

DF702_LoRa Configuration manual



V2.0
Date 2018-5-16

CNDingtek Technology Company



IOT Leading Brand

**The purpose of
Measurement, Instrumentation, and Sensors Handbook
CNDingtek
is to provide a
reference that is both concise and useful for engineers in
industry, scientists, designers, managers, research
personnel and protocol , as well as many others who
have measurement problems.**

**We provide to our Customer Protocol, Installation , Operation and
Configuration detailed of devices.**

A Smart City Project of CNDingtek Technology Company

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1 Overview

In these documents information about of LoRa Module DF702 Trash Bin Sensor are given with detailed.

- The function of device
- Hardware interface
- How to set LoRa module parameters
- Equipment parameters (full height value, upload interval data etc)
- Equipment upgrades

For more information if you have any questions, please contact us first.

2 Device Function Descriptions

Note

Device will upload data when its power is activated it can send us data automatically to the user through LoRa Module.

Main Function of Device

LoRa Module DF702 Sensor can give detailed about the using place for example Trash Bin its full Detection, fire detection, fall Detection , Full ,Half and Empty Condition of Device and about the power Detection of Sensor.

Notes: the standard version does not have the fall detection, only the enhanced version has this function.

Main Function	Functional Description	Default Alarm Threshold	Whether the data will be reported immediately when the alarm condition is reached	Remarks
Full	Check if the Trash bin is full	30cm (Can be modified)	No	The Device will detect the Distance between sensor and garbage if this Distance is more Than 30cm no alarm if less than 30 cm alarm will be activated.
Fire	Detect if a fire has been occurred	75°C (Can be modified above 75°C Fire alarm will be activated)	Yes	Detected temperature is less than 75°C above this Temperature sensor will activate the alarm.
Fall	Check whether the trash Bin can fallen any side			This feature is available in enhanced version not in slandered version.
Battery	Check if the battery is about to run out	20% (Can be modified)	No	It will detect the power of battery more than 20% no alarm less than 20% alarm will be activated.

Data Time Intervals

For example Test time data every 10 minutes, when a change of state is detected the data will be upload, the state remains unchanged in next intervals, and no data will be uploaded. The data will be uploaded periodically like as heartbeat the data interval default 4 hours can be modified, specific reference to the agreement.

State change means:

From full to not from
Not from to full

For example:

Time	State	Upload data or no
10:10	full	Yes (Battery Should be connected)
10:20	full	No
10:30	not full	Yes
10:40	not full	No
10:50	full	Yes

3 The Main LoRa Band Introduction

The main LoRa band are used given below CN470, EU868, US915, AU915, AS923.

Band	The default uplink frequency	The default downlink frequency(RXWIN1)	The default downlink frequency (RXWIN2)
CN470 (470-510MHz)	470.3,470.5,470.7,470.9, 471.1,471.3,471.5,471.7,	500.3,500.5,500.7,500. 9 501.1,501.3,501.5,501. 7	505.3
EU868 (863-870MHz)	868.1,868.3,868.5	868.1,868.3,868.5	869.525
US915 (902-928MHz)	902.3,902.5,902.7,902.9, 903.1,903.3,903.5,903.7	923.3,923.9,924.5,925. 1 925.7,926.3,926.9,927. 5	923.3
AU915 (915-928MHz)	915.2,915.4,915.6,915.8 916.0,916.2,916.4,916.6	923.3,923.9,924.5,925. 1 925.7,926.3,926.9,927. 5	923.3
AS923 (915-928MHz)	923.2,923.4	923.2,923.4	923.2

4 Device Interface Definition

In the given figure, the power interface, module configuration debugging, interface, device parameter configuration and upgrade interface are introduced respectively with detailed. In figure 4.1 PCB board is shown and all connecting parts are also shown which part where will be placed.

4.1 Connection of Hollow Sockets

- **Power socket:** connect the battery
- **Hollow positions:** Configure the LoRa module parameters or debug module the jumper cap should be placed in a hollow position.
- **Solid position:** The default position the device to transmit data/configure device parameters such as data upload interval and full height the jumper cap should be placed at right side a solid position.

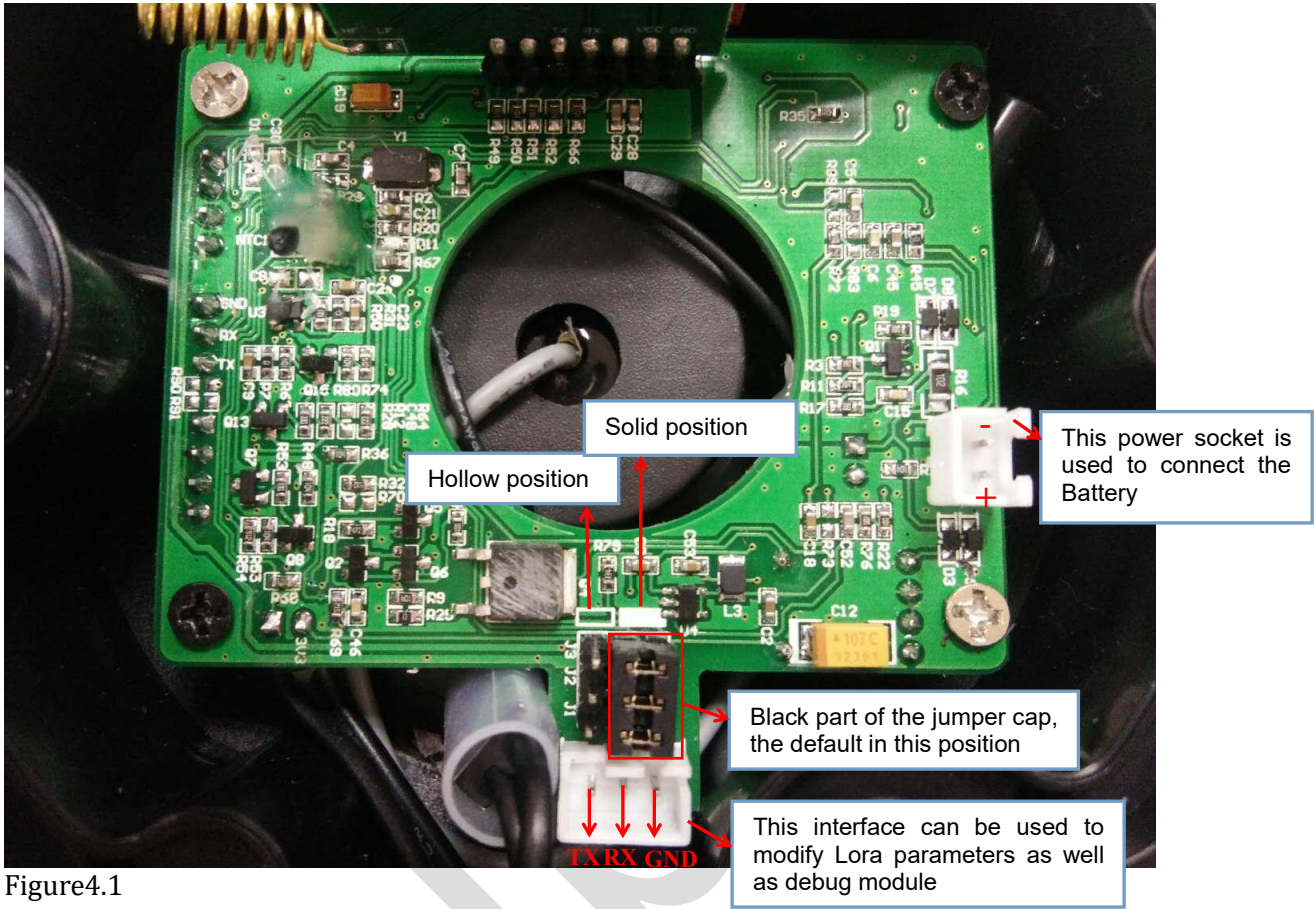


Figure4.1

- 4.2 Reverse side of picture of PCB board (open the Screws of PCB Board) as shown in figure 4.2.

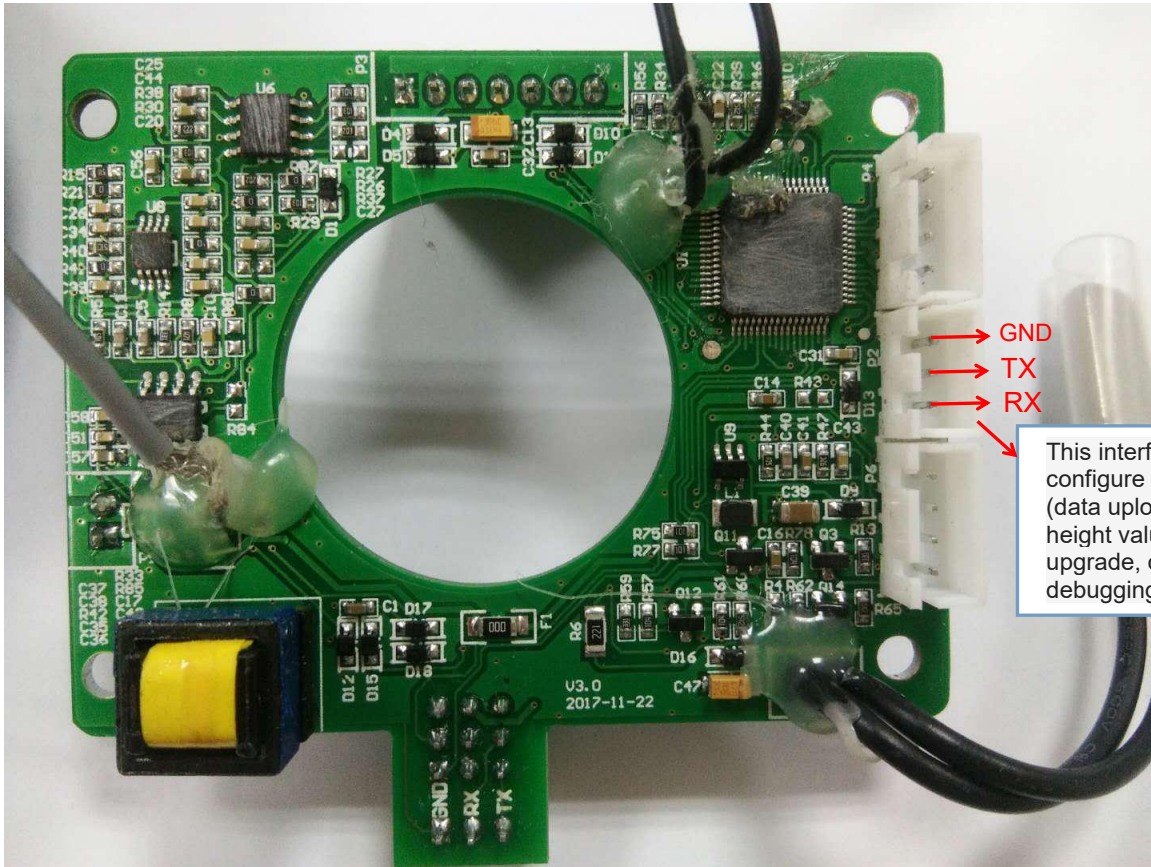


Figure4.2

5 Configure LoRa parameters

LoRa can be configured according to the relevant parameters such as devaddr, deveui and nwkkey are helpful in configuration process.

- **Required tools for configuration of LoRa Device**

- TTL and its cable
- Serial software
- LoRa instruction manual
- Equipment
- TTL and cable for the goods accessories

Please check these two items when you receive package from company as shown in Figure 5.1 and Figure5.2.



Figure5.1

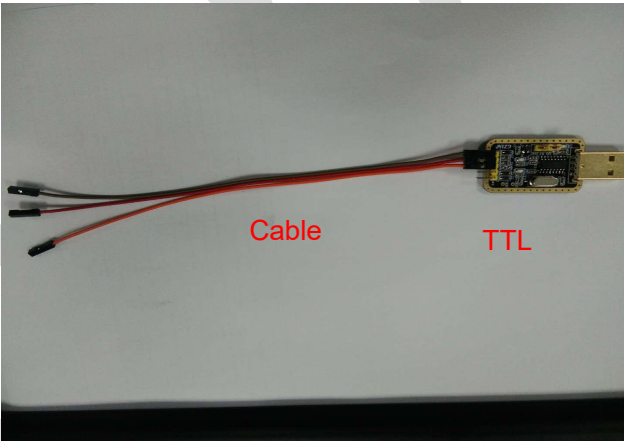


Figure5.2



Serial software:

5.2 Connect TTL to sensor

Device Serial Port connection GND, TX, and RX locations have been marked on the diagram as shown in Figure5.3.

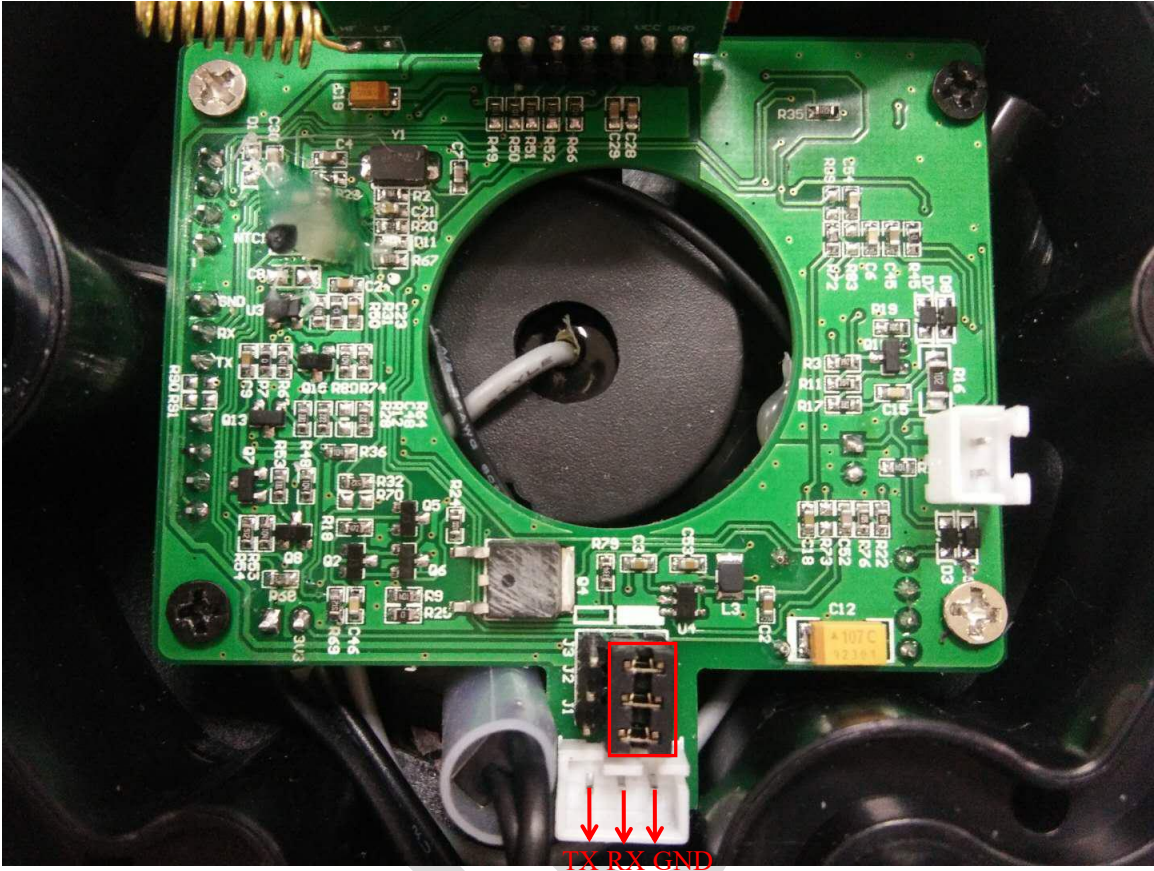


Figure5.3

Connect TTL to device, as shown in Figure 5.4.

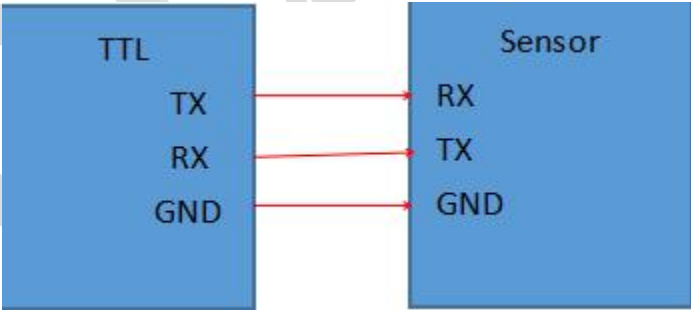


Figure5.4

Steps

- 1 Change jumper cap to hollow position (default it is in the solid position) as shown in figure5.5.
- 2 Connect the TTL to the device as shown in figure 5.4.
- 3 Connect the device's power supply, as shown in figure5.6.

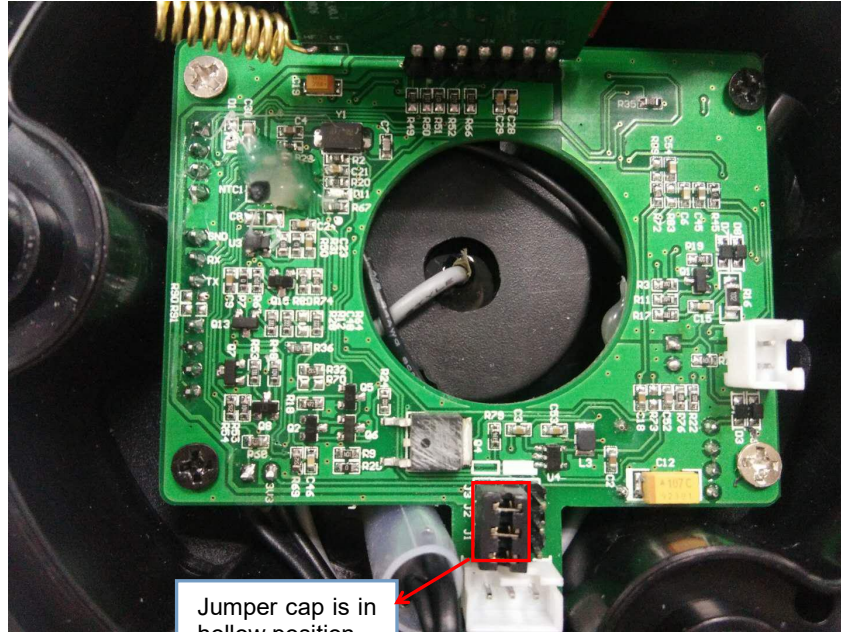


Figure5.5

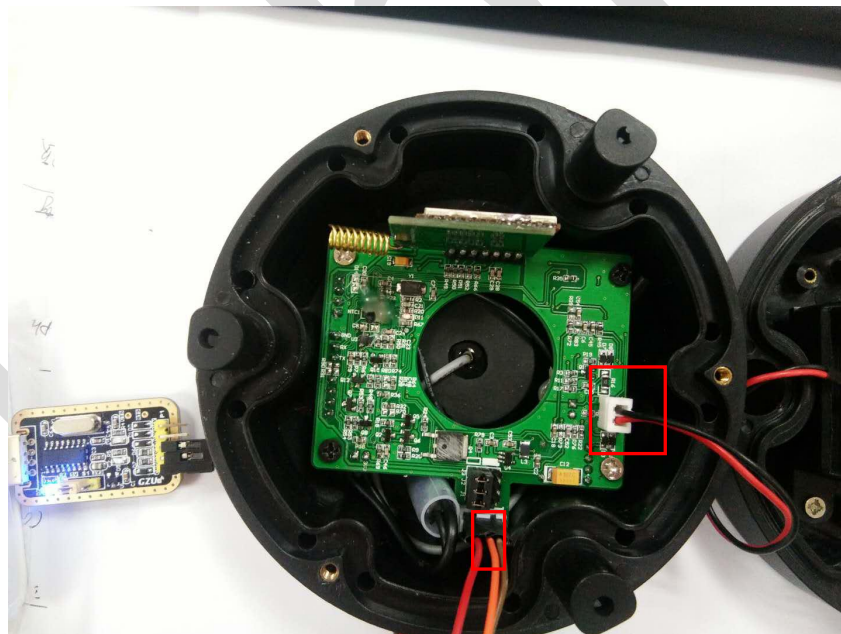


Figure5.6

5.3 Environment to Configuration of Device

1 Open the serial software when opening, the default information of serial port software is shown in figure 5.7.

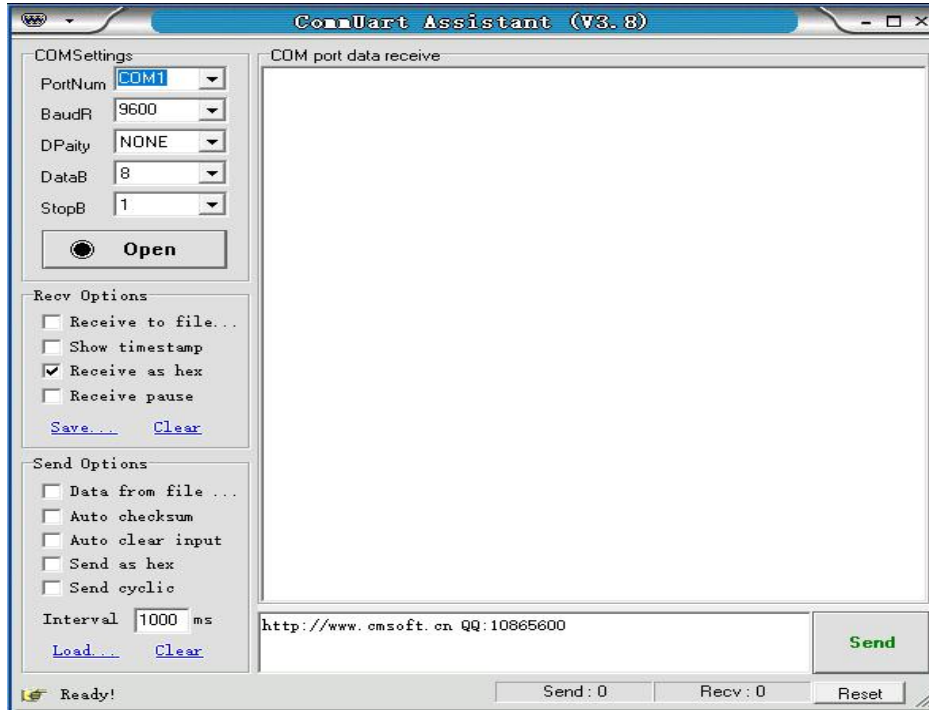


Figure5.7

2 Select the serial of configuration of serial software

- Port number (you can select port Number from device manager of your system)
- Set the baud rate: 115200, (DF702 is 115200 baud rate and DO100 is 9600)
- Parity bit: NONE
- Data bits: 8
- Stop bit: 1

As shown in figure 5.8 you can follow the given instruction.

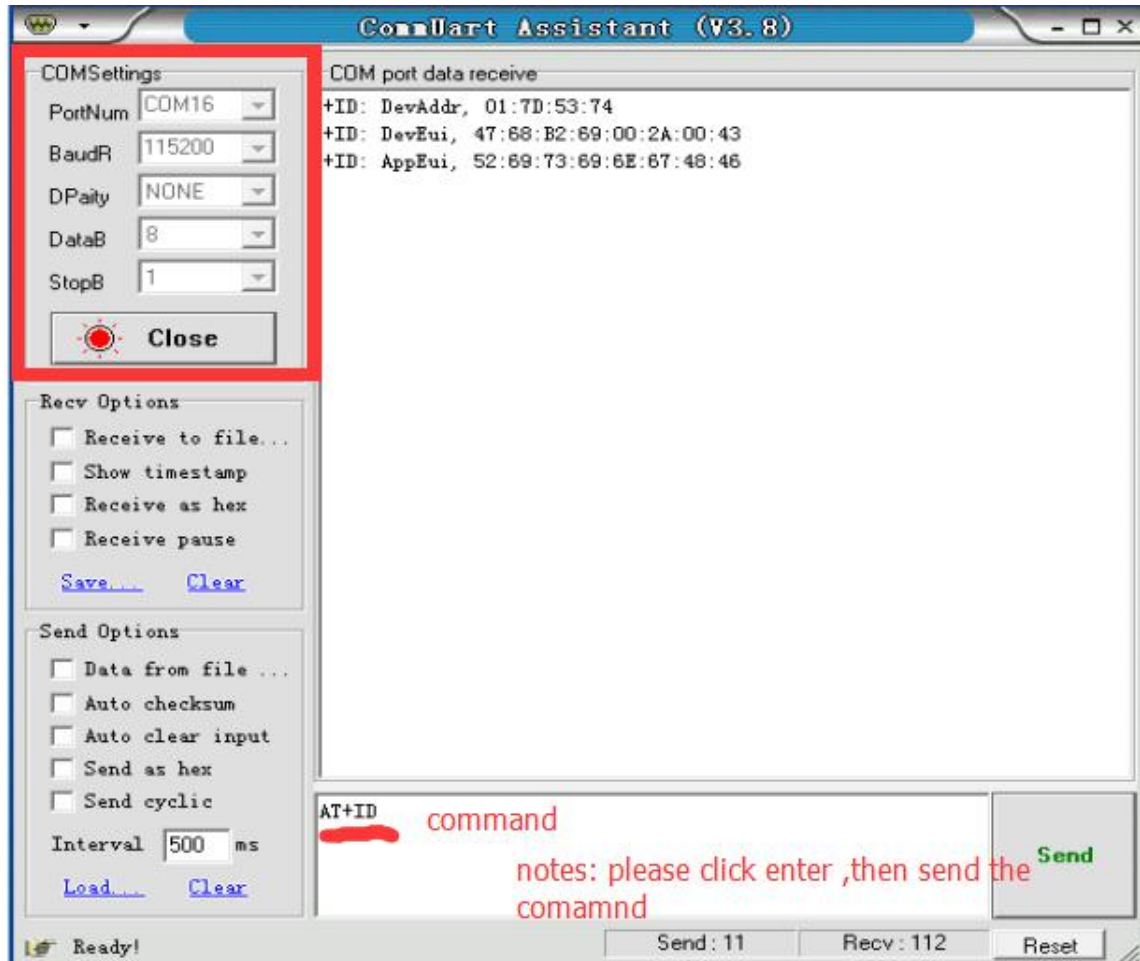


Figure5.8

3 when you send as related commandos of configuration and related parameters to the serial software, such as devaddr, nwkskey, etc. (please refer to the specific instruction format LoRa instruction manual).

Sending First Command

send input command:AT+ID, (read all) as shown in figure5.8.

Response of Device

```
+ID: DevAddr, 01:7D:53:74
+ID: DevEui, 47:68:B2:69:00:2A:00:43
+ID: AppEui, 52:69:73:69:6E:67:48:46
```

Sending Second Command

AT+KEY=NWKSKEY;"6132f00ad1efd2d4af5e12f8ef745d8b" (set nwkskey),as shown in figure5.9.

Response of Device

```
+KEY: NWKSKEY 6132F00AD1EFD2D4AF5E12F8EF745D8B
```

As shown below:

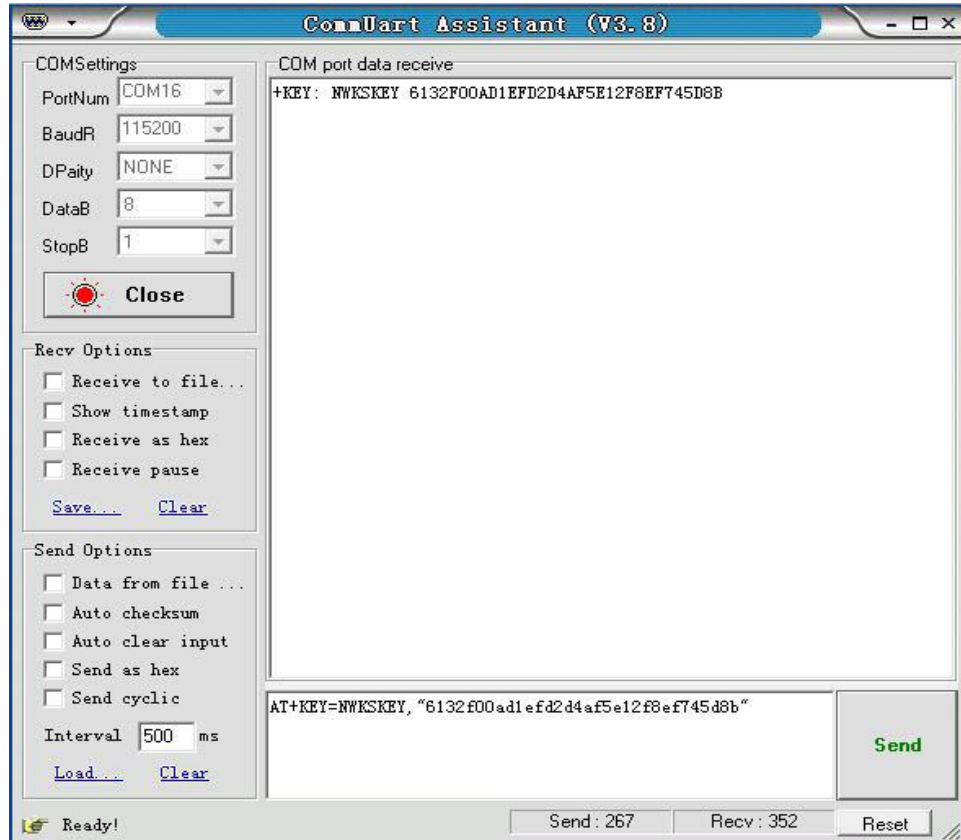


Figure5.9

Reference instruction:

Set DEVADDR:

AT+ID=DevAddr, "4 bytes length hex identifier"
eg: AT+ID=DevAddr, "01234567"

Set DEVEUI:

AT+ID= DevEui, "8 bytes length hex identifier (64bits)"
eg: AT+ID=DevEui, "0123456789ABCDEF"

Set NWKSKEY:

AT+KEY=NWKSKEY, "16 bytes length key"
eg: AT+KEY=NWKSKEY,"2B7E151628AED2A6ABF7158809CF4F3C"

Set APPSKEY

AT+KEY=APPSKEY, "16 bytes length key"
eg:

AT+KEY=APPSKEY,"2B7E151628AED2A6ABF7158809CF4F3C"

Detailed instructions, please refer to the [RHF-PS01509] LoRawan Class AC AT Command Specification - v4.3.pdf document

Note: If you are facing following problems you can overcome easy way.

- Make sure the position of the jumper cap is switched to the hollow position. If it is placed at solid position module configuration cannot be completed.
- Check if TTL and device RX, TX connection is correct, if the connection is wrong, there will be no reply sending instructions.
- Confirm the baud rate is the correct choice of baud rate, the correct should be 115200.

5.4 Video link

Configuration of Lora parameter DF702 Smart Trash Bin Sensor is shown with detailed you can follow these instructions as well as click at video link .

<https://youtu.be/nklTd88SPXI>

6 Configurations of Relevant Parameters of Device

Through the configuration, you can also modify the relevant parameters of the device such as alarm height value, temperature value, battery level and etc.

6.1 Required tools

- A TTL and cable
- Serial software
- Equipment
- Protocol manual

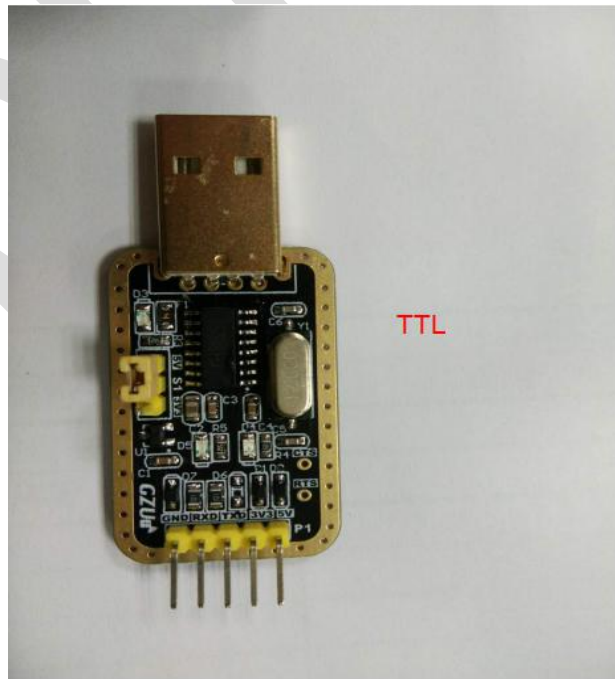


Figure6.1

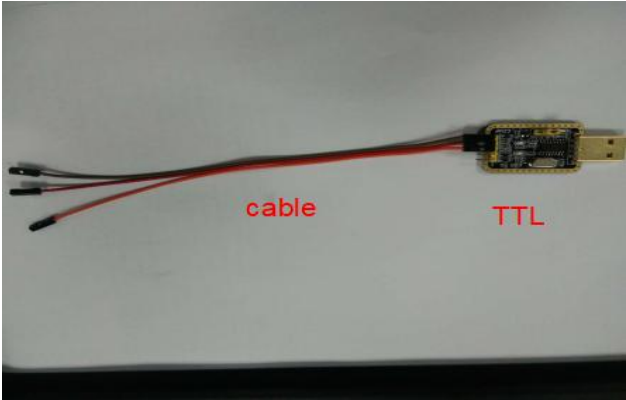


Figure6.2



Serial software

6.2 Connect TTL to sensor

Device serial port GND, TX and RX positions have been marked on the diagram.Upper diagram the connection of RX,TX,and GND is given with detailed if you not connect properly then you cannot configure your device properly.

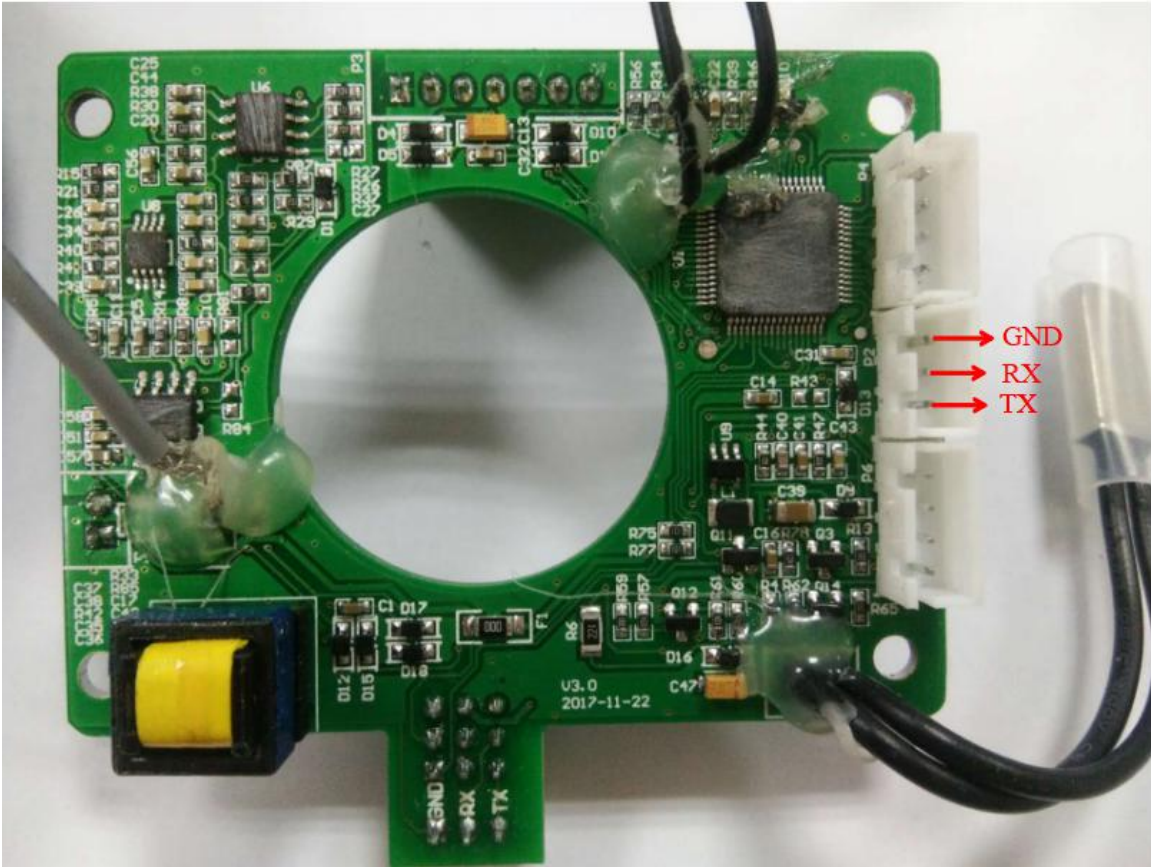


Figure6.3

TTL and Device ports connection are shown in the figure 6.4.

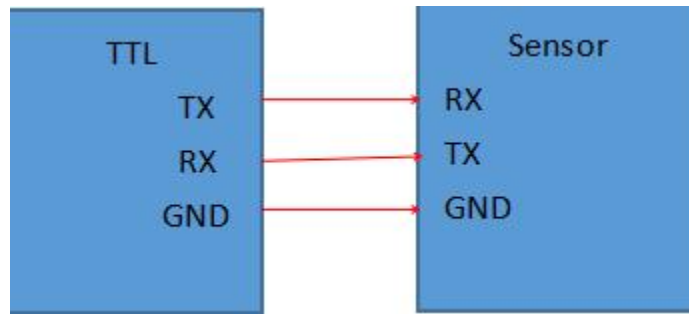


Figure6.4

Steps:

1 Confirm that the jumper cap is at the solid position (jumper cap defaults to solid position) as shown in figure6.5.

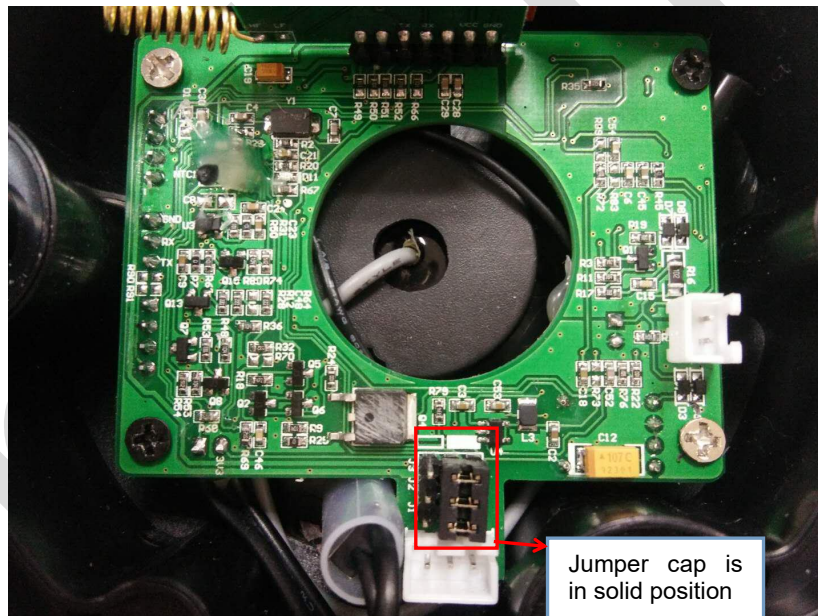


Figure6.5

2 Connect TTL to sensor, as shown in figure6.4 and figure6.6

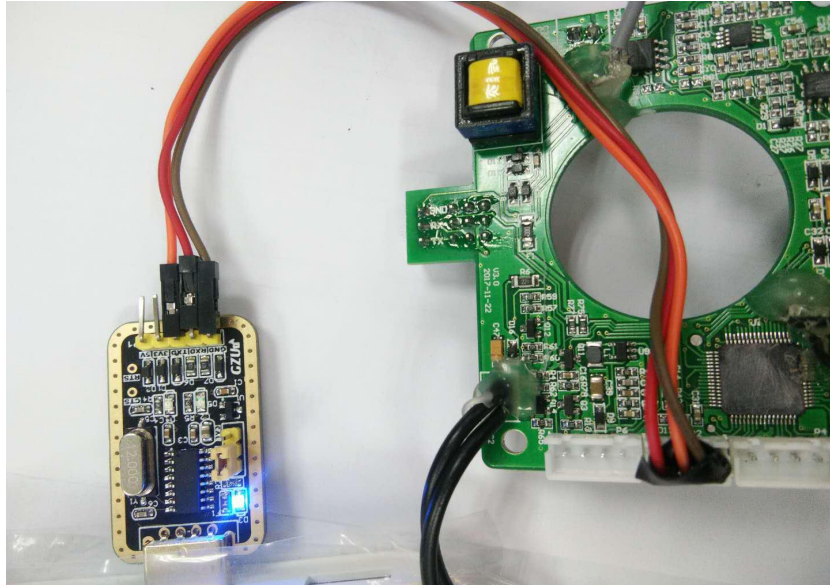


Figure6.6

6.3 Use serial software to configure

- Open the serial software
- Select the serial port number
- Set the baud rate: 115200
- Parity bit: NONE
- Data bits: 8
- Stop bit: 1
- Connect the device's power

When you see the serial port output sending instructions are in Hexadecimal then we will change the format of serial software sending option .

Data is sent in hexadecimal format (please refer to instruction format for details) .

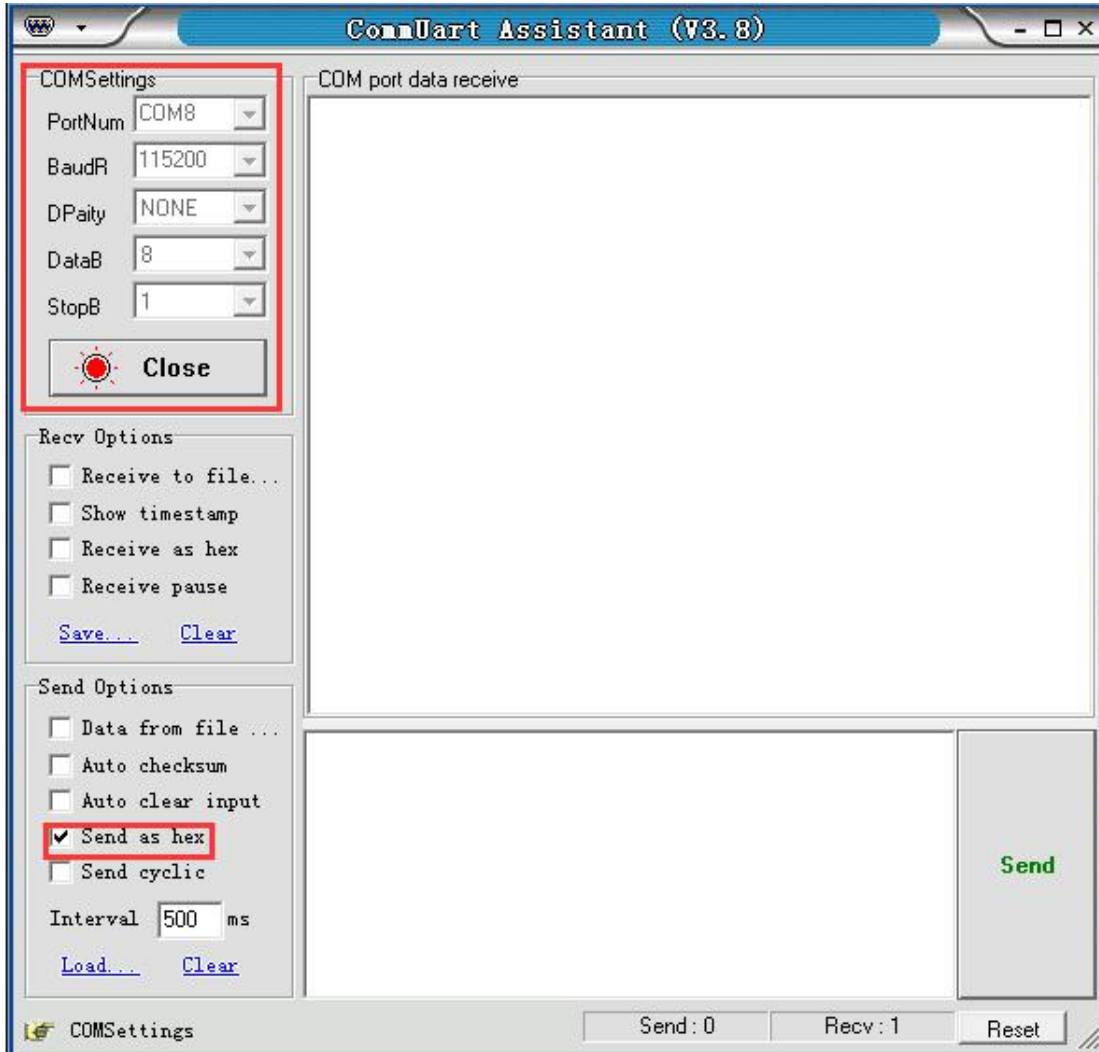


Figure6.7

Note

Before sending the command, please first click the "enter" and then click Send .

Example 1: change upload time to an hour the instruction is: 99990101 as shown in Figure 6.8.

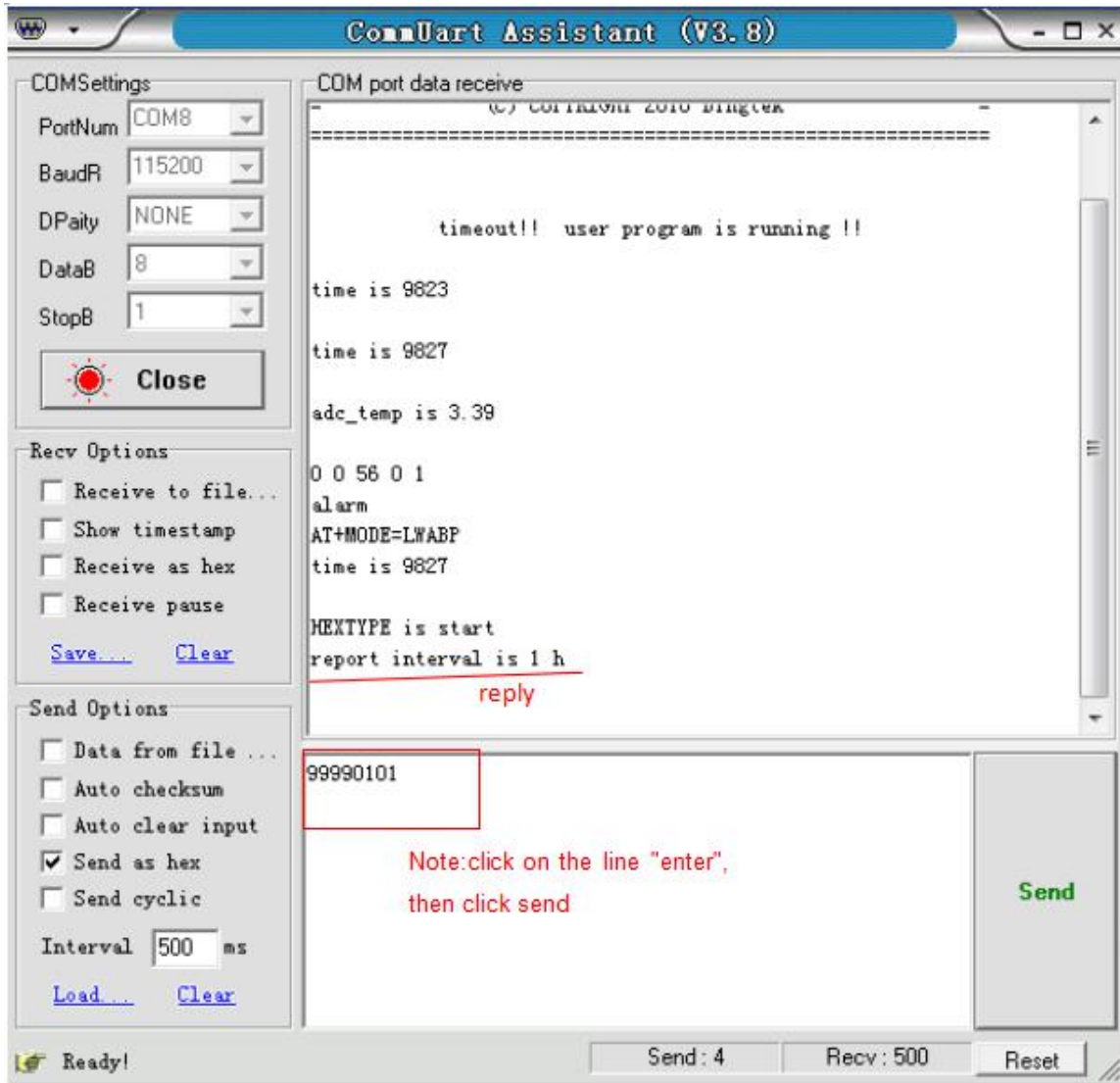


Figure6.8

Note: For the format of the instruction, please refer to the protocol document of the corresponding equipment.

Notes:

1. When the device is at Sleep mode sending instructions will be invalid.
2. Before sending instructions please click enter, and then send.
3. The command is sent in hexadecimal format except for configuring APN for details refer to the protocol.
4. Check whether the RX and TX of the TTL and the device are correctly connected. If the connection is reversed no output is displayed on the serial port after the device is powered on, and the device cannot be configured.

6.4 Video link

Configuration of Lora parameter DF702 Smart Trash Bin Sensor is shown with detailed you can follow these instructions as well as click at video link.

<https://youtu.be/99gA-TYWf8g>

7 Upgrade devices

7.1 Instructions

Dear customer if you want to upgrade the files you need to contact us to gets information about new version and use our software to upgrade the files.

If device has special requirements or needs to be customized please contact sales department for confirmation. If there is no special features it is not recommended to upgrade the equipment.

7.2 Tools

- A TTL and cable
- Serial software
- HyperTerminal software
- Program files

7.3 Connect TTL to sensor

Device serial port definition: GND, TX and RX positions have been marked on the diagram as shown in figure7.2.

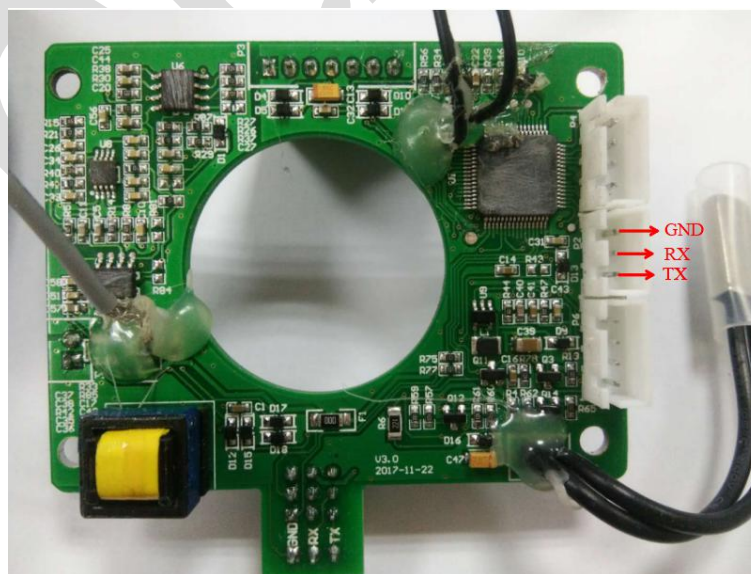


Figure7.2

TTL and device connection as shown in figure 7.3:

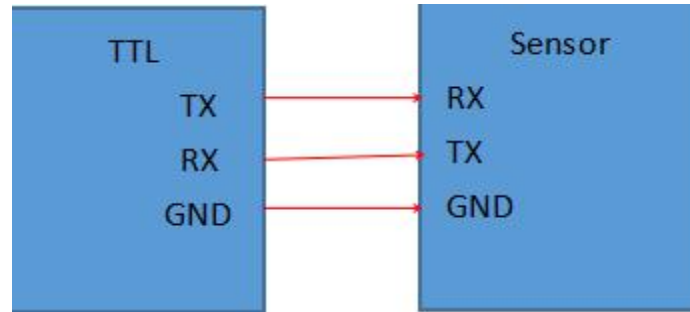


Figure7.3

- Confirm that the jumper cap is in the solid position (jumper cap defaults to solid position), as shown in figure7.4.

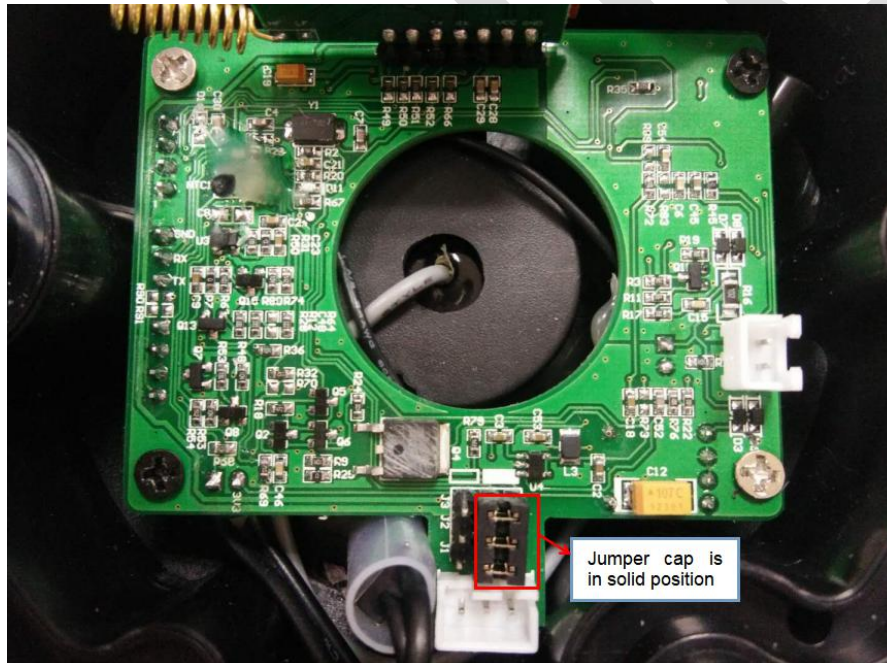


Figure7.4

3 Connect TTL to sensor, as shown in figure7.3 and figure7.5.

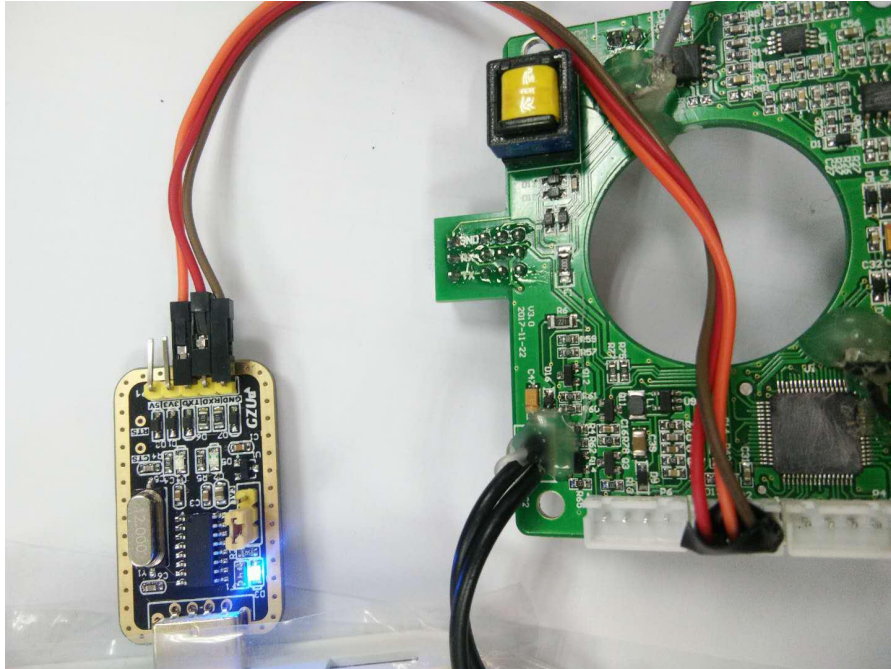


Figure7.5

7.4 Upgrade steps

7.4.1 Steps

Up gradation of device can be possible to following the steps

- Open the serial software
- select the desired serial port
- set the baud rate: 115200
- parity: None
- data bits: 8
- stop bit: 1

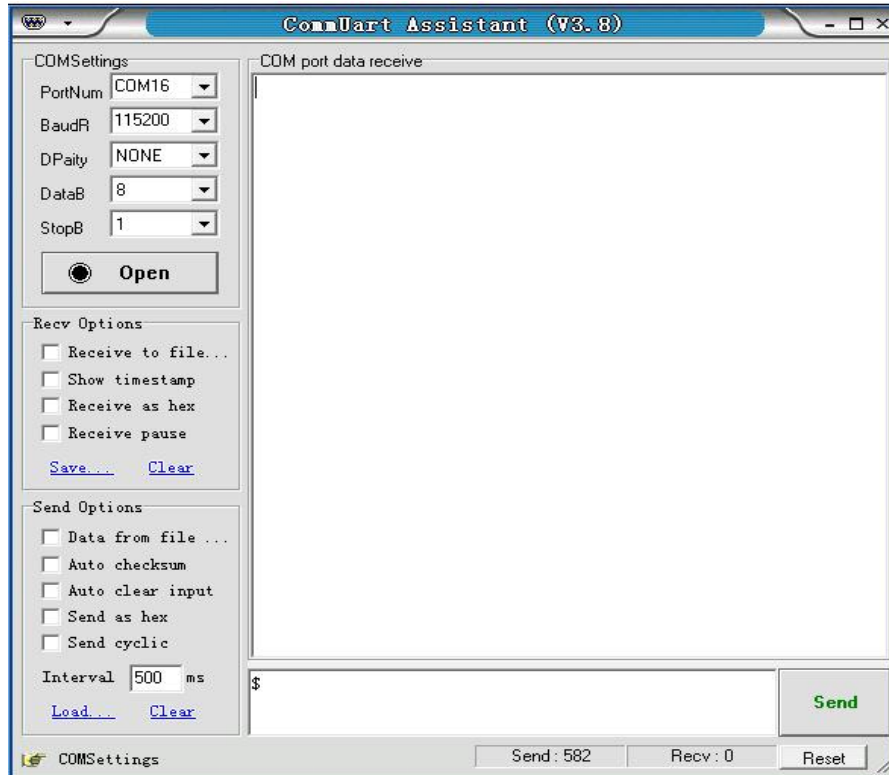


Figure7.7

- **7.4.2 Step**

Click the Open button, enter \$ in the input box click the Enter, as shown in the figure 7.7 set the time interval to 500ms or <500ms check the cycle to send options click send.

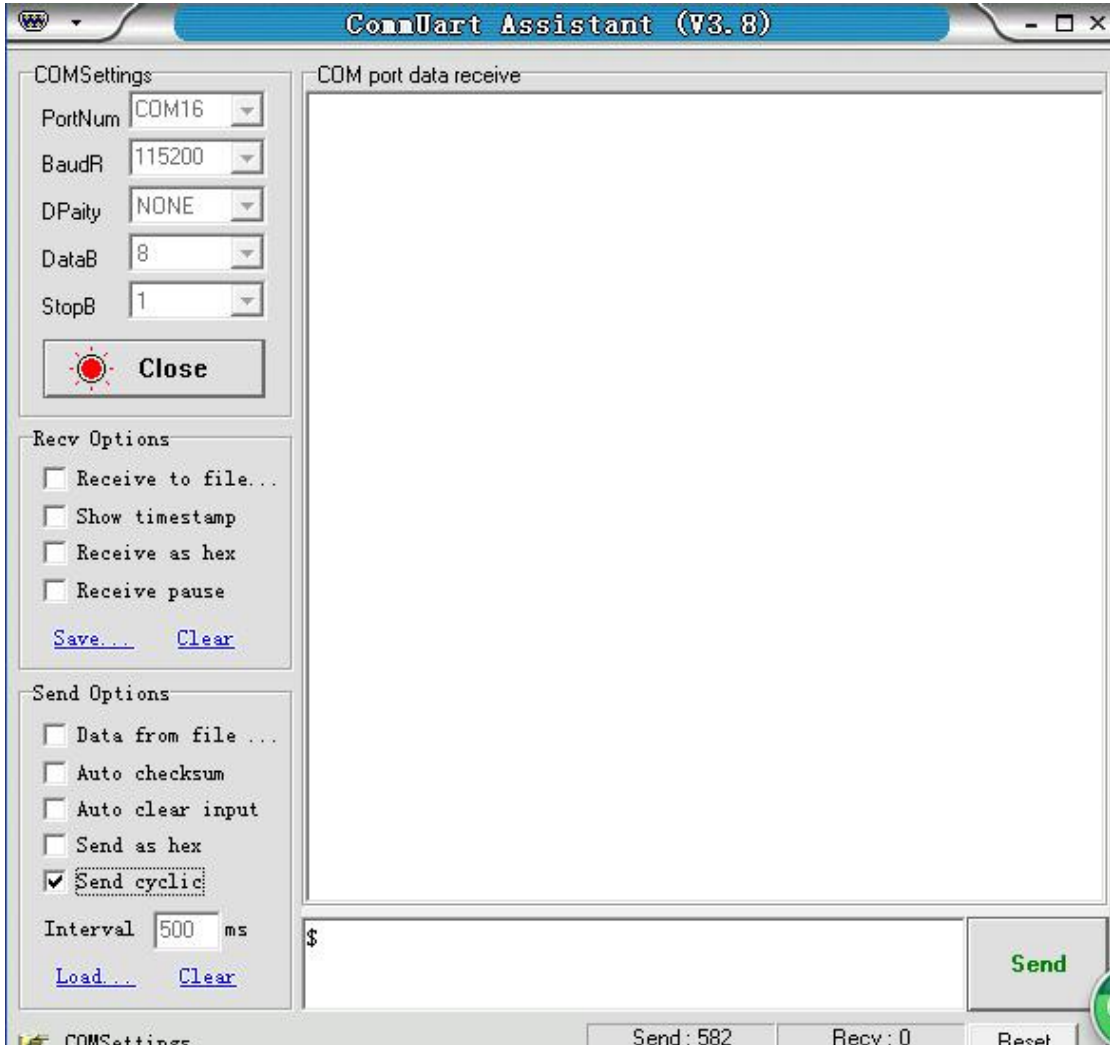


Figure 7.5

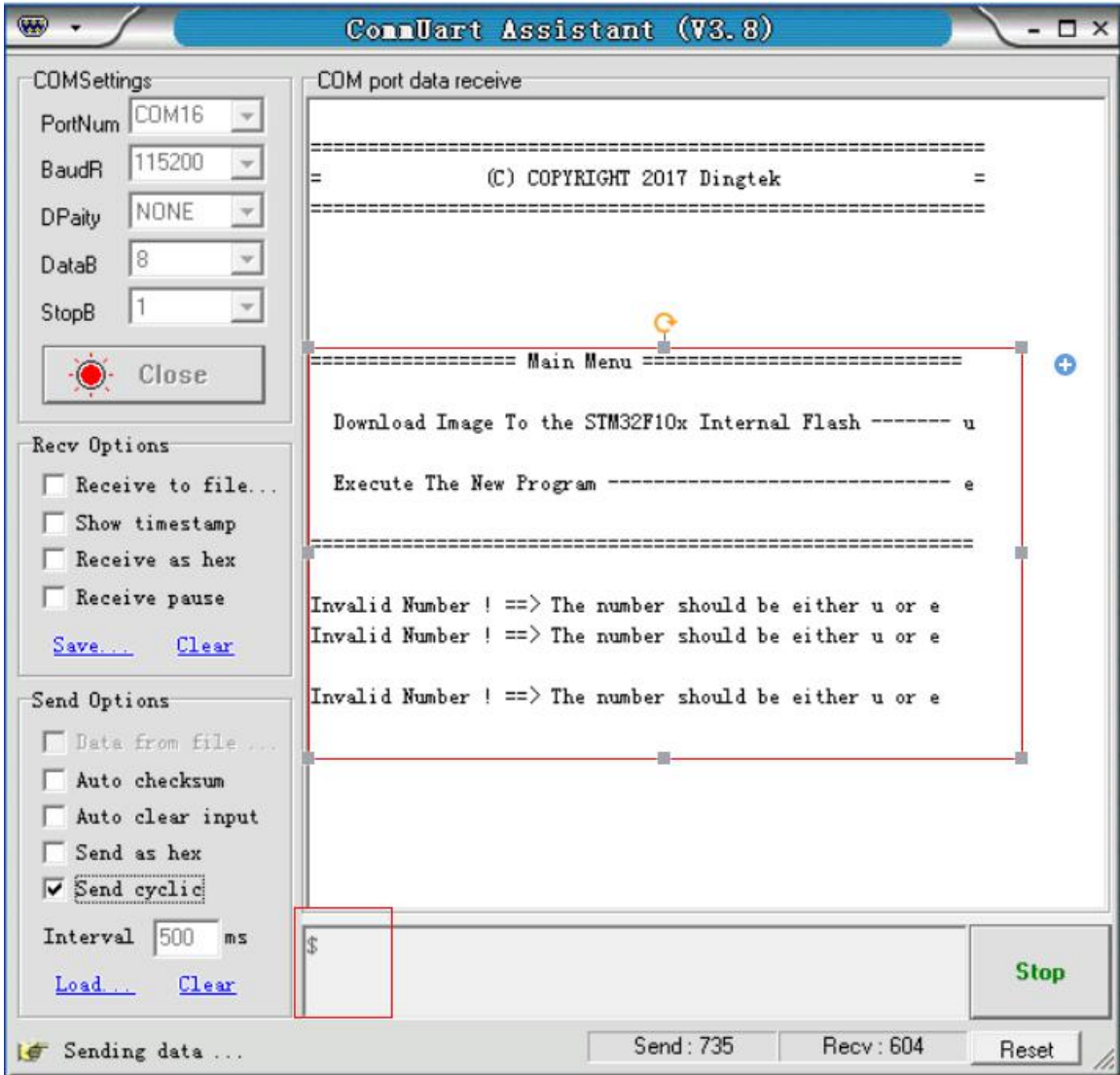


Figure7.6

7.4.3 Restart the device you can see as given Figure 7.6 .Next input is u click on the line and Click send you can gets output result: cccccc

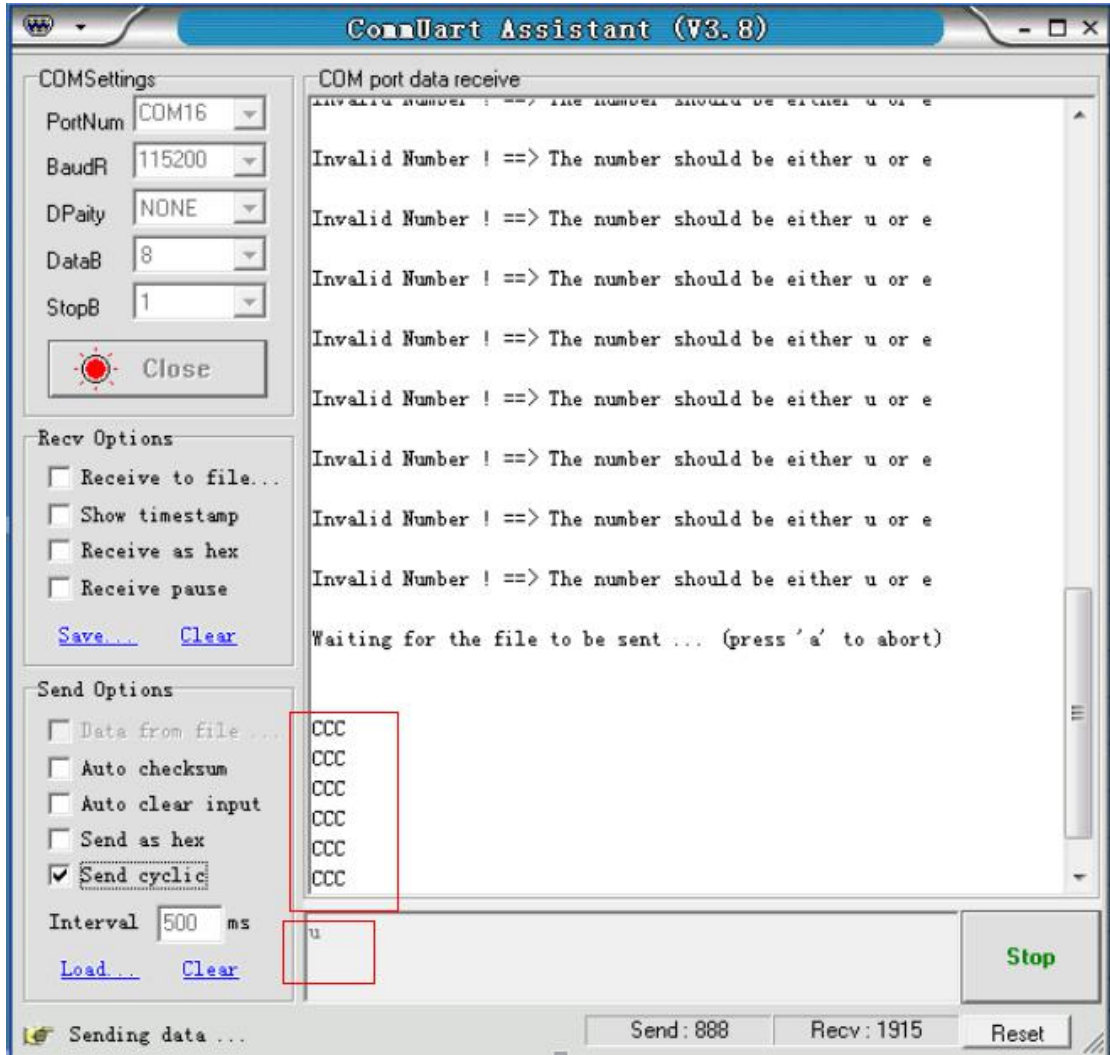


Figure7.7

7.4.4 When you receive Output result cccccc then click at close of this Serial port software.

7.4.5 Before open the Hyperterm exe file please close the Serial software it is necessary step.

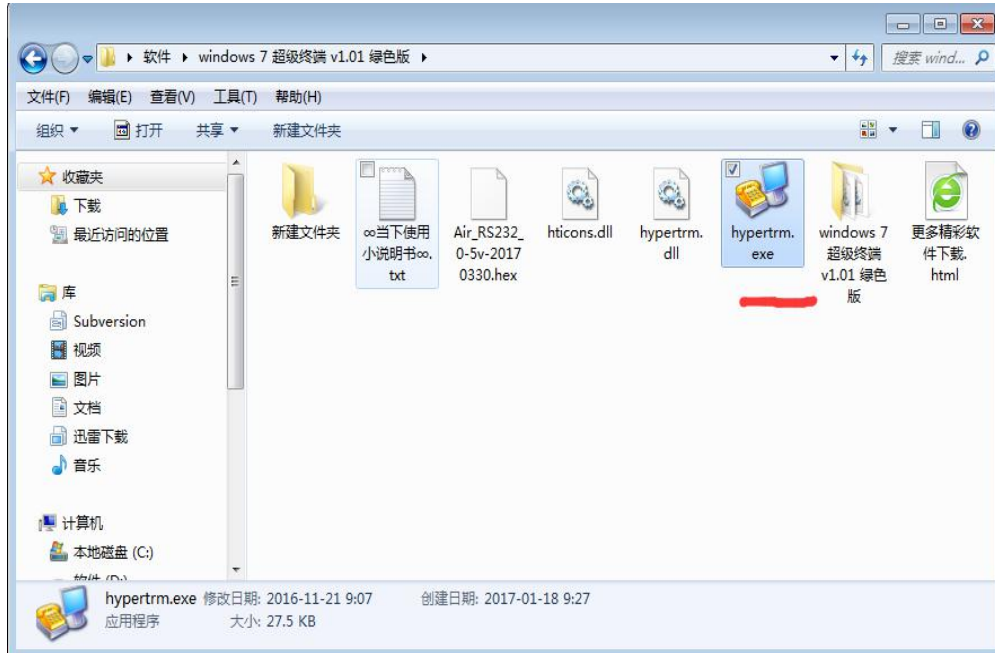


Figure7.9

7.4.6 Open the software Hyperterm exe as shown in Figure7.10 dialog box, enter 1 in the name bar, and click OK Figure7.11.

You can see Figure 7.12 dialog box, select the desired serial port, in Figure selected port is such as COM16, and then click OK.

The Figure7.13 dialog box appears selects the following steps in dialog box.

- Select baud rate: 115200
- Parity: None
- Data Bits: 8
- Stop Bits: 1
- Data Flow Control bits: 1

After selecting the dialog box then Click OK.

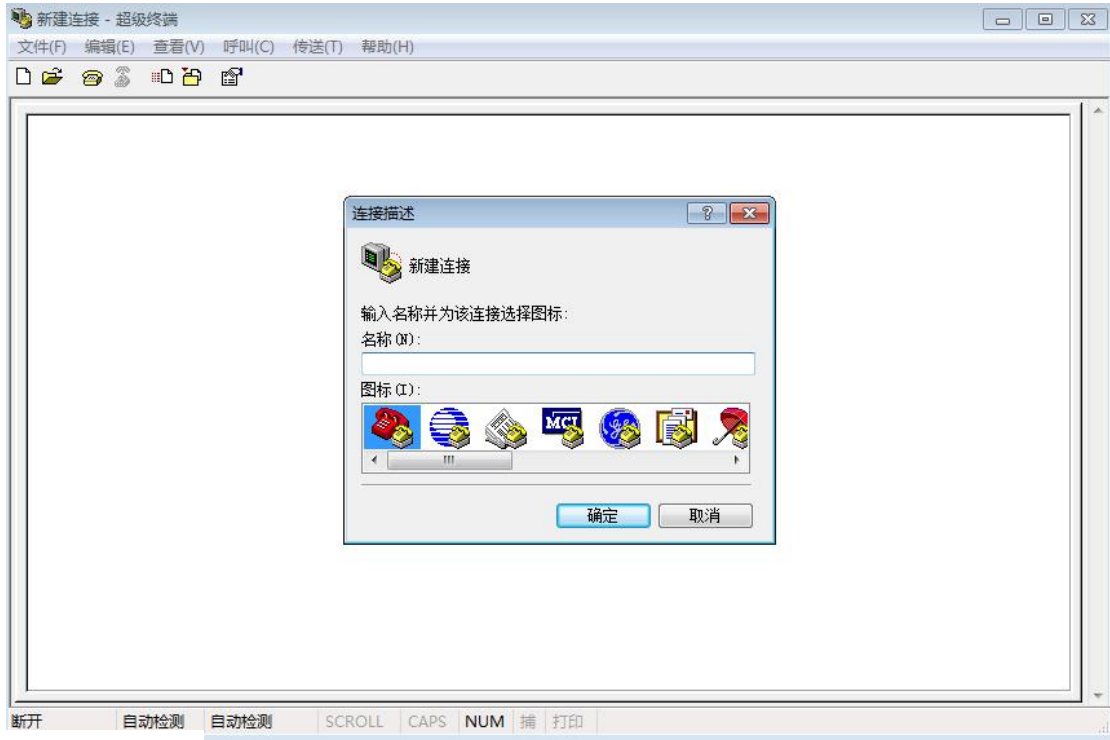


Figure7.10

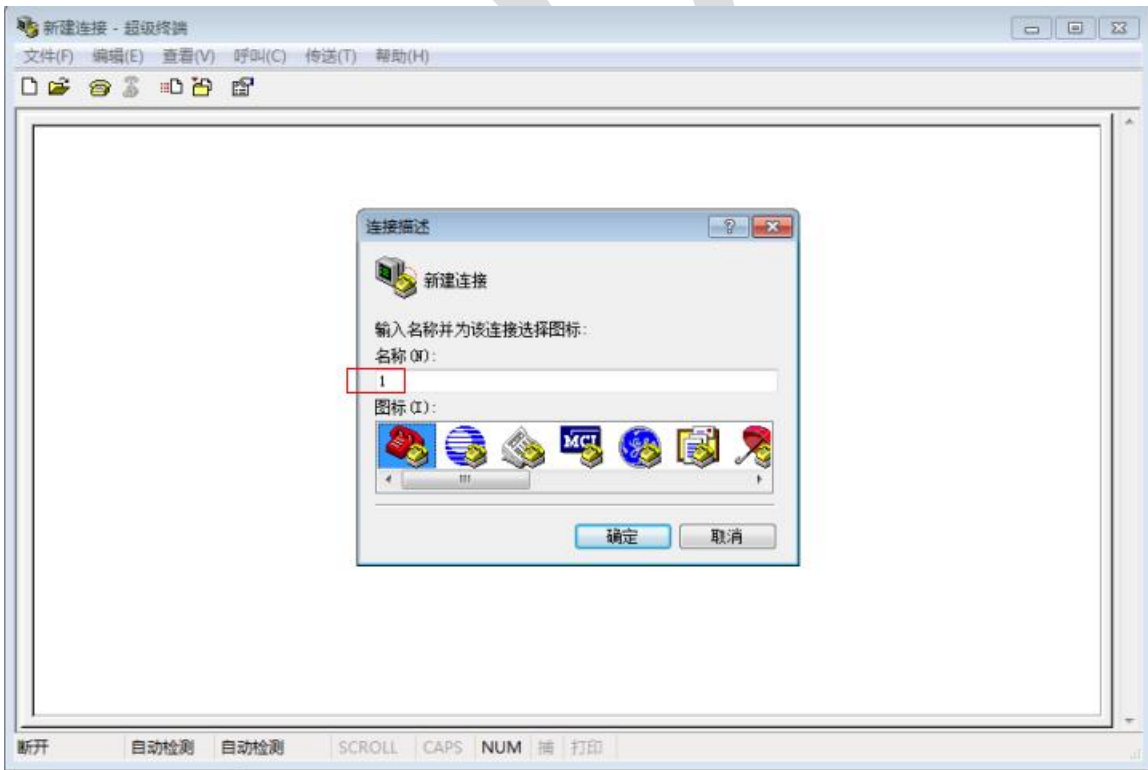


Figure7.11

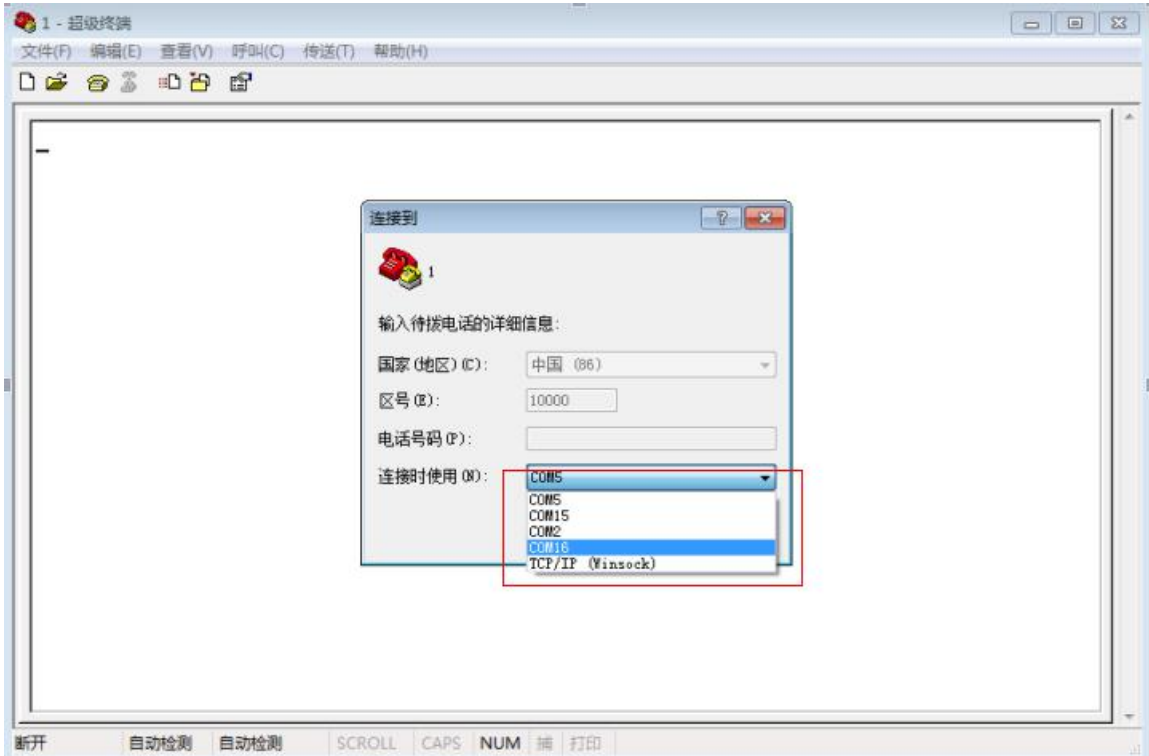


Figure7.12

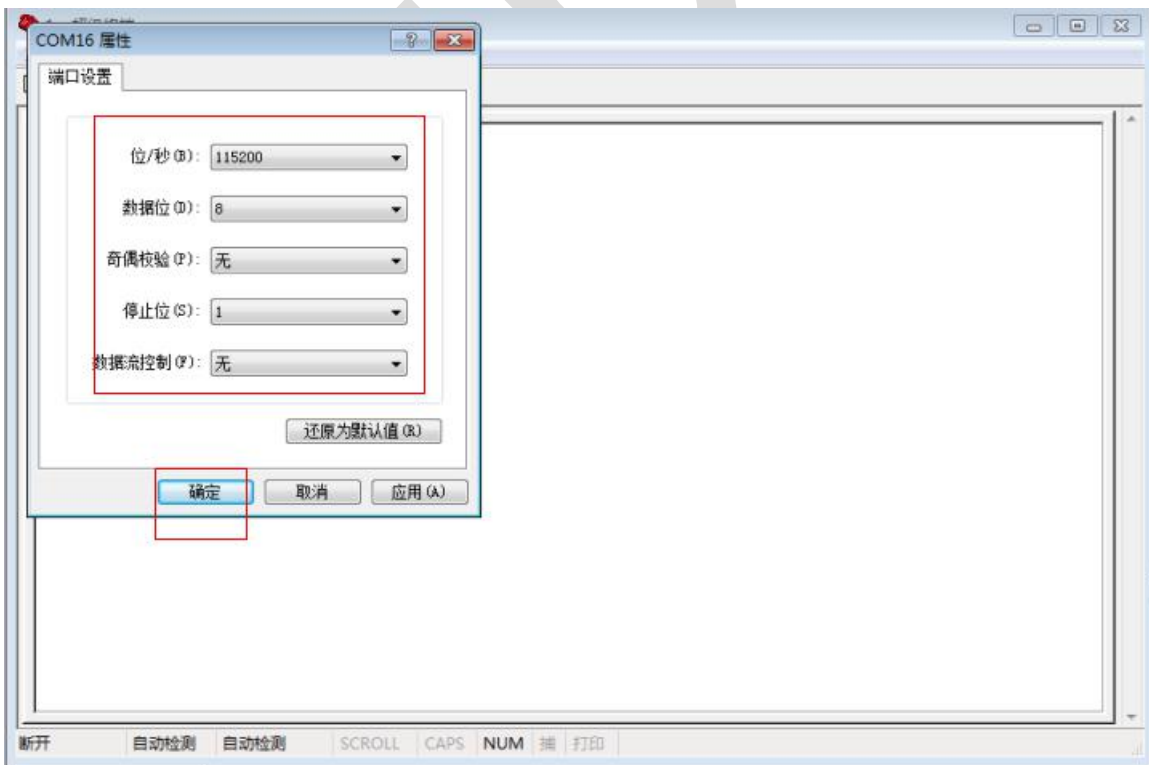


Figure7.13

7.4.7 Click the connection option; you can receive output **cccc** on the screen.

Click at send option and select the file which you want to upgrade select the address of your file. Agreement selecting option you can select given modem Ymodem and Click Send.

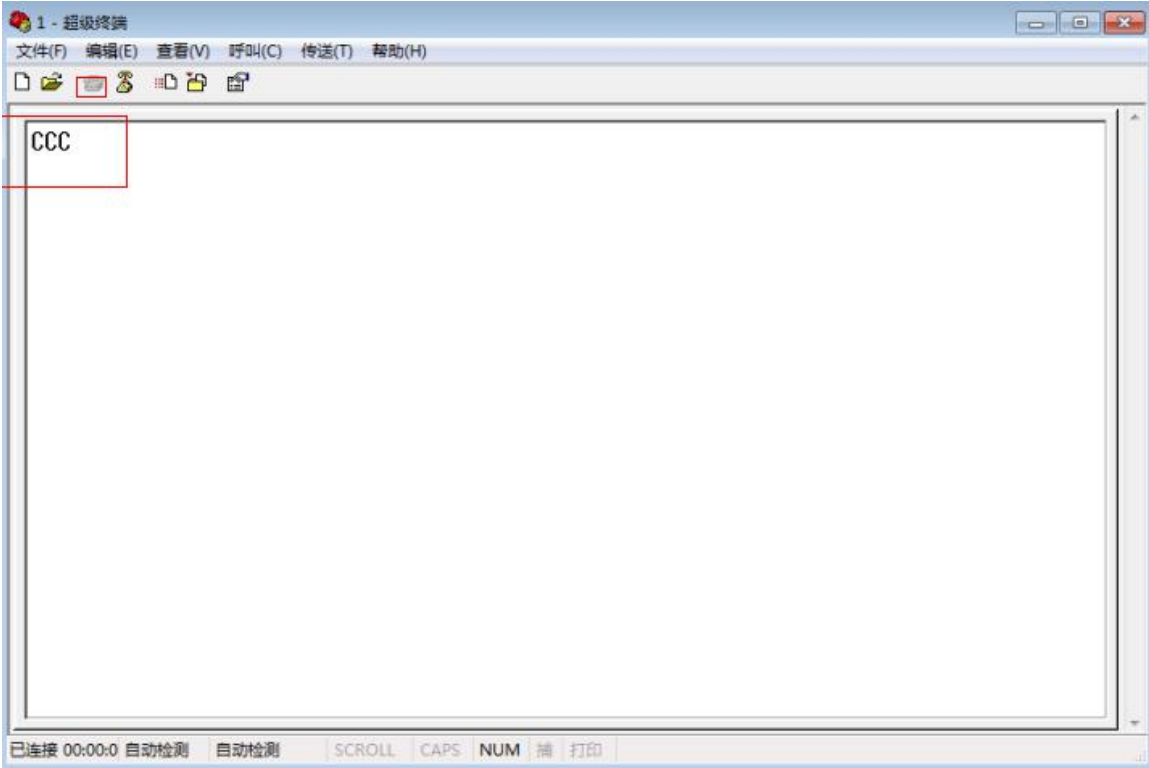


Figure7.14

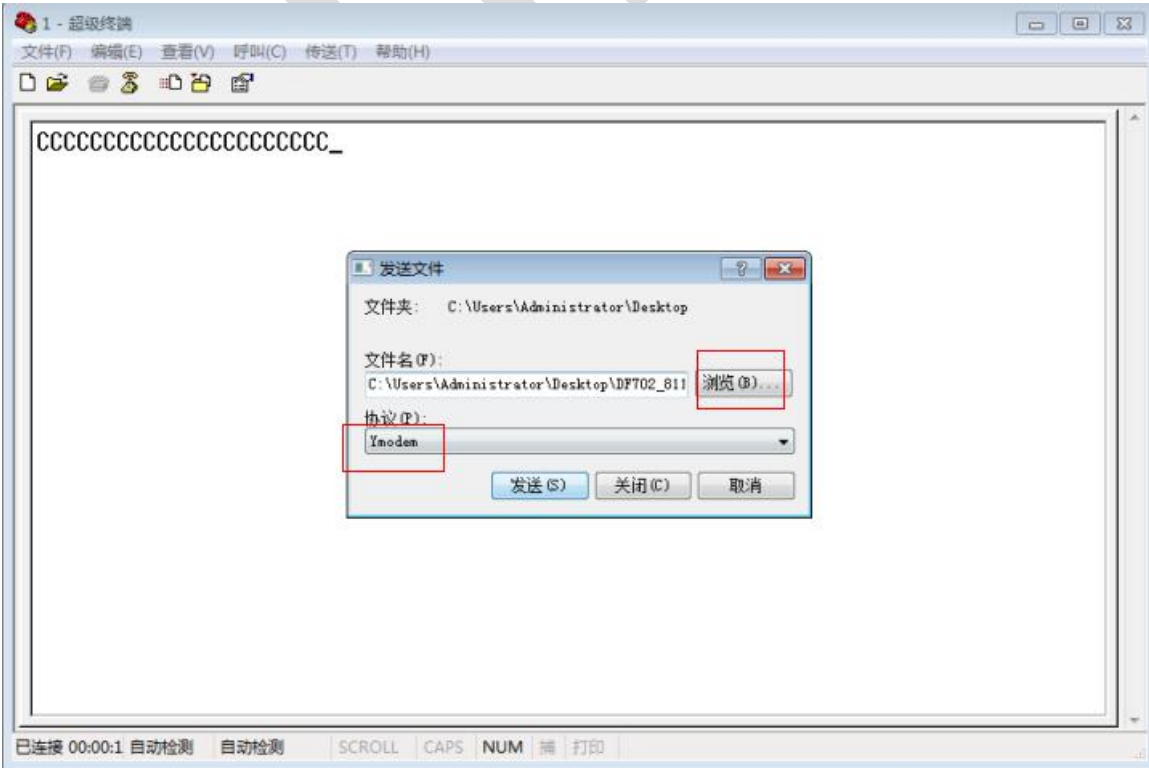


Figure7.15

7.4.8 File will be transfer and procedure is completed, you can see on the screen promised to upgrade successfully (Programming Completed Successfully) as shown in Figure 7.16.

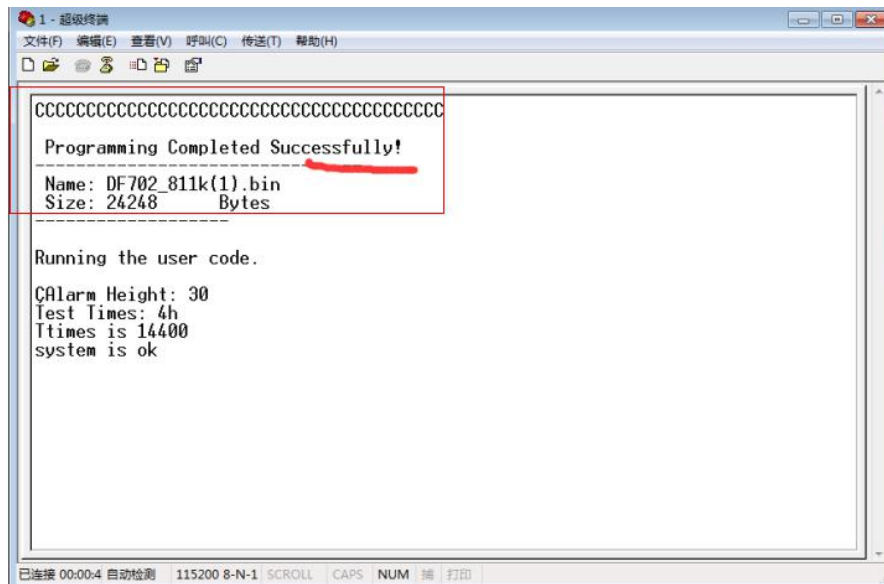


Figure7.16

Notes:

1. If you cannot confirm the results of figure7.6 on the serial port software please checks connection of RX, TX and TTL device.

7.5 Video link

The instruction of upgrading the device is given with detailed this link can help you to upgrade the device corresponding the different correct steps.

DF702 Smart Trash Bin sensor Upgrade Instruction:

<https://youtu.be/zUQbWT6V414>

Attachment**1 Network server**

For the network Server in CNDingtek following plate form are used

- Dingtek Network Server
- TTN Network server
- Loriot Network server
- Actility Network server

User can connect devices to network server to send the data directly from device to network server.

1.1 Dingtek

CNDingtek has own server Dingtek if you want to use our network server you just need to configure your gateway to our network server. During the usage of CNDingtek Network Server you need no more settings just connect the device with power and use it easily.

For network server you can contact to customer Services

E-mail: service@dingtek.com

1.2 TTN Network Server

After login:

- Register Gateway: Click "Gateway-> register gateway".
- Select "I'm using the legacy packet forwarder",
- fill in the registration information, click "Register-gateway" to complete the gateway registration.

Gateway ID
A unique, human-readable identifier for your gateway. It can be anything so be creative!

I'm using the legacy packet forwarder
Select this if you are using the legacy [Semtech packet forwarder](#).

Description
A human-readable description of the gateway

Frequency Plan
The [frequency plan](#) this gateway will use

Router
The router this gateway will connect to. To reduce latency, pick a router that is in a region which is close to the location of the gateway.

Location
The exact location of your gateway. This will be used if your gateway cannot determine its location by itself. Set a location by clicking on the map.

- Add a device on the TTN
- Click "Applications-> add application"
- Fill in the registration information, click "Add application"

Applications > Add Application

Application ID
The unique identifier of your application on the network

Description
A human readable description of your new app

Application EUI
An application EUI will be issued for The Things Network block for convenience, you can add your own in the application settings page.

Handler registration
Select the handler you want to register this application to

Cancel Add application

- Click "Devices-> register device" to input device information DevAddr, Deveui and APPKEY and click "Register".

Applications > dingtek > Devices

Overview **Devices** Payload Formats Integrations Data Settings

REGISTER DEVICE [bulk import devices](#)

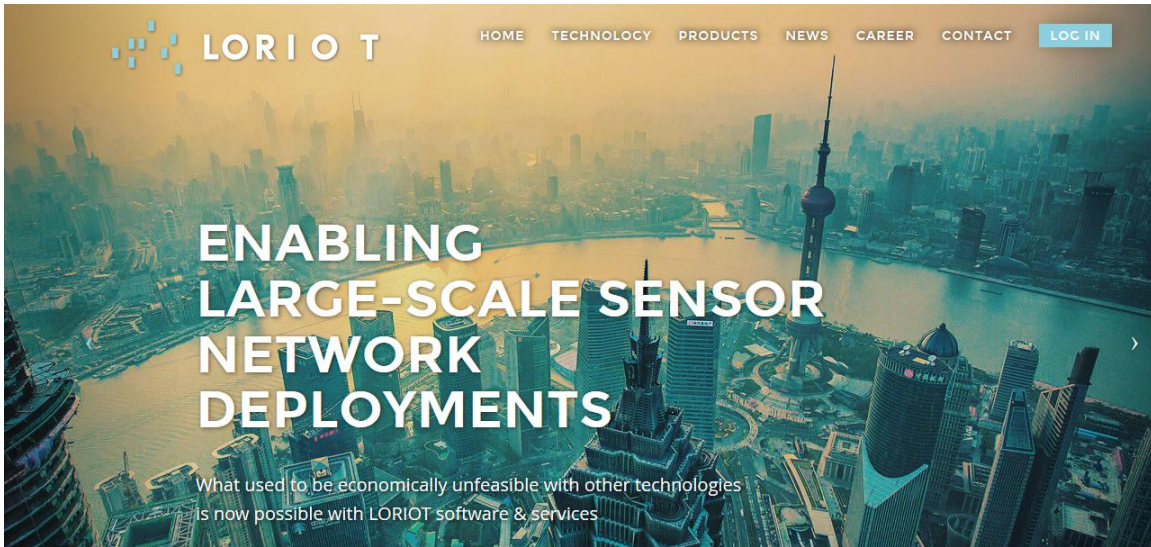
Device ID
This is the unique identifier for the device in this app. The device ID will be immutable.

Device EUI
The device EUI is the unique identifier for this device on the network. You can change the EUI later.

App Key
The App Key will be used to secure the communication between you device and the network.

App EUI

1.3 Lorient



- login
- login interface:
- Log in China, please choose: CN1 Shenzhen, Chin

The screenshot shows the LORIoT website's server selection interface. It features three main columns for different regions: EUROPE & AFRICA, ASIA / PACIFIC, and AMERICAS. Each column contains a table of server options with their respective locations. A 'New' badge is present next to several server entries.

EUROPE & AFRICA		ASIA / PACIFIC		AMERICAS	
Server	Location	Server	Location	Server	Location
EU1	Frankfurt, Germany	AP1	Singapore	US1	California, USA
EU2	New Amsterdam, Netherlands	AU1	Sydney, Australia	US2	New New York, USA
EU3	New Madrid, Spain	CN1	Shenzhen, China	SA1	Sao Paulo, Brazil
AF1	Cape Town, South Africa	AP2	New Tokyo, Japan		
		AP3	New Mumbai, India		

Registration of a free [community account](#) is available on all servers. Activate Windows

- Enter the user name and password, click login;

Add Applications

- 1.3.2 Add application
- Login, you can see Gateways and Application information:
- Click [Application +](#) to add an application

The screenshot shows the LORIoT dashboard for user jingqi.wang@dingtek.com. The left sidebar contains navigation options: Dashboard, Applications, Gateways, Documentation, FAQ, Account, and Support. The main content area includes:

- account information:** Email: jingqi.wang@dingtek.com, Name: Justin Wang, with a Logout button.
- tier COMMUNITY NETWORK:** Welcome to LORIoT.io Community Network. You are now part of a world-wide ecosystem of LoRaWAN developers. Your devices can use any community gateway to reach our network. As a reward for sharing your gateway, we provide you one Free Network Application.
- COMMUNITY NETWORK features:**
 - No account expiration
 - Roaming among all community gateways
 - Open LoRa Forum support
 - One Free Network Application
- News:**
 - 28th March 2016 04:29 (INFO): The server is provided in partnership with RisingHF.
 - 9th October 2017 15:00 (UPDATE): New version of the back-end and front-ends (release notes) has been deployed. The legacy UI does not include the new features, but should remain in a working state until the end of the year.
 - 10th July 2017 19:00 (UPDATE): We have a fresh new user interface ready for you. You will need to login separately into this interface, but can use both the current and the new in parallel. The old user interface will be sunset by October 2017. The release notes for the last update are now also available.
- Gateways (only last 10 shown):**

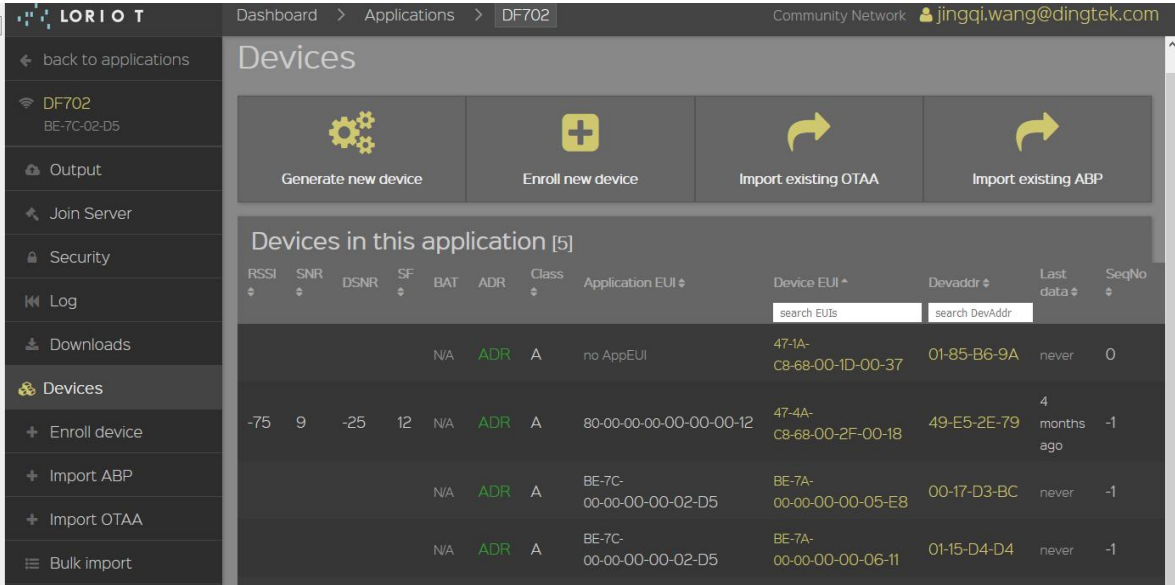
Location	Model	MAC	Version	Last data
null	Gemtek	1C-49-7B-FF-FF-D4-07-23 1C74977B1D41071223	udp4.2	16 days ago
- Applications (only last 10 shown):**

Name	AppID	Devices
DF702	BE-7C-02-D5	2

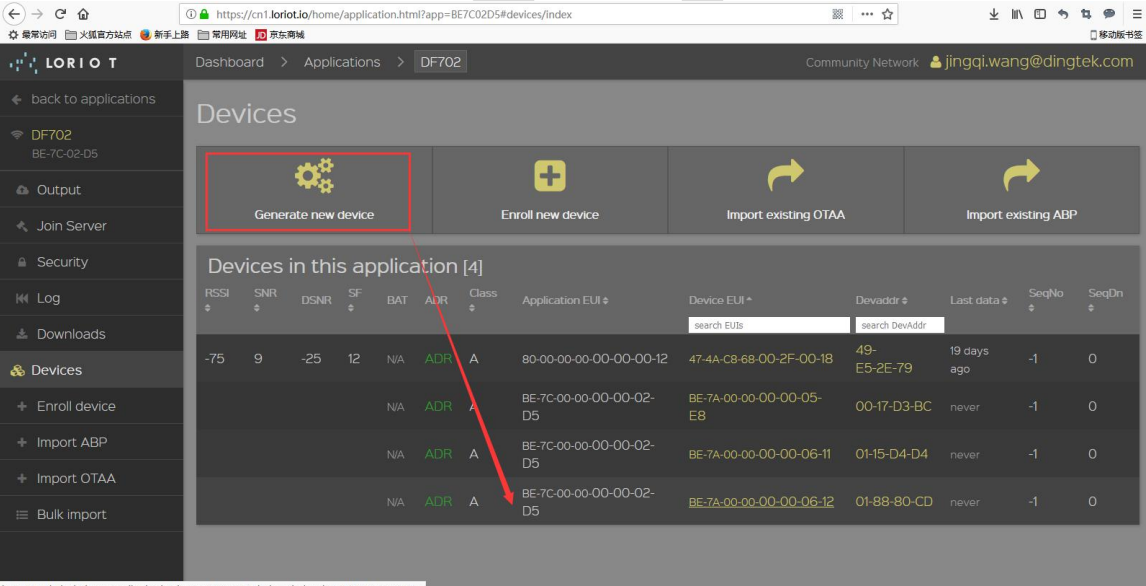
- 1.3.3 Add device
- Click Dashboard-> Applications-> DF702 (Added Applications) ->Manage Device to add devices
- There are two ways to add a device.

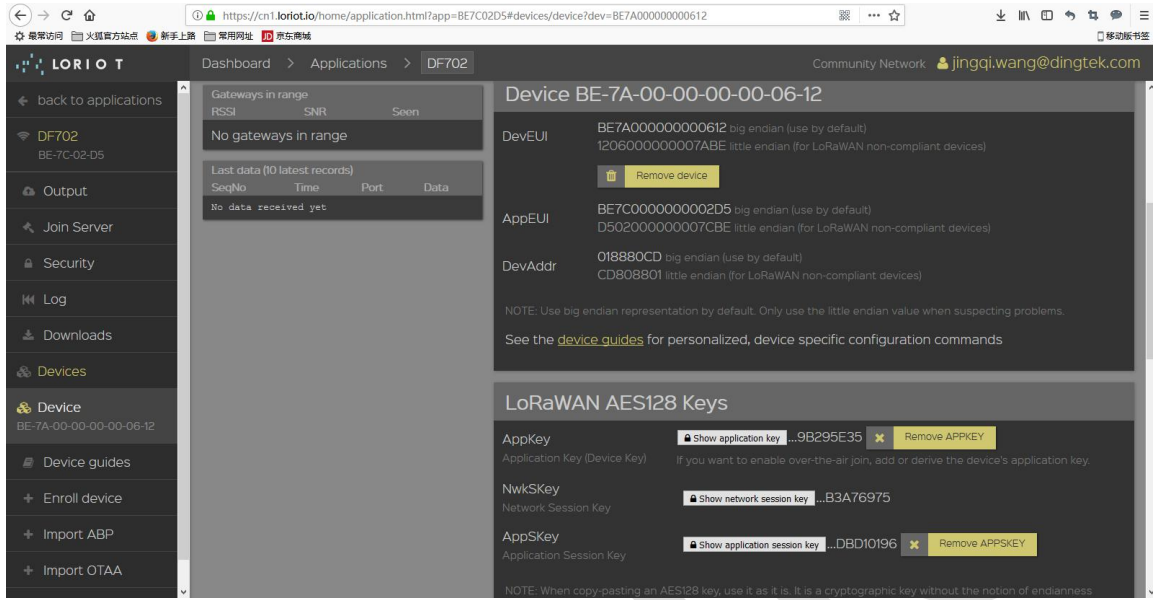
The screenshot shows the LORIoT dashboard for application DF702 (BE-7C-02-D5). The breadcrumb navigation is Dashboard > Applications > DF702. The left sidebar has options: back to applications, DF702, Output, Join Server, Security, Log, Downloads, Devices, Enroll device, Import ABP, Import OTAA, and Bulk import. The main content area includes:

- Controls:** Data output, Security tokens, and **Manage devices** (highlighted with a red box).
- Capacity:** Allocated capacity: 10 devices, Used capacity: 2 devices. Upgrade to [commercial account](#) to increase the capacity.
- Network Application:**
 - Name: DF702 (Edit name)
 - Application ID: BE-7C-02-D5
 - Data output: HTTP Push (Edit output)
 - Documentation: API Documentation
- Traffic history:** Message count history (Hourly/Daily)



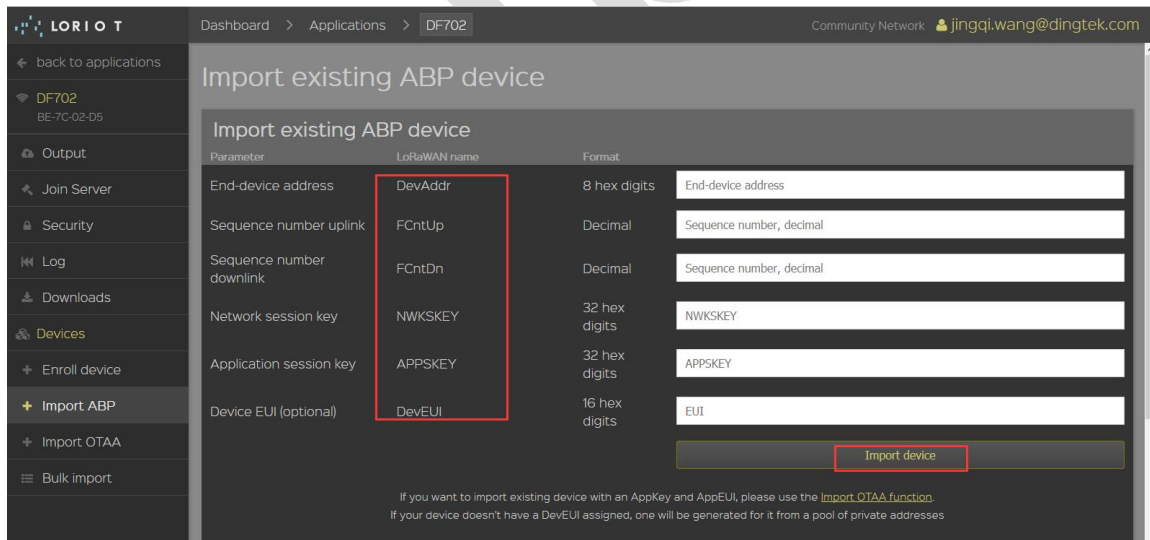
- The Lorient server automatically generates OTAA mode devices, so parameters such as Deveui, Appeui, Appkey are generated by the server. If the device is automatically generated by lorient you need to modify the corresponding parameters of the device.





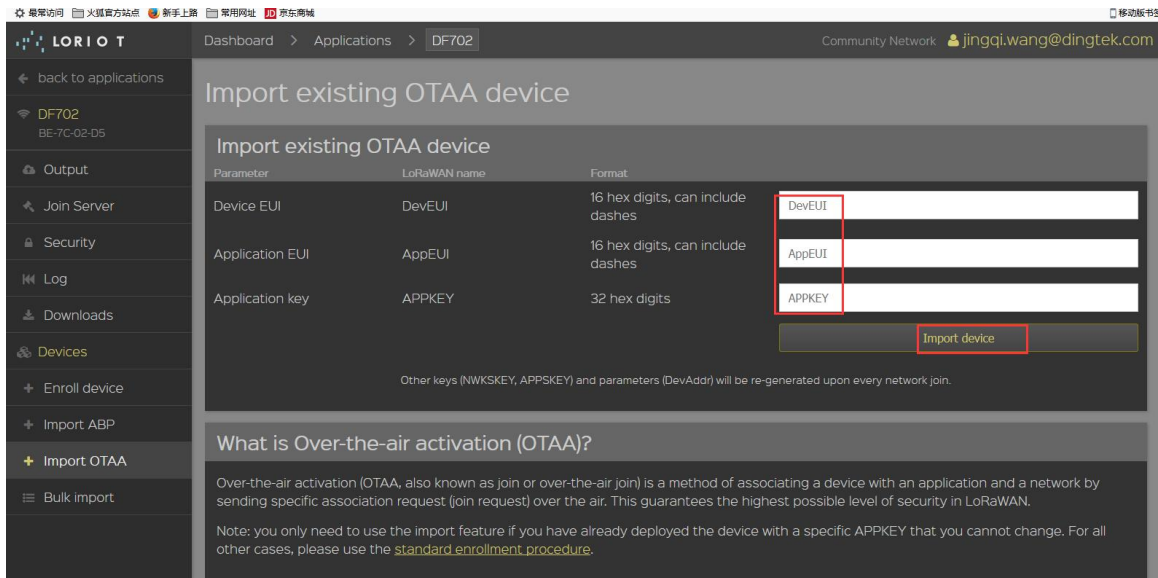
Import devices

- Import ABP-type devices:
- Need to add DevEUI, DevAddr, NwkSKey, AppSKey, FcntUp, FcntDn Label already contains DevEUI, DevAddr, NwkSKey, AppSKey information FcntUp, FcntDn, may be 0 number is possible.

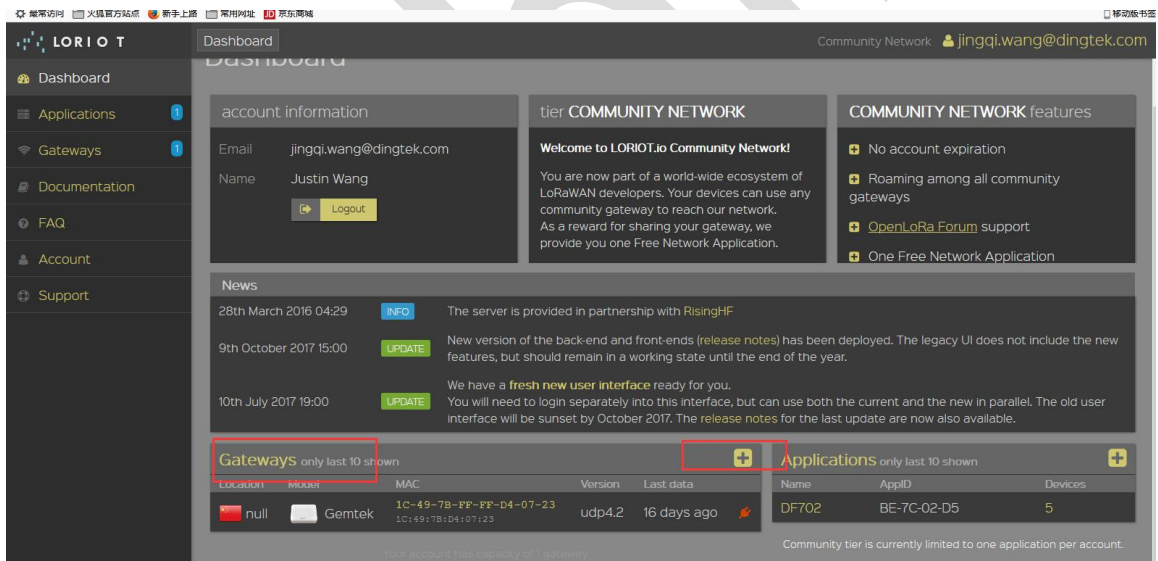


Import OTAA-type devices

- Fill in DevEui, AppEui and APPKey, and then click Import device. To add success. Device label are already contains DevEui, AppEui and APPKey information.

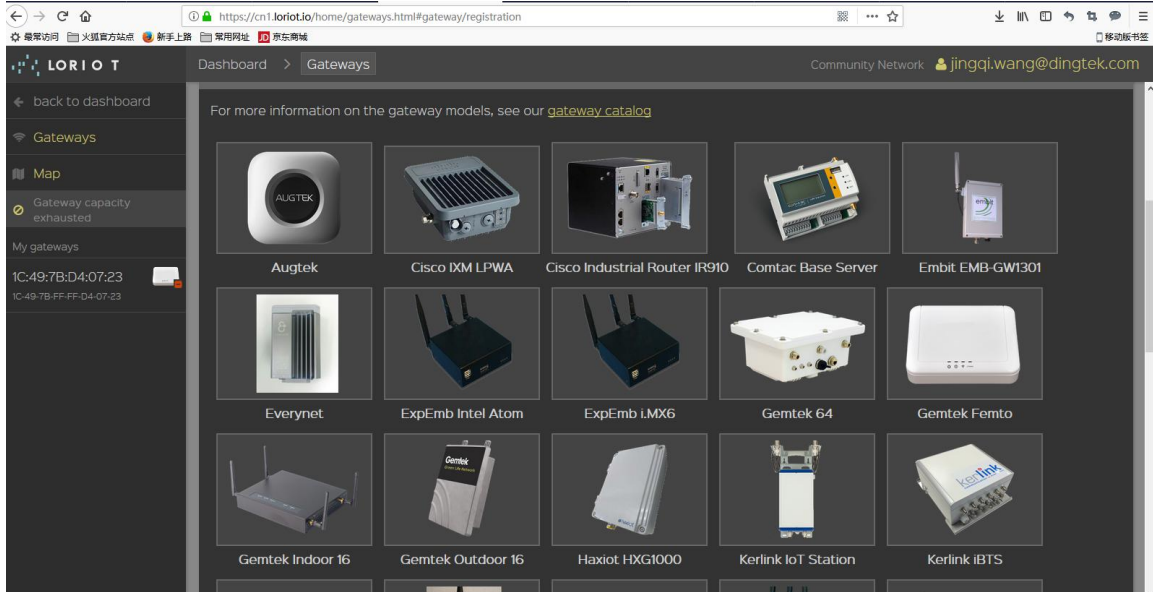


1.3.4 Add Gateway

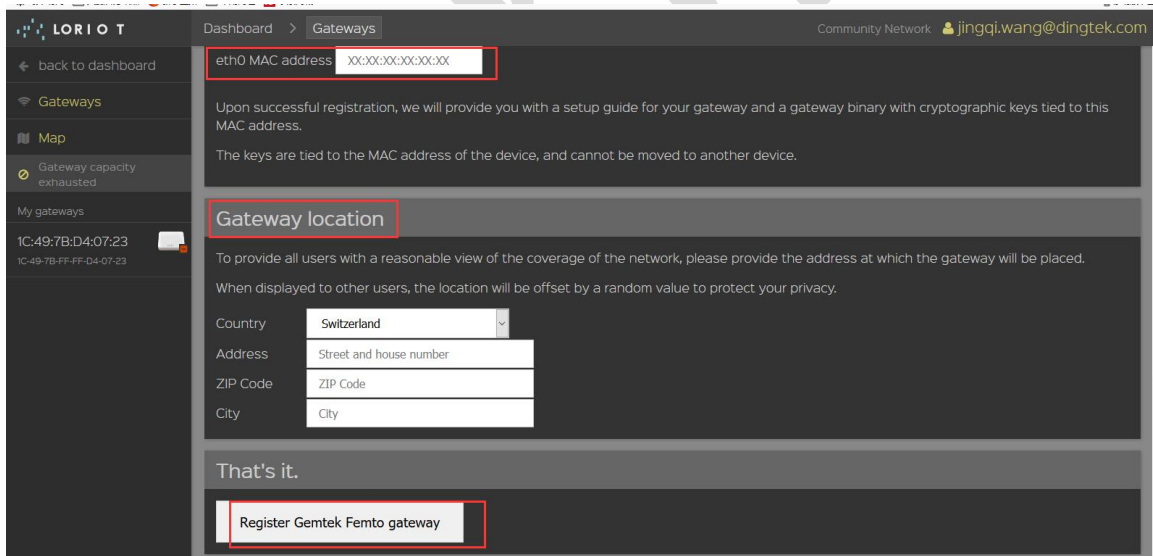


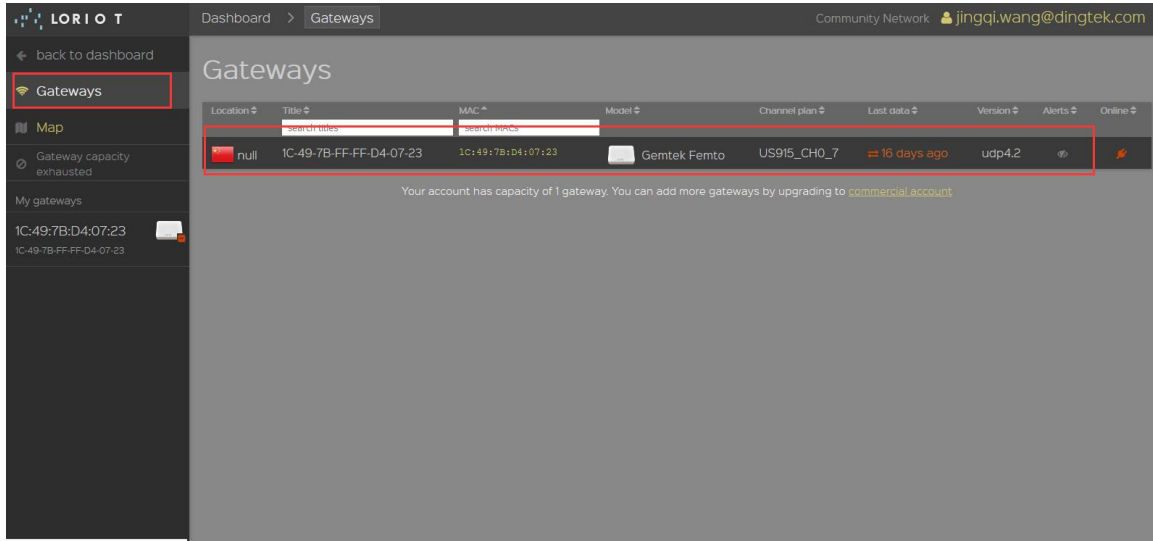
- Select the type of gateway used:
- Follow the prompts to add gateway information.

Note: loriot generates a gateway ID based on the MAC information of the added gateway.

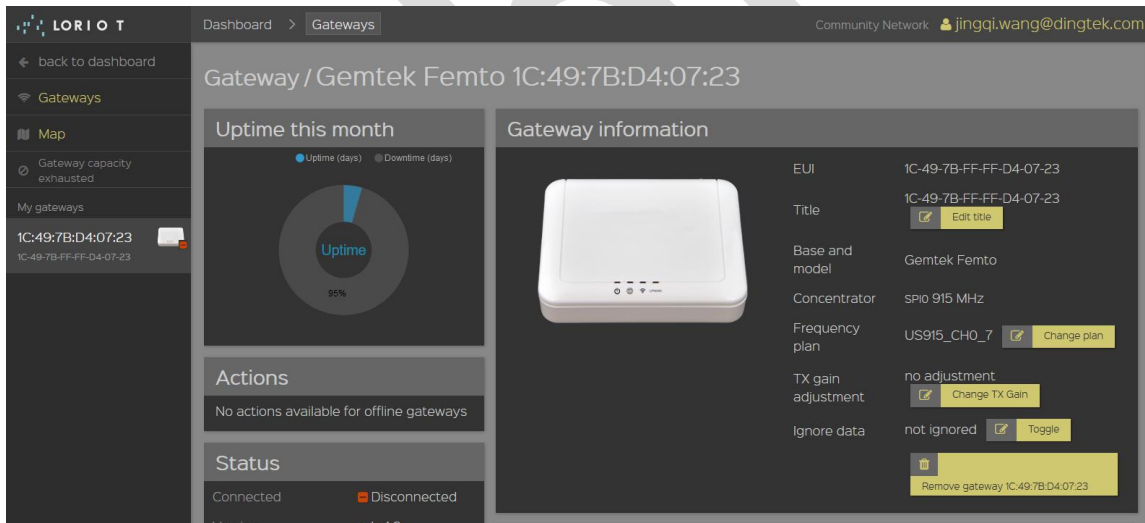


- Take as an example: Need to enter the gateway MAC, and location, and then click register..

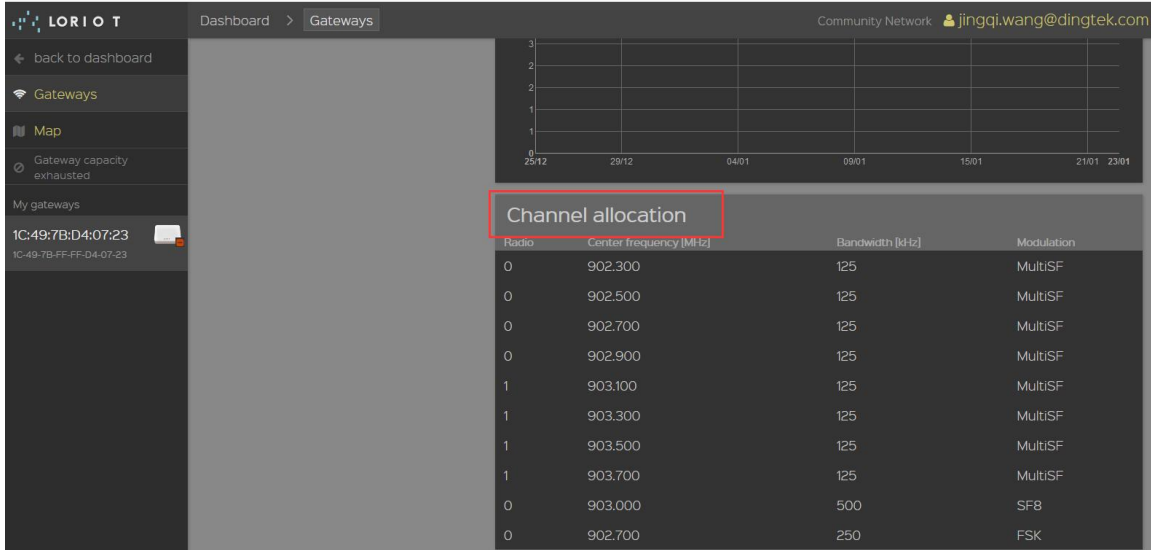




- Click on the registered gateway, you can see the gateway information, and can choose the required band, such as US915_CH0.



- In the gateway information interface you can also monitor the frequency of the selected band, as shown below.
- According to this frequency, check the frequency of the server, gateway and device frequency point three frequency is the same. If not, the data can not be uploaded correctly.



1.4 Activity

1.4.1 Add ABP mode device

- Enter the relevant information, as shown below.

Device name

Custom

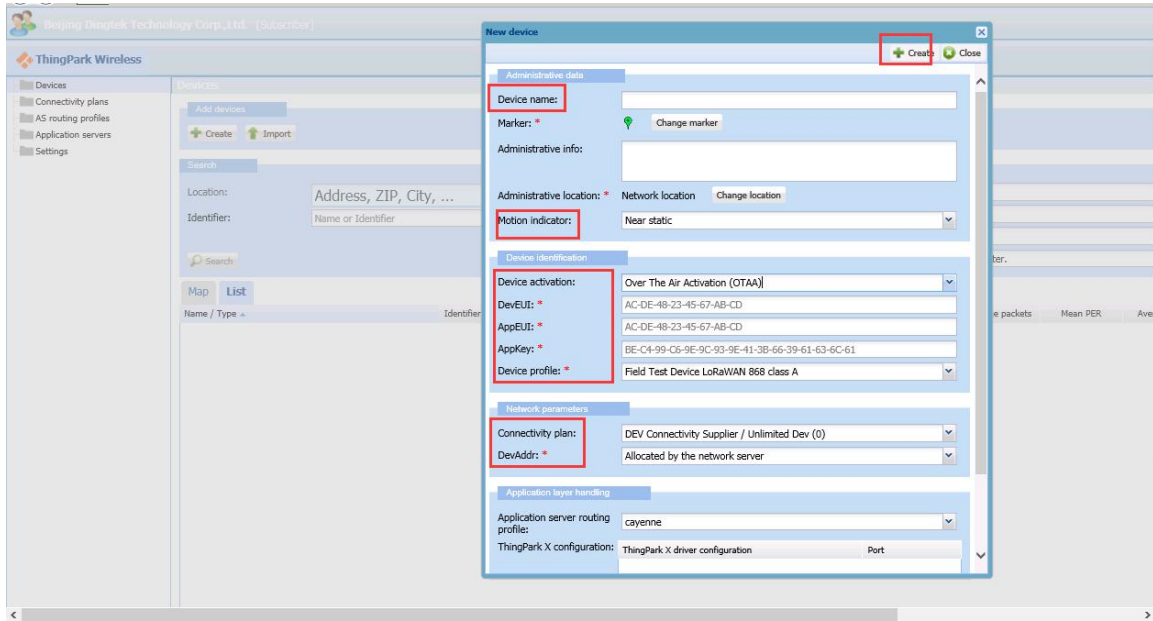
Port Number 3

The screenshot shows the 'New device' configuration form in the ThingPark Wireless interface. The form is divided into several sections, with key fields highlighted by red boxes:

- Administrative data:** Device name (highlighted), Marker, Administrative info.
- Administrative location:** Network location (highlighted), Change location.
- Motion indicator:** Near static (highlighted).
- Device identification:** Device activation (Activation By Personalization (ABP) - highlighted), DevEUI, DevAddr, NwkSKey, Device profile (Field Test Device LoRaWAN 868 class A - highlighted).
- Network parameters:** Connectivity plan (DEV Connectivity Supplier / Unlimited Dev (0) - highlighted).
- Application layer handling:** Application server routing profile (cayenne), AppSKeys (AppKey - highlighted), Port (highlighted).

1.4.2 Add OTAA Mode Device

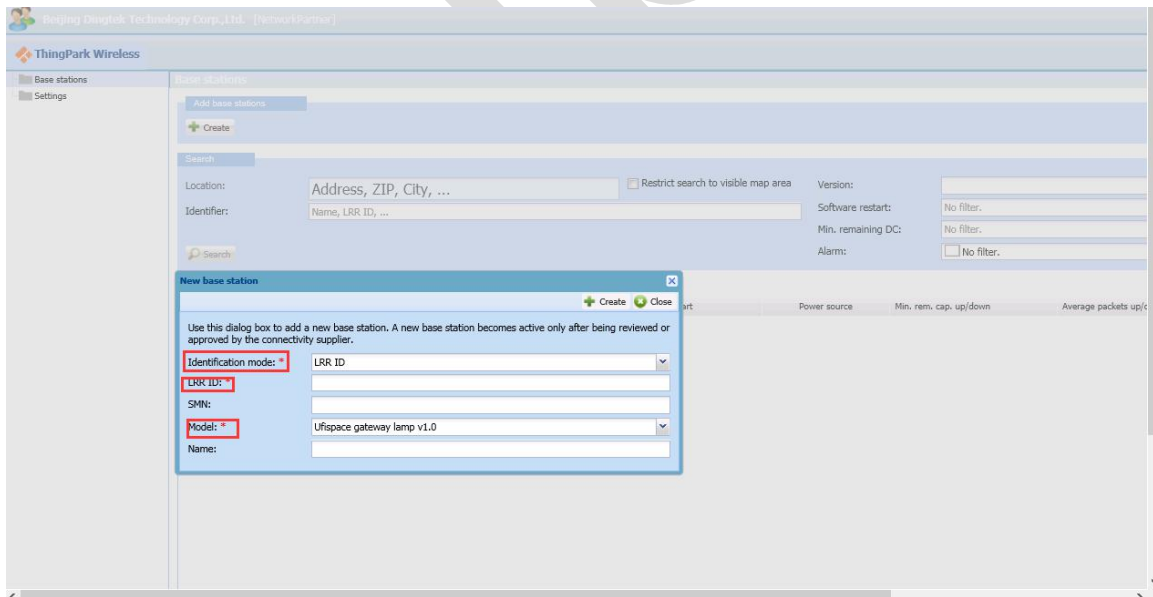
Enter the relevant information, as shown below.



1.4.2 Add a gateway

Note

Actility supports lrr mode gateways and does not support packet forwarding mode. Given picture you need to add these contents make sure of New Base Station.



2 Common problem Facing by the Customers and their solutions

How to configure LoRawan gateway? -LoRa version

If you buy the Gateway from CNDingtek after your receiving Gateway , we have the gateway configuration, you only need to connect the gateway power supply, and network cable.

If you receive the gateway, then you want to change the gateway IP and port number, please refer to the relevant manuals provided by our company, or contact our technical staff.

Why User cannot See Device Data?

Considering shipping rules, devices are not connected to battery. So user should open cover and connect battery with the PCB board. For some version with magnetic part outside, please remove the magnetic part, then the battery will power to the sensor.

Check whether the frequency bands of the device and the gateway are the same. The gateway frequency should work with the LoRawan module band. please configure the sensor or gateway to make them match.

The LoRa server device data should be same as the sensor. For ABP mode, the devaddr/nwkskey/appskey should be same as the registration information on the server. For OTAA mode, the deveui, appeui should be same as the registration.

Shorten distance between sensor and gateway

Some LoRa server, like TTN (the things network) ask for special devaddr. Please use TTL UART to connect with sensor and change the parameter.

- Please check whether the gateway is correctly connected to the network server.
- Please check the position of the jumper cap, whether the jumper is on the solid position.

User receive data But is Garbled Form.

Nwkskey,appskey/port error If port, nwkskey, appskey is error. The data will be messed that user can not directly read the data.

Please contact with CNDingtek to receive the updated protocol which is disclosed after NDA signed.

How to Test and Install Devices?

Please refer to the relevant manual or we can provide you with the relevant video.

How to modify LoRa module parameters

Please refer to LoRa configuration section in "DF702 Configuration Manual.

How to modify the data upload time,full height alarm value parameters?

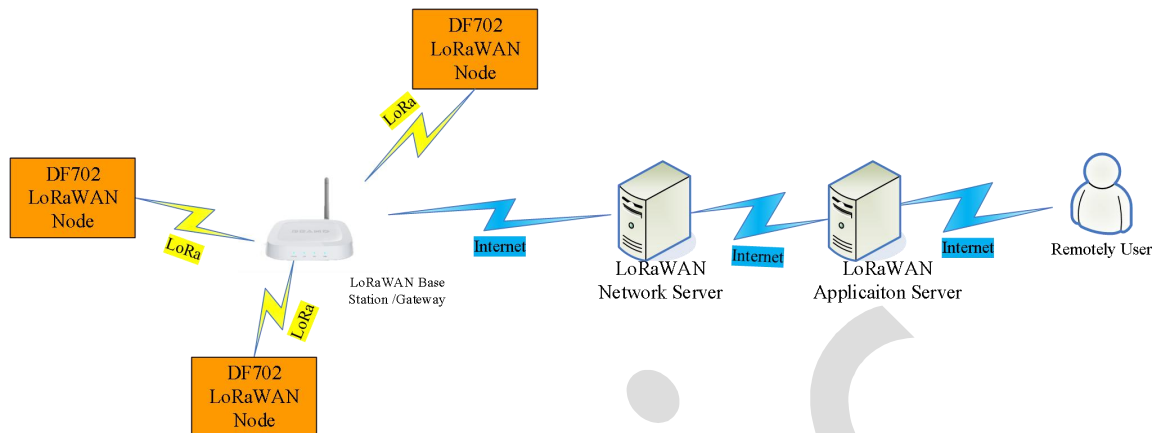
Please refer to the "Device Parameter Configuration" in the "DF702 Configuration Manual.

Where User can monitor Device Data ?

For the LoRa version

Form gateway and the Network Server are required. The device sends the data to the gateway. The gateway forwards the data to the network server . The data can be seen on the network server and the data is forwarded to the application server . If necessary, we can provide the corresponding gateway the application server and application server or data

interface.



Why the measured height of the device has been 2000/0, and sometimes the measured data is not accurate?

Measuring distance is in the blind spot. The dead zone of the equipment is about 15cm. When the distance from the equipment to the garbage is less than 15cm, the equipment can not measure the data or measured data will not accurate. Beyond the measurement range, the device can only be measured as far as 2m.

Installation or testing is not correct the test or installation the equipment perpendicular to the garbage/object under test, the best test to ensure that the white probe is completely blocked.

Device have Fall Function?

The standard version will measure with full, fire and battery check features, and enhanced version will measure full, fire and battery check, and fall function.

Can I change my device data interval to 5 minutes or 1 minute?

Can be changed to 5 minutes, can not be changed to 1 minute, the device default 10 minutes test once, you can change it to 5 minutes, the operation method, please refer to "DF702 Configuration Manual" in the device parameter configuration section for special needs please advance and sales Personnel instructions.

How does the device work?

Currently, the device will upload data every time it is powered on again.

The main function.

Test once every 10 minutes, when a change of state is detected, the data upload, the state remains unchanged, do not upload data. And periodically send heartbeat data, the data interval default 4 hours can be modified, specific reference to the agreement.

State change means: from full to not from, or not from to full.

For example:

Time	State	Upload data or no
10:10	full	Yes (first data)
10:20	full	No
10:30	not full	Yes
10:40	not full	No
10:50	full	Yes

Public