# LoRaWAN 4-Detect-Channels Distance Sensor User Manual

## Document Version: 1.1
## Image Version: v1.0

| Version | Description | Date |
|---|---|---|
| 1.0 | Release | 2021-Aug-19 |
| | | |
| | | |
| | | |
| | | |
| | | |

# 1. Introduction

## 1.1What is LoRaWAN 4-Channels Distance Sensor

The Dragino LDDS04 is a **LoRaWAN 4-Channels Distance Sensor** for Internet of Things solution. It is capable to add up to four Ultrasonic Sensors to measure four distances at the same time.

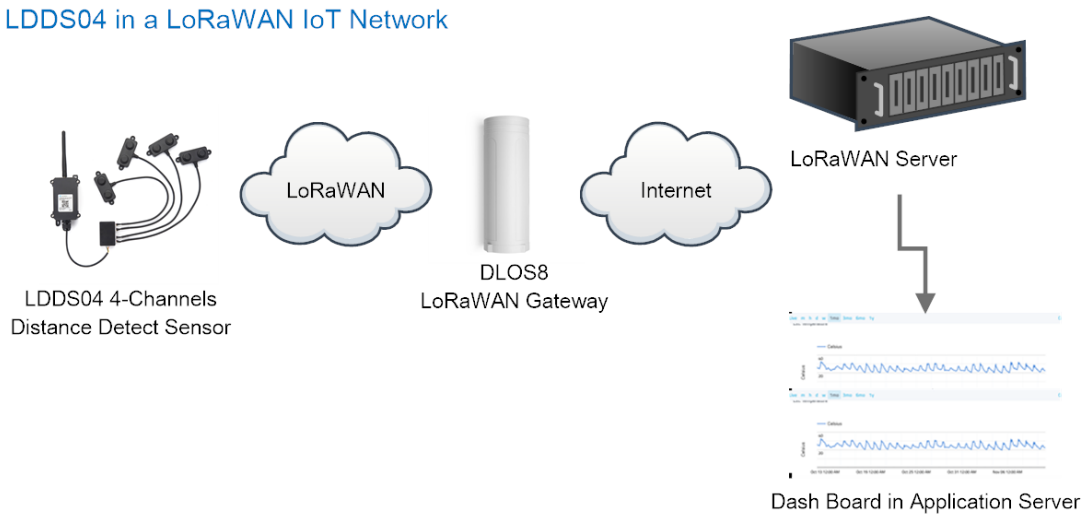
The LDDS04 can be applied to scenarios such as horizontal distance measurement, parking management system, object proximity and presence detection, intelligent trash can management system, robot obstacle avoidance, automatic control, sewer, etc.

It detects the distance between the measured object and the sensor, and uploads the value via wireless to LoRaWAN IoT Server.

The LoRa wireless technology used in LDDS04 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.

LDDS04 is powered by **8500mAh Li-SOCI2 battery**, it is designed for long term use up to 5 years.

Each LDDS04 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.



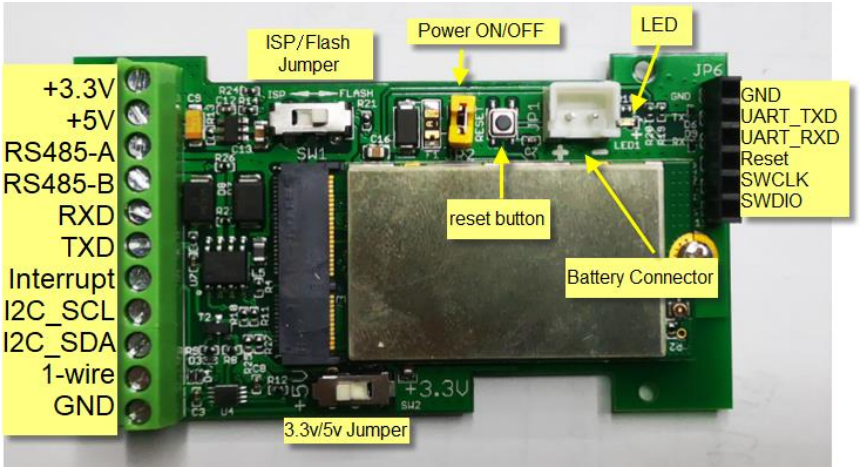
## 1.2Features

- ✧ LoRaWAN 1.0.3 Class A
- ✧ Ultra-low power consumption
- ✧ Detect Range: Base on External Probe
- ✧ Monitor Battery Level
- ✧ Bands: CN470/EU433/KR920/US915/EU868/AS923/AU915/IN865
- ✧ AT Commands to change parameters
- ✧ Uplink on periodically
- ✧ Downlink to change configure
- ✧ 8500mAh Battery for long term use

## 1.3Applications

- ✧ Horizontal distance measurement
- ✧ Parking management system
- ✧ Object proximity and presence detection
- ✧ Intelligent trash can management system
- ✧ Robot obstacle avoidance
- ✧ Automatic control
- ✧ Sewer

## 1.4Pin mapping and power on



## 1.5Probe Options

### 1.5.1 Probes Comparation

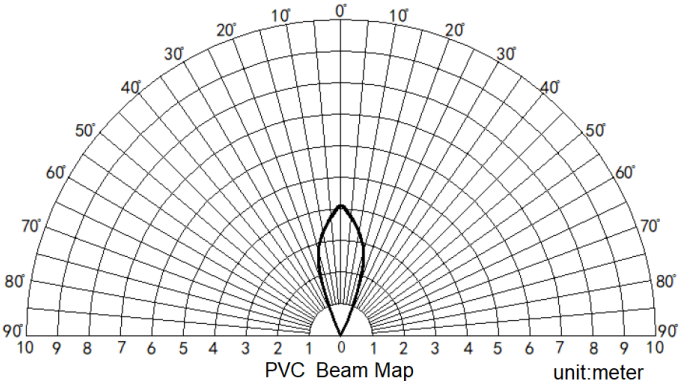
| Model | Photo | Description |
|---|---|---|
| A01A-15 |  | Detect Distance: 28 cm ~ 750 cm<br>Bling Spot Distance: 0 ~ 28cm<br>Accuracy: ±(1cm+S*0.3%) (S: Distance)<br>Measure Angle: ~ 40°<br>Cable Length: 1.5 meter<br>Temperature Compensation<br>Suitable for Flat Object Detect<br>IP67 Water Proof |
| A02-15 |  | Detect Distance: 3cm ~ 450cm<br>Bling Spot Distance: 0 ~ 3cm<br>Accuracy: ±(1cm+S*0.3%) (S: Distance)<br>Measure Angle: ~ 60°<br>Cable Length: 1.5 meter<br>Temperature Compensation<br>Suitable for Flat Object Detect, Rubbish Bin<br>IP67 Water Proof |
| A13-15 |  | Detect Distance: 25cm ~ 200cm<br>Bling Spot Distance: 0 ~ 25cm<br>Accuracy: ±(1cm+S*0.3%) (S: Distance)<br>Measure Angle: ~ 20°<br>Cable Length: 1.5 meter<br>Temperature Compensation<br>Suitable for Flat Object Detect, Rubbish Bin<br>IP67 Water Proof |
| A16-15 |  | Detect Distance: 50cm ~ 1500cm<br>Bling Spot Distance: 0 ~ 50cm<br>Accuracy: ±(1cm+S*0.3%) (S: Distance)<br>Measure Angle: ~ 40°<br>Cable Length: 1.5 meter<br>Temperature Compensation<br>Suitable for Long Distance Detect<br>IP67 Water Proof |

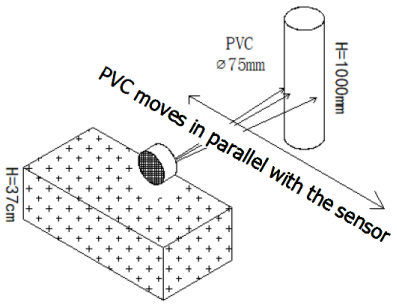
### 1.5.2 A01A-15 probe

A01A-15 is mainly used for plane distance measurement; it can carry out targeted measurement on plane objects and can measure long distances and high accuracy.

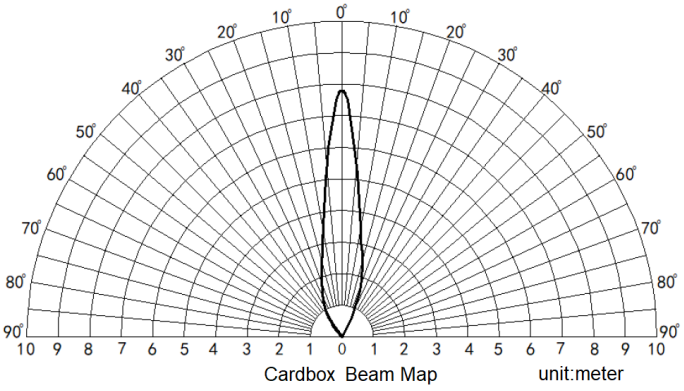
**Beam Chart:**

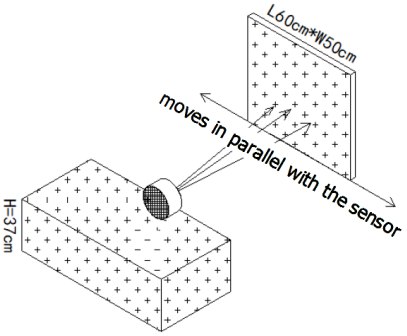
(1) The tested object is a white cylindrical tube made of PVC, with a height of 100cm and a diameter of 7.5cm.



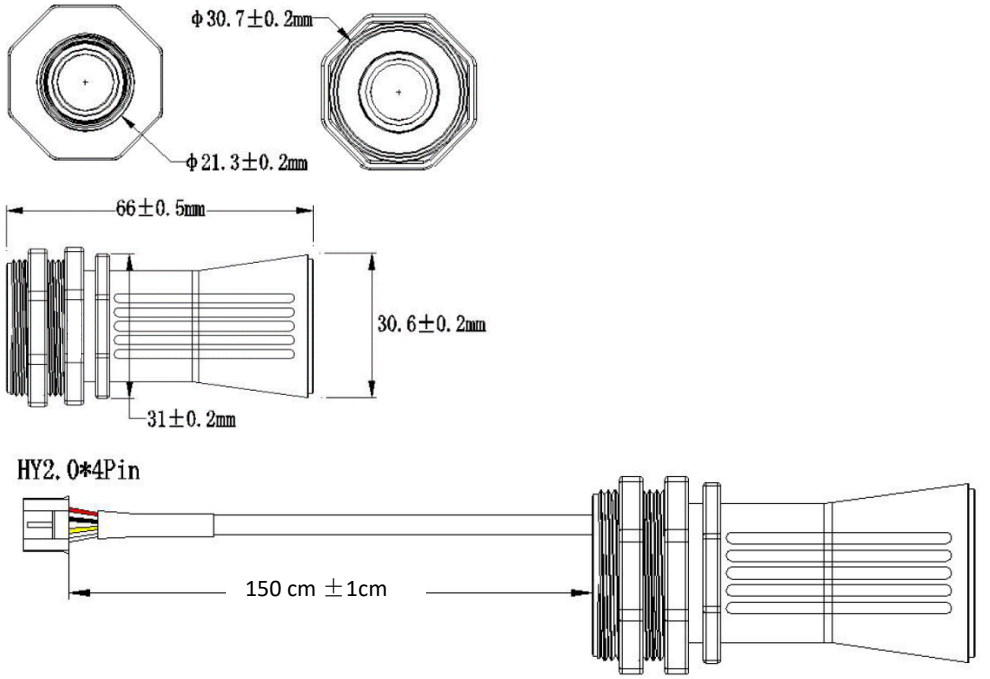




(2) The object to be tested is a "corrugated cardboard box" perpendicular to the central axis of 0 °, and the length * width is 60cm * 50cm.



## Mechanical:



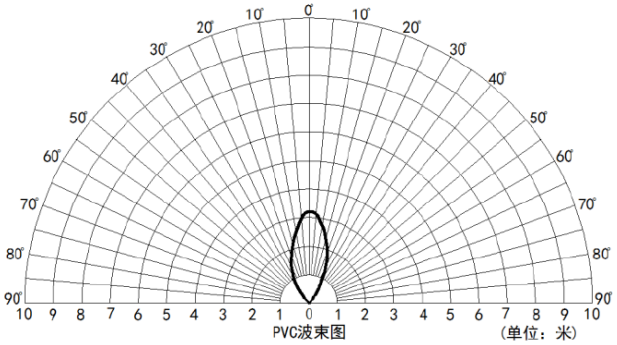

## Application:

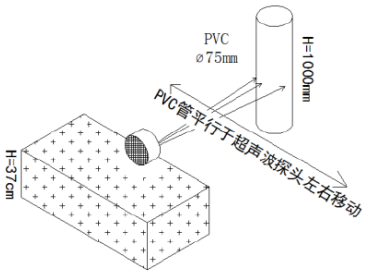


### 1.5.3 A02-15 probe

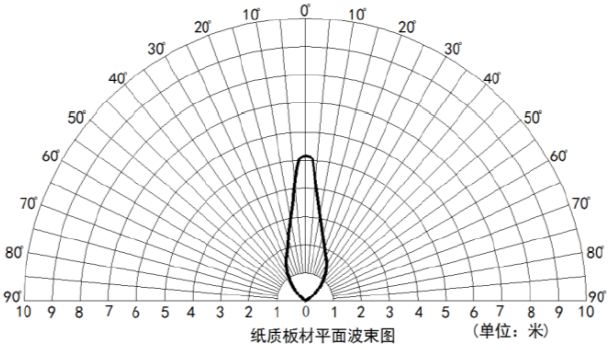
**Beam Chart:**

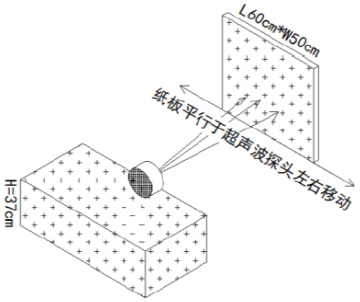
(1) The tested object is a white cylindrical tube made of PVC, with a height of 100cm and a diameter of 7.5cm.



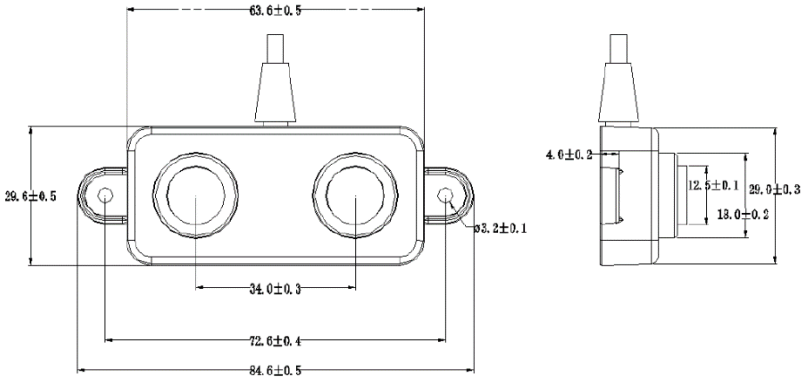




(2) The object to be tested is a "corrugated cardboard box" perpendicular to the central axis of 0 °, and the length * width is 60cm * 50cm.




**Mechanical:**

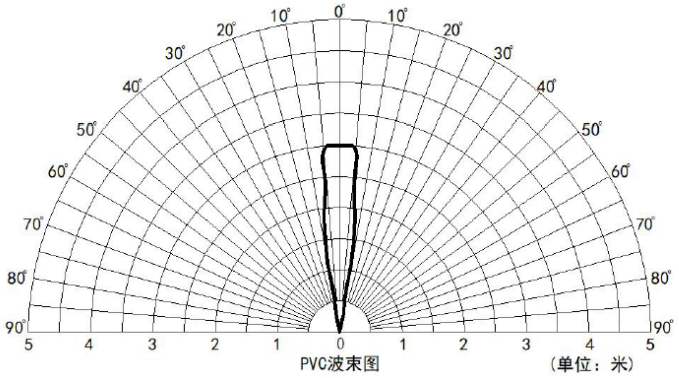


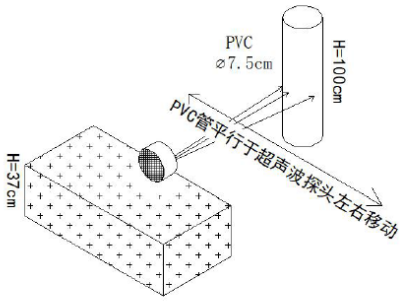

**Application:**

### 1.5.4 A13-15 probe

**Beam Chart:**

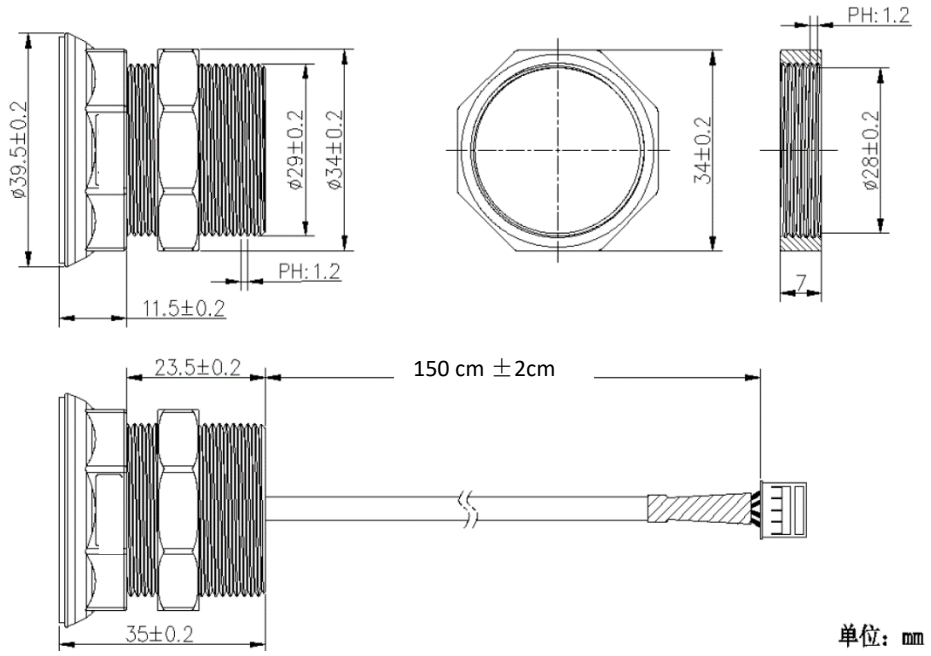
(1) The tested object is a white cylindrical tube made of PVC, with a height of 100cm and a diameter of 7.5cm.



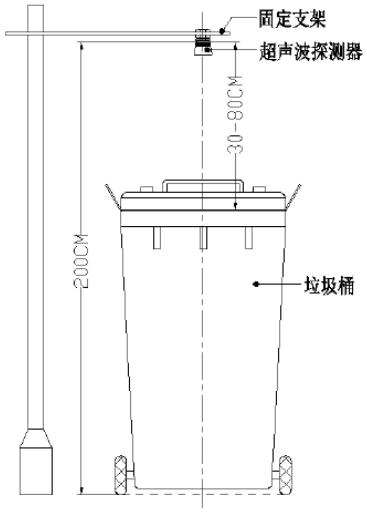

(2) The object to be tested is a "corrugated cardboard box" perpendicular to the central axis of 0 °, and the length * width is 60cm * 50cm.

**Mechanical:**



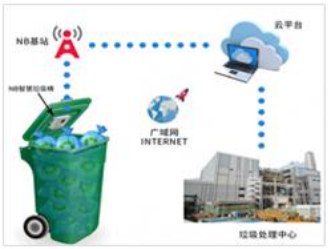
## Installation Requirement:

1) The effective detection range of the product is 25cm-200cm, so the vertical distance between the installation position of the module and the bottom of the trash bin is required to be less than 200cm.
2) The installation position of the product should be perpendicular to the trash bin to maintain a good horizontal plane, and be located at the center of the trash bin diameter;
3) In order to effectively filter out the reflection echo from the diameter of the trash bin and baffle, the distance between the installation position of the module and the edge of the diameter of the trash bin (non-vertical horizontal distance) is required to be 30cm
For trash bins between 80cm and 25cm in diameter, it is recommended that the installation position of the module and the height of the trash bin (the vertical and horizontal distance) be 30cm. For trash bins with a diameter of about 60cm, it is recommended that the installation position of the module and the height of the trash bin (vertical horizontal distance) be between 30cm-50cm. There is no such restriction on large-diameter (>60cm) trash bins.




超声波探测器安装示意图

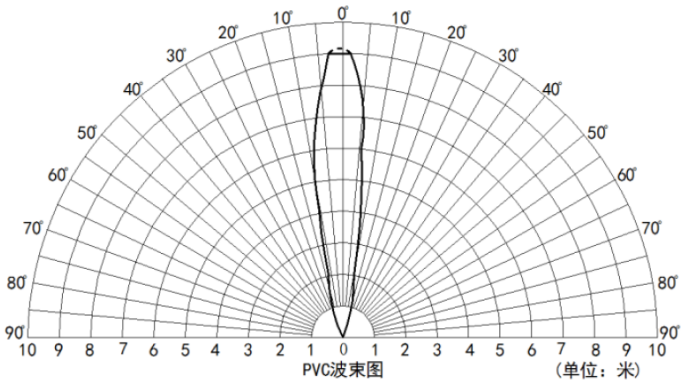
## Application:

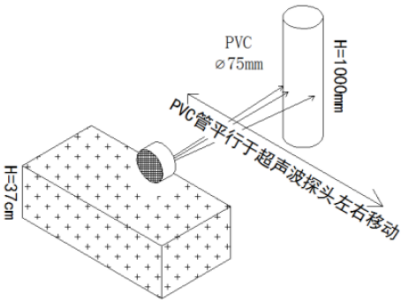



### 1.5.5 A16-15 probe

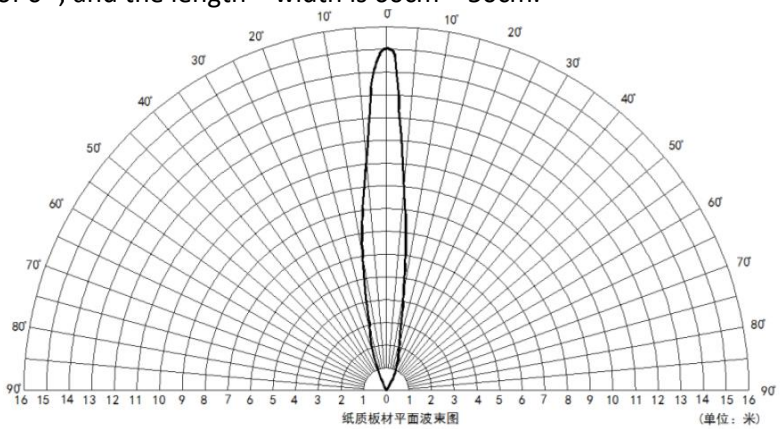
**Beam Chart:**

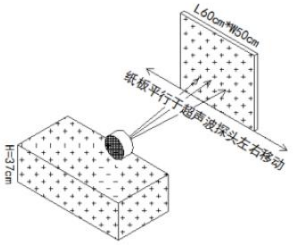
(1) The tested object is a white cylindrical tube made of PVC, with a height of 100cm and a diameter of 7.5cm.



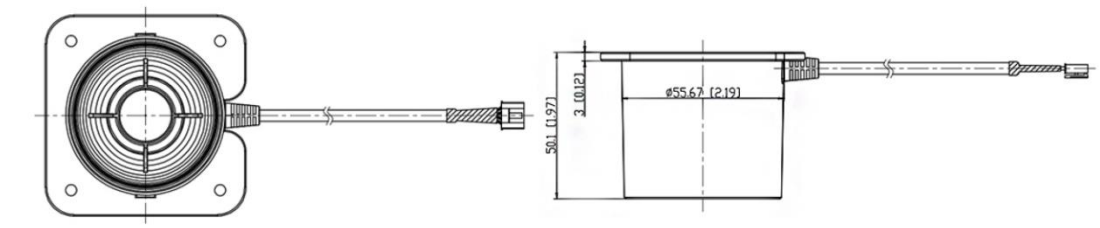



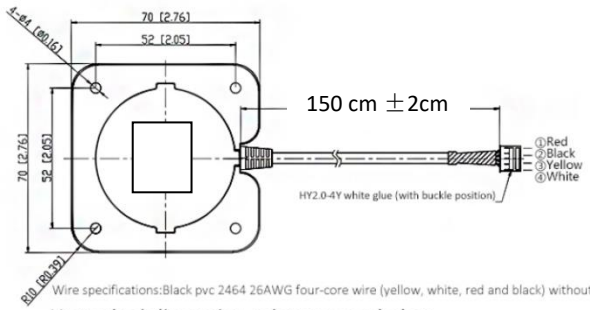

(2) The object to be tested is a "corrugated cardboard box" perpendicular to the central axis of 0 °, and the length * width is 60cm * 50cm.



## Mechanical:




Wire specifications:Black pvc 2464 26AWG four-core wire (yellow, white, red and black) without shielding

Unmarked dimension tolerances as below.

| TOLERANCE (mm) | 0~10 | ≥10~30 | ≥30~50 | ≥50~100 | ≥100~200 |
|---|---|---|---|---|---|
| | ±0.1 | ±0.15 | ±0.2 | ±0.3 | ±0.5 |

## Application:

# 2. Configure LDDS04 to connect to LoRaWAN network

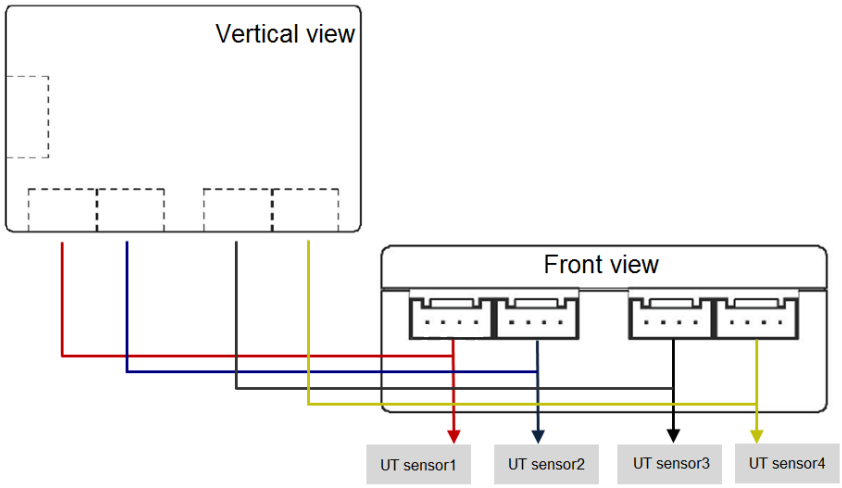
## 2.1How it works

The LDDS04 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 power on the LDDS04. It will automatically join the network via OTAA and start to send the sensor value. The default uplink interval is 20 minutes.

## 2.2Connect Probe

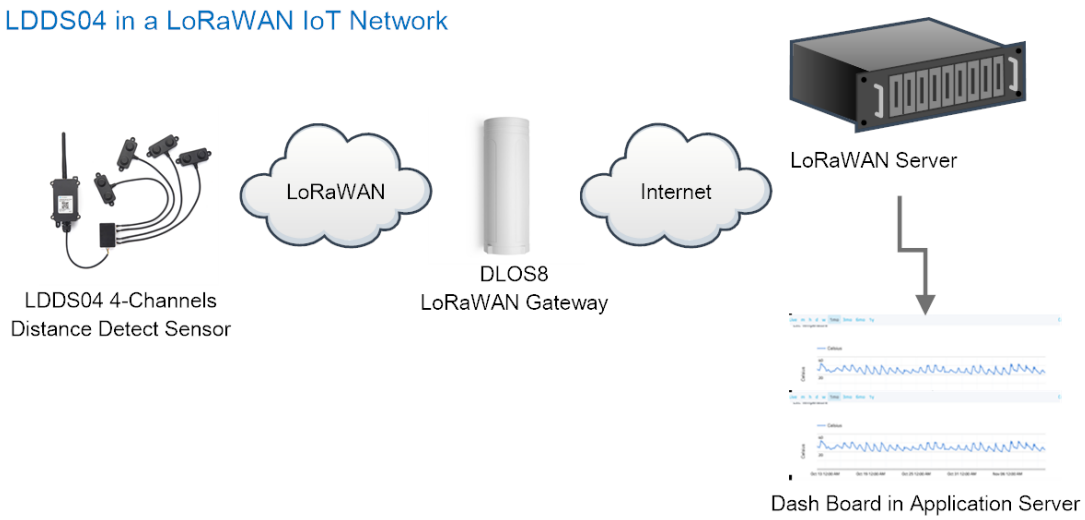
LDDS04 has a converter, User need to connect the Ultrasonic Probes to the convert as below. Different probes are supported, please see this link for the probe options.

Probe mapping as below.



## 2.3Quick 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 DLOS8 as a LoRaWAN gateway in this example.

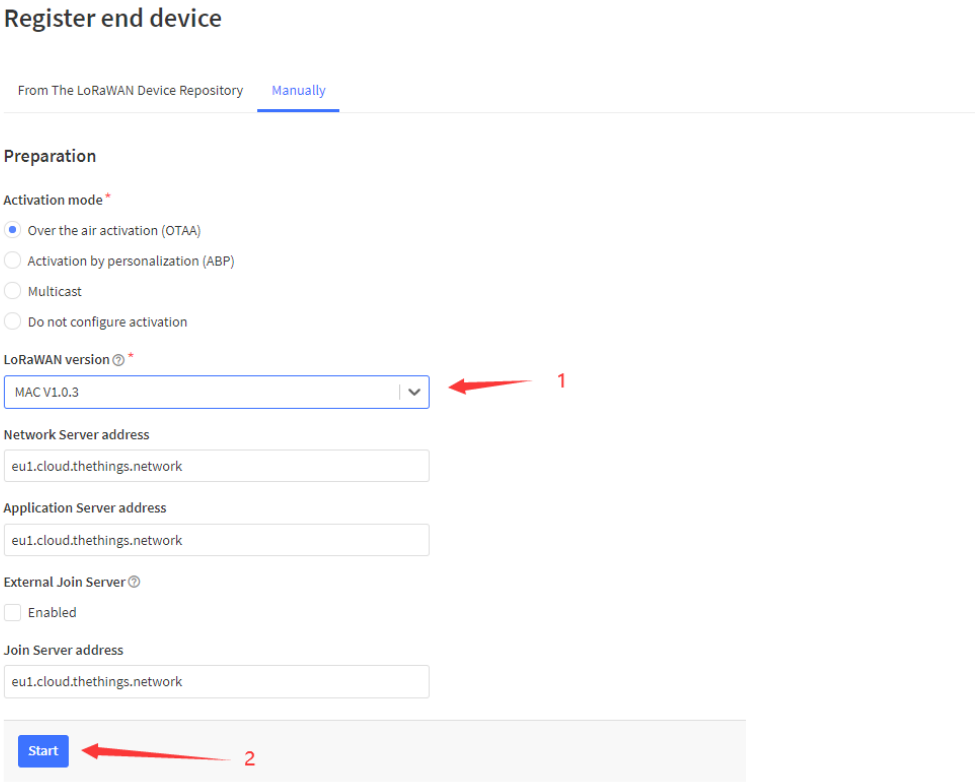



The LG308 is already set to connected to TTN network , so what we need to now is configure the TTN server.

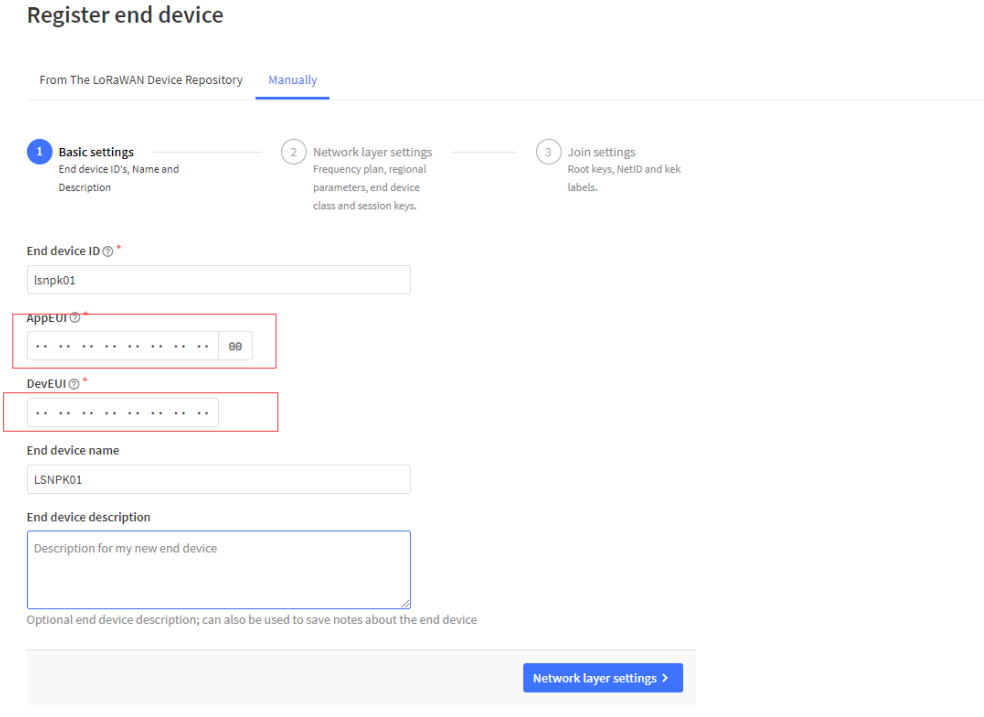
**Step 1**: Create a device in TTN with the OTAA keys from LDDS04.
Each LDDS04 is shipped with a sticker with the default device EUI as below:


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

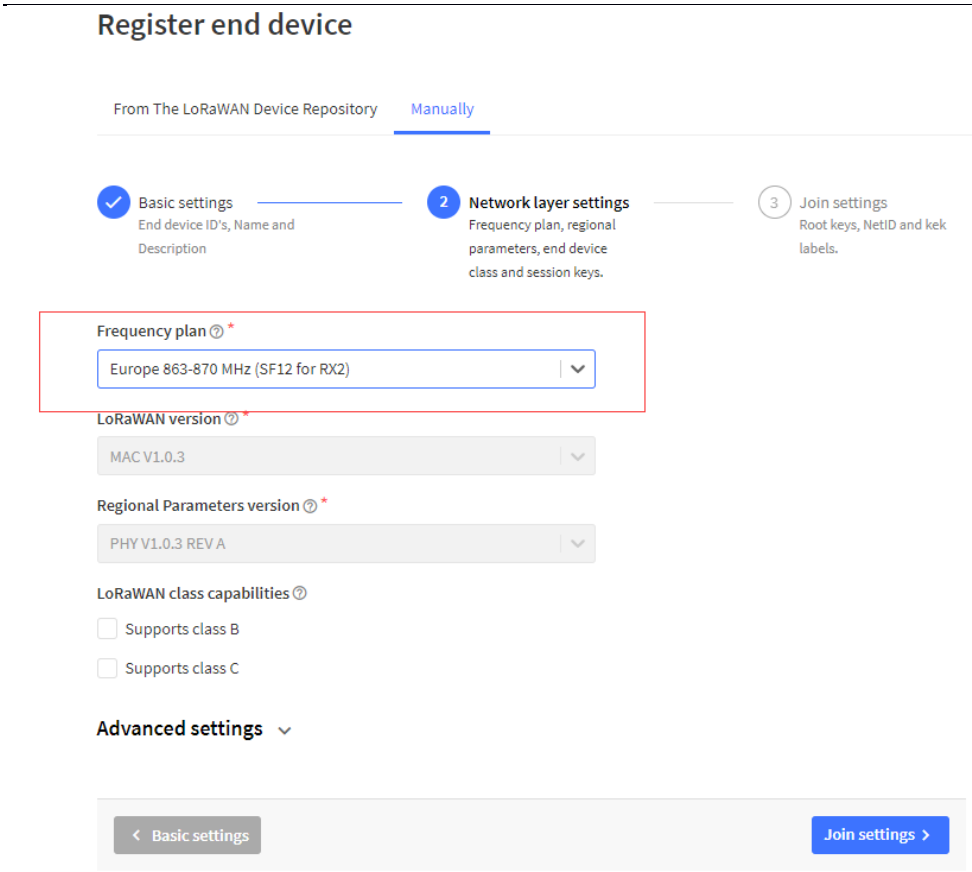
**Register the device**



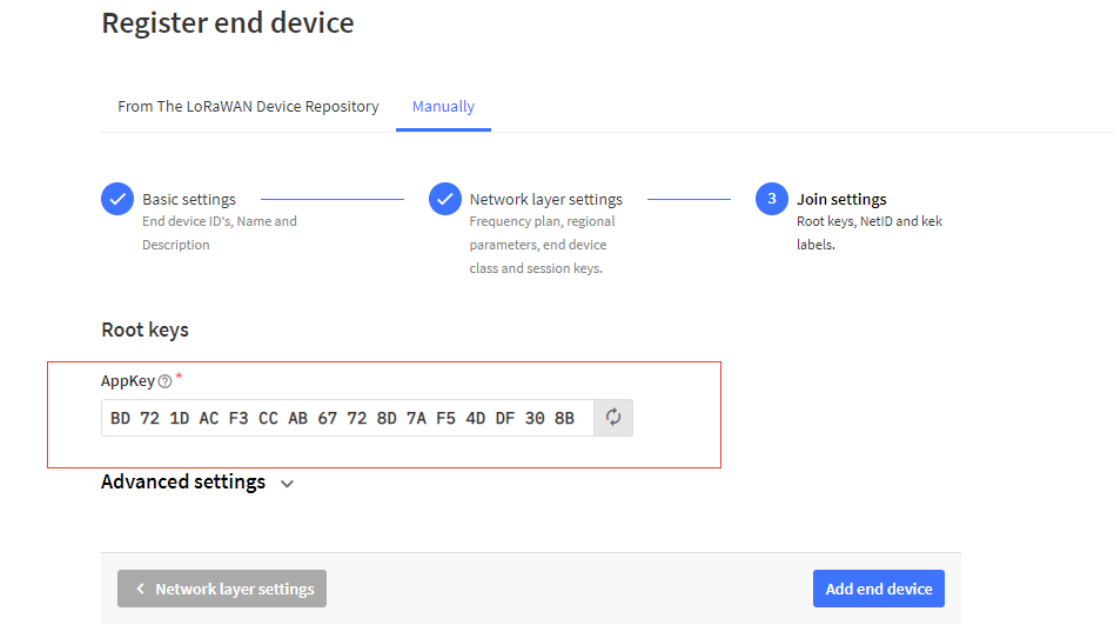

## Add APP EUI and DEV EUI




## 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

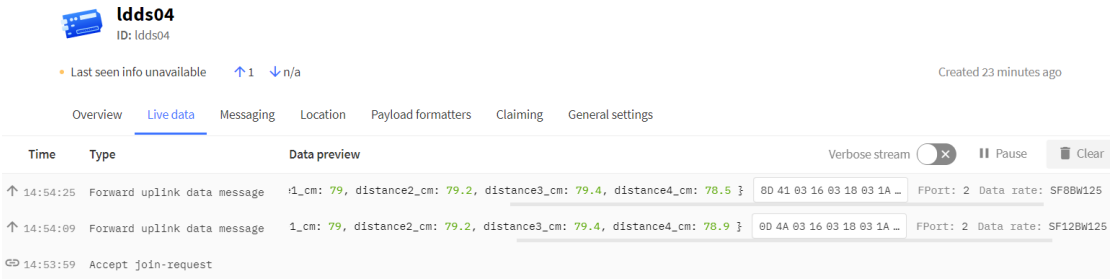
**Add APP KEY**


Register end device
From The LoRaWAN Device Repository
Manually
Basic settings
End device ID's, Name and Description
Network layer settings
Frequency plan, regional parameters, end device class and session keys.
3
Join settings
Root keys, NetID and kek labels.
Root keys
AppKey *
BD 72 1D AC F3 CC AB 67 72 8D 7A F5 4D DF 30 8B
Advanced settings
Network layer settings
Add end device

**Step 2**: Power on LDDS04

Put a Jumper on JP2 to power on the device. (The Switch must be in FLASH position).

**Step 3:** The LDDS04 will auto join to the TTN network. After join success, it will start to upload messages to TTN and you can see the messages in the panel.

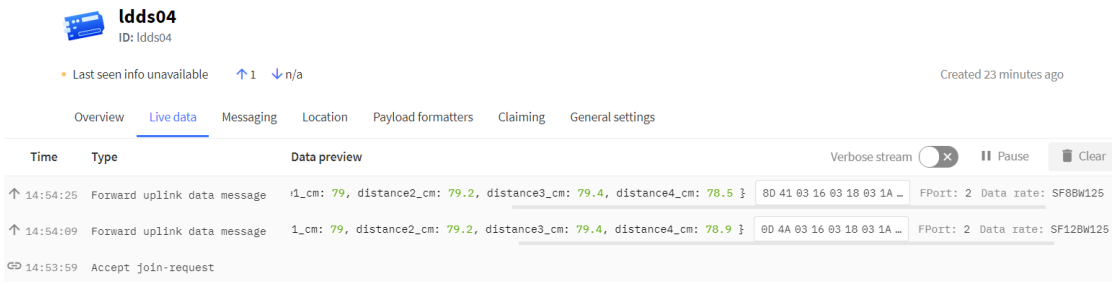


## 2.4Uplink Payload

LDDS04 will uplink payload via LoRaWAN with below payload format:

Uplink payload includes in total 11 bytes.

| Size (bytes) | 2 | 2 | 2 | 2 | 2 | 1 |
|---|---|---|---|---|---|---|
| **Value** | BAT & Interrupt_flag | Distance of UT sensor1 | Distance of UT sensor2 | Distance of UT sensor3 | Distance of UT sensor4 | Message Type |




### 2.4.1 Battery Info

Check the battery voltage for LDDS04.
Ex1: 0x0D4A & 0x3FFF = 3402mV
Ex2: 0x8D41 & 0x3FFF = 3393mV

### 2.4.2 Interrupt Pin

This bit shows if uplink packet is generated by Interrupt Pin or not. Click here for the hardware and software set up. Note: The Internet Pin is a separate pin in the screw terminal. See pin mapping.

Example:

(0x0D4A & 0x8000) >>15 = 0: Normal uplink packet.
(0x8D41 & 0x8000) >>15 = 1: Interrupt Uplink Packet.

### 2.4.3 Distance

The measuring distance of the four distance measuring modules, the default unit is cm.

**Example**:
Uplink Payload: 0D 4A 03 16 03 18 03 1A 03 15 01

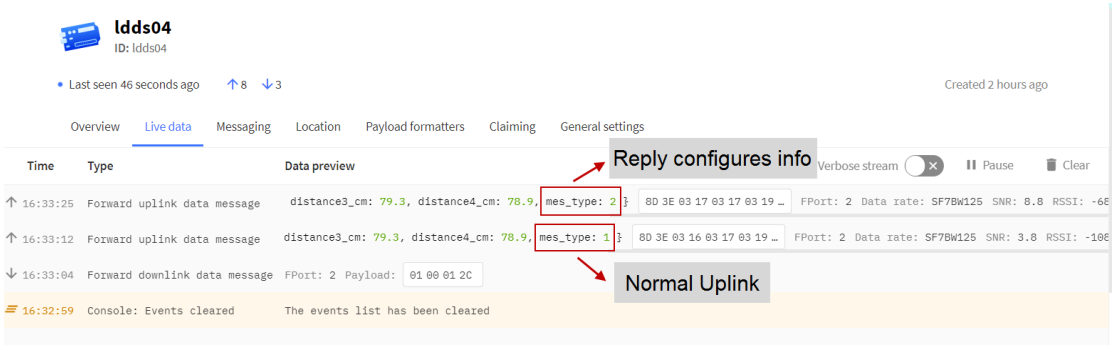
Data analysis:

Distance of UT sensor1 : 0316(H) = 790 (D)/10 = 79cm.
Distance of UT sensor2 : 0318(H) = 792 (D)/10 = 79.2cm.
Distance of UT sensor3 : 031A(H) = 794 (D)/10 = 79.4cm.
Distance of UT sensor4 : 0315(H) = 789 (D)/10 = 78.9cm.

### 2.4.4 Message Type

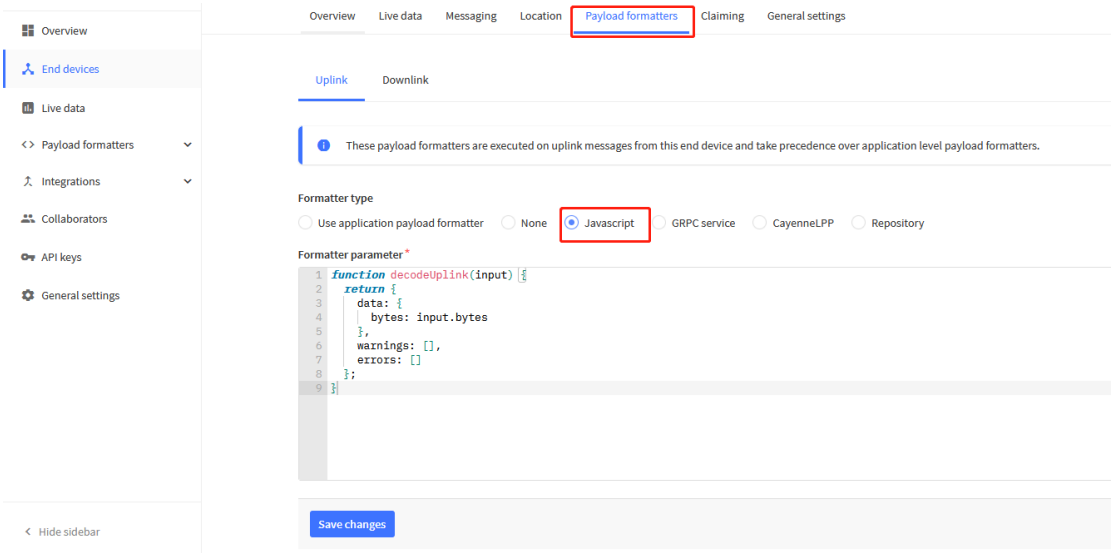
For a normal uplink payload, the message type is always 0x01.
Valid Message Type:

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



### 2.4.5 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:
LDDS04 TTN Payload Decoder:
https://www.dragino.com/downloads/index.php?dir=LoRa_End_Node/LDDS04/Decoder/

```
function Decoder(bytes, port) {
  var decode = {};
  var value=(bytes[0]<<8 | bytes[1]) & 0x3FFF;
  decode.BatV= value/1000;
  decode.EXTI_Trigger=(bytes[0] & 0x80)? "TRUE":"FALSE";
  decode.distance1_cm=(bytes[2]<<8 | bytes[3])/10;
  decode.distance2_cm=(bytes[4]<<8 | bytes[5])/10;
  decode.distance3_cm=(bytes[6]<<8 | bytes[7])/10
  decode.distance4_cm=(bytes[8]<<8 | bytes[9])/10;
  decode.mes_type= bytes[10];

  if(!((bytes[0]==0x03)&&(bytes[10]==0x02)))
  {
    return decode;
  }
}
```

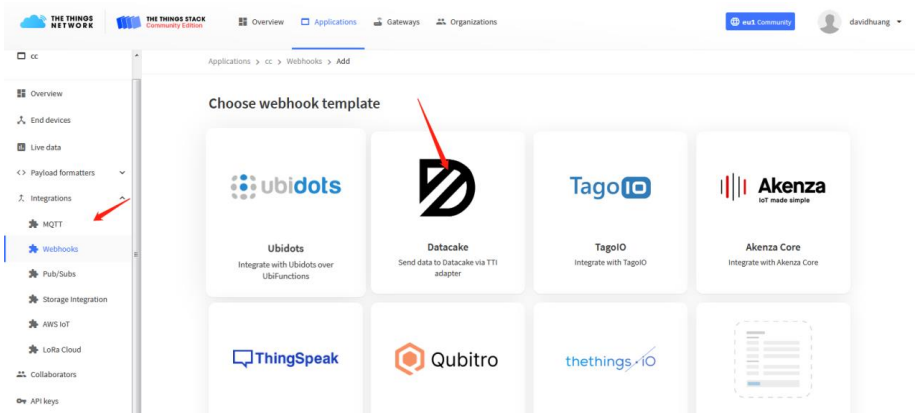
## 2.5Uplink Interval

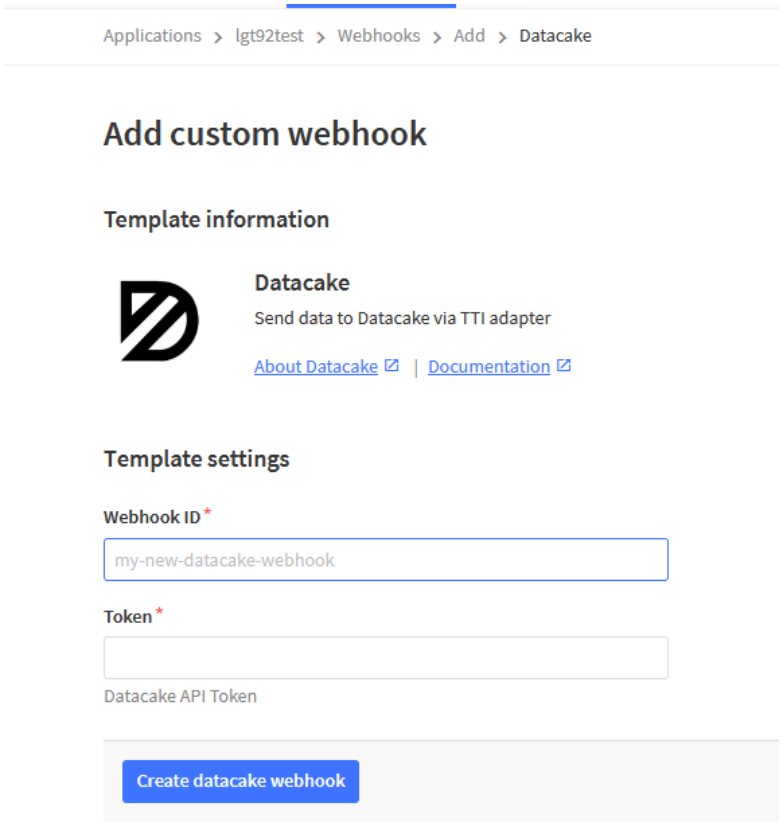
The LDDS04 by default uplink the sensor data every 20 minutes. User can change this interval by AT Command or LoRaWAN Downlink Command. See this link:
http://wiki.dragino.com/index.php?title=End_Device_AT_Commands_and_Downlink_Commands#Change_Uplink_Interval

## 2.6Show 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 LDDS04 product.

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

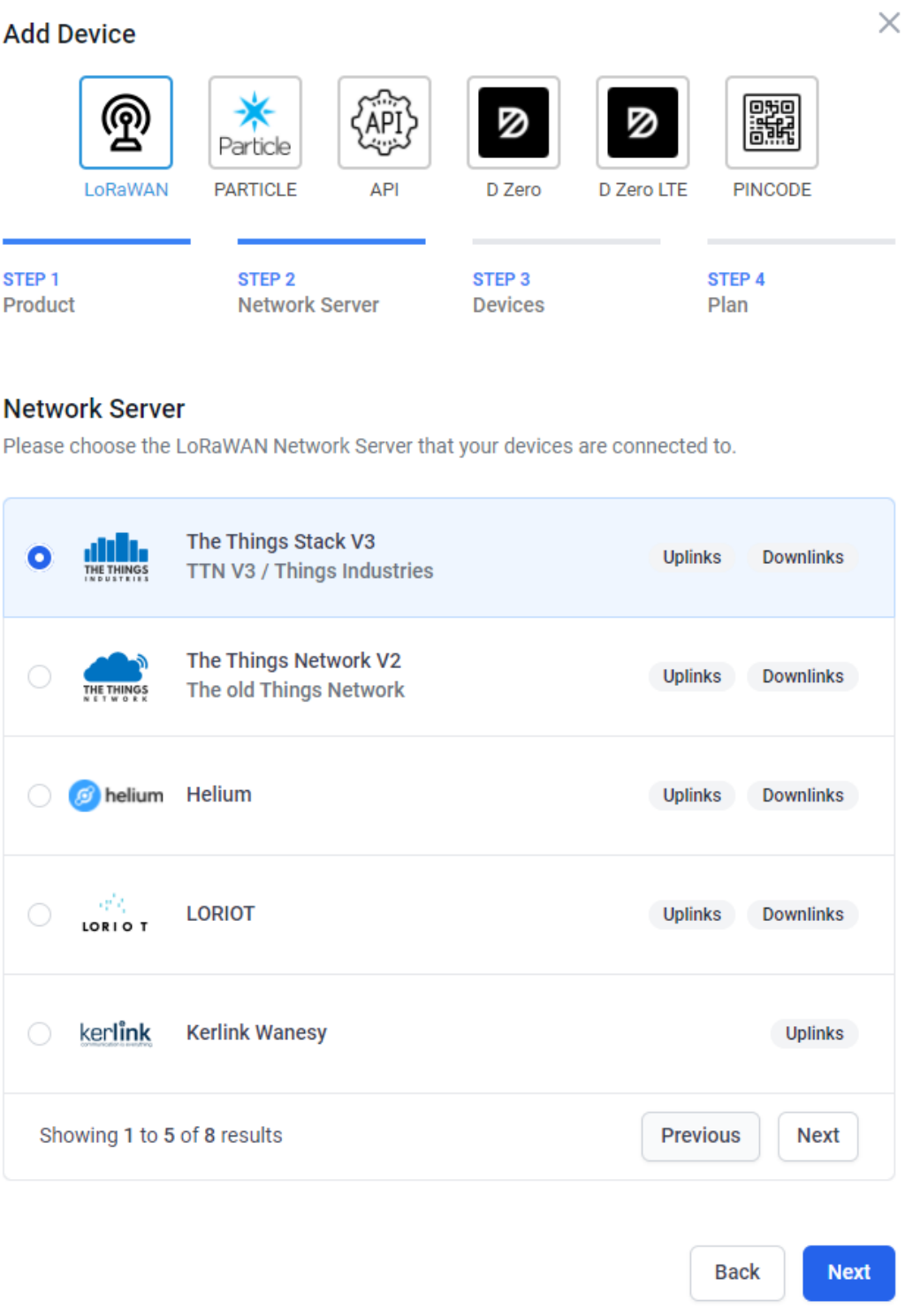
## New Product

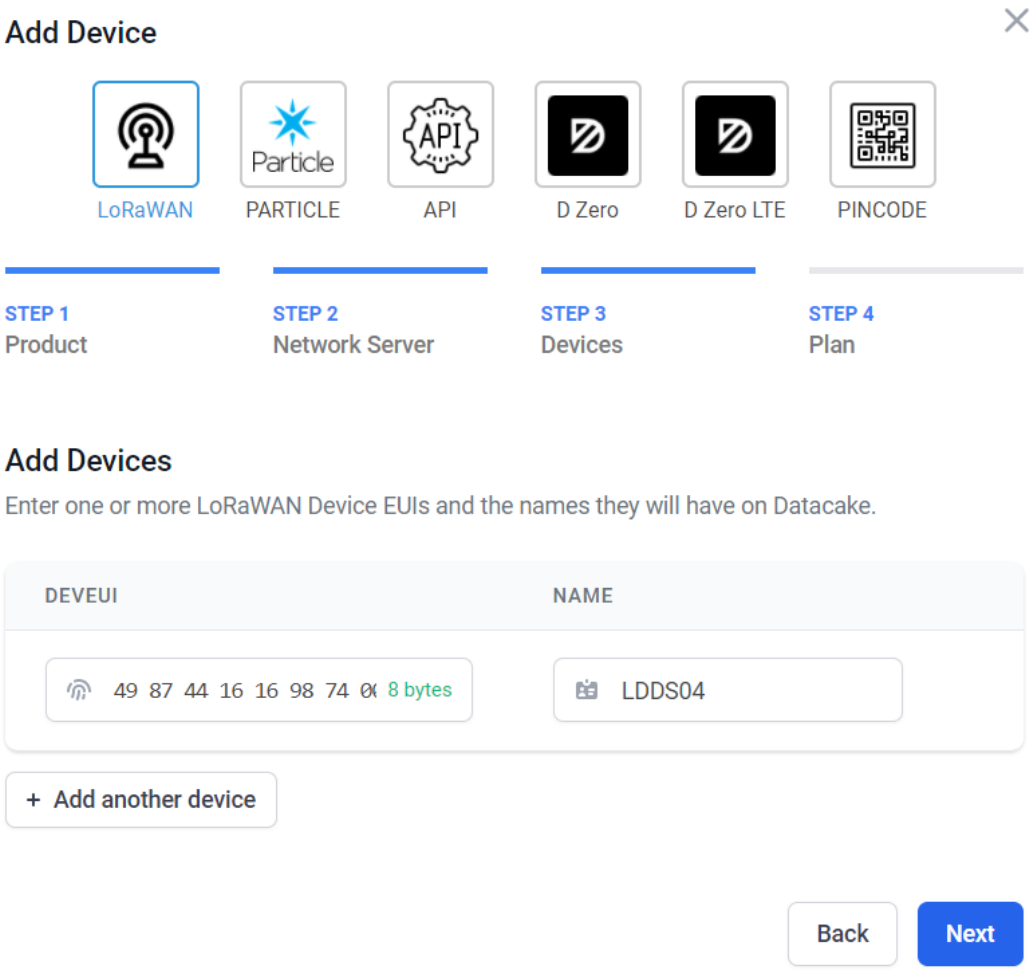
If your device is not available as a template, you can start with an empty device. You will have to create the device definition (fields, dashboard) and provide the payload decoder in the device's configuration.

Product Name

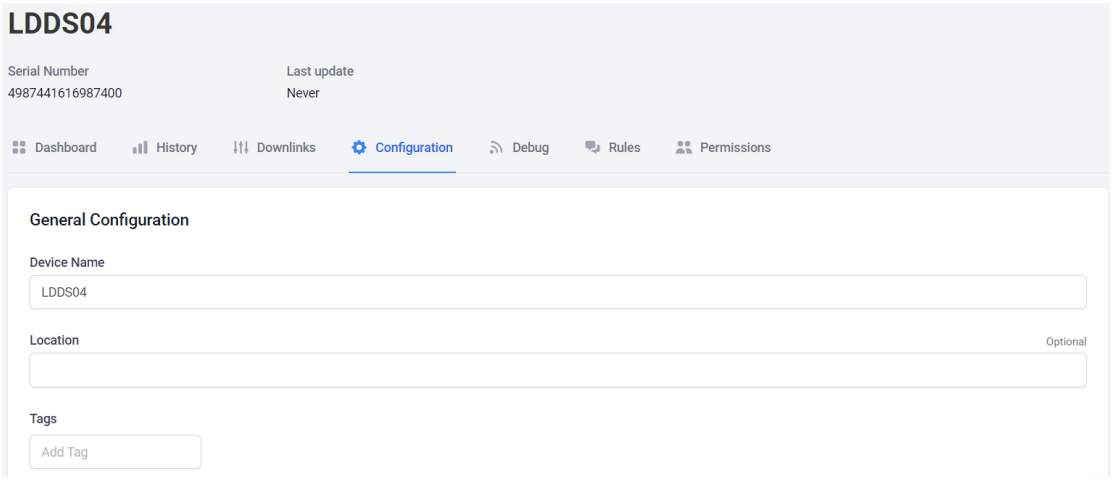
LDDS04

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



Payload Decoder

Product-wide setting

When your devices sends data, the payload will be passed to the payload decoder, alongside the event's name. The payload decoder then transforms it to measurements.

```
function Decoder(bytes, port) {
  var decode = {};
  var value=(bytes[0]<<8 | bytes[1]) & 0x3FFF;
  decode.BatV= value/1000;
  decode.EXTI_Trigger=(bytes[0] & 0x80)? "TRUE":"FALSE";
  decode.distance1_cm=(bytes[2]<<8 | bytes[3])/10;
  decode.distance2_cm=(bytes[4]<<8 | bytes[5])/10;
  decode.distance3_cm=(bytes[6]<<8 | bytes[7])/10
  decode.distance4_cm=(bytes[8]<<8 | bytes[9])/10;
  decode.mes_type= bytes[10];

  if(!((bytes[0]==0x03)&&(bytes[10]==0x02)))
  {
    return decode;
  }
}
```

Fields

Fields describe the data the device will store.

1 → + Add Field

2 → BatV

| NAME | IDENTIFIER | TYPE | CURRENT VALUE | LAST UPDATE |
|---|---|---|---|---|
| BatV | BATV | Float | 3.375 | 5 minutes ago |
| distance1_cm | DISTANCE1_CM | Float | 59.3 | 5 minutes ago |
| distance2_cm | DISTANCE2_CM | Float | 61.3 | 5 minutes ago |
| distance3_cm | DISTANCE3_CM | Float | 58.4 | 5 minutes ago |
| distance4_cm | DISTANCE4_CM | Float | 68 | 5 minutes ago |

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

ldds04

Serial Number
49874416169874AA

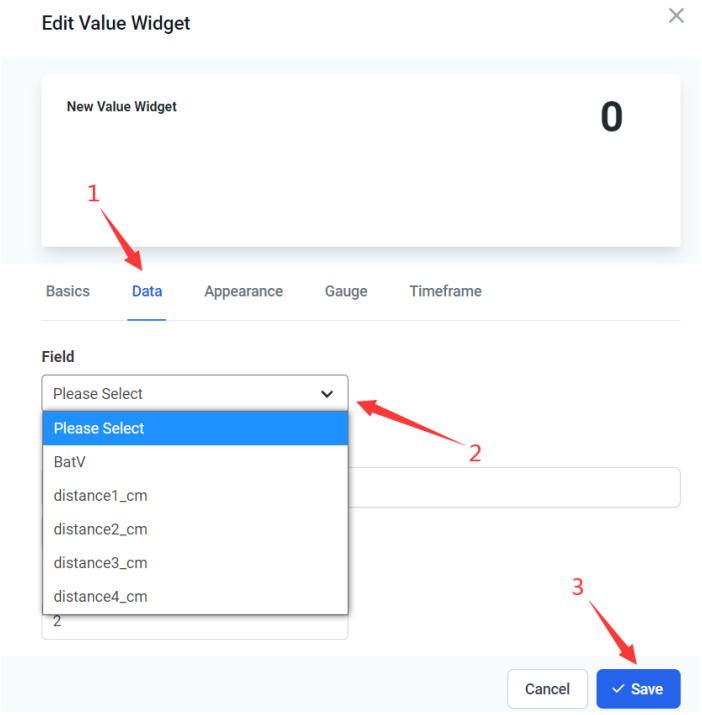
Last update
Thu Sep 02 2021 11:52:15 GMT+0800

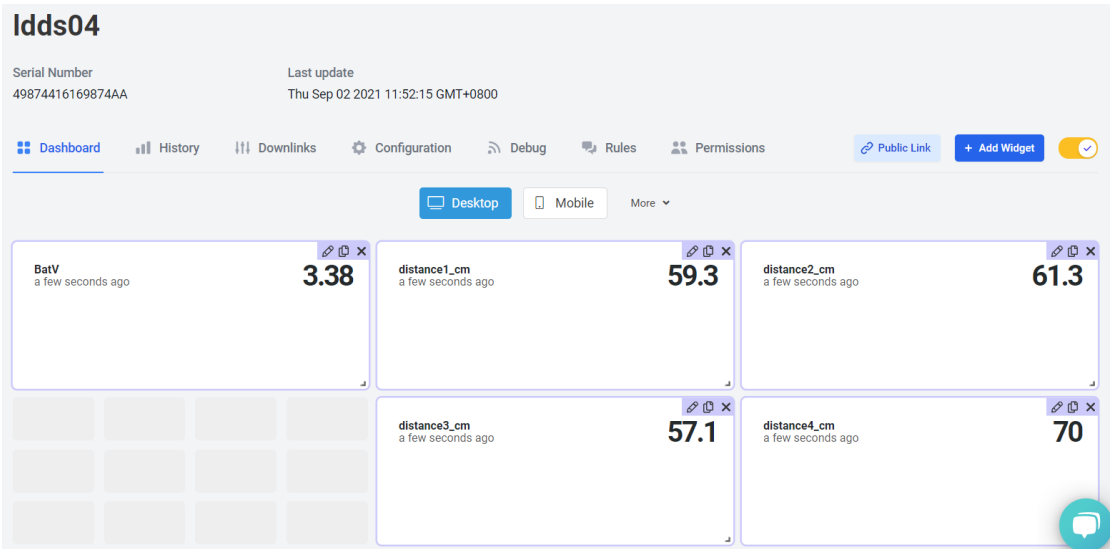
Dashboard | History | Downlinks | Configuration | Debug | Rules | Permissions | Public Link | + Add Widget

1 → + Add Widget

2 → Desktop | Mobile | More

- **Boolean** — Displays a boolean state
- **Chart** — Displays a chart
- **Headline** — Displays a headline
- **Histogram** — Displays a histogram
- **Map** — Displays a map
- **Text** — Displays a text widget
- **Value** — Displays a measurement
- **Switch** — Displays a switch widget
- **Slider** — Displays a slider
- **Downlink** — Button that sends a message to a device
- **Image** — Displays a static image


Edit Value Widget
New Value Widget
0
1
Basics
Data
Appearance
Gauge
Timeframe
Field
Please Select
Please Select
BatV
distance1_cm
distance2_cm
distance3_cm
distance4_cm
2
2
3
Cancel
Save


ldds04
Serial Number
49874416169874AA
Last update
Thu Sep 02 2021 11:52:15 GMT+0800
Dashboard
History
Downlinks
Configuration
Debug
Rules
Permissions
Public Link
Add Widget
Desktop
Mobile
More
BatV
a few seconds ago
3.38
distance1_cm
a few seconds ago
59.3
distance2_cm
a few seconds ago
61.3
distance3_cm
a few seconds ago
57.1
distance4_cm
a few seconds ago
70

## 2.7 Frequency Plans

The LDDS04 uses OTAA mode and below frequency plans by default. If user want to use it with different frequency plan, please refer the AT command sets.

### 2.7.1 EU863-870 (EU868)

Uplink:
868.1 - SF7BW125 to SF12BW125
868.3 - SF7BW125 to SF12BW125 and SF7BW250
868.5 - SF7BW125 to SF12BW125
867.1 - SF7BW125 to SF12BW125
867.3 - SF7BW125 to SF12BW125
867.5 - SF7BW125 to SF12BW125
867.7 - SF7BW125 to SF12BW125
867.9 - SF7BW125 to SF12BW125
868.8 - FSK

Downlink:
Uplink channels 1-9 (RX1)
869.525 – SF12BW125 (RX2 downlink only)

### 2.7.2 US902-928(US915)

Used in USA, Canada, and South America. Frequency band as per definition in LoRaWAN 1.0.3 Regional document.

To make sure the end node supports all sub band by default. In the OTAA Join process, the end node will use frequency 1 from sub-band1, then frequency 1 from sub-band2, then frequency 1 from sub-band3, etc to process the OTAA join.

After Join success, the end node will switch to the correct sub band by:

- Check what sub-band the LoRaWAN server ask from the OTAA Join Accept message and switch to that sub-band
- Use the Join successful sub-band if the server doesn't include sub-band info in the OTAA Join Accept message ( TTN v2 doesn't include)

### 2.7.3 CN470-510 (CN470)

Used in China, Default use CHE=1
Uplink:
486.3 - SF7BW125 to SF12BW125
486.5 - SF7BW125 to SF12BW125
486.7 - SF7BW125 to SF12BW125
486.9 - SF7BW125 to SF12BW125
487.1 - SF7BW125 to SF12BW125
487.3 - SF7BW125 to SF12BW125
487.5 - SF7BW125 to SF12BW125
487.7 - SF7BW125 to SF12BW125

Downlink:
506.7 - SF7BW125 to SF12BW125
506.9 - SF7BW125 to SF12BW125
507.1 - SF7BW125 to SF12BW125
507.3 - SF7BW125 to SF12BW125
507.5 - SF7BW125 to SF12BW125

507.7 - SF7BW125 to SF12BW125
507.9 - SF7BW125 to SF12BW125
508.1 - SF7BW125 to SF12BW125
505.3 - SF12BW125 (RX2 downlink only)

### 2.7.4 AU915-928(AU915)

Frequency band as per definition in LoRaWAN 1.0.3 Regional document.

To make sure the end node supports all sub band by default. In the OTAA Join process, the end node will use frequency 1 from sub-band1, then frequency 1 from sub-band2, then frequency 1 from sub-band3, etc to process the OTAA join.

After Join success, the end node will switch to the correct sub band by:

- Check what sub-band the LoRaWAN server ask from the OTAA Join Accept message and switch to that sub-band
- Use the Join successful sub-band if the server doesn't include sub-band info in the OTAA Join Accept message ( TTN v2 doesn't include)

### 2.7.5 AS920-923 & AS923-925 (AS923)

**Default Uplink channel:**
923.2 - SF7BW125 to SF10BW125
923.4 - SF7BW125 to SF10BW125

**Additional Uplink Channel**:
(OTAA mode, channel added by JoinAccept message)

**AS920~AS923 for Japan, Malaysia, Singapore**:
922.2 - SF7BW125 to SF10BW125
922.4 - SF7BW125 to SF10BW125
922.6 - SF7BW125 to SF10BW125
922.8 - SF7BW125 to SF10BW125
923.0 - SF7BW125 to SF10BW125
922.0 - SF7BW125 to SF10BW125

**AS923 ~ AS925 for Brunei, Cambodia, Hong Kong, Indonesia, Laos, Taiwan, Thailand, Vietnam**:
923.6 - SF7BW125 to SF10BW125
923.8 - SF7BW125 to SF10BW125
924.0 - SF7BW125 to SF10BW125
924.2 - SF7BW125 to SF10BW125
924.4 - SF7BW125 to SF10BW125
924.6 - SF7BW125 to SF10BW125

**Downlink:**
Uplink channels 1-8 (RX1)
923.2 - SF10BW125 (RX2)

### 2.7.6 KR920-923 (KR920)

Default channel:
922.1 - SF7BW125 to SF12BW125

922.3 - SF7BW125 to SF12BW125
922.5 - SF7BW125 to SF12BW125

Uplink: (OTAA mode, channel added by JoinAccept message)
922.1 - SF7BW125 to SF12BW125
922.3 - SF7BW125 to SF12BW125
922.5 - SF7BW125 to SF12BW125
922.7 - SF7BW125 to SF12BW125
922.9 - SF7BW125 to SF12BW125
923.1 - SF7BW125 to SF12BW125
923.3 - SF7BW125 to SF12BW125

Downlink:
Uplink channels 1-7(RX1)
921.9 - SF12BW125 (RX2 downlink only; SF12BW125 might be changed to SF9BW125)

### 2.7.7 IN865-867 (IN865)

Uplink:
865.0625 - SF7BW125 to SF12BW125
865.4025 - SF7BW125 to SF12BW125
865.9850 - SF7BW125 to SF12BW125

Downlink:
Uplink channels 1-3 (RX1)
866.550 - SF10BW125 (RX2)

## 2.8 LED Indicator

The LDDS04 has an internal LED which is used to show the status of different state.

- After LDDS04 is turned on, if the 4 channels converter is detected, the LED will **flash 4 times quickly**.
- **Blink once** when device transmit a packet.
- Solid ON for **Five Seconds** when OTAA Join Successfully.

## 2.9Firmware Change Log

**Firmware download link:**
http://www.dragino.com/downloads/index.php?dir=LoRa_End_Node/LDDS04/Firmware/

**Firmware Upgrade Method:**
http://wiki.dragino.com/index.php?title=Firmware_Upgrade_Instruction_for_STM32_base_products#Introduction

# 3. Configure LDDS04 via AT Command or LoRaWAN Downlink

Use can configure LDDS04 via AT Command or LoRaWAN Downlink.

- AT Command Connection: See FAQ.
- LoRaWAN Downlink instruction for different platforms:

http://wiki.dragino.com/index.php?title=Main_Page#Use_Note_for_Server

There are two kinds of commands to configure LDDS04, they are:

- **General Commands**.

  These commands are to configure:

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

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

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

- **Commands special design for LDDS04**

  These commands only valid for LDDS04, as below:

## 3.1Set 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<br>OK<br>the interval is 30000ms = 30s |
| AT+TDC=60000 | Set Transmit Interval | OK<br>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

## 3.2Set Interrupt Mode

Feature, Set Interrupt mode for GPIO_EXIT.

**AT Command: AT+INTMOD**

| Command Example | Function | Response |
|---|---|---|
| AT+INTMOD=? | Show current interrupt mode | 0<br>OK<br>the mode is 0 = No interruption |
| AT+INTMOD=2 | Set Transmit Interval<br>0- (Disable Interrupt),<br>1- (Trigger by rising and falling edge),<br>2- (Trigger by falling edge)<br>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

## 3.3Get Firmware Version Info

Feature: use downlink to get firmware version.

**Downlink Command: 0x26**

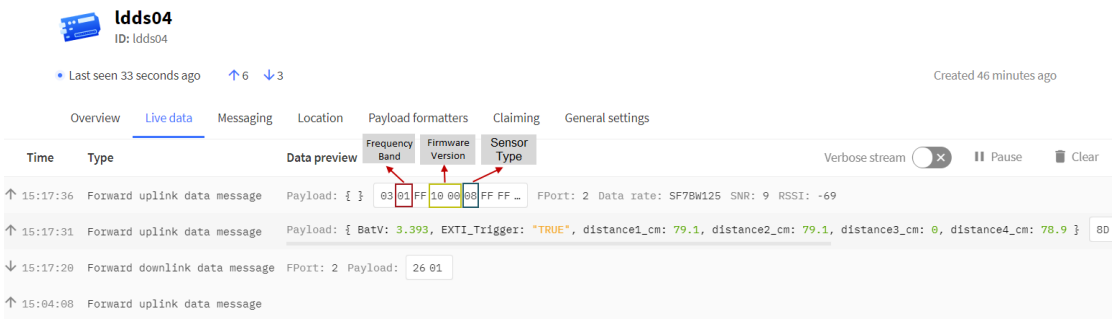
| Downlink Control Type | FPort | Type Code | Downlink payload size(bytes) |
|---|---|---|---|
| Get Firmware Version Info | Any | 26 | 2 |

- 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 | 1 | 1 | 2 | 1 | 4 | 1 |
|---|---|---|---|---|---|---|---|
| **Value** | Software Type | Frequency Band | Sub-band | Firmware Version | Sensor Type | Reserve | Message Type<br>Always 0x02 |




**Software Type**: Always 0x03 for LDDS04

**Frequency Band**:

*0x01: EU868
*0x02: US915
*0x03: IN865
*0x04: AU915
*0x05: KZ865
*0x06: RU864
*0x07: AS923
*0x08: AS923-1
*0x09: AS923-2
*0xa0: AS923-3

**Sub-Band**: value 0x00 ~ 0x08

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

**Sensor Type**:

0x01: LSE01
0x02: LDDS75
0x03: LDDS20
0x04: LLMS01
0x05: LSPH01
0x06: LSNPK01
0x07: LLDS12
0x08: LDDS04

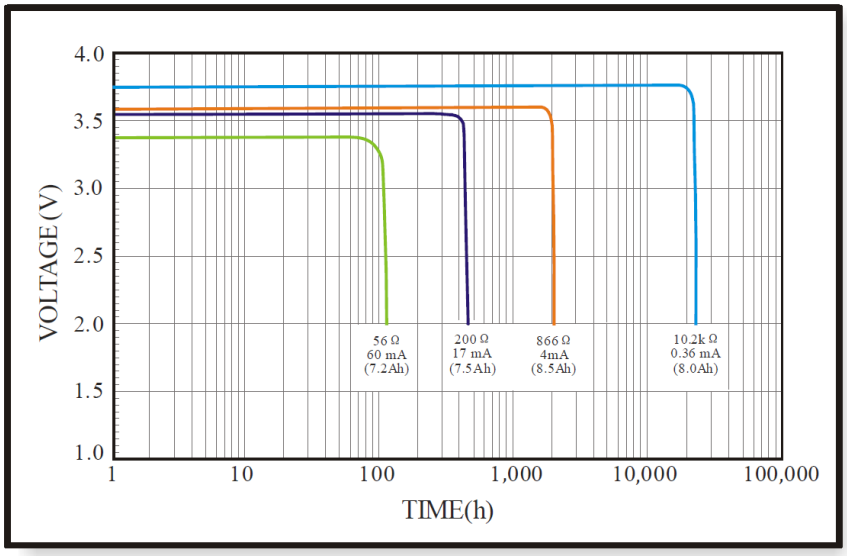
# 4. Battery & how to replace

## 4.1Battery Type

LDDS04 is equipped with a [8500mAH ER26500 Li-SOCI2 battery]. The battery is un-rechargeable battery with low discharge rate targeting for 8~10 years use. This type of battery is commonly used in IoT target for long-term running, such as water meter.

The discharge curve is not linear so can't simply use percentage to show the battery level. Below is the battery performance.

1. Typical discharge profile at +20℃ (Typical value)




Minimum Working Voltage for the LDDS04:
LDDS04: 2.45v ~ 3.6v

## 4.2Replace Battery

Any battery with range 2.45 ~ 3.6v can be a replacement. We recommend to use Li-SOCl2 Battery. And make sure the positive and negative pins match.

## 4.3Power Consumption Analyze

Dragino Battery powered product are all runs in Low Power mode. We have an update battery calculator which base on the measurement of the real device. User can use this calculator to check the battery life and calculate the battery life if want to use different transmit interval.

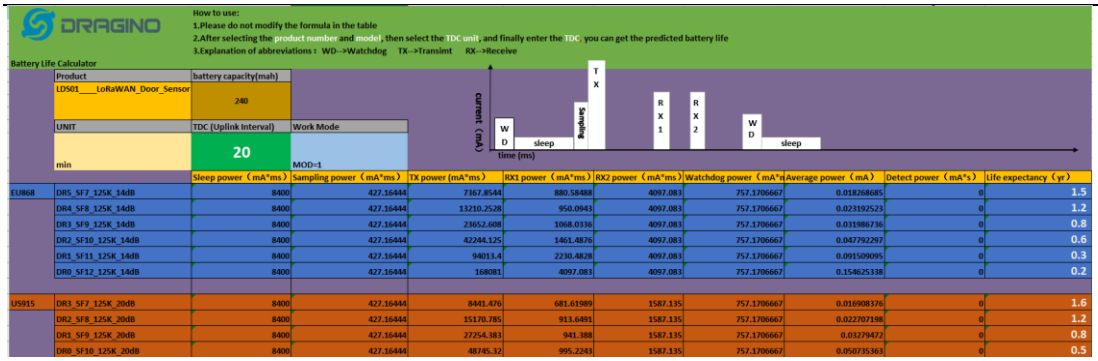
Instruction to use as below:

Step 1: Downlink the up-to-date DRAGINO_Battery_Life_Prediction_Table.xlsx from:
https://www.dragino.com/downloads/index.php?dir=LoRa_End_Node/Battery_Analyze/

Step 2: Open it and choose

- Product Model
- Uplink Interval
- Working Mode

And the Life expectation in difference case will be shown on the right.



DRAGINO

How to use:
1.Please do not modify the formula in the table
2.After selecting the product number and model, then select the TDC unit, and finally enter the TDC, you can get the predicted battery life
3.Explanation of abbreviations : WD-->Watchdog TX-->Transimt RX-->Receive

Battery Life Calculator

| Product | battery capacity(mah) |
|---|---|
| LDS01___LoRaWAN_Door_Sensor | 240 |

| UNIT | TDC (Uplink Interval) | Work Mode |
|---|---|---|
| min | 20 | MOD=1 |



| | | Sleep power（mA*ms） | Sampling power（mA*ms） | TX power (mA*ms) | RX1 power（mA*ms） | RX2 power（mA*ms） | Watchdog power（mA*ms） | Average power（mA） | Detect power（mA*s） | Life expectancy（yr） |
|---|---|---|---|---|---|---|---|---|---|---|
| EU868 | DR5_SF7_125K_14dB | 8400 | 427.16444 | 7367.8544 | 880.58488 | 4097.083 | 757.1706667 | 0.018268685 | 0 | 1.5 |
| | DR4_SF8_125K_14dB | 8400 | 427.16444 | 13210.2528 | 950.0943 | 4097.083 | 757.1706667 | 0.023192523 | 0 | 1.2 |
| | DR3_SF9_125K_14dB | 8400 | 427.16444 | 23652.608 | 1068.0336 | 4097.083 | 757.1706667 | 0.031986736 | 0 | 0.8 |
| | DR2_SF10_125K_14dB | 8400 | 427.16444 | 42244.125 | 1461.4876 | 4097.083 | 757.1706667 | 0.047792297 | 0 | 0.6 |
| | DR1_SF11_125K_14dB | 8400 | 427.16444 | 94013.4 | 2230.4828 | 4097.083 | 757.1706667 | 0.091509095 | 0 | 0.3 |
| | DR0_SF12_125K_14dB | 8400 | 427.16444 | 168081 | 4097.083 | 4097.083 | 757.1706667 | 0.154625338 | 0 | 0.2 |
| | | | | | | | | | | |
| US915 | DR3_SF7_125K_20dB | 8400 | 427.16444 | 8441.476 | 681.61989 | 1587.135 | 757.1706667 | 0.016908376 | 0 | 1.6 |
| | DR2_SF8_125K_20dB | 8400 | 427.16444 | 15170.785 | 913.6491 | 1587.135 | 757.1706667 | 0.022707198 | 0 | 1.2 |
| | DR1_SF9_125K_20dB | 8400 | 427.16444 | 27254.383 | 941.388 | 1587.135 | 757.1706667 | 0.03279472 | 0 | 0.8 |
| | DR0_SF10_125K_20dB | 8400 | 427.16444 | 48745.32 | 995.2243 | 1587.135 | 757.1706667 | 0.050735363 | 0 | 0.5 |

The battery related documents as below:

- Battery Dimension,
- Lithium-Thionyl Chloride Battery datasheet, Tech Spec
- Lithium-ion Battery-Capacitor datasheet, Tech Spec


### 4.3.1 Battery Note

The Li-SICO battery is designed for small current / long period application. It is not good to use a high current, short period transmit method. The recommended minimum period for use of this battery is 5 minutes. If you use a shorter period time to transmit LoRa, then the battery life may be decreased.

### 4.3.2 Replace the battery

You can change the battery in the LDDS04.The type of battery is not limited as long as the output is between 3v to 3.6v. On the main board, there is a diode (D1) between the battery and the main circuit. If you need to use a battery with less than 3.3v, please remove the D1 and shortcut the two pads of it so there won't be voltage drop between battery and main board.

The default battery pack of LDDS04 includes a ER26500 plus super capacitor. If user can't find this pack locally, they can find ER26500 or equivalence, which will also work in most case. The SPC can enlarge the battery life for high frequency use (update period below 5 minutes)

# 5. Use AT Command

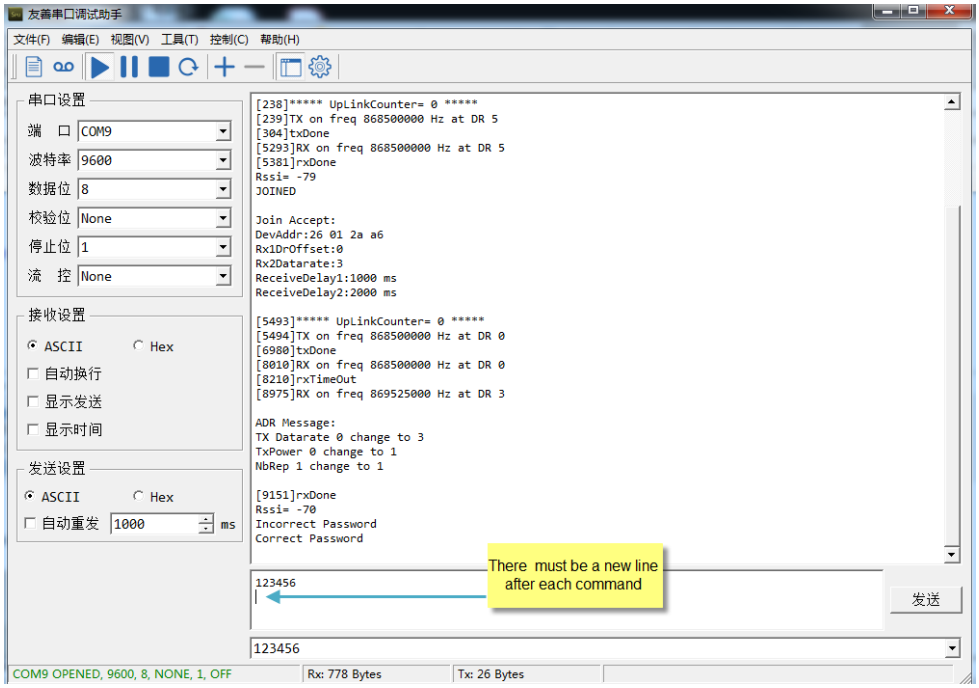
## 5.1 Access AT Commands

LDDS04 supports AT Command set in the stock firmware. You can use a USB to TTL adapter to connect to LDDS04 for using AT command, as below.


Connection:

USB TTL GND <----> GND
USB TTL TXD <----> UART_RXD
USB TTL RXD <----> UART_TXD

In the PC, you need to set the serial baud rate to **9600** to access the serial console for LDDS04. LDDS04 will output system info once power on as below:




Valid AT Command please check Configure Device.

# 6. FAQ

## 6.1How to change the LoRa Frequency Bands/Region

You can follow the instructions for how to upgrade image.
When downloading the images, choose the required image file for download.

# 7. Trouble Shooting

## 7.1AT 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.

# 8. Order Info

## 8.1Main Device LDDS04

Part Number: **LDDS04-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

## 8.2Probe Model

Detail See Probe Option Section

- A01A-15
- A02-15
- A13-15
- A16-15

## 9. Packing Info

**Package Includes**:

- LDDS04 LoRaWAN 4-Channels Distance Sensor x 1

Exclude probes.

**Dimension and weight**:

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

## 10. 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