LDS01 – LoRaWAN Door Sensor User Manual

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Image Version: v1.0

Version	Description	Date
1.0	Release	2020-Feb-1

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1. Introduction

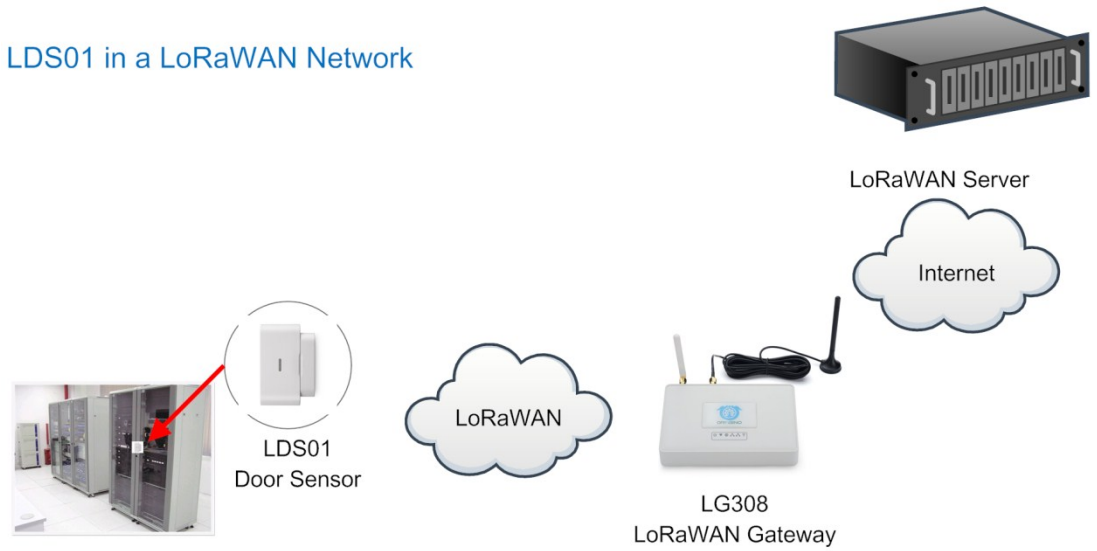
1.1 What is LDS01 LoRaWAN Door Sensor

The Dragino LDS01 is a LoRaWAN Door Sensor. It detects door open/close status and uplink to LoRaWAN network. The LDS01 is small sensor; the dimension is as small as 64 x 30 x 14 mm.

LDS01 is powered by a CR2032 coin battery, in a good LoRaWAN Network Coverage case, it can transmit as many as 12,000 uplink packets (base on SF7, 14dB). in poor LoRaWAN network coverage, it can transmit ~ 1,300 uplink packets (base on SF10, 18dB). The design goal for one battery is up to 1 year. User can easily change the CR2032 battery for reuse.

The LDS01 will send periodically data every day as well as for each door open/close action. It also count the door open times and calculate last door open duration.

Each LDS01 is pre-loaded with a set of unique keys for LoRaWAN registrations, register these keys to local LoRaWAN server and it will auto connect after power on.



1.2 Features

- ✓ LoRaWAN Class A v1.0.3
- ✓ Frequency Bands: CN470/EU433/KR920/US915/EU868/AS923/AU915/IN865/RU864
- ✓ SX1262 LoRa Core
- ✓ Door Open/Close detect
- ✓ Door open/close statistics
- ✓ CR2032 battery powered
- ✓ AT Commands to change parameters
- ✓ Uplink on periodically and open/close action
- ✓ Remote configure parameters via LoRa Downlink
- ✓ Firmware upgradable via program port

1.3 Applications

- ✓ Smart Buildings & Home Automation
- ✓ Logistics and Supply Chain Management
- ✓ Smart Metering
- ✓ Smart Agriculture
- ✓ Smart Cities
- ✓ Smart Factory

1.4 Dimension

1.5 Firmware Change log

LDS01 Image files – Download link

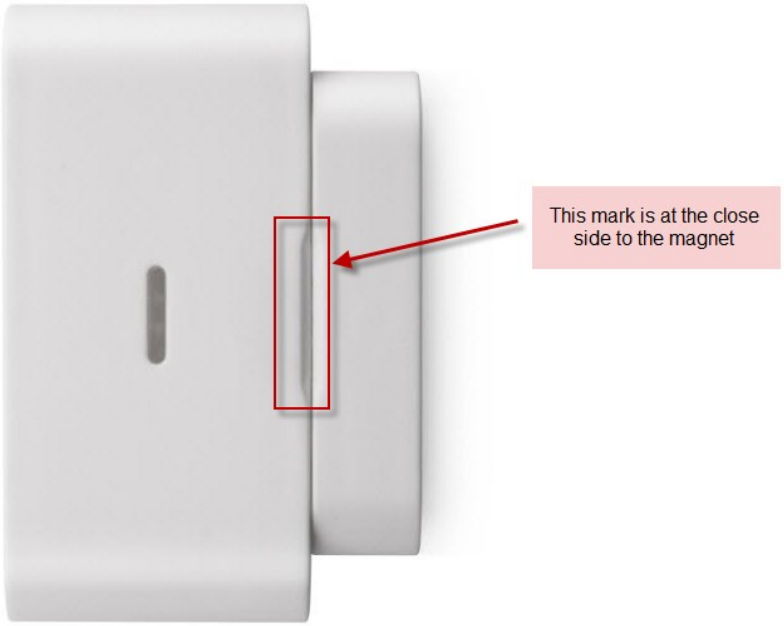
Image v1.0

- ➢ Release

2. Power ON LDS01

When receive the LDS01, please open the enclosure and remove the isolated paper and PRESS RESET so the coin battery can power on the device and device runs on low power mode. The LED will blink when devices is powered.

3. How to install LDS01



4. Operation Mode

4.1 How it works?

The LDS01 is configured as LoRaWAN OTAA Class A mode by default. It has OTAA keys to join network. To connect a local LoRaWAN network, user just need to input the OTAA keys in the network server and power on the LDS01. It will auto join the network via OTAA.

In case user can't set the OTAA keys in the network server and has to use the existing keys from server. User can use AT Command to set the keys in the devices.

4.2 Example to join LoRaWAN network

Here shows an example for how to join the TTN Network. Below is the network structure, we use our LG308 as LoRaWAN gateway here.

The LDS01 in installed on the door edge to detect the open / close event. And send the status to LoRaWAN server. The LDS01 will uplink two type of messages to the server.

- ✓ A keep-alive message which send once per day.
- ✓ A door event message when there is a door open/close.

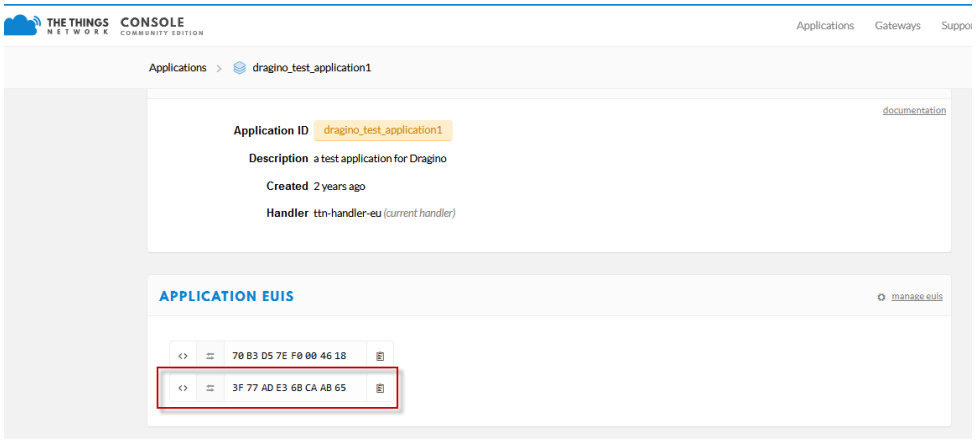
The LG308 is already set to connect to TTN network . So what we need to now is only configure the TTN:

Step 1: Create a device in TTN with the OTAA keys from LDS01.

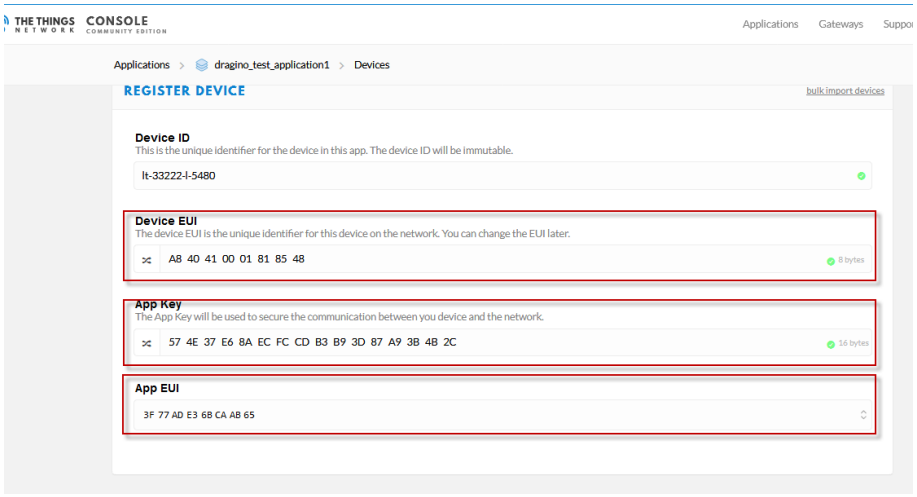
Each LDS01 is shipped with a sticker with unique device EUI:

User can enter this key in their LoRaWAN Server portal. Below is TTN screen shot:

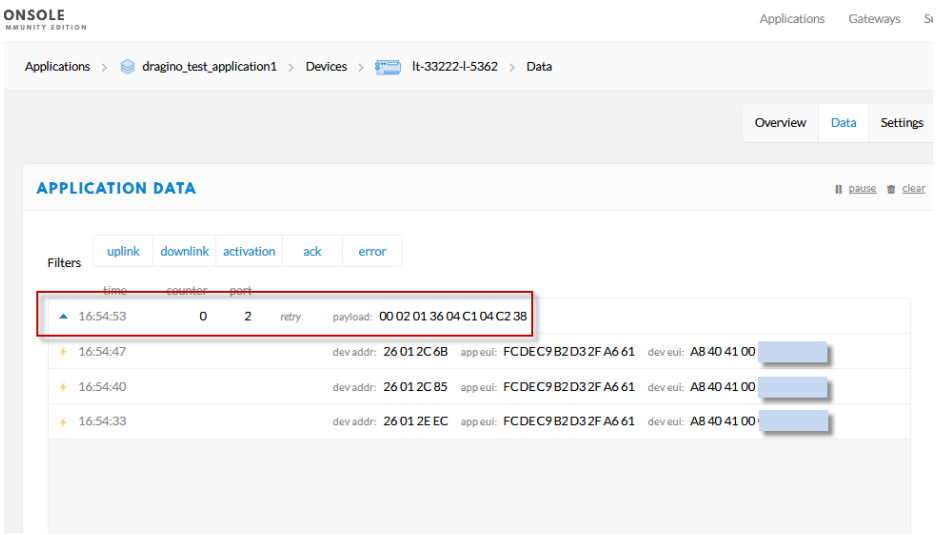
Add APP EUI in the application.



Add APP KEY and DEV EUI



Step 2: Power on LDS01 and it will auto join to the TTN network. After join success, it will start to upload message to TTN and user can see in the panel.

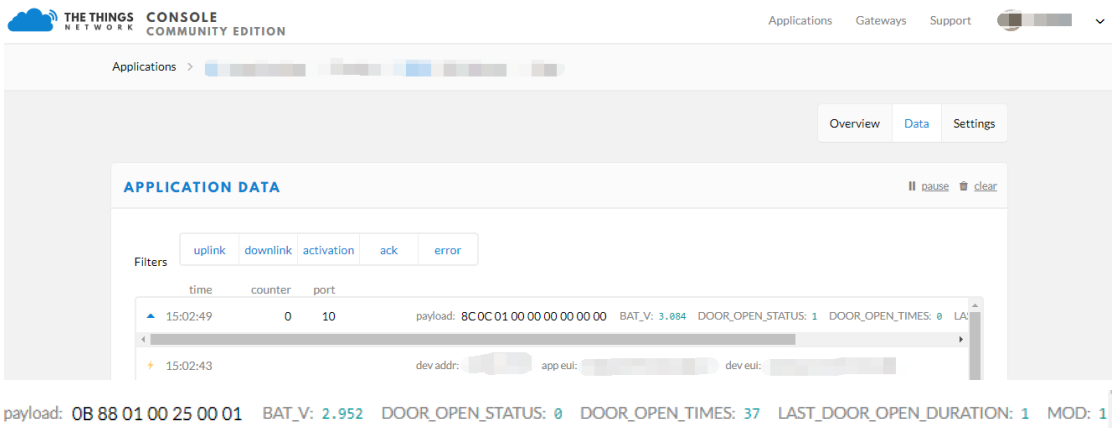


4.3 Uplink Payload

Uplink Payload total 9 bytes.

Size(bytes)	2	1	3	3
value	Status&BAT	MOD Always:0x01	Total open door events	Last door open duration (unit: min)

Example:



Example Payload Decoder in TTN:

http://www.dragino.com/downloads/index.php?dir=LoRa_End_Node/LDS01/Payload/

4.4 Downlink Payload

Downlink Control Type	Type Code	Downlink payload size(bytes)
TDC (Transmit Time Interval—Keep Alive Interval)	0x01	4
RESET	0x04	2
Clear Counting	0xA6	2

Example Downlink payload setting in TTN:

Type Code 0x01

If the payload=0100003C, means to control the LDS01's Keep Alive interval to 0x00003C=60(S)

Type Code 0x04

If payload = 0x04FF, it will reset the LDS01.

Type Code 0xA6

Example: 0xA601: Clear Counting

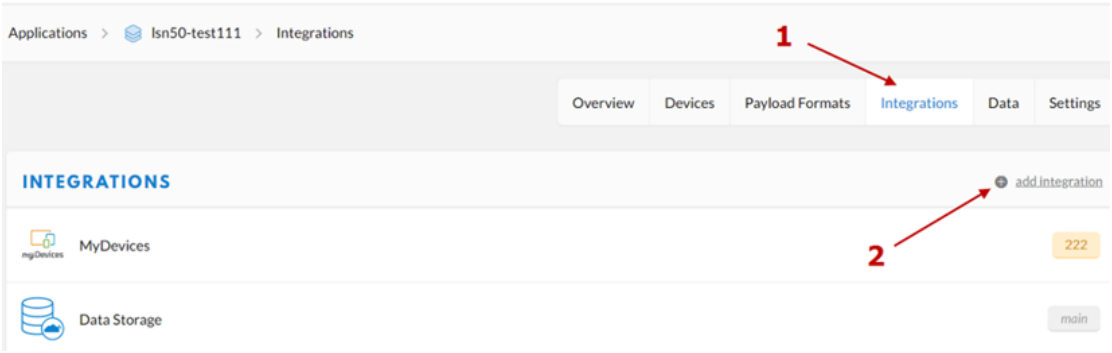
For LDS01: reset both count number and time.

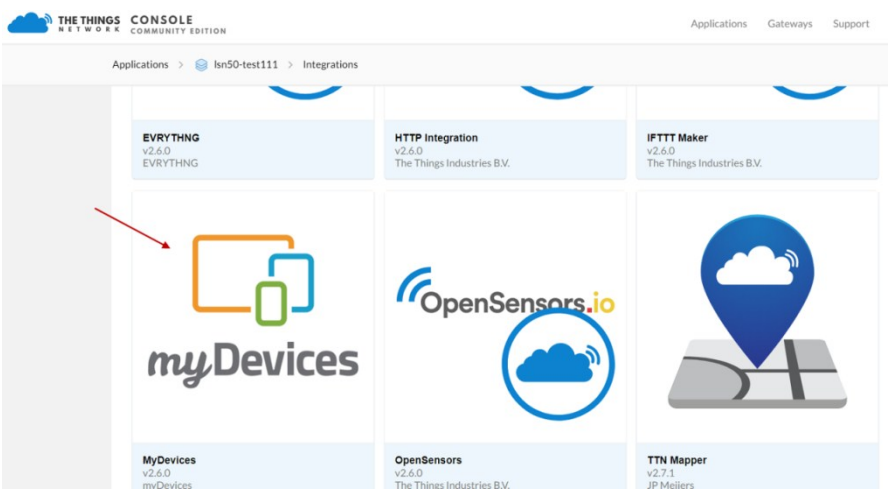
4.5 Integrate with Mydevice

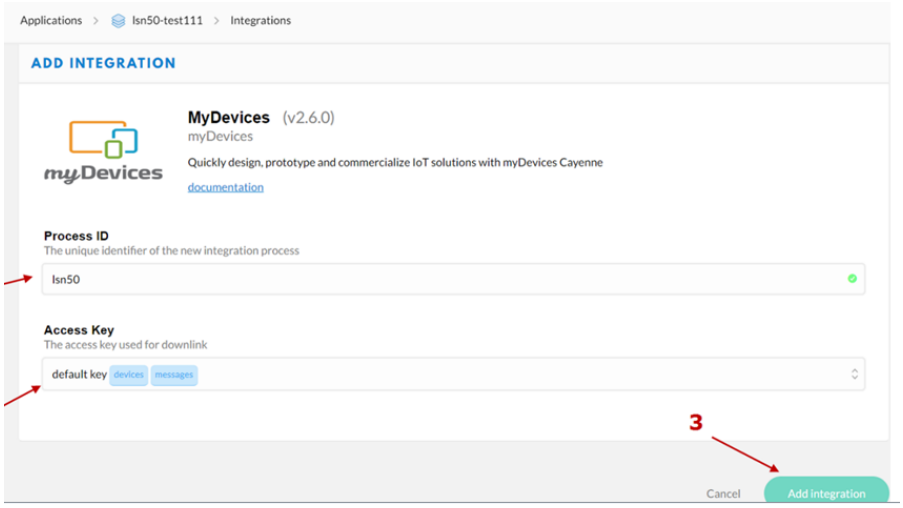
Mydevices provides a human friendly interface to show the sensor data, once we have data in TTN, we can use Mydevices to connect to TTN and see the data in Mydevices. Below are the steps:

Step 1: Be sure that your device is programmed and properly connected to the network at this time.

Step 2: To configure the Application to forward data to Mydevices you will need to add integration. To add the Mydevices integration, perform the following steps:

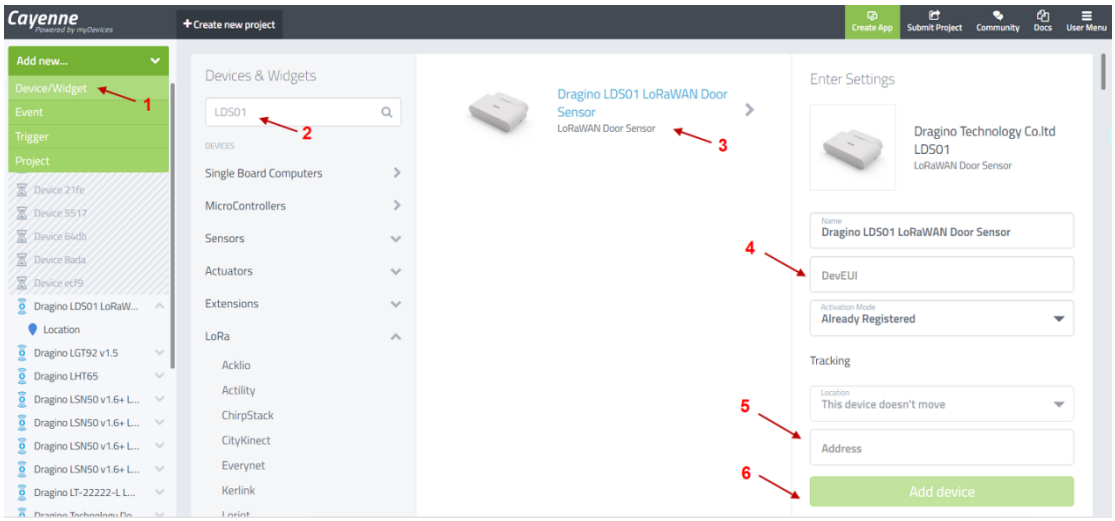


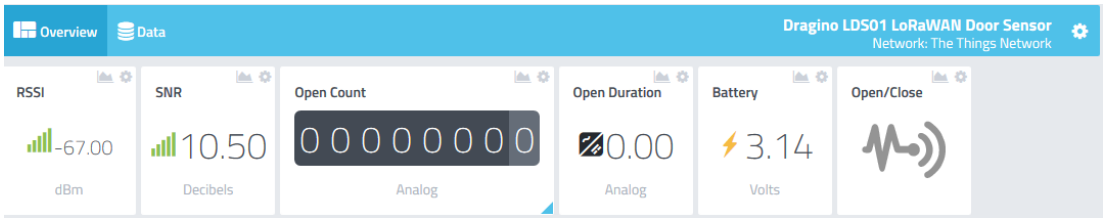




Step 3: Create an account or log in Mydevices.

Step 4: Search LDS01 and add DevEUI.





4.6 LEDs

Action	LED behavior
Power On	**GREEN on 1s, RED on 1s, BLUE on 1s**
Joined successful	**GRENN LED** on 5s
Send an uplink message	**GREEN LED** blinks once
Got a downlink message	**BLUE LED** blinks once

4.7 Battery

LDS01 is powered by a CR2032 coin battery, when running in deep sleep mode, the device power consumption is ~5uA.

The main power consumption is transmitting an uplink message. Depends on LoRaWAN network signal strength, the device can send different number of uplink messages.

1. In poor network coverage and US915 band. The device will transmit at SF10 at max power. in this case, it can uplink about ~1,300 messages.
2. In good network coverage and EU868 band, the device will transmit at SF7, and can uplink as many as 12,000 messages.

When battery voltage is below 2.75v, the LDS01 can't send uplink message.

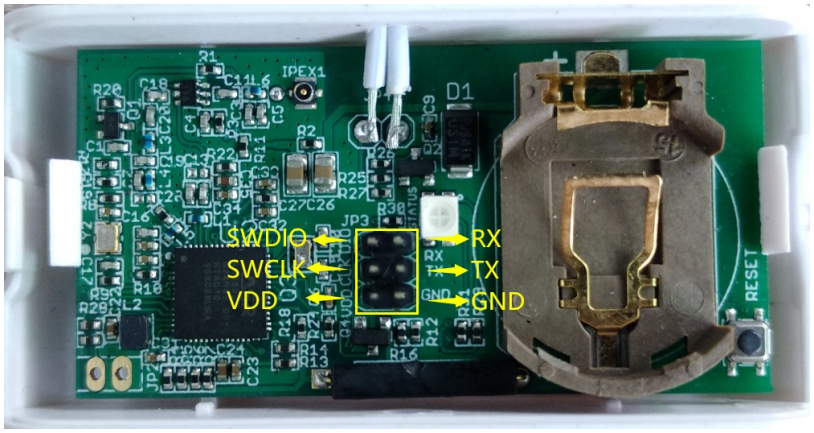
Note: It is recommended to change battery when it reaches 2.8v. After change the battery, make sure to **PRESS RESET** button to active the low power mode.

Below shows the battery placement:

5. Use AT Command

5.1 Access AT Command

LDS01 supports AT Command set. User can use a USB to TTL adapter to configure LDS01 via use AT command, as below.



USB to TTL <- -> LDS01

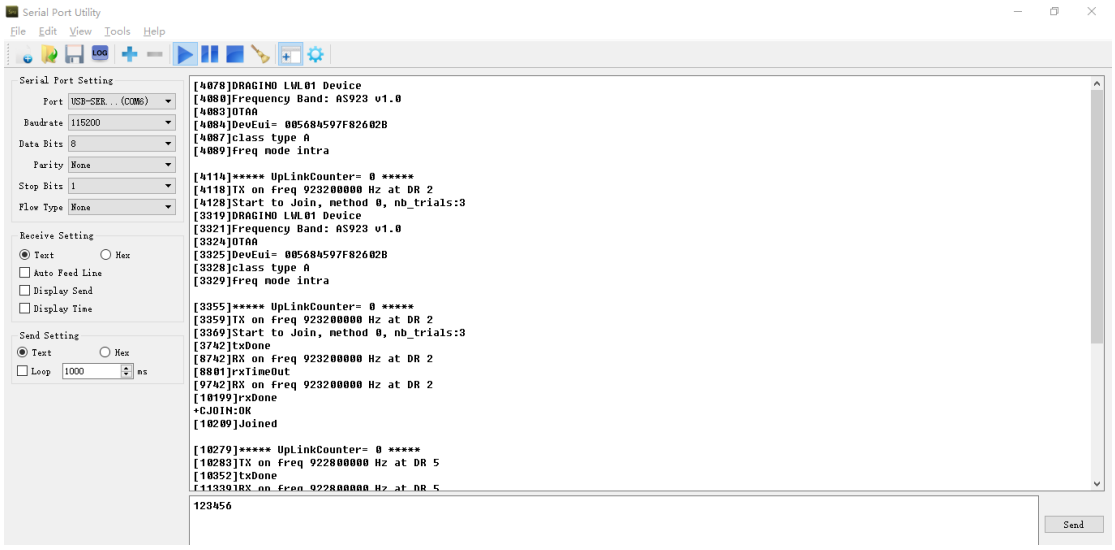
RX <- -> TX

TX <- -> RX

GND <- -> GND

In PC, User needs to set **serial tool**(such as putty, SecureCRT) baud rate to **115200** to access to access serial console of LWL01. Below is the output for reference:

The AT Access password is **123456**.



Each AT Command need to add an ENTER at the end before send.

When entering the first command, the RED LED will on and user can now input AT Commands. After input all needed AT Commands, Please input AT+CLPM=1 to set the device to work in Low Power mode and RED LED will be off.

More detail AT Command manual can be found at AT Command Manual

6. FAQ

6.1 How to upgrade the image?

User can upgrade the firmware of LWL01 for bug fix, new features, or change working region. The upgrade instruction are here:

http://wiki.dragino.com/index.php?title=Firmware_Upgrade_Instruction

6.2 How to change the LoRa Frequency Bands/Region?

User can follow the introduction for how to upgrade image. When download the images, choose the required image file for download.

7. Order Info

Part Number: LDS01-XXX

XXX:

- **EU433**: frequency bands EU433
- **EU868**: frequency bands EU868
- **KR920**: frequency bands KR920
- **CN470**: frequency bands CN470
- **AS923**: frequency bands AS923
- **AU915**: frequency bands AU915
- **US915**: frequency bands US915
- **IN865**: frequency bands IN865
- **CN779**: frequency bands CN779

8. Packing Info

Package Includes:

- ✓ LDS01 x 1

Dimension and weight:

- ✓ Device Size: 64 x 30 x 14 mm

9. Support

- Support is provided Monday to Friday, from 09:00 to 18:00 GMT+8. Due to different timezones we cannot offer live support. However, your questions will be answered as soon as possible in the before-mentioned schedule.
- Provide as much information as possible regarding your enquiry (product models, accurately describe your problem and steps to replicate it etc) and send a mail to

support@dragino.com