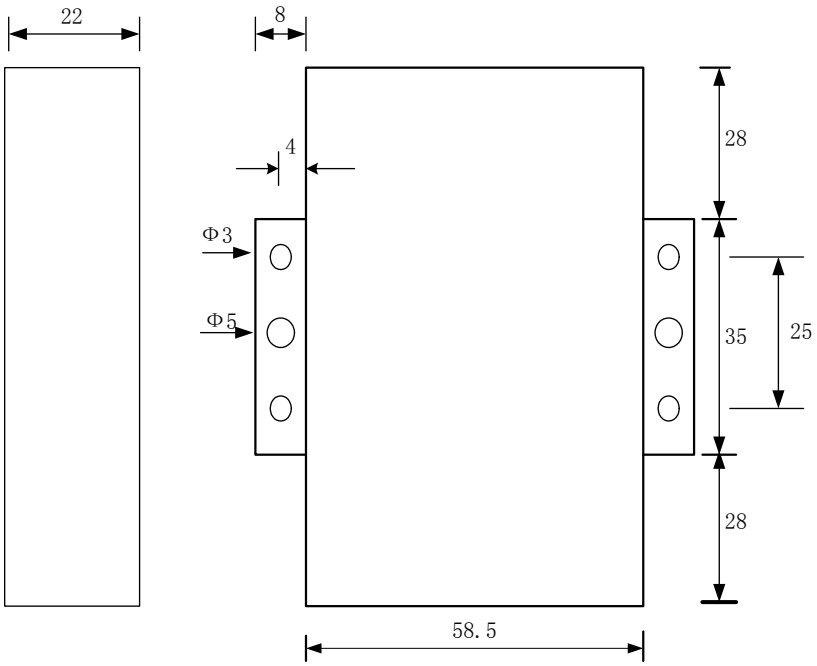
The LoRa Terminal must be installed correctly to make it work properly.
Warning: Forbid to install the MODEM when powered!

2.2 Encasement List

Name	Quantity	Remark
LoRa Terminal host	1	
LoRa Antenna	1	
Power adapter	1	
RS232 data cable	1	optional
RS485 data cable	1	optional
Manual CD	1	
Certification card	1	
Maintenance card	1	

2.3 Installation and Cable Connection

Dimension: (unit: mm)



Installation of antenna:

Screw the SMA male pin of the LoRa antenna to the male SMA interface of the IP MODEM with sign “LoRa”.

Warning: The cellular antenna and the LoRa antenna can not be connected wrongly. And the antennas must be screwed tightly, or the signal quality of antenna will be influenced!

Antenna install note:

1, Install the antenna far away from the large area metal and ground.

2, Keep the antennas visual.

3, Minimize obstructions between the antennas.

4, Reduce the extension cords of the antenna.

The performance of different antenna installation types, as the figure 2-2.

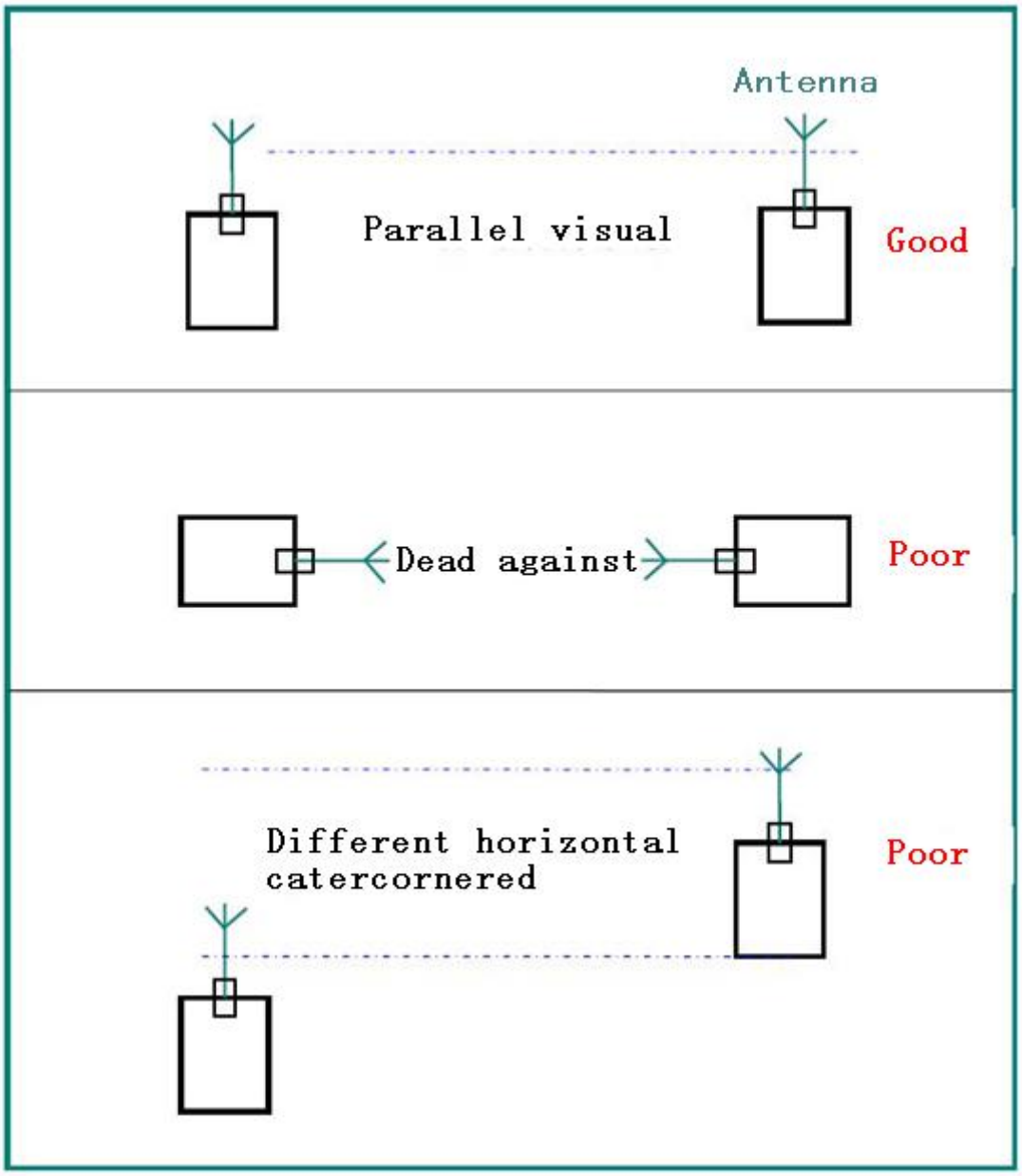


Figure 2-2 Installation antenna mode

User Interface Signal Definition

Pin Number	Signal Name	Default Function	Extensible Function
1	PWR	Power input anode	N/A
2	GND	Power Ground	N/A
3	GND	Power Ground	N/A
4	RX	RS232 RX	N/A
5	TX	RS232 TX	N/A
6	A	RS485 anode	N/A

7	B	RS485 cathode	N/A
8	IO1	GPIO	sleep control
9	IO2	GPIO	N/A
10	IO3	ADC, analog input function (voltage acquisition 0 ~ 5 V)	GPIO
11	IO4	ADC, analog input function (current collection 0 ~ 20 mA)	GPIO
12	IO5	ADC, analog input function (current collection 0 ~ 20 mA)	GPIO

Installation of cable:

IP MODEM adopts industrial terminal block interface. The recommendatory cable is 28-16AWG. The detail description of standard layout adapter and communication cables as is following:

Adapter（Rating Output 12VDC/0.5A）：

Cable Color	Power Output Polarity
Black &White Alternate	Anode
Black	Cathode

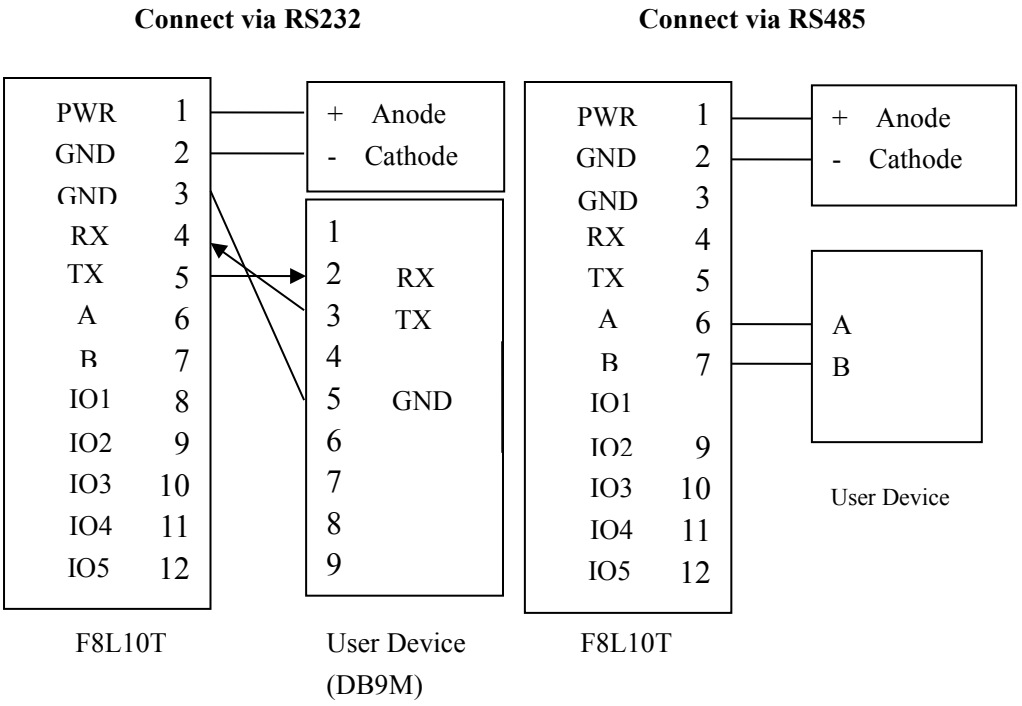
RS232 Cable：

Cable Color	Corresponding DB9-M Pin Number
Brown	Pin 2
Blue	Pin 3
Black	Pin 5

RS485 Cable：

Cable Color	Signal definition
Red	RS485(A)
Black	RS485(B)

Power adapter and communication cable connection chart as following:



2.4 Power

The power range of the LoRa Terminal is DC 5~36V.

Warning: When we use other power, we should make sure that the power can supply power above 4W.

We recommend user to use the standard DC 12V/0.5A power.

2.5 Indicator Lights Introduction

The LoRa Terminal provides three indicator lights: “Power”, “ACT”, “Online”.

Indicator Light	State	Introduction
Power	ON	LoRa Terminal is powered on
	OFF	LoRa Terminal is powered off
ACT	BLINK	Data is communicating
	OFF	No data
Online	ON	LoRa Terminal has logged on network
	OFF	LoRa Terminal hasn’t logged on network

Chapter 3 Configuration

3.1 Configure connection

In the Lora digital transmission terminal configuration, the need to pass the factory configuration RS232 serial cable or rs232-485 conversion line Lora data transmission terminal and configured to connect the PC together, as follows:

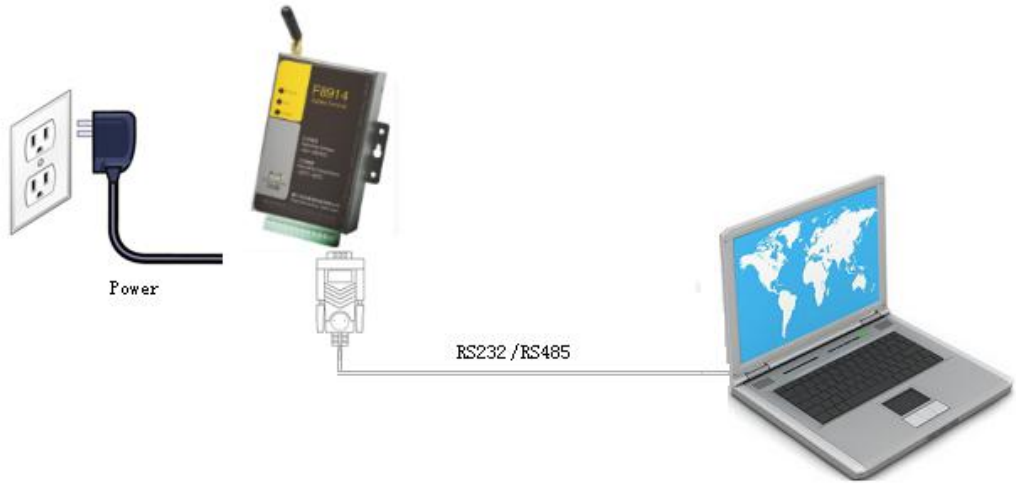


Figure 3-1 F8L10T configuration connection with PC

3.2 Introduction of parameter configuration

F8L10T parameter configuration in two ways:

Through the Four-Faith configuration software LoRaConfig: all configuration is configured with the corresponding entry software interface, this configuration is only suitable for users to facilitate the configuration of PC Case.

By extending the at command (hereinafter referred to as the AT command) way to deploy: in this configuration, the user only needs to have the serial communication program can configure all parameters such as F8L10T, windows of the super terminal, Linux minicom, putty, or directly by the user's SCM system to node configuration. In the use of extended at command to configure F8L10T to bring F8L10T into the configuration state.

Among them, AT command configuration can refer to "AT command manual".

Configure the f8l10t parameters by configuration software, as shown in Figure 3-2.

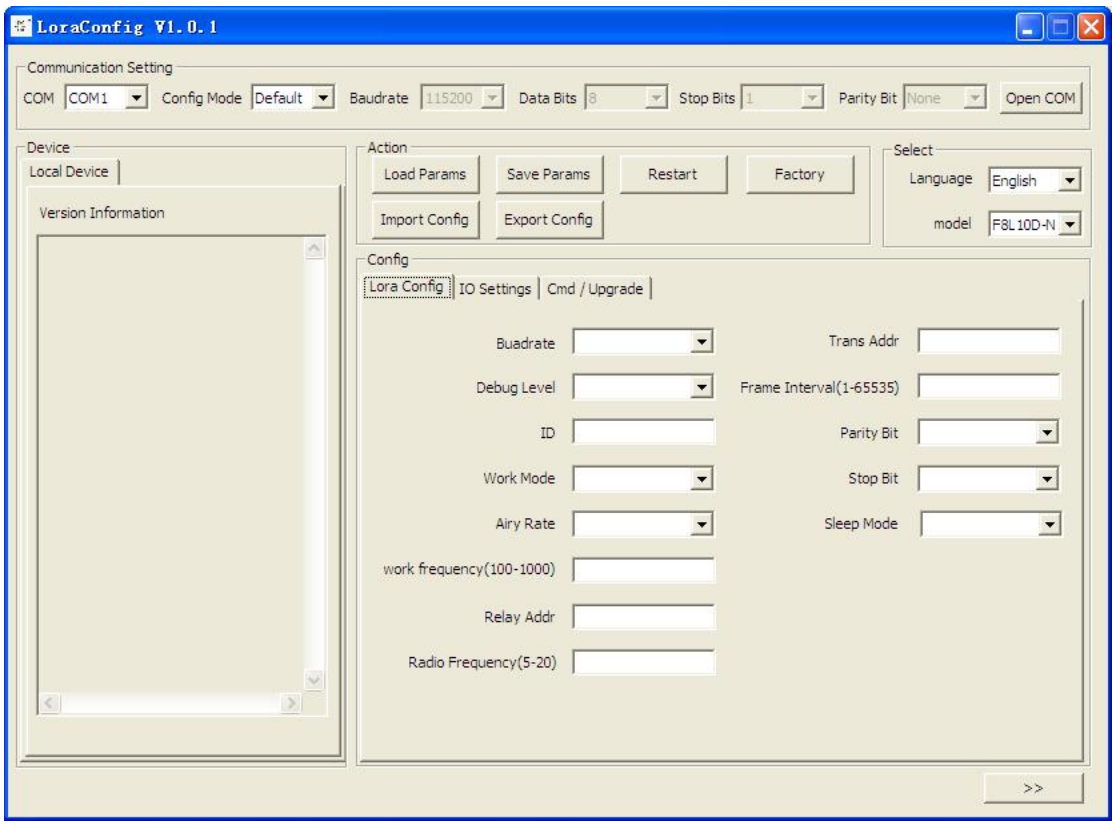


Figure 3-2 configuration interface

Column display serial parameters currently open serial port settings in the serial port parameters,please choose the correct value of this configuration, at the same time, open the serial port. The serial port parameter settings column if the right button is displayed as "closed serial". That serial port has been opened, otherwise please open the serial port.

The equipment again after power, configuration software f8l10t into the configuration state, and automatically load the current configuration parameters of equipment, in the area on the right side of the display parameters, thus can start all configuration parameters in the configuration f8l10t, as shown in Figure 3-2.

3.3 Detailed parameters

3.3.1 serial port configuration

It can configure the baud rate, data bit, parity bit and stop bit of the communication serial port.

Default: 115200 Baud rate, Attributes 8N1.

3.3.2 serial port work mode

Module serial data work can be divided into "TRNS","AT" and "API".

"TRNS": data transmission, when the need to pass through the address configuration, namely the destination address.

"AT": protocol format reference "Lora AT commands manual",usually used for parameter configuration and manual testing.

"API": serial data must be based on a certain data format for sending and receiving, protocol format reference "Lora API commands manual". The maximum length is 100 bytes.

Default: TRNS

3.3.3 ID

Set the module ID, configurable range 0~65535.

3.3.4 working frequency

Module data transmission frequency, different hardware modules can work different frequency bands, roughly divided into low frequency band (525MHz below) and high frequency band (525MHz above) two categories.Typical operating frequency band is 410M ~ 441MHz, 470M ~ 510MHz, 850 ~ 950MHz, etc., 1000KHz for a channel.Different application areas have different frequency band restrictions, as well as different channel interference factors, the error rate is different, so need to adjust the value according to the actual situation.

The default value for the low-band hardware module is 433, and the default for the high-band module is 868.

3.3.5 Air speed

The rate of data in the air can be divided into 6 levels, The higher the level, the higher the rate. Under the same conditions, the higher the rate, the closer the transmission distance.Therefore, you need to adjust this value according to the actual environment.

Attention: all devices must be at the same rate, otherwise they can not communicate.

Default: 3 Level

3.3.6 Transmitting power

The hardware module without PA can set the transmit power of 5 ~ 20dBm. The power of the hardware module with PA is fixed at 30dBm.

Default: 20

3.3.7 Relay address

When the transmission distance between nodes is too far, this parameter is set to the relay node' ID, and the relay node will help the node forward the data to the final destination node.

Default: 1000

3.3.8 sleep mode

When the device is in low power mode, can be set to NONE(not dormant), TIME(timing dormant) and DEEP(deep sleep). Regular sleep, you need to configure the "wake up time" and "sleep time"; the depth of dormancy, only through the IO1 pin to wake up.

Default: NONE

In regular sleep, keep the device wake-up time, unit MS, when the device wake up super this time will go to sleep.

In regular sleep, keep the device dormant time, unit MS, when the device sleep over this time will wake up, in a normal working state.

3.3.9 Debug level

Debug level control module log display, can be divided into three debugging levels, which:

0 do not output any log information

1 output Key log information

2 output detailed log information

Default: 1