LMS01-LB/LS -- LoRaWAN Leaf Moisture Sensor User Manual

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on 2024/01/15 09:37

Table of Contents

Table of Contents:

1. Introduction

1.1 What is LoRaWAN Leaf Moisture Sensor

The Dragino LMS01-LB/LS is a **LoRaWAN Leaf Moisture Sensor** for IoT of Agriculture. It is designed to measure the **leaf moisture and temperature**, so to send to the platform to analyze the leaf status such as : watering, moisturizing, dew, frozen. The probe is IP67 waterproof.

LMS01-LB/LS detects leaf's **moisture and temperature** use FDR method, it senses the dielectric constant cause by liquid over the leaf surface, and cover the value to leaf moisture. The probe is design in a leaf shape to best simulate the real leaf characterizes. The probe has as density as 15 leaf vein lines per centimeter which make it can senses small drop and more accuracy.

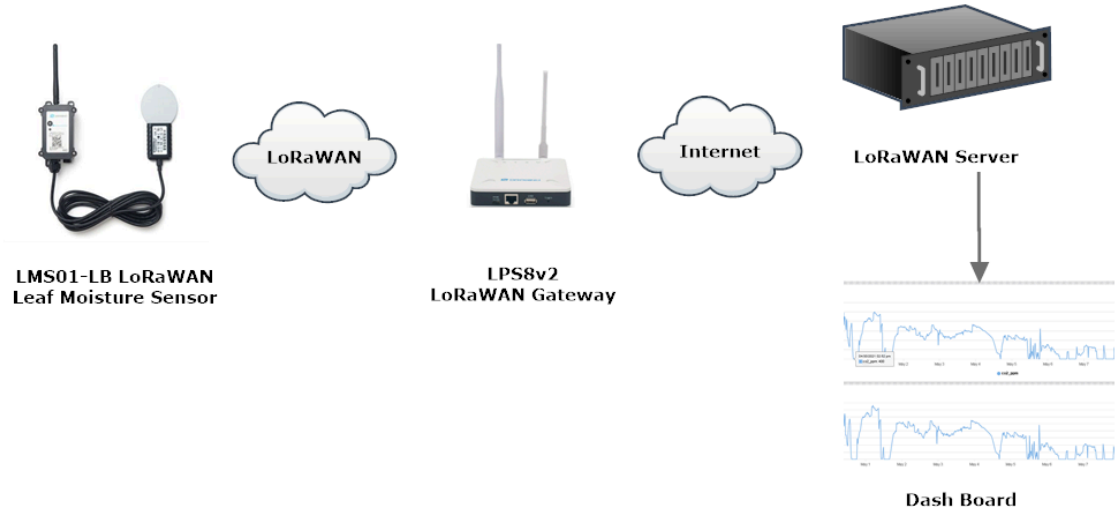
The LoRa wireless technology used in LMS01-LB/LS allows device to send data and reach extremely long ranges at low data-rates. It provides ultra-long range spread spectrum communication and high interference immunity whilst minimizing current consumption.

LMS01-LB/LS **Supports BLE configure** and **wireless OTA update** which make user easy to use.

LMS01-LB/LS is powered by **8500mAh Li-SOCI2 battery** or **solar powered + li-on battery** it is designed for long term use up to 5 years.

Each LMS01-LB/LS is pre-load with a set of unique keys for LoRaWAN registrations, register these keys to local LoRaWAN server and it will auto connect after power on.

LMS01-LB in LoRaWAN Network



1.2 Features

- LoRaWAN 1.0.3 Class A
- Bands: CN470/EU433/KR920/US915/EU868/AS923/AU915/IN865
- Ultra-low power consumption
- Monitor Leaf moisture
- Monitor Leaf temperature
- Monitor Battery Level
- Support Bluetooth v5.1 and LoRaWAN remote configure
- Support wireless OTA update firmware
- AT Commands to change parameters
- Downlink to change configure
- IP66 Waterproof Enclosure
- IP67 rate for the Sensor Probe
- 8500mAh Li/SOCl2 Battery (LMS01-LB)
- Solar panel + 3000mAh Li-on battery (LMS01-LS)

1.3 Specification

Common DC Characteristics:

- Supply Voltage: Built-in Battery , 2.5v ~ 3.6v
- Operating Temperature: -40 ~ 85°C

Leaf Moisture: percentage of water drop over total leaf surface

- Range: 0~100%

- Resolution: 0.1%
- Accuracy: ±3%(0~50%); ±6%(>50%)
- IP67 Protection
- Length: 3.5 meters

Leaf Temperature:

- Range: -50 ~ 80°C
- Resolution: 0.1°C
- Accuracy: <±0.5°C(-10°C ~ 70°C),<±1.0°C (others)
- IP67 Protection
- Length: 3.5 meters

LoRa Spec:

- Frequency Range, Band 1 (HF): 862 ~ 1020 Mhz, Band 2 (LF): 410 ~ 528 Mhz
- Max +22 dBm constant RF output vs.
- RX sensitivity: down to -139 dBm.
- Excellent blocking immunity

Battery:

- Li/SOCI2 un-chargeable battery
- Capacity: 8500mAh
- Self-Discharge: <1% / Year @ 25°C
- Max continuously current: 130mA
- Max boost current: 2A, 1 second

Power Consumption

- Sleep Mode: 5uA @ 3.3v
- LoRa Transmit Mode: 125mA @ 20dBm, 82mA @ 14dBm

1.4 Applications

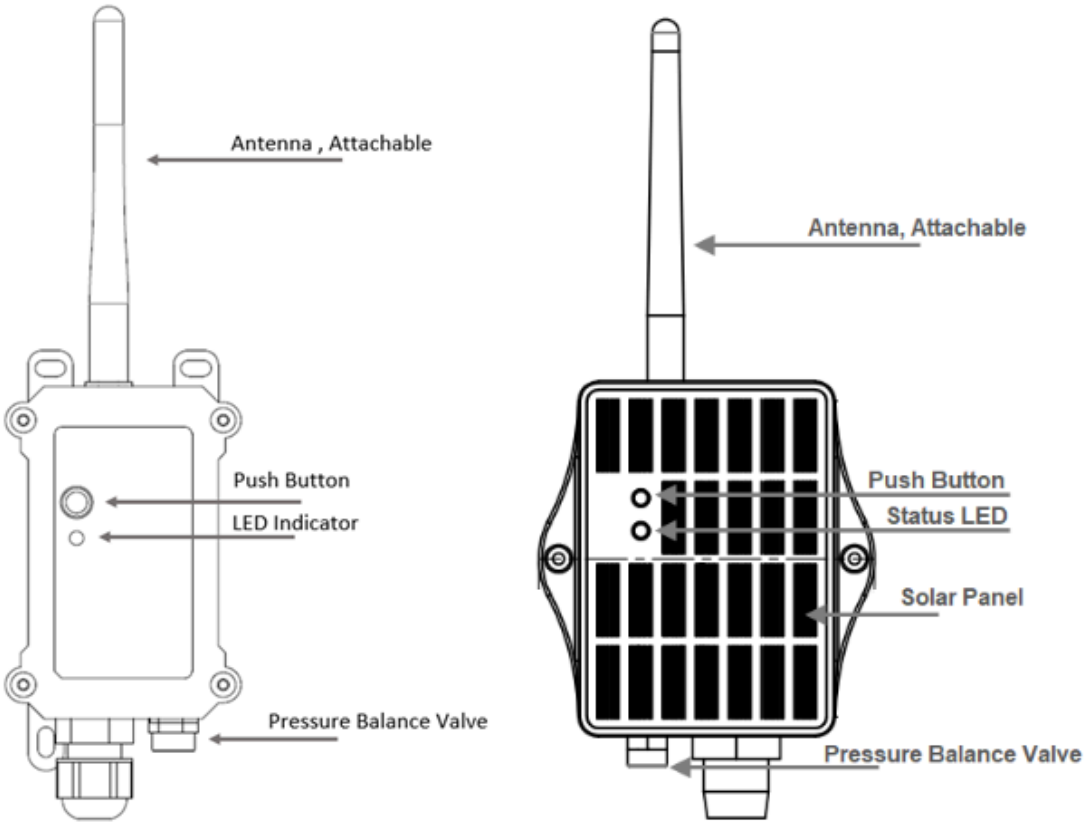
- Smart Agriculture

1.5 Sleep mode and working mode

Deep Sleep Mode: Sensor doesn't have any LoRaWAN activate. This mode is used for storage and shipping to save battery life.

Working Mode: In this mode, Sensor will work as LoRaWAN Sensor to Join LoRaWAN network and send out sensor data to server. Between each sampling/tx/rx periodically, sensor will be in IDLE mode), in IDLE mode, sensor has the same power consumption as Deep Sleep mode.

1.6 Button & LEDs



Behavior on ACT	Function	Action
Pressing ACT between 1s < time < 3s	Send an uplink	If sensor is already Joined to LoRaWAN network, sensor will send an uplink packet, **blue led** will blink once. Meanwhile, BLE module will be active and user can connect via BLE to configure device.
Pressing ACT for more than 3s	Active Device	**Green led** will fast blink 5 times, device will enter **OTA mode** for 3 seconds. And then start to JOIN LoRaWAN network. **Green led** will solidly turn on for 5 seconds after joined in network. Once sensor is active, BLE module will be active and user can connect via BLE to configure device, no matter if device join or not join LoRaWAN network.
Fast press ACT 5 times.	Deactivate Device	**Red led** will solid on for 5 seconds. Means device is in Deep Sleep Mode.

1.7 BLE connection

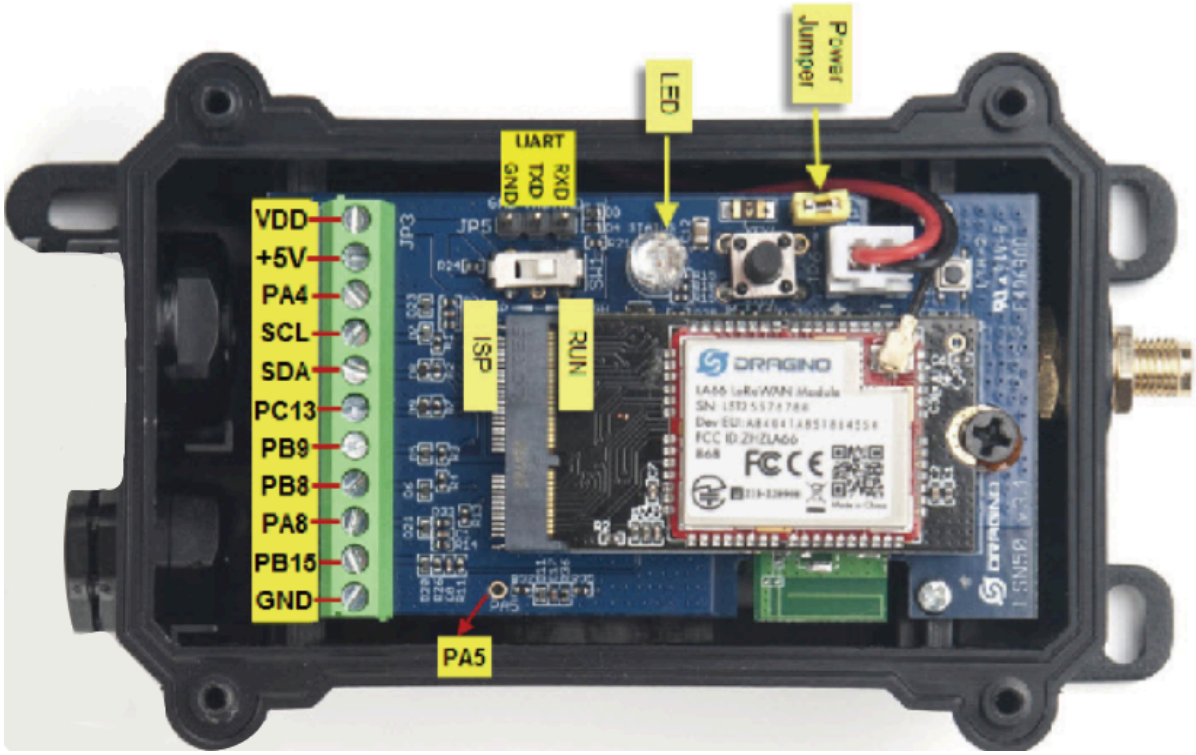
LMS01-LB/LS support BLE remote configure.

BLE can be used to configure the parameter of sensor or see the console output from sensor. BLE will be only activate on below case:

- Press button to send an uplink
- Press button to active device.
- Device Power on or reset.

If there is no activity connection on BLE in 60 seconds, sensor will shut down BLE module to enter low power mode.

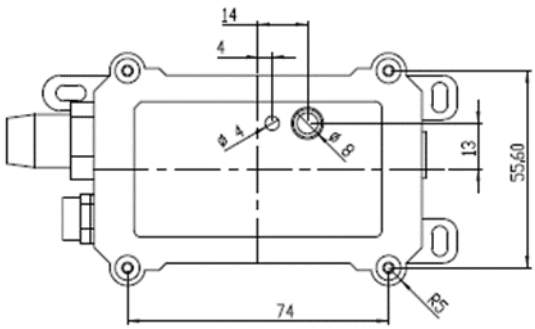
1.8 Pin Definitions

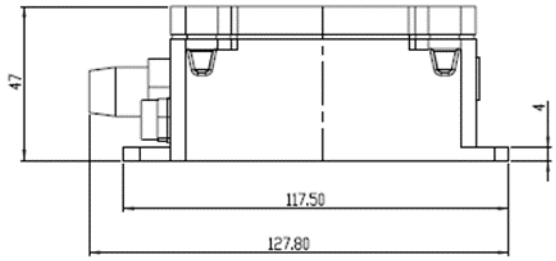


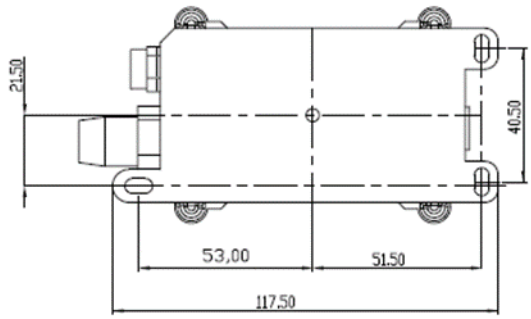
1.9 Mechanical

1.9.1 for LB version

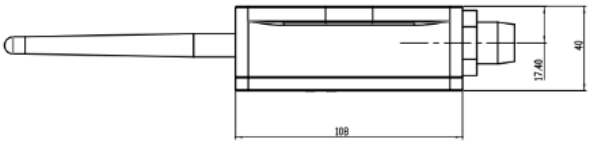
Main Device Dimension:

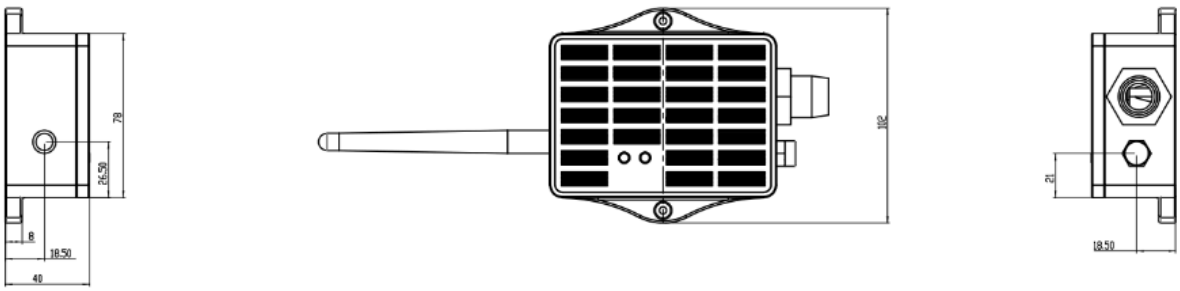






1.9.2 for LS version





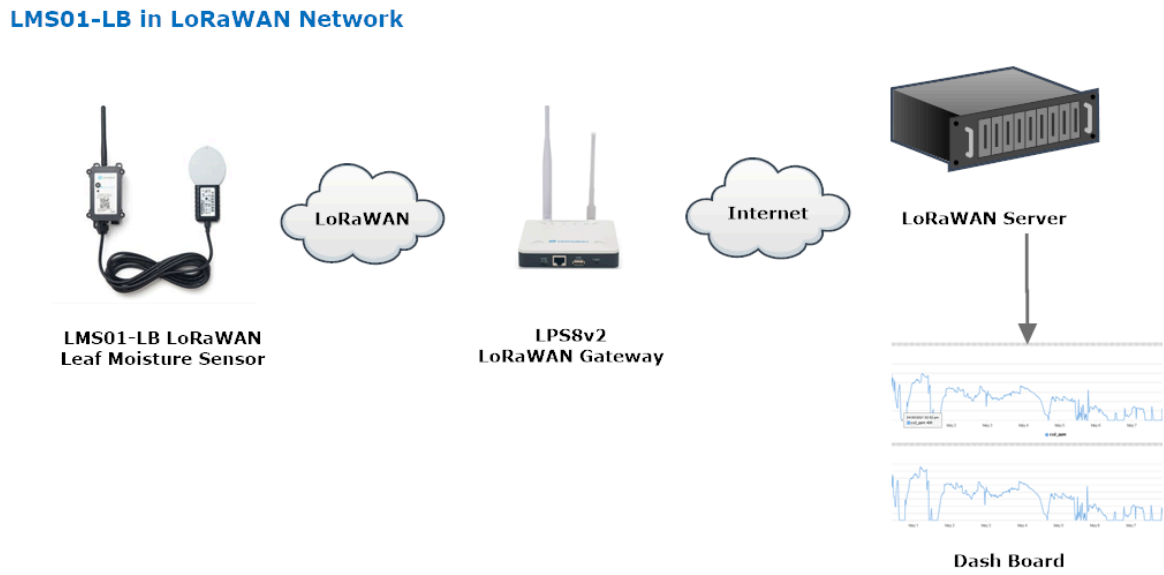
2. Configure LMS01-LB/LS to connect to LoRaWAN network

2.1 How it works

The LMS01-LB/LS is configured as **LoRaWAN OTAA Class A** mode by default. It has OTAA keys to join LoRaWAN network. To connect a local LoRaWAN network, you need to input the OTAA keys in the LoRaWAN IoT server and press the button to activate the LMS01-LB/LS. It will automatically join the network via OTAA and start to send the sensor value. The default uplink interval is 20 minutes.

2.2 Quick guide to connect to LoRaWAN server (OTAA)

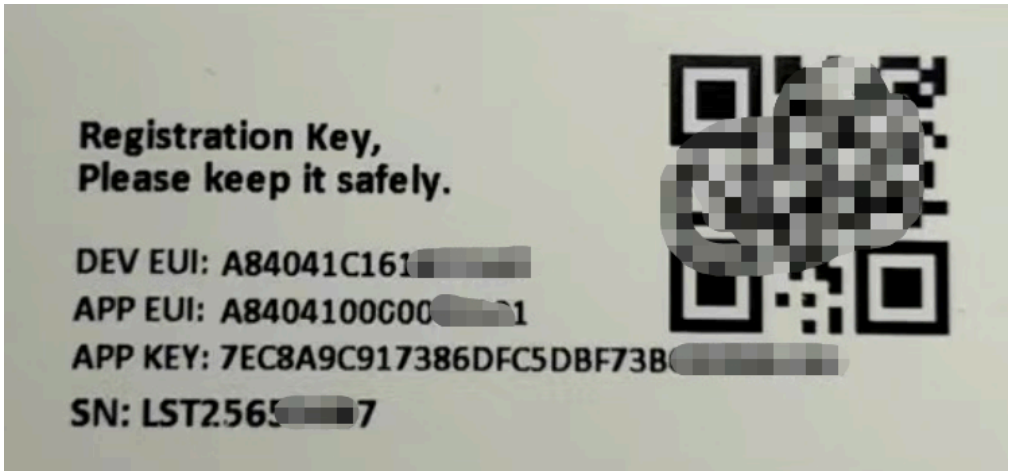
Following is an example for how to join the TTN v3 LoRaWAN Network. Below is the network structure; we use the LPS8v2 as a LoRaWAN gateway in this example.



The LPS8v2 is already set to connected to TTN network , so what we need to now is configure the TTN server.

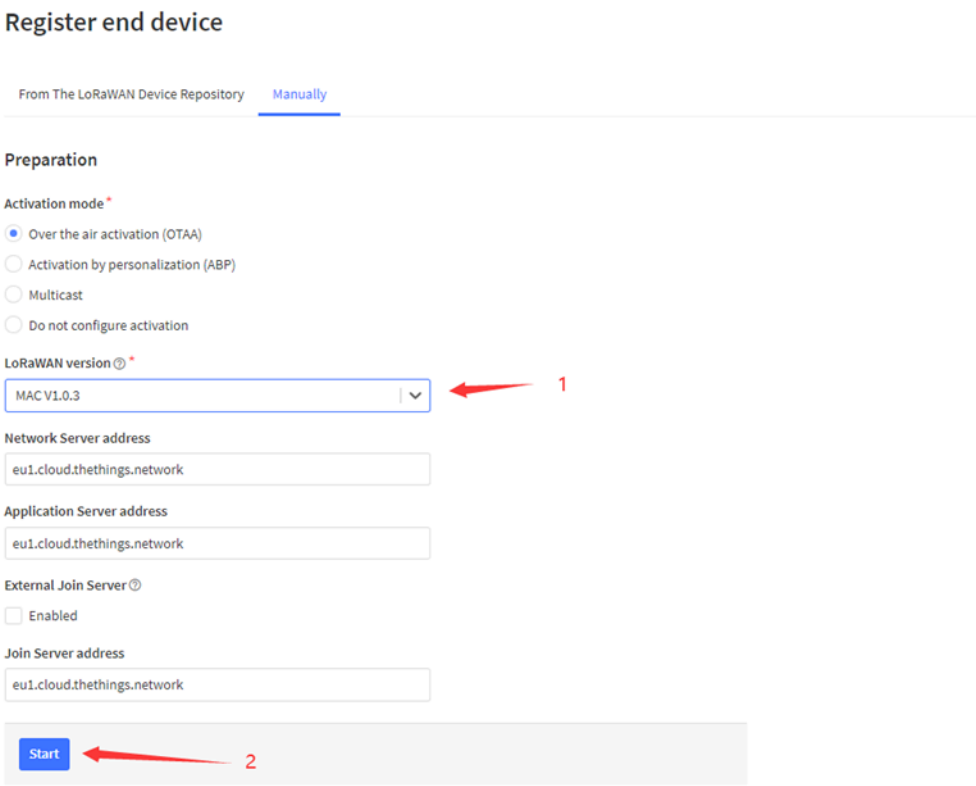
Step 1: Create a device in TTN with the OTAA keys from LMS01-LB/LS.

Each LMS01-LB/LS is shipped with a sticker with the default device EUI as below:

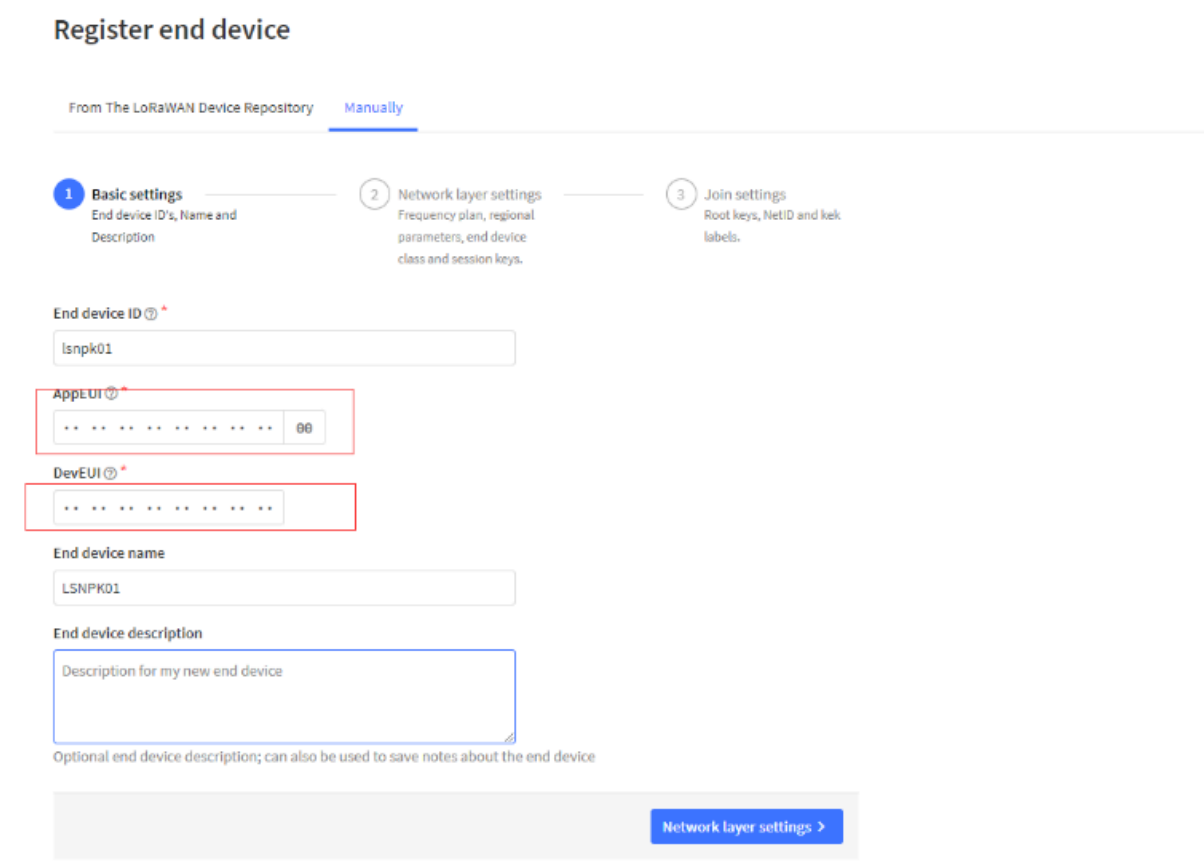


You can enter this key in the LoRaWAN Server portal. Below is TTN screen shot:

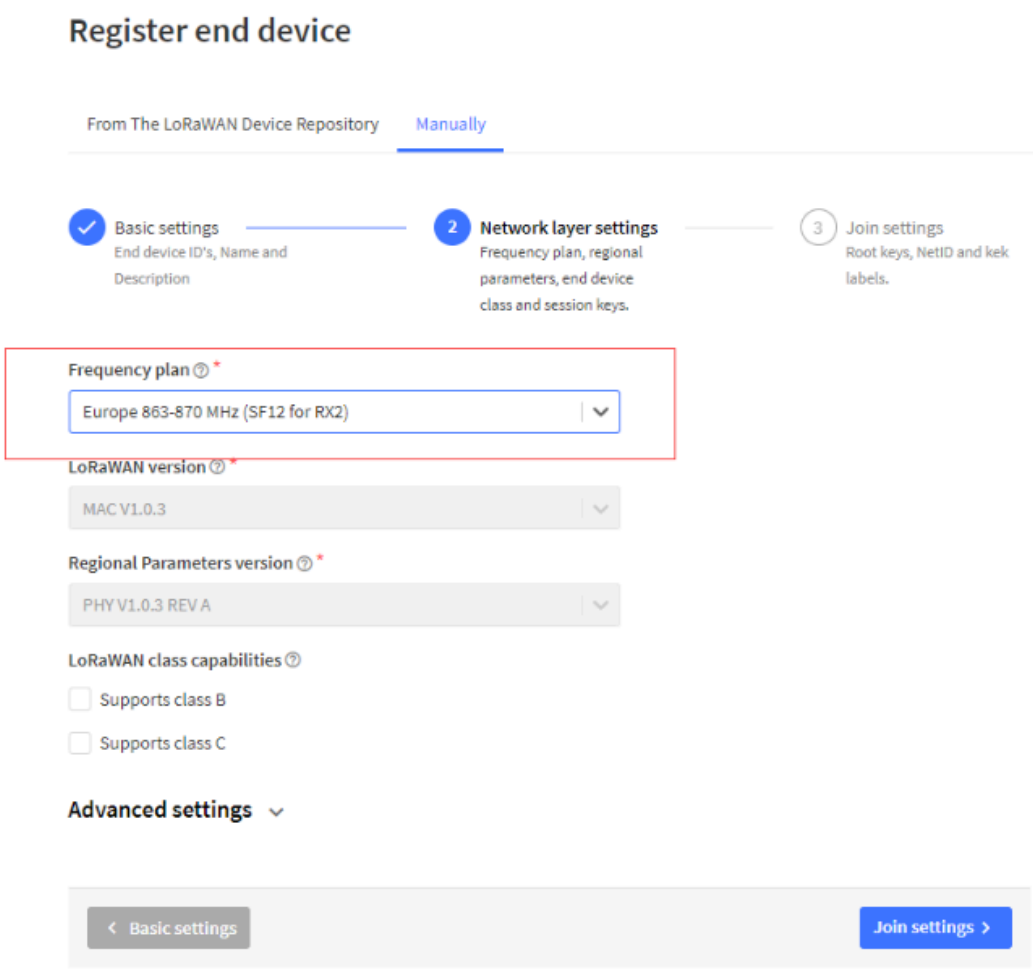
Register the device



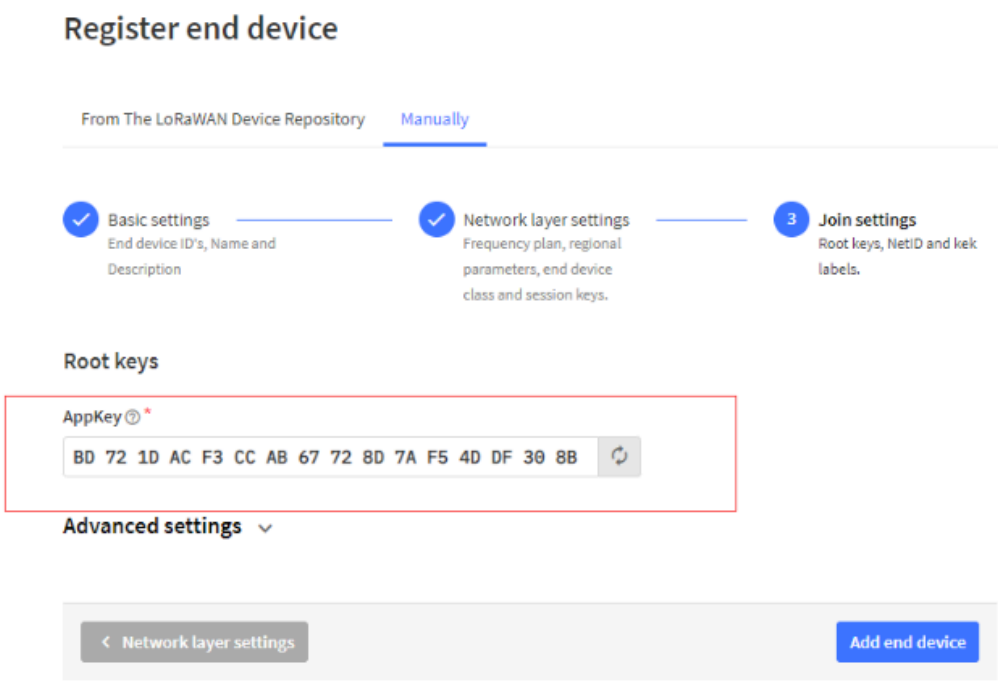
Add APP EUI and DEV EUI



Add APP EUI in the application


Register end device
From The LoRaWAN Device Repository
Manually
Basic settings
End device ID's, Name and Description
2
Network layer settings
Frequency plan, regional parameters, end device class and session keys.
3
Join settings
Root keys, NetID and kek labels.
Frequency plan *
Europe 863-870 MHz (SF12 for RX2)
LoRaWAN version *
MAC V1.0.3
Regional Parameters version *
PHY V1.0.3 REV A
LoRaWAN class capabilities
Supports class B
Supports class C
Advanced settings
Basic settings
Join settings

Add APP KEY



Step 2: Activate on LMS01-LB/LS

Press the button for 5 seconds to activate the LMS01-LB/LS.

Green led will fast blink 5 times, device will enter **OTA mode** for 3 seconds. And then start to JOIN LoRaWAN network. **Green led** will solidly turn on for 5 seconds after joined in network.

After join success, it will start to upload messages to TTN and you can see the messages in the panel.

2.3 Uplink Payload

LMS01-LB/LS will uplink payload via LoRaWAN with below payload format:

Uplink payload includes in total 11 bytes.

Normal uplink payload:

Size(bytes)	2	2	2	2	1	1	1
Value	BAT	Temperature (Optional)	Leaf Moisture	Leaf Temperature	Digital Interrupt (Optional)	Reserve	Message Type

2.3.1 Battery Info

Check the battery voltage for LMS01-LB/LS.

Ex1: 0x0B45 = 2885mV

Ex2: 0x0B49 = 2889mV

2.3.2 DS18B20 Temperature sensor

This is optional, user can connect external DS18B20 sensor to the +3.3v, one-wire and GND pin . and this field will report temperature.

Example:

If payload is: 0105H: (0105 & FC00 == 0), temp = 0105H /10 = 26.1 degree

If payload is: FF3FH : (FF3F & FC00 == 1) , temp = (FF3FH - 65536)/10 = -19.3 degrees.

2.3.3 Leaf Moisture

Range: 0 ~ 100%

Example:

0x0015(H) = 21(D) /10= 2.1%

2.3.4 Leaf Temperature

Get Leaf Temperature

Example:

If payload is: **0105H**: (0105 & FC00 == 0), temp = 0105H /10 = 26.1 degree

If payload is: **FF3FH** : (FF3F & FC00 == 1) , temp = (FF3FH - 65536)/10 = -19.3 degrees.

2.3.5 Interrupt Pin

This data field shows if this packet is generated by interrupt or not. Click here for the hardware and software set up.

Example:

0x00: Normal uplink packet.

0x01: Interrupt Uplink Packet.

2.3.6 Message Type

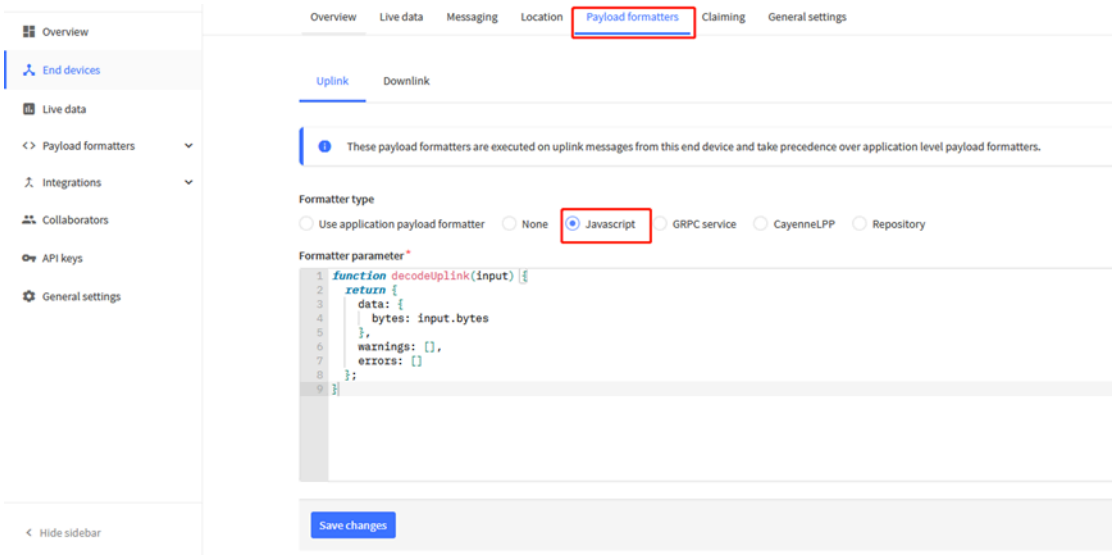
For a normal uplink payload, the message type is always 0x01.

Valid Message Type:

Message Type Code	Description	Payload
0x01	Normal Uplink	Normal Uplink Payload
0x02	Reply configures info	Configure Info Payload

2.3.7 Decode payload in The Things Network

While using TTN network, you can add the payload format to decode the payload.



The payload decoder function for TTN is here:

LMS01-LB/LS TTN Payload Decoder: https://github.com/dragino/dragino-end-node-decoder

2.4 Uplink Interval

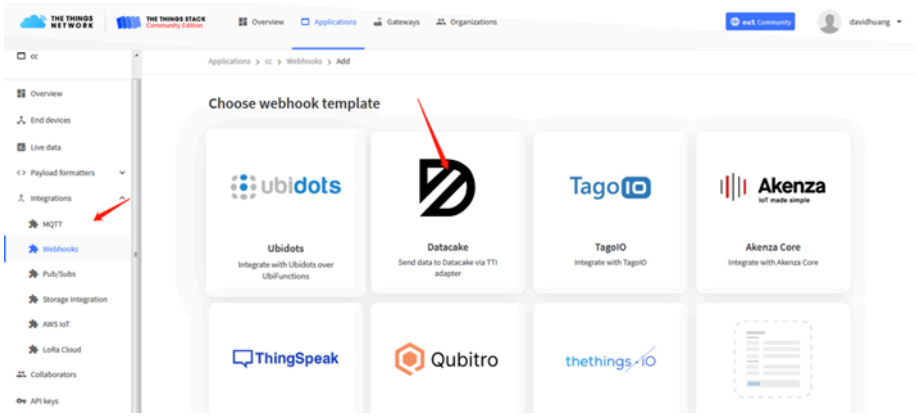
The LMS01-LB/LS by default uplink the sensor data every 20 minutes. User can change this interval by AT Command or LoRaWAN Downlink Command. See this link: Change Uplink Interval

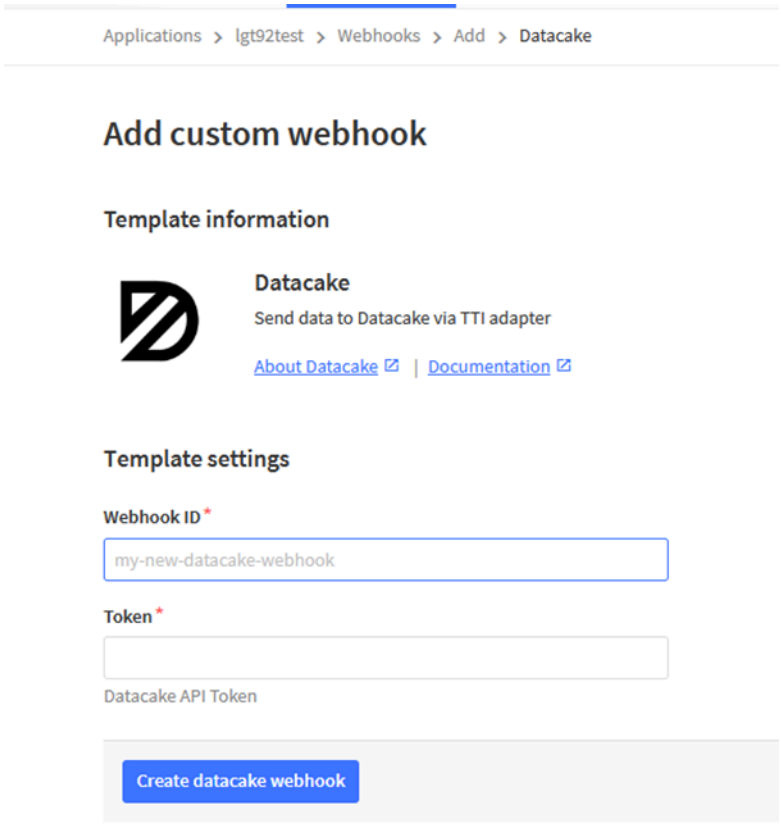
2.5 Show Data in DataCake IoT Server

DATACAKE provides a human friendly interface to show the sensor data, once we have data in TTN, we can use DATACAKE to connect to TTN 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.

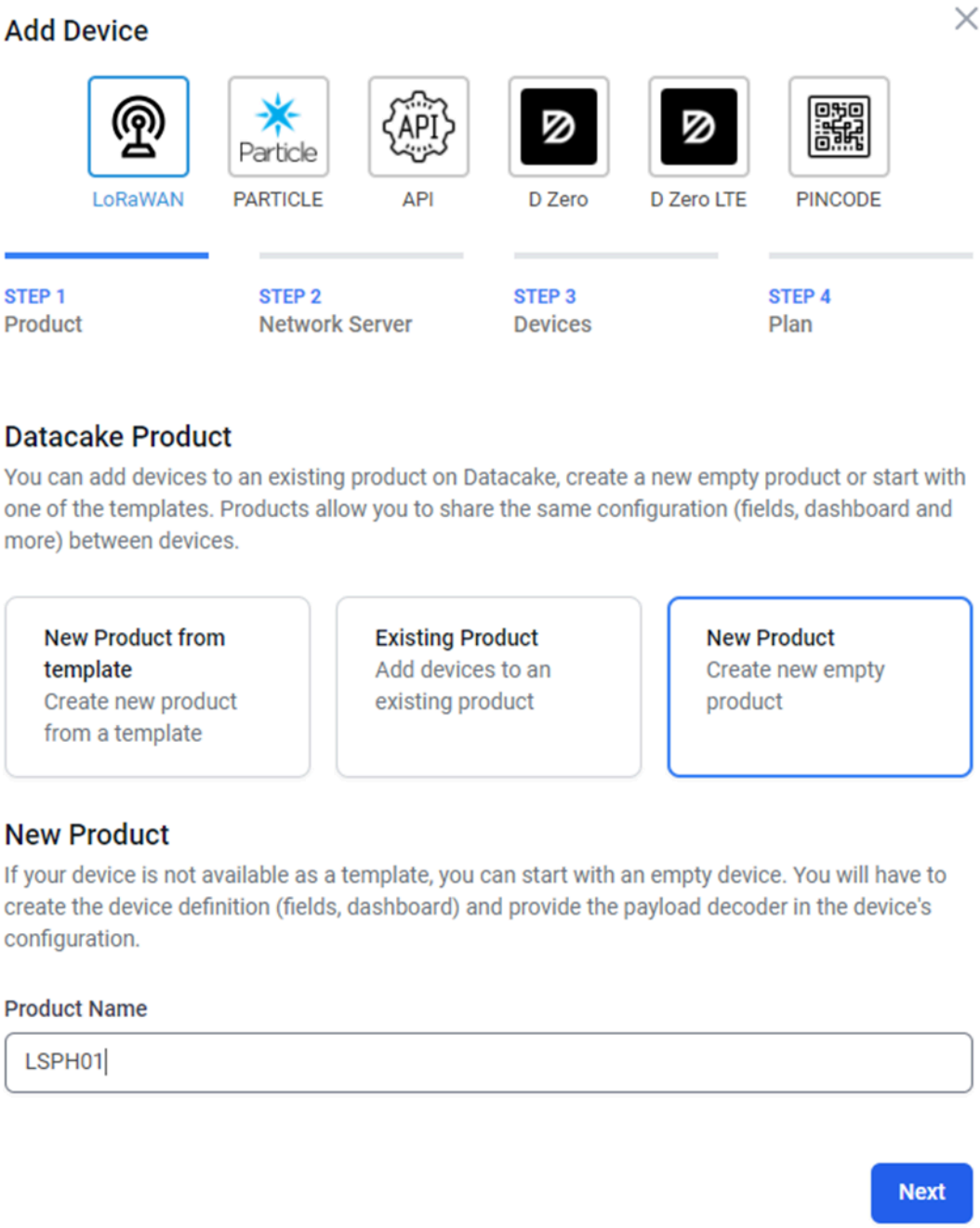
Step 2: To configure the Application to forward data to DATACAKE you will need to add integration. To add the DATACAKE integration, perform the following steps:

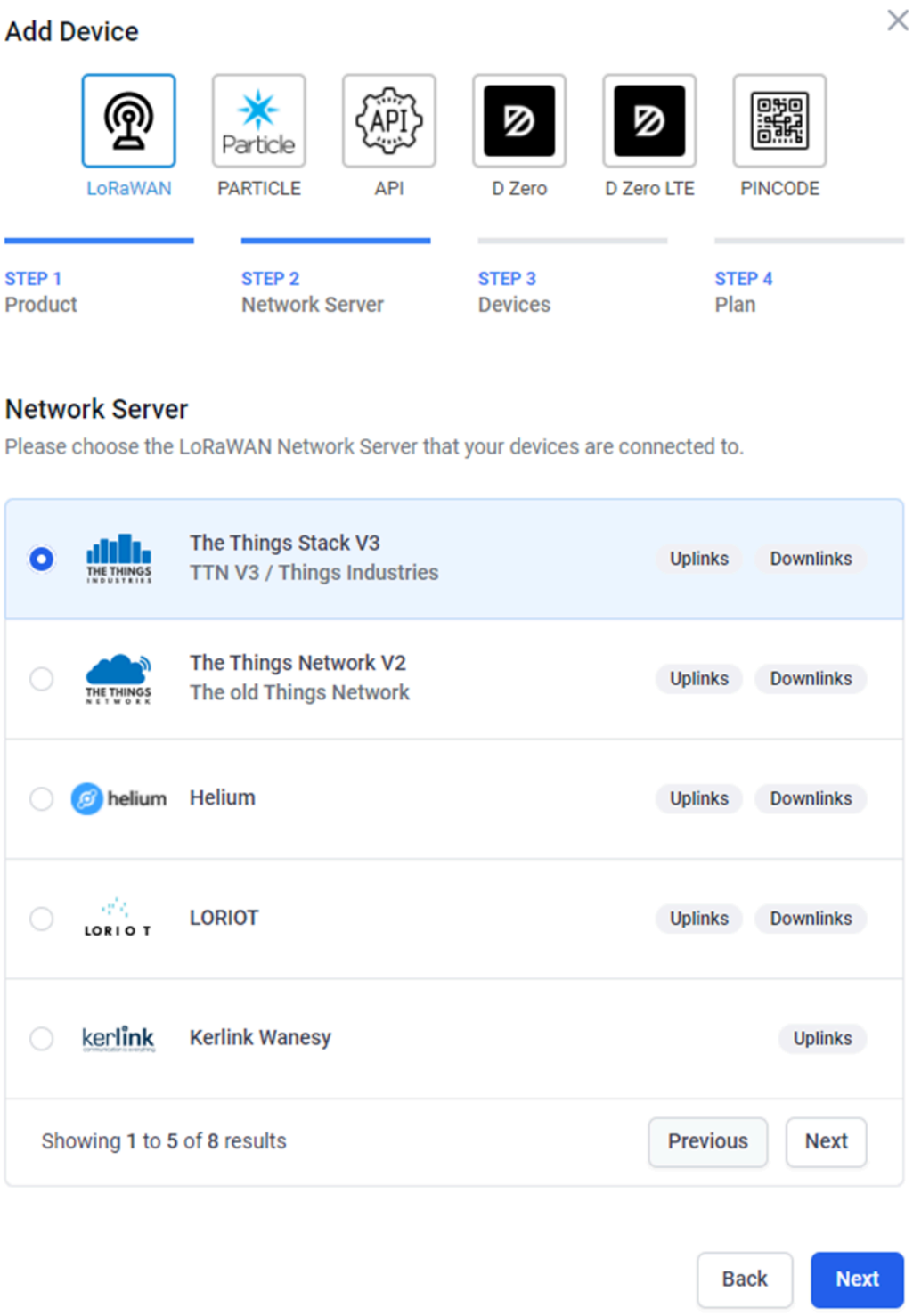


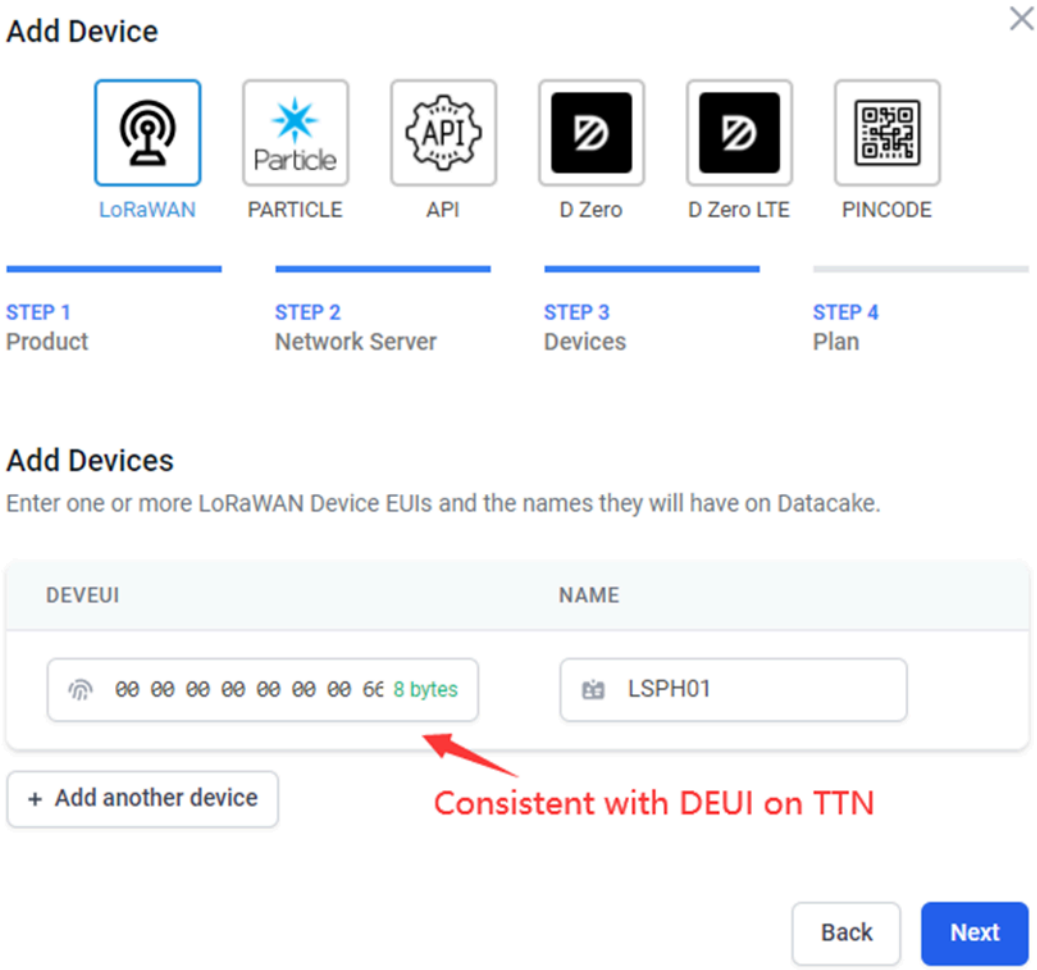


Step 3: Create an account or log in Datacake.

Step 4: Create LMS01-LB/LS product.

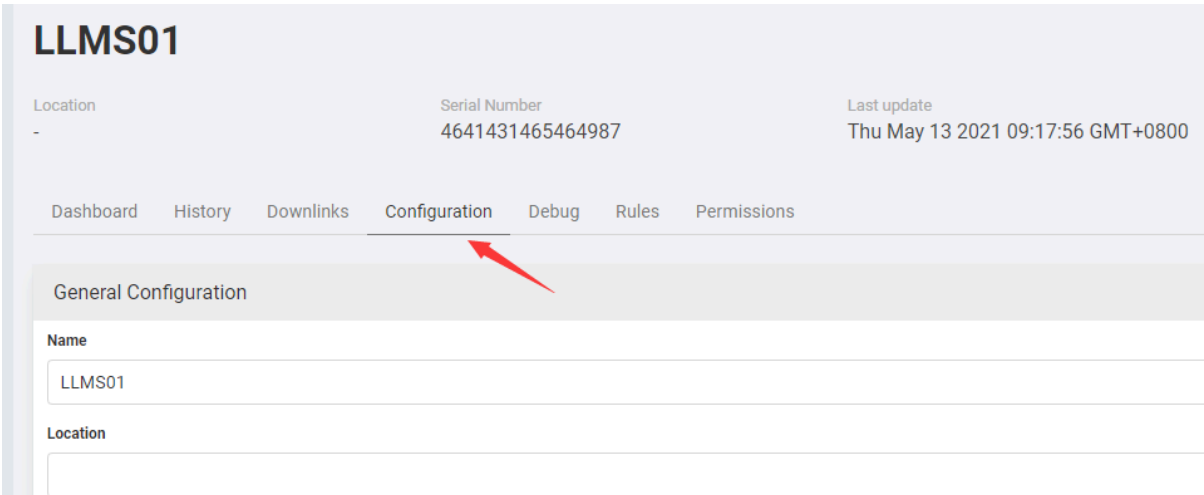

Add Device
LoRaWAN
PARTICLE
API
D Zero
D Zero LTE
PINCODE
STEP 1
Product
STEP 2
Network Server
STEP 3
Devices
STEP 4
Plan
Datacake Product
You can add devices to an existing product on Datacake, create a new empty product or start with one of the templates. Products allow you to share the same configuration (fields, dashboard and more) between devices.
New Product from template
Create new product from a template
Existing Product
Add devices to an existing product
New Product
Create new empty product
New Product
If your device is not available as a template, you can start with an empty device. You will have to create the device definition (fields, dashboard) and provide the payload decoder in the device's configuration.
Product Name
LSPH01
Next

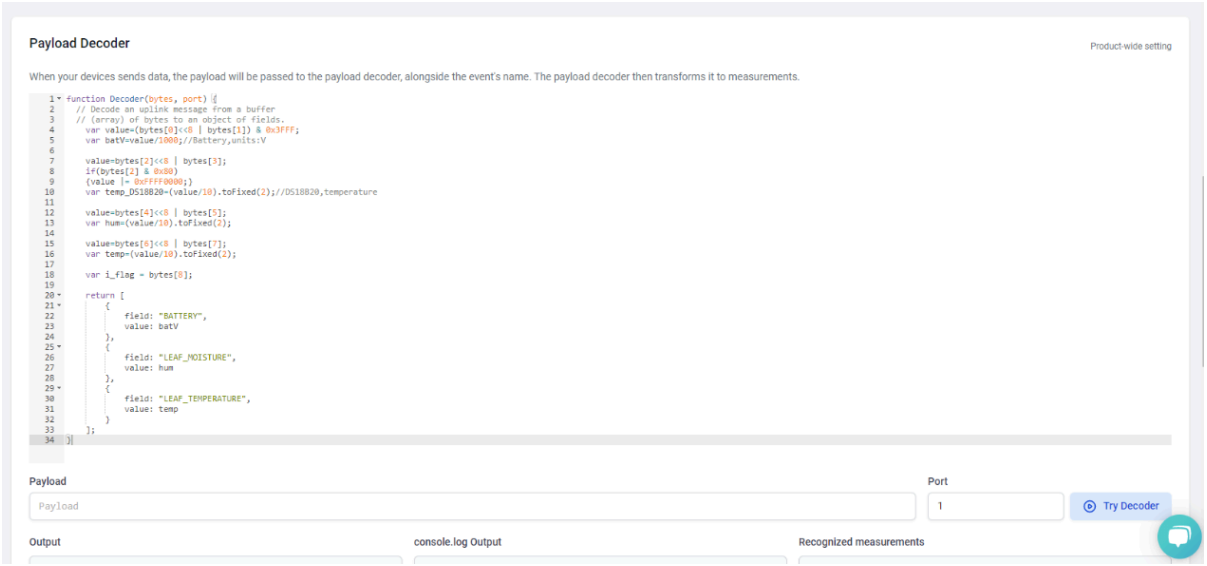

Add Device
LoRaWAN
PARTICLE
API
D Zero
D Zero LTE
PINCODE
STEP 1
Product
STEP 2
Network Server
STEP 3
Devices
STEP 4
Plan
Network Server
Please choose the LoRaWAN Network Server that your devices are connected to.
The Things Stack V3
TTN V3 / Things Industries
Uplinks
Downlinks
The Things Network V2
The old Things Network
Uplinks
Downlinks
Helium
Uplinks
Downlinks
LORIOT
Uplinks
Downlinks
Kerlink Wanesy
Uplinks
Showing 1 to 5 of 8 results
Previous
Next
Back
Next

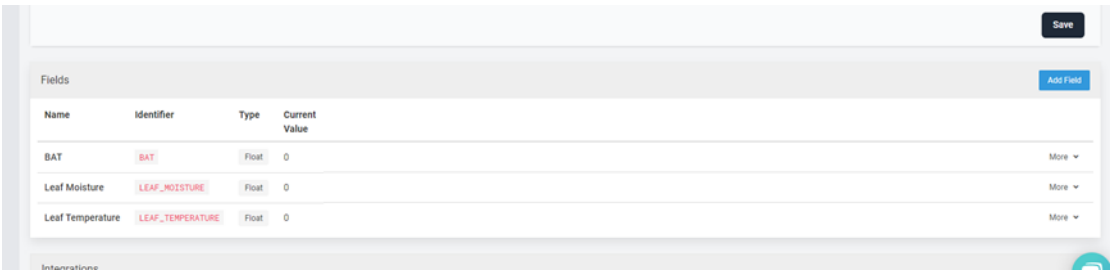


Step 5: add payload decode

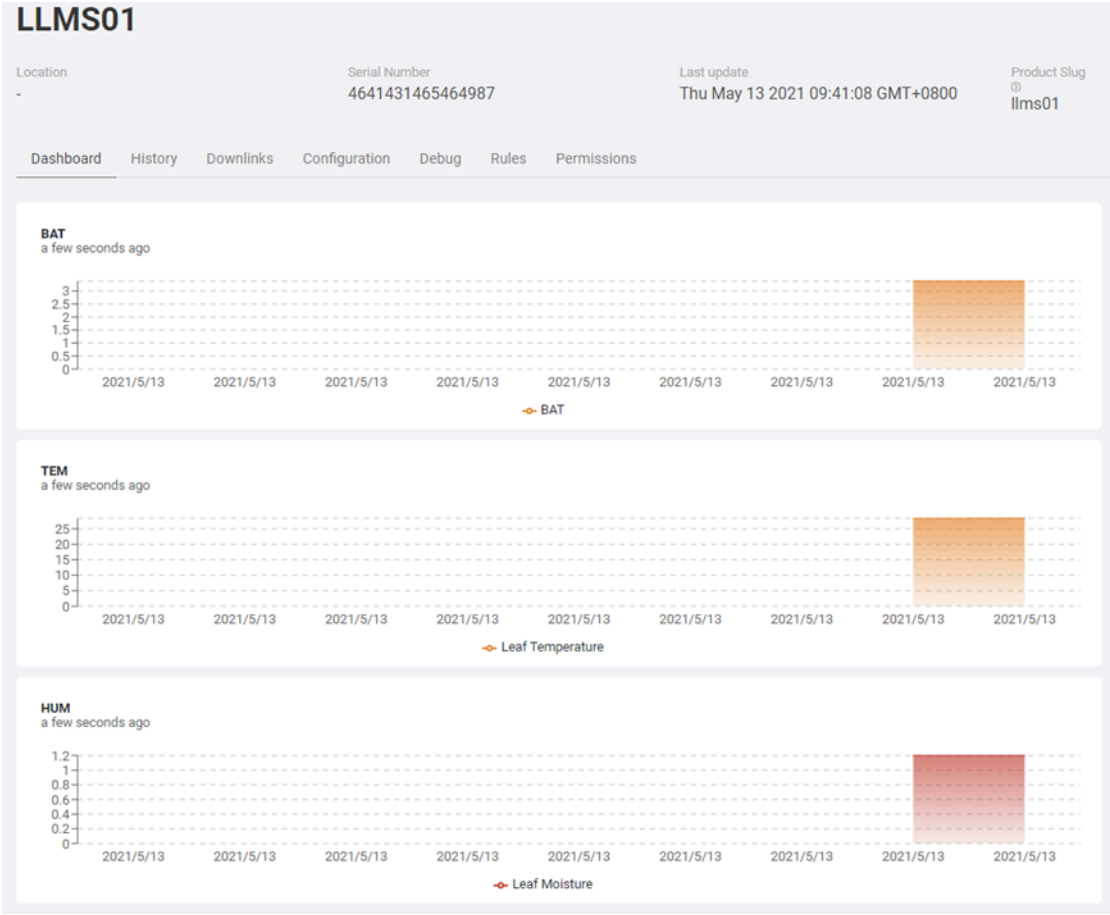
Download Datacake decoder from: https://github.com/dragino/dragino-end-node-decoder







After added, the sensor data arrive TTN, it will also arrive and show in Mydevices.



2.6 Datalog Feature

Datalog Feature is to ensure IoT Server can get all sampling data from Sensor even if the LoRaWAN network is down. For each sampling, LMS01-LB/LS will store the reading for future retrieving purposes.

2.6.1 Ways to get datalog via LoRaWAN

Set **PNACKMD=1**, LMS01-LB/LS will wait for ACK for every uplink, when there is no LoRaWAN network, LMS01-LB will mark these records with non-ack messages and store the sensor data, and it will send all messages (10s interval) after the network recovery.

- a) LMS01-LB/LS will do an ACK check for data records sending to make sure every data arrive server.
- b) LMS01-LB/LS will send data in **CONFIRMED Mode** when PNACKMD=1, but LMS01-LB/LS won't re-transmit the packet if it doesn't get ACK, it will just mark it as a NONE-ACK message. In a future uplink if LMS01-LB/LS gets a ACK, LMS01-LB/LS will consider there is a network connection and resend all NONE-ACK messages.

2.6.2 Unix TimeStamp

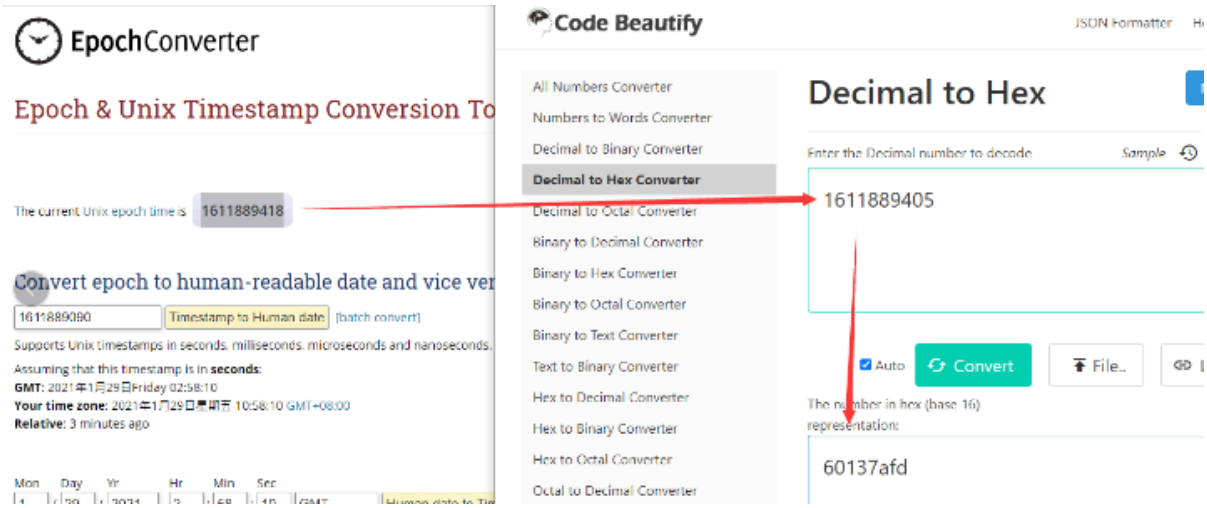
LMS01-LB/LS uses Unix TimeStamp format based on

Size (bytes)	4	1
DeviceTimeAns Payload	32-bit unsigned integer : Seconds since epoch*	8bits unsigned integer: fractional-second in ½^8 second steps

Figure 10 : DeviceTimeAns payload format

User can get this time from link: https://www.epochconverter.com/ :

Below is the converter example



So, we can use AT+TIMESTAMP=1611889405 or downlink 3060137afd00 to set the current time 2021 – Jan -- 29 Friday 03:03:25

2.6.3 Set Device Time

User need to set **SYNCMOD=1** to enable sync time via MAC command.

Once LMS01-LB/LS Joined LoRaWAN network, it will send the MAC command (DeviceTimeReq) and the server will reply with (DeviceTimeAns) to send the current time to LMS01-LB/LS. If LMS01-LB/LS fails to get the time from the server, LMS01-LB/LS will use the internal time and wait for next time request (AT+SYNCTDC to set the time request period, default is 10 days).

Note: LoRaWAN Server need to support LoRaWAN v1.0.3(MAC v1.0.3) or higher to support this MAC command feature, Chirpstack,TTN V3 v3 and loriot support but TTN V3 v2 doesn't support. If server doesn't support this command, it will through away uplink packet with this command, so user will lose the packet with time request for TTN V3 v2 if SYNCMOD=1.

2.6.4 Poll sensor value

Users can poll sensor values based on timestamps. Below is the downlink command.

Downlink Command to poll Open/Close status (0x31)			
1byte	**4bytes**	**4bytes**	**1byte**
31	Timestamp start	Timestamp end	Uplink Interval

Timestamp start and Timestamp end-use Unix TimeStamp format as mentioned above. Devices will reply with all data logs during this period, using the uplink interval.

For example, downlink command 31 618E5740 618E8170 05

Is to check 2021/11/12 12:00:00 to 2021/11/12 15:00:00's data

Uplink Internal =5s, means LMS01-LB/LS will send one packet every 5s. range 5~255s.

2.7 Frequency Plans

The LMS01-LB/LS uses OTAA mode and below frequency plans by default. Each frequency band use different firmware, user update the firmware to the corresponding band for their country.

http://wiki.dragino.com/xwiki/bin/view/Main/End%20Device%20Frequency%20Band/

2.8 Installation

LMS01-LB/LS probe has two sides. The side without words are the sense side. Please be ware when install the sensor.

3. Configure LMS01-LB/LS

3.1 Configure Methods

LMS01-LB/LS supports below configure method:

- AT Command via Bluetooth Connection (**Recommended**): BLE Configure Instruction.
- AT Command via UART Connection : See UART Connection.
- LoRaWAN Downlink. Instruction for different platforms: See IoT LoRaWAN Server section.

3.2 General Commands

These commands are to configure:

- General system settings like: uplink interval.
- LoRaWAN protocol & radio related command.

They are same for all Dragino Devices which support DLWS-005 LoRaWAN Stack. These commands can be found on the wiki:

http://wiki.dragino.com/xwiki/bin/view/Main/End%20Device%20AT%20Commands%20and%20Downlink%20Command/

3.3 Commands special design for LMS01-LB/LS

These commands only valid for LMS01-LB/LS, as below:

3.3.1 Set Transmit Interval Time

Feature: Change LoRaWAN End Node Transmit Interval.

AT Command: AT+TDC

Command Example	Function	Response
AT+TDC=?	Show current transmit Interval	30000 OK the interval is 30000ms = 30s
AT+TDC=60000	Set Transmit Interval	OK Set transmit interval to 60000ms = 60 seconds

Downlink Command: 0x01

Format: Command Code (0x01) followed by 3 bytes time value.

If the downlink payload=0100003C, it means set the END Node's Transmit Interval to 0x00003C=60(S), while type code is 01.

- Example 1: Downlink Payload: 0100001E // Set Transmit Interval (TDC) = 30 seconds
- Example 2: Downlink Payload: 0100003C // Set Transmit Interval (TDC) = 60 seconds

3.3.2 Set Interrupt Mode

Feature, Set Interrupt mode for GPIO_EXTI of pin.

When AT+INTMOD=0 is set, GPIO_EXTI is used as a digital input port.

AT Command: AT+INTMOD

Command Example	Function	Response
AT+INTMOD=?	Show current interrupt mode	0 OK the mode is 0 =Disable Interrupt
AT+INTMOD=2	Set Transmit Interval 0. (Disable Interrupt), 1. (Trigger by rising and falling edge) 2. (Trigger by falling edge) 3. (Trigger by rising edge)	OK

Downlink Command: 0x06

Format: Command Code (0x06) followed by 3 bytes.

This means that the interrupt mode of the end node is set to 0x000003=3 (rising edge trigger), and the type code is 06.

- Example 1: Downlink Payload: 06000000 // Turn off interrupt mode
- Example 2: Downlink Payload: 06000003 // Set the interrupt mode to rising edge trigger

3.3.3 Get Firmware Version Info

Feature: use downlink to get firmware version.

Downlink Command: 0x26

Downlink Control Type	FPort	Type Code	Downlink payload size(bytes)
Get Firmware Version Info	Any	26	2

- Reply to the confirmation package: 26 01
- Reply to non-confirmed packet: 26 00

Device will send an uplink after got this downlink command. With below payload:

Configures info payload:

Size(bytes)	1	2	1	1	2
Value	Sensor Model	Firmware Version	Frequency Band	Sub-band	BAT

Software Type: Always 0x2D for LMS01-LB/LS

Firmware Version: 0x0100, Means: v1.0.0 version

Frequency Band:

0x01: EU868

0x02: US915

0x03: IN865

0x04: AU915

0x05: KZ865

0x06: RU864

0x07: AS923

0x08: AS923-1

0x09: AS923-2

0x0a: AS923-3

0x0b: CN470

0x0c: EU433

0x0d: KR920

0x0e: MA869

Sub-Band:

- AU915 and US915: value 0x00 ~ 0x08
- CN470: value 0x0B ~ 0x0C
- Other Bands: Always 0x00

Battery Info:

Check the battery voltage.

Ex1: 0x0B45 = 2885mV

Ex2: 0x0B49 = 2889mV

4. Battery & Power Consumption

LMS01-LB use ER26500 + SPC1520 battery pack and LMS01-LS use 3000mAh Recharable Battery with Solar Panel. See below link for detail information about the battery info and how to replace.

Battery Info & Power Consumption Analyze .

5. OTA Firmware update

User can change firmware LMS01-LB/LS to:

- Change Frequency band/ region.
- Update with new features.
- Fix bugs.

Firmware and changelog can be downloaded from : **Firmware download link**

Methods to Update Firmware:

- (Recommanded way) OTA firmware update via wireless : **http://wiki.dragino.com/xwiki/bin/view/Main/Firmware%20OTA%20Update%20for%20Sensors/**
- Update through UART TTL interface : **Instruction**.

6. FAQ

6.1 AT Commands input doesn't work

In the case if user can see the console output but can't type input to the device. Please check if you already include the **ENTER** while sending out the command. Some serial tool doesn't send **ENTER** while press the send key, user need to add ENTER in their string.

7. Order Info

Part Number: LMS01-LB-XX or LMS01-LS-XX

XX: The default frequency band

- **AS923**: LoRaWAN AS923 band
- **AU915**: LoRaWAN AU915 band
- **EU433**: LoRaWAN EU433 band
- **EU868**: LoRaWAN EU868 band
- **KR920**: LoRaWAN KR920 band
- **US915**: LoRaWAN US915 band
- **IN865**: LoRaWAN IN865 band
- **CN470**: LoRaWAN CN470 band

8. Packing Info

Package Includes:

- LMS01-LB or LMS01-LS LoRaWAN Leaf Moisture Sensor

Dimension and weight:

- Device Size: cm
- Device Weight: g
- Package Size / pcs : cm
- Weight / pcs : g

9. Support

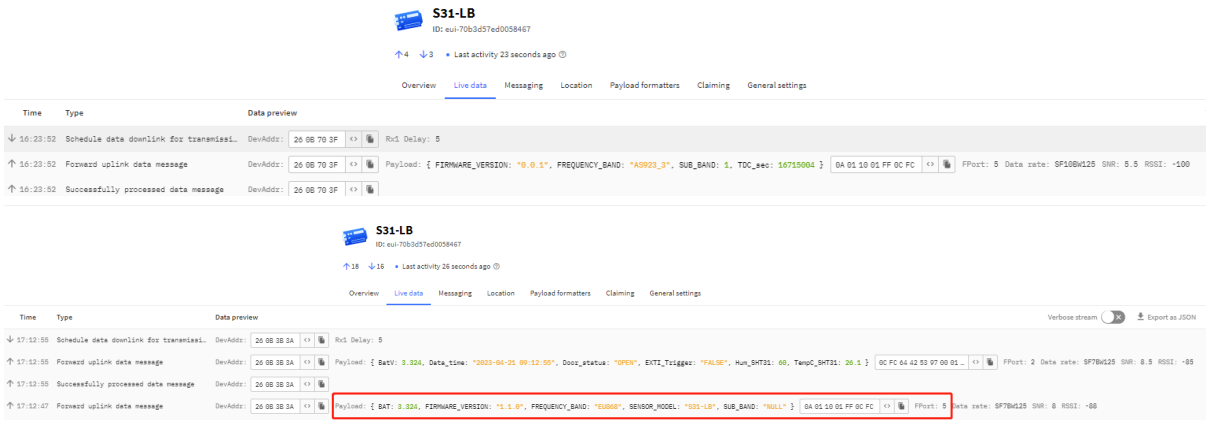
- Support is provided Monday to Friday, from 09:00 to 18:00 GMT+8. Due to different timezones we cannot offer live support. However, your questions will be answered as soon as possible in the before-mentioned schedule.
- Provide as much information as possible regarding your enquiry (product models,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

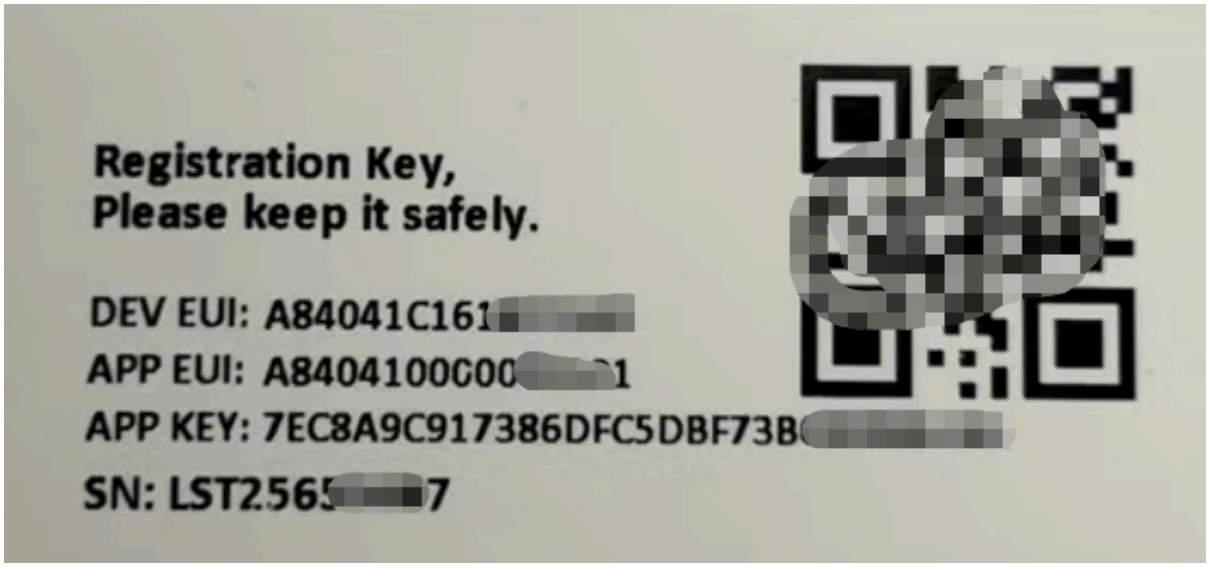
Flash Add	Unix Time	Ext	BAT voltage	Value
80196E0	21/1/19 04:27:03	1	3145	sht_temp=22.00 sht_hum=32.6 ds_temp=327.67
80196F0	21/1/19 04:28:57	1	3145	sht_temp=21.90 sht_hum=33.1 ds_temp=327.67
8019600	21/1/19 04:30:30	1	3145	sht_temp=21.81 sht_hum=33.4 ds_temp=327.67
8019610	21/1/19 04:40:30	1	3145	sht_temp=21.65 sht_hum=33.7 ds_temp=327.67
8019620	21/1/19 04:50:30	1	3147	sht_temp=21.55 sht_hum=34.1 ds_temp=327.67
8019630	21/1/19 04:00:30	1	3149	sht_temp=21.50 sht_hum=34.1 ds_temp=327.67
8019640	21/1/19 04:10:30	1	3149	sht_temp=21.43 sht_hum=34.6 ds_temp=327.67
8019650	21/1/19 04:20:30	1	3151	sht_temp=21.35 sht_hum=34.9 ds_temp=327.67

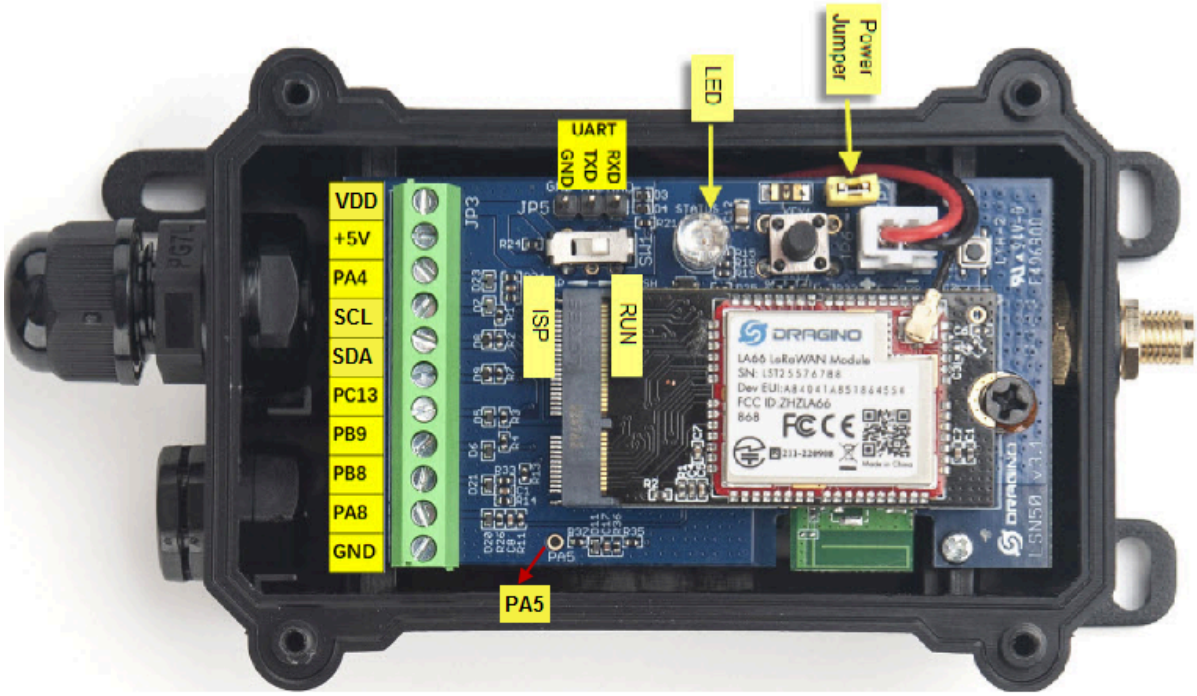

SHT31

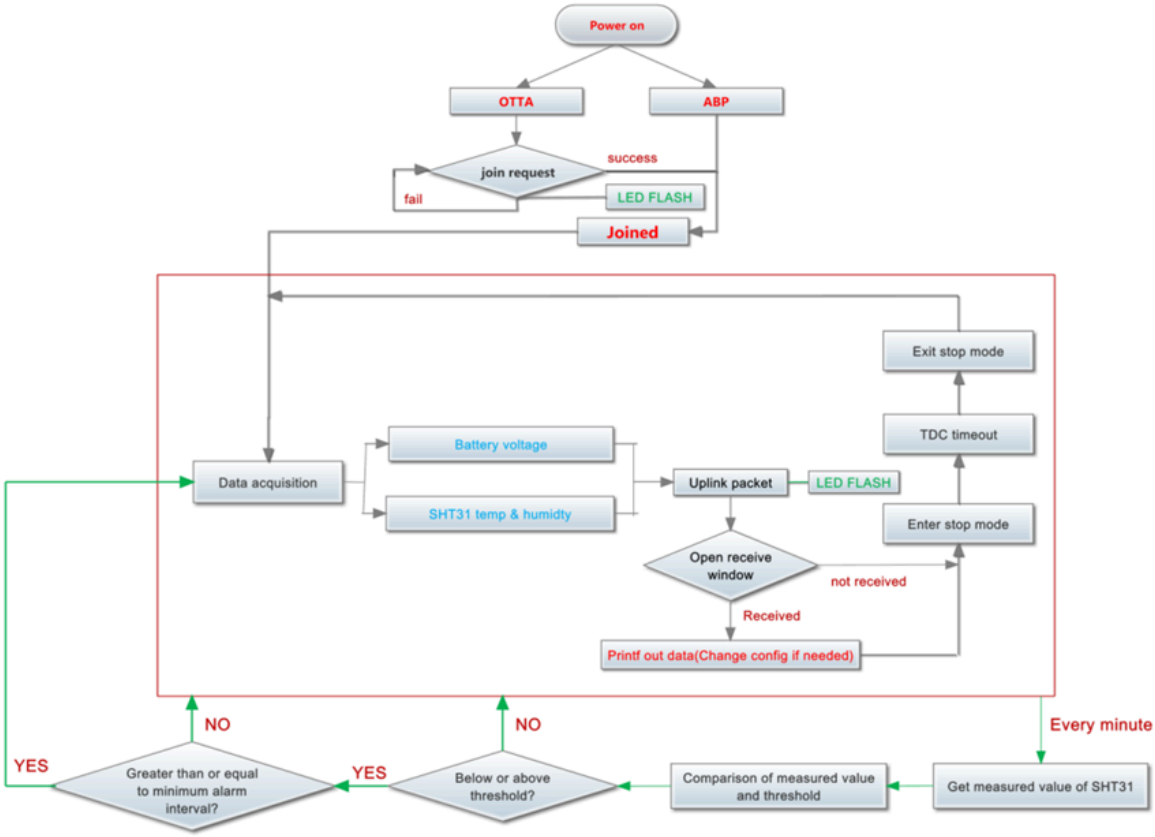

DRAGINO
LoRaWAN IOT
Sensor Node
Model: S31-LB
SHT31

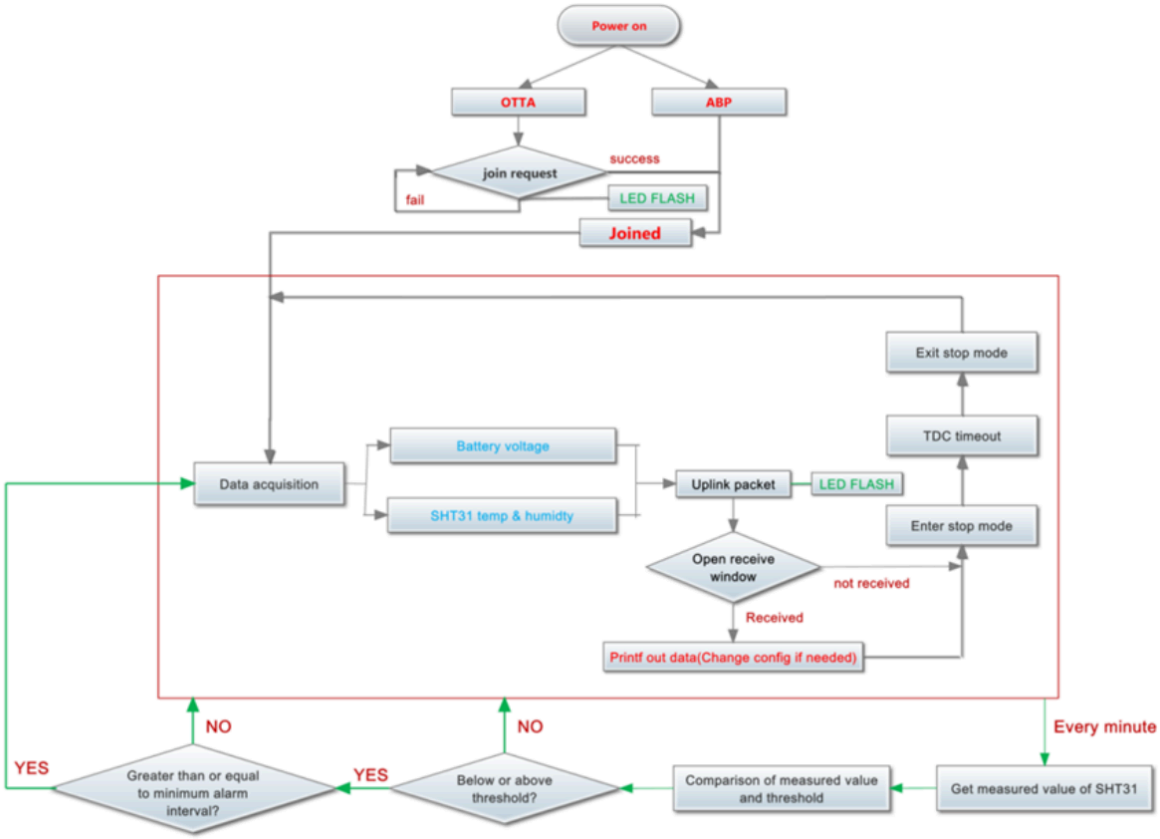

868
DRAGINO
LoRaWAN IOT
Sensor Node
Model: S31B-LB
DEV EUI: A8404197A186438D
SN: LST25578333
Made in China


S31-LB
ID: eui-70b3d57ed0058467
Last activity 23 seconds ago
Overview
Live data
Messaging
Location
Payload formatters
Claiming
General settings
Time
Type
Data preview
Schedule data downlink for transmissi…
Forward uplink data message
Successfully processed data message
S31-LB
ID: eui-70b3d57ed0058467
Last activity 26 seconds ago
Overview
Live data
Messaging
Location
Payload formatters
Claiming
General settings
Verbose stream
Export as JSON
Schedule data downlink for transmissi…
Forward uplink data message
Successfully processed data message
Forward uplink data message


Registration Key,
Please keep it safely.
DEV EUI: A84041C161
APP EUI: A8404100C00
APP KEY: 7EC8A9C917386DFC5DBF73B
SN: LST2565
7


LED
Power Jumper
UART
GND
TXD
RXD
VDD
+5V
PA4
SCL
SDA
PC13
PB9
PB8
PA8
GND
ISP
RUN
PA5
DRAGINO


Power on
OTTA
ABP
join request
success
fail
LED FLASH
Joined
Exit stop mode
TDC timeout
Battery voltage
Data acquisition
SHT31 temp & humidty
Uplink packet
LED FLASH
Enter stop mode
Open receive window
not received
Received
Printf out data(Change config if needed)
NO
NO
Every minute
YES
Greater than or equal to minimum alarm interval?
YES
Below or above threshold?
Comparison of measured value and threshold
Get measured value of SHT31


Power on
OTTA
ABP
join request
success
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Exit stop mode
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Battery voltage
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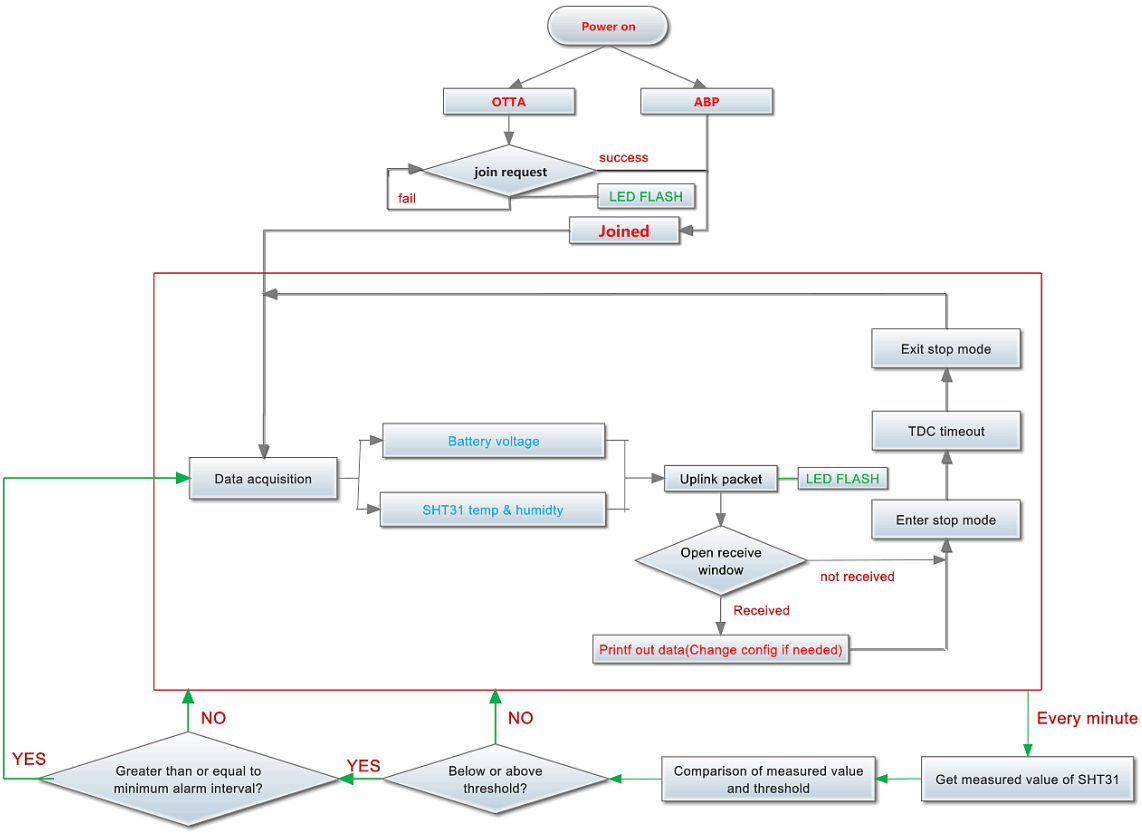
Get measured value of SHT31


Power on
OTTA
ABP
join request
success
fail
LED FLASH
Joined
Exit stop mode
TDC timeout
Battery voltage
Data acquisition
SHT31 temp & humidty
Uplink packet
LED FLASH
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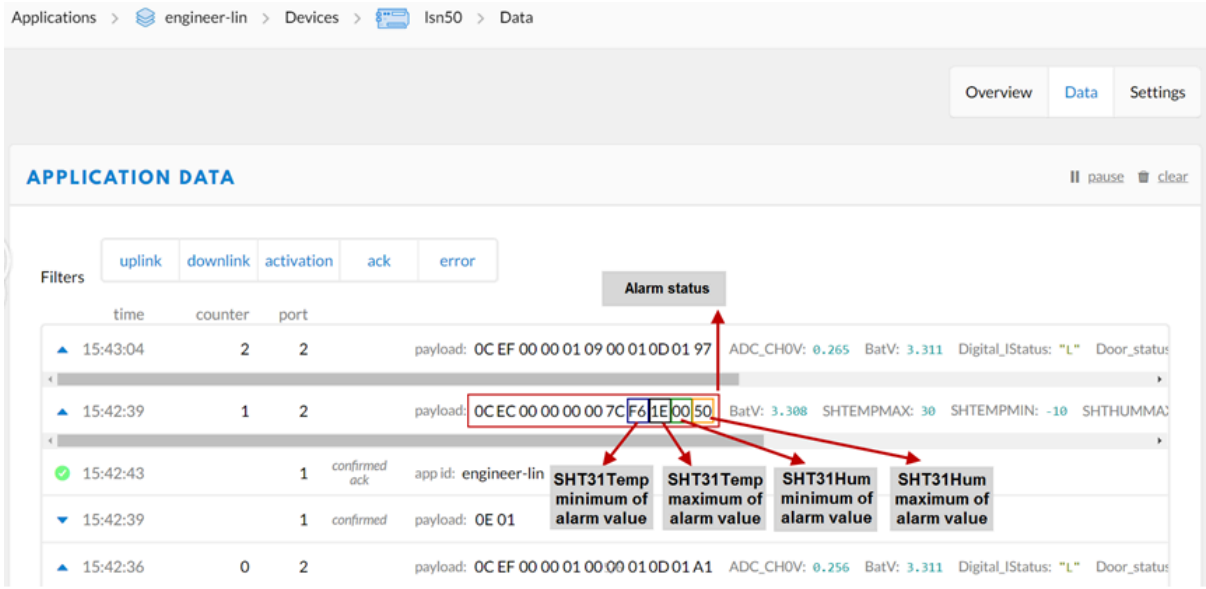
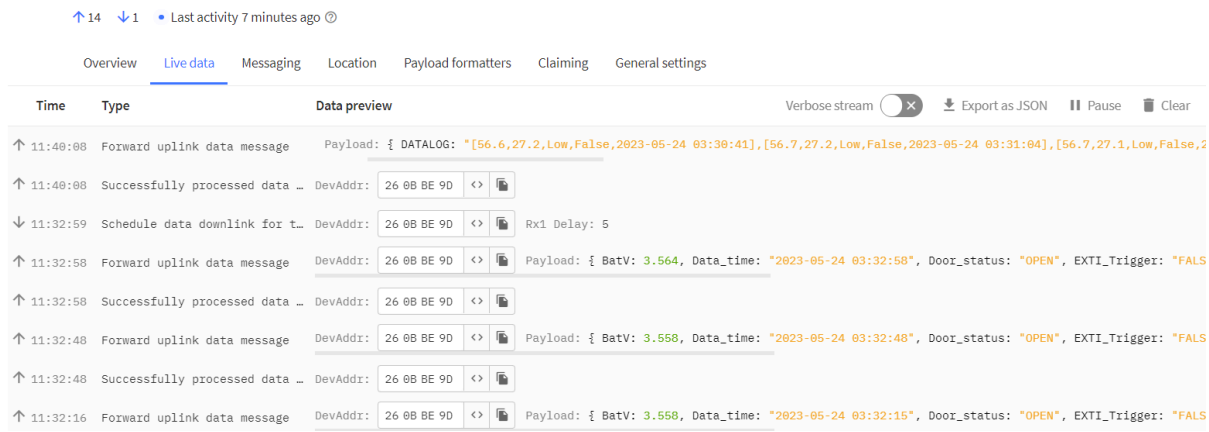
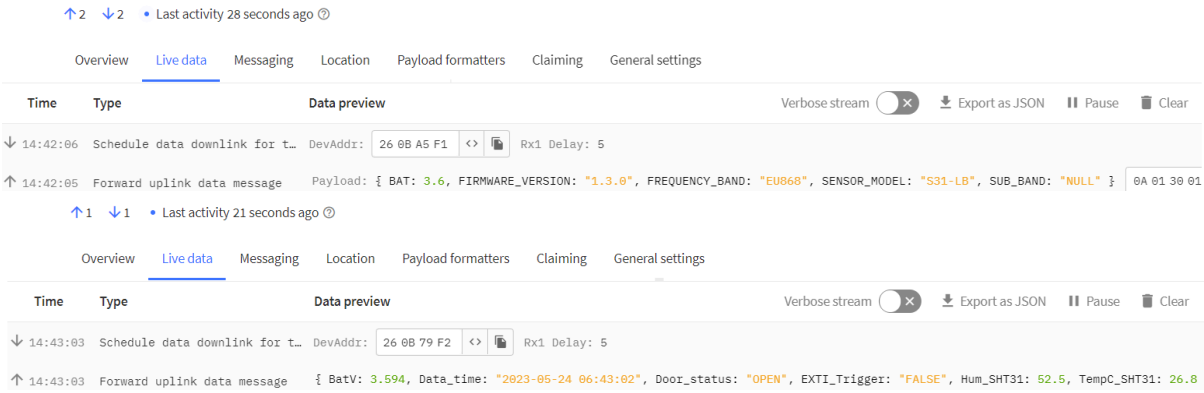
not received
Received
Printf out data(Change config if needed)
NO
NO
Every minute
YES
Greater than or equal to minimum alarm interval?
YES
Below or above threshold?
Comparison of measured value and threshold
Get measured value of SHT31



Bits	7	6	[5:2]	1	0
mean	No ACK Message	Poll Message Flag	Reserved	Level of PA8	Alarm Flag

```
Stop Tx events when read sensor data
8031080 2023/5/24 03:30:41 3558 temp=27.2 hum=56.6 level:low status:false
8031090 2023/5/24 03:31:04 3564 temp=27.2 hum=56.7 level:low status:false
80310A0 2023/5/24 03:31:16 3564 temp=27.1 hum=56.7 level:low status:false
80310B0 2023/5/24 03:31:36 3564 temp=27.1 hum=57.0 level:low status:false
80310C0 2023/5/24 03:32:06 3558 temp=27.1 hum=57.2 level:low status:false

80310D0 2023/5/24 03:32:15 3558 temp=27.0 hum=57.3 level:low status:false
80310E0 2023/5/24 03:32:48 3558 temp=27.0 hum=57.5 level:low status:false
80310F0 2023/5/24 03:32:58 3564 temp=27.0 hum=57.6 level:low status:false
Start Tx events

OK
```

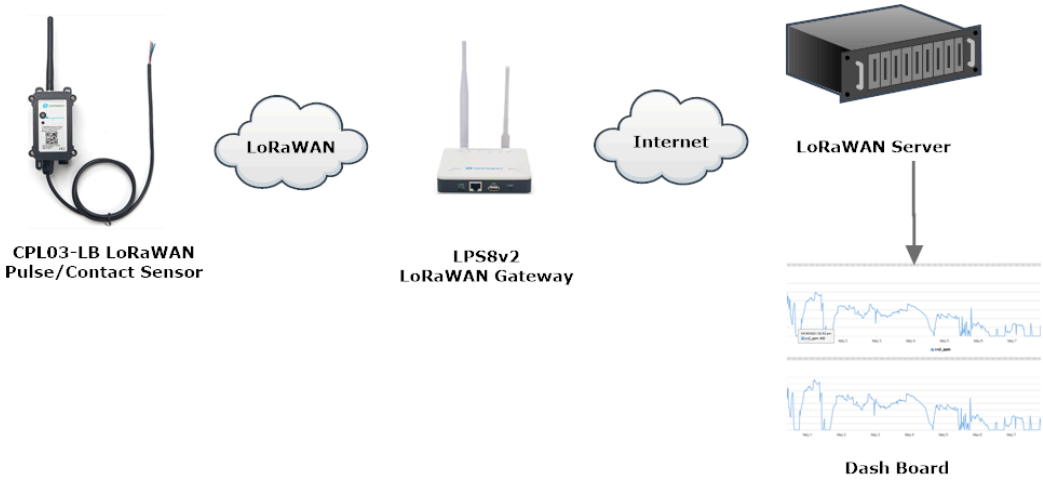



2 2 • Last activity 28 seconds ago
Overview Live data Messaging Location Payload formatters Claiming General settings
Time Type Data preview Verbose stream Export as JSON Pause Clear
14:42:06 Schedule data downlink for t… DevAddr: 26 0B A5 F1 Rx1 Delay: 5
14:42:05 Forward uplink data message Payload: { BAT: 3.6, FIRMWARE_VERSION: "1.3.0", FREQUENCY_BAND: "EU868", SENSOR_MODEL: "S31-LB", SUB_BAND: "NULL" } 0A 01 30 01
1 1 • Last activity 21 seconds ago
Overview Live data Messaging Location Payload formatters Claiming General settings
Time Type Data preview Verbose stream Export as JSON Pause Clear
14:43:03 Schedule data downlink for t… DevAddr: 26 0B 79 F2 Rx1 Delay: 5
14:43:03 Forward uplink data message { BatV: 3.594, Data_time: "2023-05-24 06:43:02", Door_status: "OPEN", EXTI_Trigger: "FALSE", Hum_SHT31: 52.5, TempC_SHT31: 26.8

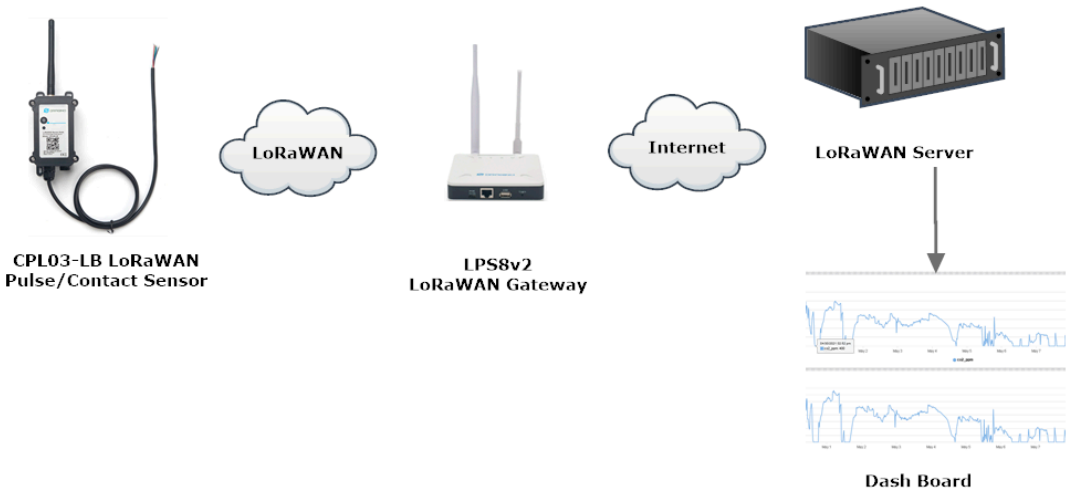

DRAGINO
LoRaWAN Sensor Node
Dry Contact/Open-Close Sensor
Model: CPL03-LB


DRAGINO
LoRaWAN Sensor Node
Dry Contact/Open-Close Sensor
Model: CPL03-LB

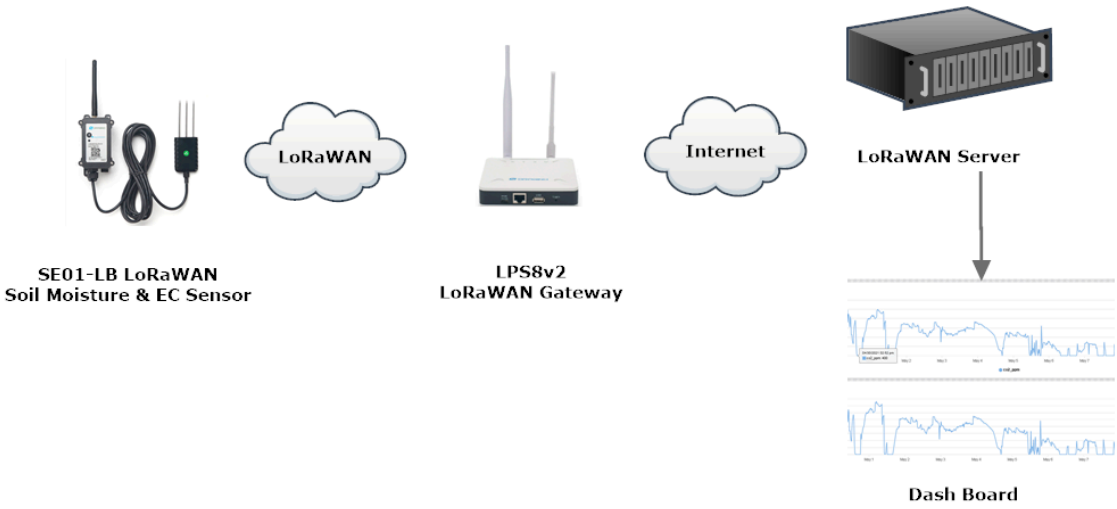
CPL03-LB in LoRaWAN Network



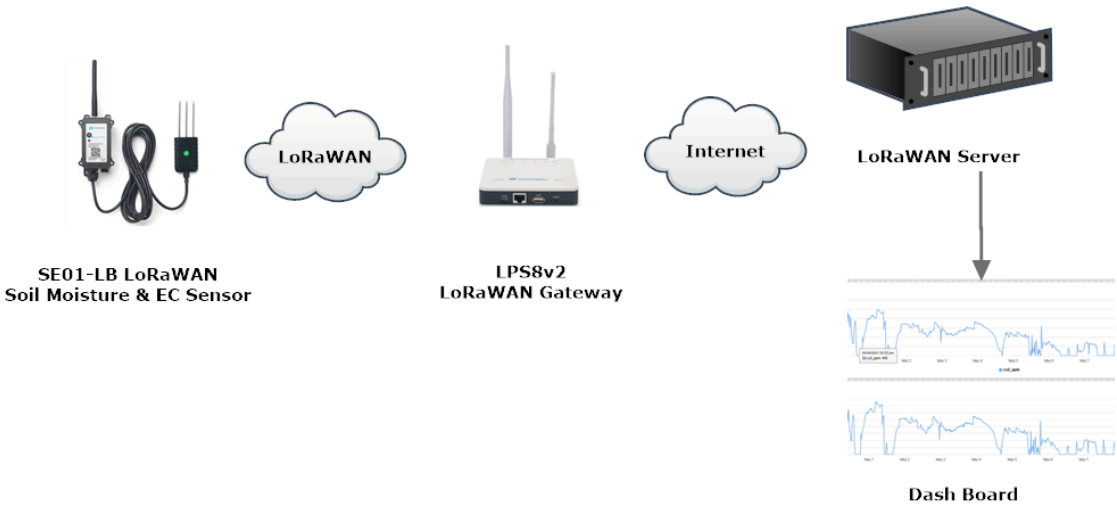
CPL03-LB in LoRaWAN Network



SE01-LB in LoRaWAN Network



SE01-LB in LoRaWAN Network

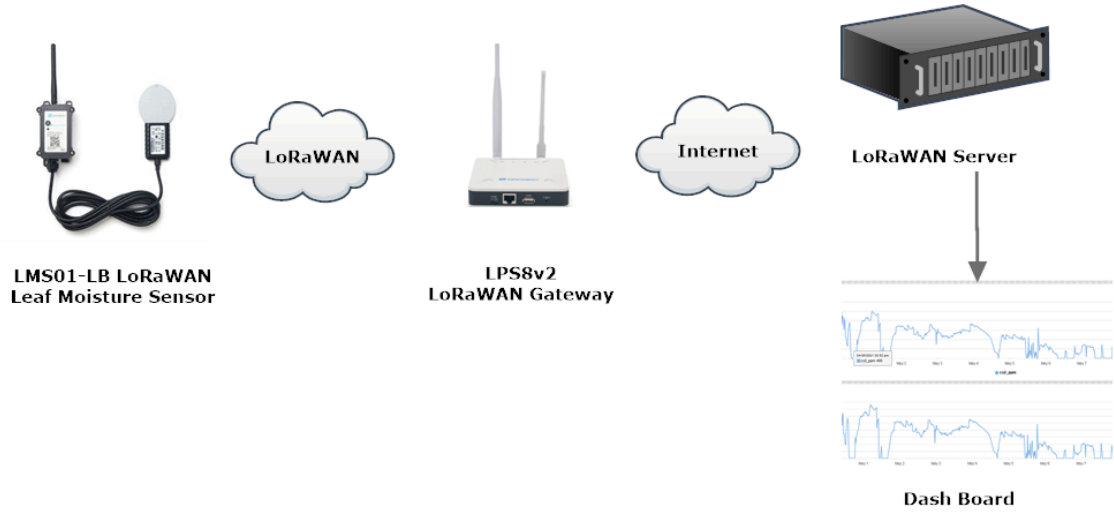



DRAGINO
LoRaWAN Soil Sensor
For Soil Moisture & EC
Model: SE01-LB

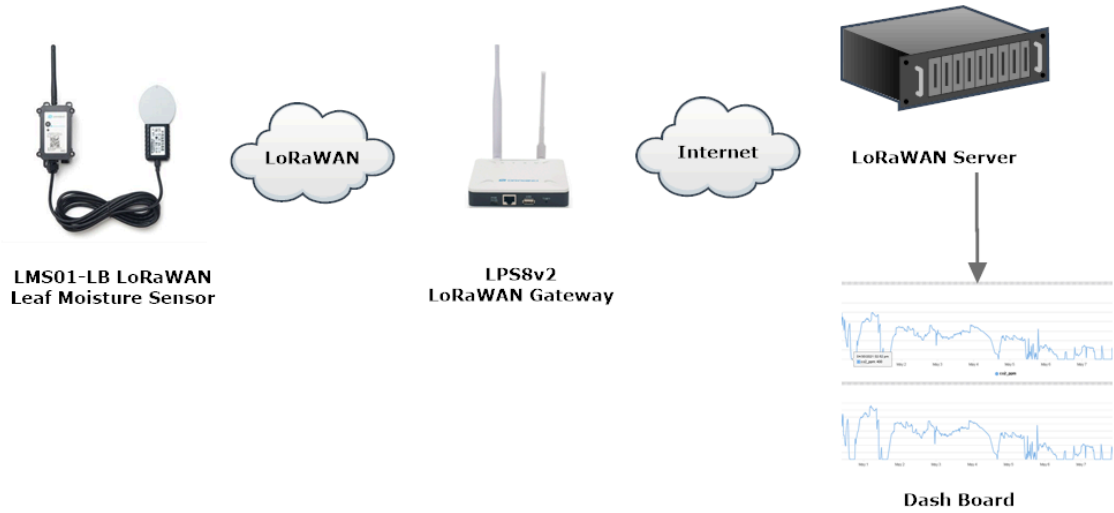
```
8031000 2023/6/6 07:09:17 3347 0 0 ds_temp=327.6 water_soil=0.00 temp_soil=28.36 conduct_soil=0
8031010 2023/6/6 07:10:31 3347 0 0 ds_temp=327.6 water_soil=0.00 temp_soil=28.42 conduct_soil=0
8031020 2023/6/6 07:11:31 3347 0 0 ds_temp=327.6 water_soil=0.00 temp_soil=28.42 conduct_soil=0

8031030 2023/6/6 07:12:31 3347 0 0 ds_temp=327.6 water_soil=0.00 temp_soil=28.35 conduct_soil=0

8031040 2023/6/6 07:13:31 3347 0 0 ds_temp=327.6 water_soil=0.00 temp_soil=28.31 conduct_soil=0
8031050 2023/6/6 07:14:31 3347 0 0 ds_temp=327.6 water_soil=0.00 temp_soil=28.21 conduct_soil=0
8031060 2023/6/6 07:15:31 3347 0 0 ds_temp=327.6 water_soil=0.00 temp_soil=28.28 conduct_soil=0
8031070 2023/6/6 07:16:31 3347 0 0 ds_temp=327.6 water_soil=0.00 temp_soil=28.34 conduct_soil=0

8031080 2023/6/6 07:17:31 3347 0 0 ds_temp=327.6 water_soil=0.00 temp_soil=28.41 conduct_soil=0
8031090 2023/6/6 07:18:31 3347 0 0 ds_temp=327.6 water_soil=0.00 temp_soil=28.52 conduct_soil=0
80310A0 2023/6/6 07:19:31 3347 0 0 ds_temp=327.6 water_soil=0.00 temp_soil=28.44 conduct_soil=0
80310B0 2023/6/6 07:20:31 3347 0 0 ds_temp=327.6 water_soil=0.00 temp_soil=28.46 conduct_soil=0

80310C0 2023/6/6 07:21:31 3347 0 0 ds_temp=327.6 water_soil=0.00 temp_soil=28.52 conduct_soil=0
80310D0 2023/6/6 07:22:31 3347 0 0 ds_temp=327.6 water_soil=0.00 temp_soil=28.56 conduct_soil=0
80310E0 2023/6/6 07:23:31 3347 0 0 ds_temp=327.6 water_soil=0.00 temp_soil=28.63 conduct_soil=0
80310F0 2023/6/6 07:25:31 3347 0 0 ds_temp=327.6 water_soil=0.00 temp_soil=28.55 conduct_soil=0
8031100 2023/6/6 07:27:31 3347 0 0 ds_temp=327.6 water_soil=0.00 temp_soil=28.42 conduct_soil=0
```


DRAGINO

LMS01-LB in LoRaWAN Network



LMS01-LB in LoRaWAN Network




Sense Side