



LWL01 – LoRaWAN Water Leak User Manual

Document Version: 1.3.0

Image Version: v1.3

Version	Description	Date
1.0	Release	2020-Feb-1
1.2	Update to firmware v1.2	2020-Aug-1
1.2.1	Correct how it works typo	2020-Sep-3
1.2.2	Add Mydevices photo	2020-Sep-21
1.3.0	Update to use TTN V3	2021-May-10

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1. Introduction

1.1 What is LWL01 LoRaWAN Water Leak Sensor

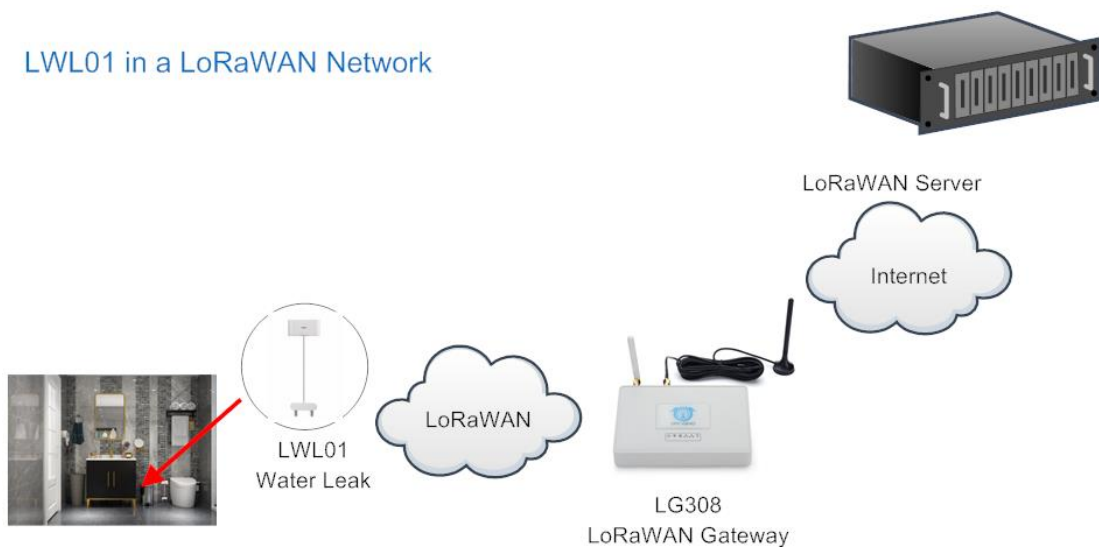
The Dragino LWL01 is a LoRaWAN Water Leak Sensor. It detects the water leak status and send it to LoRaWAN network. The LWL01 is small sensor, the dimension is as small as 64 x 30 x 14 mm.

LWL01 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 2 years. User can easily change the CR2032 battery for reuse.

The LWL01 will send periodically data every day as well as for water leak event. It also count the water leak event times and also calculate last water leak duration.

Each LWL01 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.

LWL01 in a LoRaWAN Network



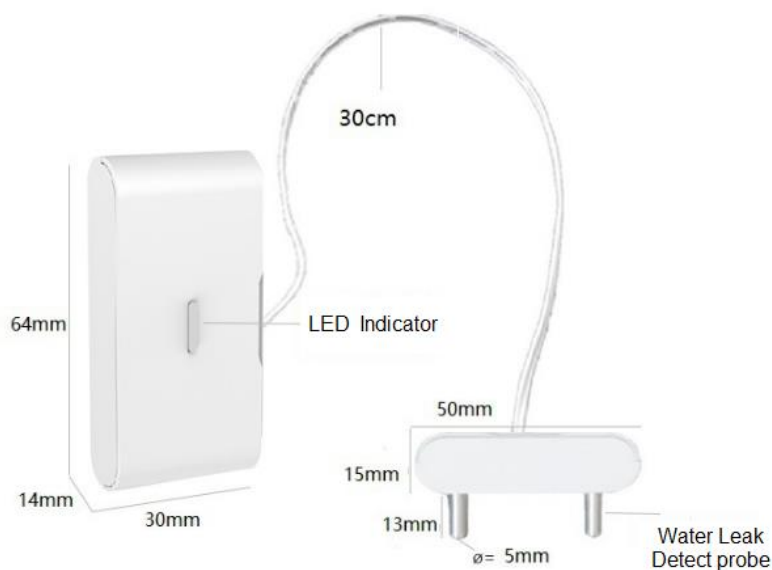
1.2 Features

- ✓ LoRaWAN Class A v1.0.3
- ✓ Frequency Bands: CN470/EU433/KR920/US915/EU868/AS923/AU915/IN865/RU864
- ✓ SX1262 LoRa Core
- ✓ Water Leak detect
- ✓ CR2032 battery powered
- ✓ AT Commands to change parameters
- ✓ 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

[LWL01 Image files – Download link](#)

2. Power ON LWL01

When receive the LWL01, please open the enclosure and remove the isolated paper and PRESS RESET so the coin battery can power on the device and device runs in low power mode. The [LED](#) will blink when devices is powered.

3. Operation Mode

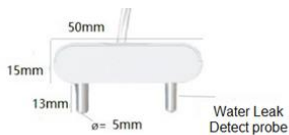
3.1 How it works?

The LWL01 is configured as LoRaWAN OTAA Class A mode. 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 LWL01. 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.

3.2 Example to join LoRaWAN network

Here shows an example for how to join the TTN V3 Network. Below is the network structure, we use our LG308 as LoRaWAN gateway here.



The LWL01 has water leak detect probe as above. When there is water between these two detect probe, the will be short and generate the water leak event. and send the status to LoRaWAN server. The LWL01 will uplink two type of messages to the server.

- ✓ A keep-alive message which send once per day.
- ✓ An emergency event message when detect a water leak. ([Alarm event can be disabled](#))
- ✓ A periodically update at every 10 minutes when in water leak.
- ✓ A message when switch from water leak to none water leak. ([Alarm event can be disabled](#))

The LG308 is already set to connect to [TTN V3 network](#) . So what we need to now is only configure the TTN V3:

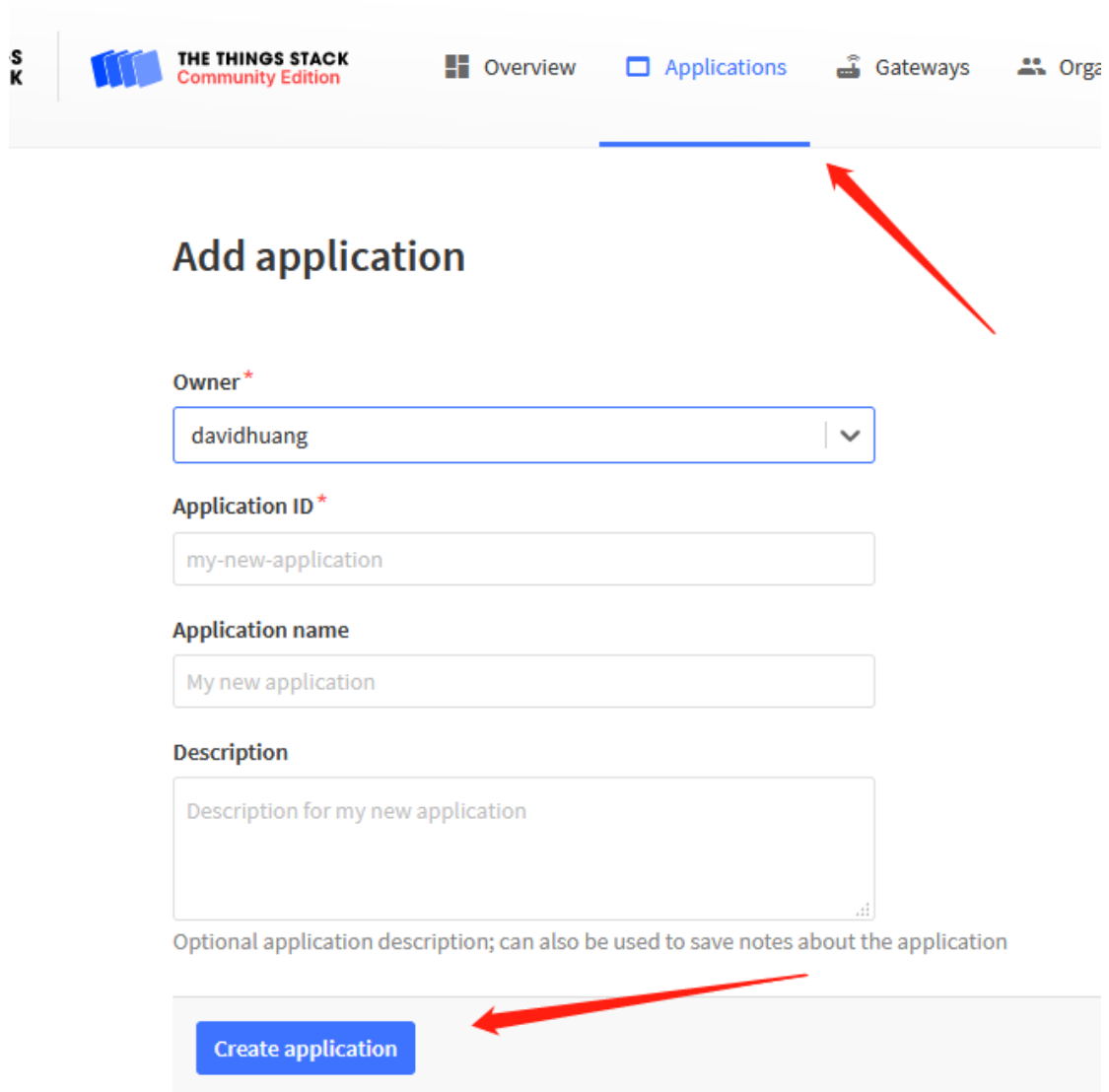
Step 1: Create a device in TTN V3 with the OTAA keys from LWL01.

Each LWL01 is shipped with a sticker with unique device EUI:



User can enter this key in their LoRaWAN Server portal. Below is TTN V3 screen shot:
Add APP EUI in the application.

Add APP KEY and DEV EUI



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Community Edition

Overview Applications Gateways Orgs

Add application

Owner*

davidhuang

Application ID*

my-new-application

Application name

My new application

Description

Description for my new application

Optional application description; can also be used to save notes about the application

Create application

CCC
ID: 123

4 End devices 2 Collaborators 2 API keys Created 95 days ago

General information

Application ID: 123

Created at: Feb 2, 2021 11:12:30

Last updated at: Apr 30, 2021 11:00:33

Live data See all activity →

- ↑ 10:09:42 1231234234_ Forward data message to Application Server
- ⓘ 10:09:42 1231234234_ Store upstream data message
- ↑ 10:09:42 1231234234_ Forward uplink data message
- ↑ 10:09:42 1231234234_ Receive uplink data message
- ↑ 10:09:42 1231234234_ Successfully processed data message
- ↑ 10:09:42 1231234234_ Drop data message

End devices (4)

Search by ID Import end devices **+ Add end device**

ID Name DevEUI JoinEUI Created

Register end device

[From The LoRaWAN Device Repository](#) Manually

1. Select the end device

Brand* Model*

Dragino Technology Co.,... | type to search...

Cannot find your exact end device? [Device registration.](#)


- LBT1
- LDDS20
- LDDS75
- LDS01
- LGT92
- LHT65
- LSE01
- LSN50-V2

2. Enter registration data

Please choose an end device first to enter registration data


Register end device

Dragino Technology Co.,... | LWL01 | Unknown ... | 1.2.2 | EU_863_870



LWL01
MAC V1.0.3, PHY V1.0.3 REV A, Over the air activation (OTAA), Class A
LoRaWAN Water Leak Sensor
[Product website](#)

2. Enter registration data

Frequency plan  *

Select... | v

The frequency plan used by the end device

AppEUI  *

..... 00

The AppEUI uniquely identifies the owner of the end device. If no AppEUI is provided by the device manufacturer (usually for dev

You can also choose to create the device manually.

Register end device

From The LoRaWAN Device Repository

Manually

Preparation

Activation mode *

- Over the air activation (OTAA)
- Activation by personalization (ABP)
- Multicast
- Do not configure activation

LoRaWAN version ? *

Network Server address

Application Server address

External Join Server ?

Add APP KEY and DEV EUI

2. Enter registration data

Frequency plan ⓘ *

Europe 863-870 MHz (SF12 for RX2) ▼

The frequency plan used by the end device

AppEUI ⓘ *

..... 00

The AppEUI uniquely identifies the owner of the end device. If no AppEUI is provided by the device manufacturer (usually for dev

DevEUI ⓘ *

.....

The DevEUI is the unique identifier for this end device

AppKey ⓘ *

..... ↻

The root key to derive session keys to secure communication between the end device and the application

End device ID *

my-new-device

After registration

Step 2: [Power on](#) LWL01 and it will auto join to the TTN V3 network. After join success, it will start to upload message to TTN V3 and user can see in the panel.

3.3 Uplink Payload

Total 9 bytes.

Size(bytes)	3	1	3	3
value	Status&BAT	MOD Always:0x02	Total water leak events	Last water leak duration (unit: min)

Example:

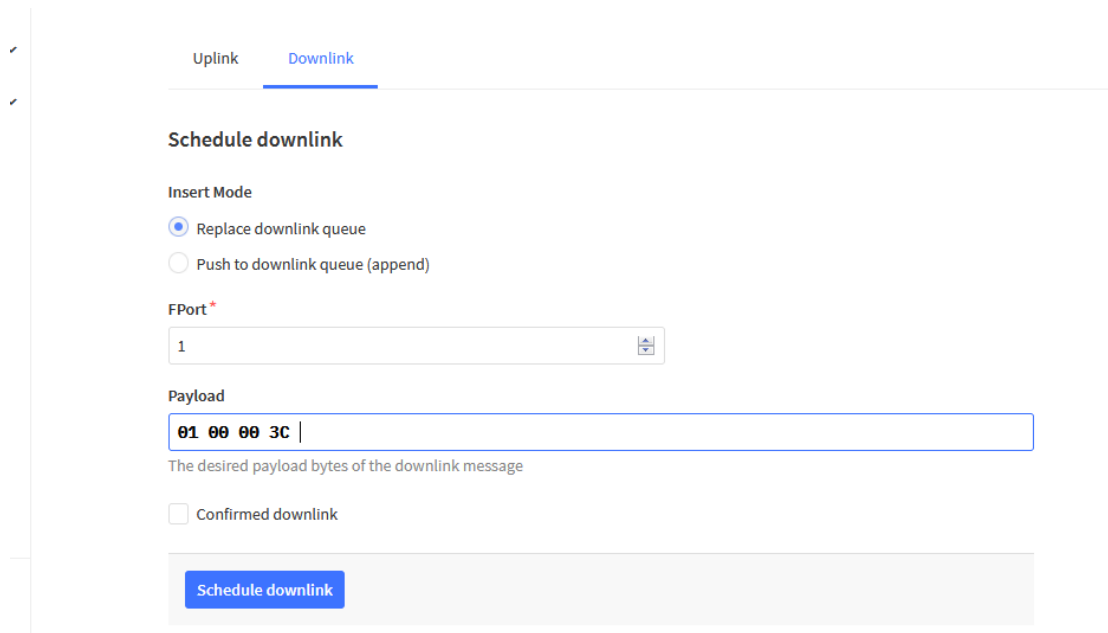
```
payload: 4B E2 02 00 00 08 00 00 01  BAT_V: 3.042  LAST_WATER_LEAK_DURATION: 1  MOD: 2  WATER_LEAK_STATUS: 1  WATER_LEAK_TIMES: 8
```

Example Payload Decoder in TTN V3:

3.4 Downlink Payload

Downlink Control Type	Type Code	Downlink payload size(bytes)
TDC (Transmit Time Interval—Keep Alive Interval)	0x01	4
RESET	0x04	2
Set confirmed mode	0x05	2
Clear Counting	0xA6	2
Enable/Disable Alarm	0xA7	2
Control ADR/DR	0xA8	3

Example Downlink payload setting in TTN V3:



The screenshot shows the 'Downlink' configuration page in TTN V3. Under 'Schedule downlink', the 'Insert Mode' is set to 'Replace downlink queue'. The 'FPort' is set to 1. The 'Payload' field contains the hexadecimal value '01 00 00 3C'. Below the payload field, there is a checkbox for 'Confirmed downlink' which is currently unchecked. A 'Schedule downlink' button is visible at the bottom of the configuration area.

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Type Code 0x01

If the payload=0100003C, means to control the LWL01's Keep Alive interval to 0x00003C=60(S)

Type Code 0x04

If payload = 0x04FF, it will reset the LWL01.

Type Code 0x05(Since firmware v1.2)

0x05 00: Set uplink to LoRaWAN unconfirmed mode

0x05 01: Set uplink to LoRaWAN confirmed mode

Type Code 0xA6

Example: 0xA601: Clear Counting

For LWL01: reset both count number and time.

Type Code 0xA7 (Since firmware v1.2)

0xA7 01 : Equal to AT+DISALARM=1

0xA7 00 : Equal to AT+DISALARM=0

Type Code 0xA8 (Since firmware v1.2)

Format: 0xA8 aa bb

aa: 1: Enable ADR; 0: Disable ADR (Same as AT+CADR command)

bb: set DR (Same as AT+CDATARATE ,only valid after ADR=0)

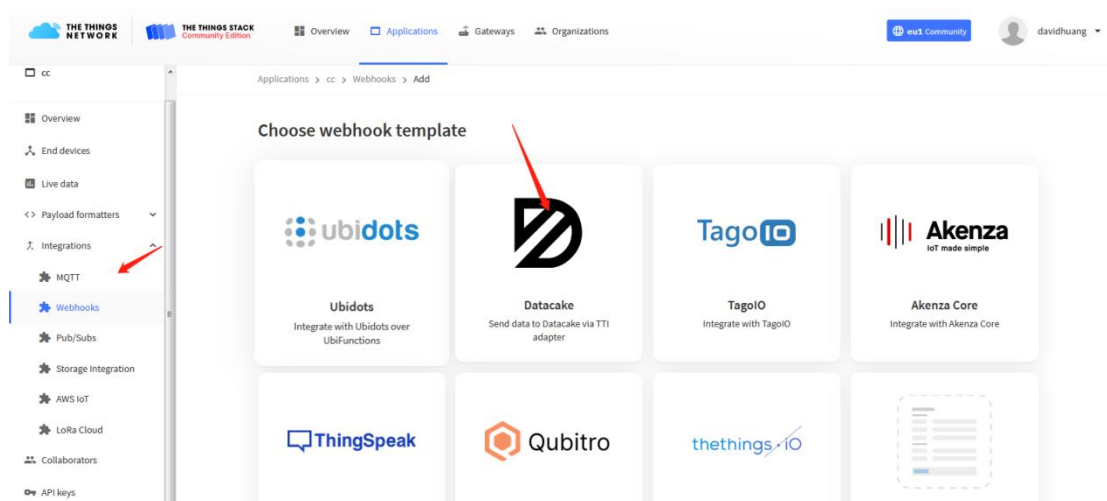
Example: 0x A8 00 02 : Set ADR=0 and DR=1

3.5 Integrate with Datacake

Datacake provides a human friendly interface to show the sensor data, once we have data in TTN V3, we can use Datacake to connect to TTN V3 and see the data in Datacake. 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 Datacake you will need to add integration. To add the Datacake integration, perform the following steps:



Applications > lgt92test > Webhooks > Add > Datacake

Add custom webhook

Template information



Datacake

Send data to Datacake via TTI adapter

[About Datacake](#) | [Documentation](#)

Template settings

Webhook ID *

Token *

Datacake API Token






Create datacake webhook

Step 3: Create an account or log in Datacake.

Step 4: Search LWL01 under LoRa – Thethingsnetwork and add DevEUI.

Complex Configuration and Setup.

Search All Manufacturers ⌵

- Dragino LSE01**
Dragino 
- Dragino LT-22222-L**
Dragino 
- Dragino LWL01**
Dragino 
- ESP32-Paxcounter**
cyberman54 
- Elsys ELT-2**
Elsys.se 

Showing 26 to 30 of 79 results

[Previous](#) [Next](#)


[Next](#)

GMT+0800 lwi01-test

Dashboard **new** Legacy Dashboard History Downlinks Configuration Debug Rules Permissions

We have introduced a new and more powerful way to create dashboards. Try out the new dashboard builder by clicking the first Dashboard tab above.

Last Water Leak Duration 0 Minutes Last Update: 8 months ago	Water Leak Status No Leak	Battery Voltage 4 Volt Last Update: 2 months ago
Number of Leaks 0 Today		
LoRaWAN Uplink RSSI -107 Last Update: 2 months ago	LoRaWAN Uplink Datarate 0 Last Update: 8 months ago	

Trend 

3.6 LEDs

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

3.7 Battery

LWL01 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 LWL01 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.

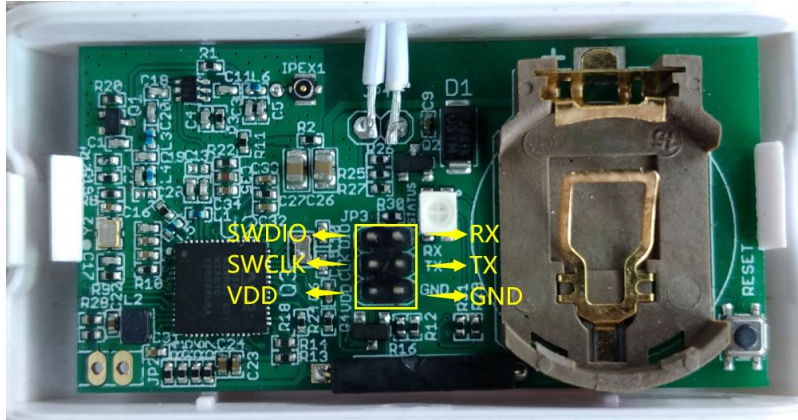
Below shows the battery placement:



4. Use AT Command

4.1 Access AT Command

LWL01 supports AT Command set. User can use a USB to TTL adapter to configure LWL01 via use AT command, as below.



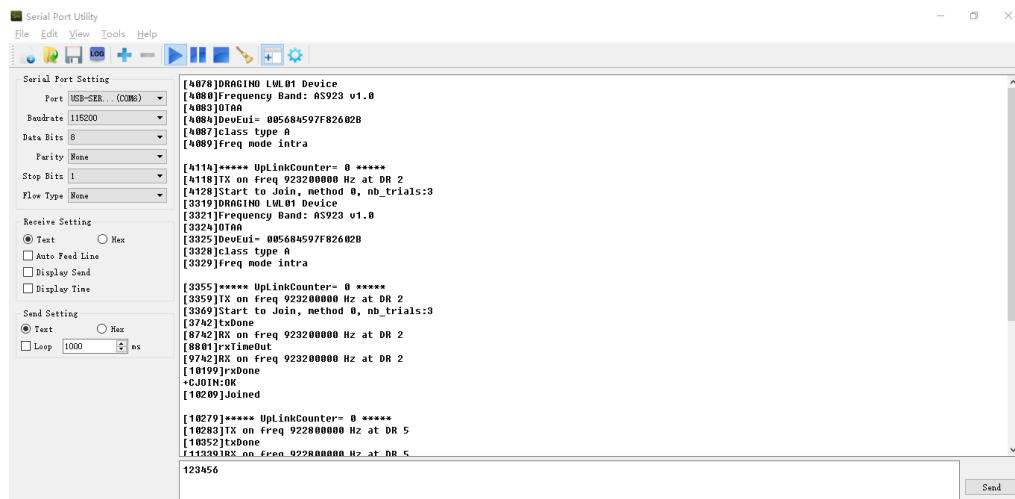
USB to TTL <- -> LWL01

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. The AT Access password is **123456**. Below is the output for reference:



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](#)

5. FAQ

5.1 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

5.2 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.

5.3 Can I disable uplink for each event to save battery life?

Yes, since firmware version v1.2, this feature is supported, User can use below method to disable this:

via AT Command:

AT+DISALARM=1, End node will only send packet in TDC time.

AT+DISALARM=0, End node will send packet in TDC time or status change for water.

via LoRaWAN downlink Command:

0xA701 : Equal to AT+DISALARM=1

0xA700 : Equal to AT+DISALARM=0

6. Order Info

Part Number: LWL01-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

7. Packing Info

Package Includes:

- ✓ LWL01 x 1

Dimension and weight:

- ✓ Device Size: 64 x 30 x 14 mm

8. 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