



LHT52 Temperature & Humidity Sensor User Manual

Document Version: 1.0.0

Image Version: v1.0

Version	Description	Date
1.0	Release	2021-Dec-31

1. Introduction.....	4
1.1 What is LHT52 Temperature & Humidity Sensor	4
1.2 Features.....	5
1.3 Specifications.....	5
1.4 Power Consumption	5
1.5 Storage & Operation Temperature	5
1.6 Applications.....	6
2. Operation Mode	7
2.1 How to activate LHT52?	7
2.2 How it works?.....	8
2.3 Example to use for LoRaWAN network.....	8
2.4 Uplink Payload.....	11
2.4.1 Uplink FPORT=5, Device Status.....	11
2.4.2 Uplink FPORT=2, Real time sensor value	12
2.4.3 Uplink FPORT=3, Datalog sensor value	13
2.4.4 Uplink FPORT=4, DS18B20 ID.....	13
2.4.5 Decoder in TTN V3	14
2.5 Show data on Datacake.....	15
2.6 Datalog Feature.....	21
2.6.1 Unix TimeStamp.....	21
2.6.2 Poll sensor value	21
2.6.3 Datalog Uplink payload.....	22
2.7 Alarm Mode.....	22
2.8 LED Indicator	25
2.9 Button.....	25
3. Configure LHT52 via AT Command or LoRaWAN Downlink.....	26
3.1 Downlink Command Set	26
3.2 Set Password	29
4. Battery Replacement	30
4.1 Battery Type and replace.....	30
4.2 Power Consumption Analyze	31

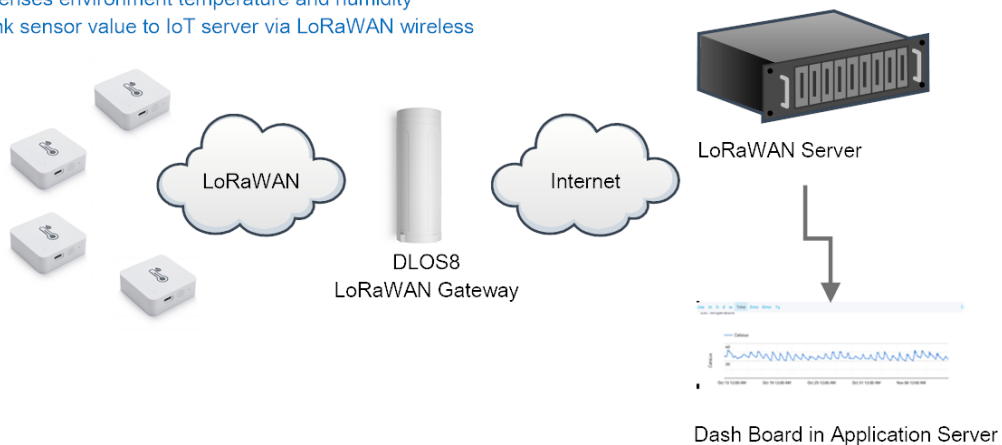
5. Sensors & Accessories	33
5.1 <i>Temperature Probe (AS-01)</i>	33
5.2 <i>Program Converter (AS-02)</i>	33
6. FAQ	34
6.1 <i>How to use AT Command to configure LHT52</i>	34
6.2 <i>AT Command and Downlink</i>	36
6.3 <i>How to upgrade the firmware?</i>	38
6.4 <i>How to change the LoRa Frequency Bands/Region?</i>	38
7. Order Info	39
7.1 <i>Main Device:</i>	39
7.2 <i>Accessories:</i>	39
8. Packing Info	39
9. Support	39
10. FCC Warning	39

1. Introduction

1.1 What is LHT52 Temperature & Humidity Sensor

The Dragino LHT52 Temperature & Humidity sensor is a Long Range LoRaWAN Sensor. It includes a built-in Temperature & Humidity sensor and has a USB Type-C sensor connector to connect to external sensors such as external Temperature Sensor.

LHT52 senses environment temperature and humidity and uplink sensor value to IoT server via LoRaWAN wireless



LHT52 senses environment temperature and humidity and send these values via long-range wireless LoRaWAN protocol. It targets professional wireless sensor network applications such as food service, smart metering, smart cities, building automation, and so on.

LHT52 supports 2 x AAA batteries and works for a long time up to several years. Use can replace the batteries easily after they are finished.

LHT52 is fully compatible with LoRaWAN v1.0.3 protocol, it can work with standard LoRaWAN gateway.

LHT52 supports Datalog feature to make sure users won't miss sensor data. It records sensor value for every uplink. These values can be retrieved by LoRaWAN server via downlink command.

LHT52 supports temperature alarm feature. It can uplink alarm in a short interval while temperature exceeds preset limits.

*Battery life depends how often to send data, please see [battery analyzer](#).

1.2 Features

- ✓ Wall Attachable.
- ✓ LoRaWAN v1.0.3 Class A protocol.
- ✓ Built-in Temperature & Humidity sensor
- ✓ Optional External Probe
- ✓ Frequency Bands: CN470/EU433/KR920/US915/EU868/AS923/AU915
- ✓ AT Commands to change parameters
- ✓ Remote configure parameters via LoRaWAN Downlink
- ✓ Firmware upgradable via program port
- ✓ Support 2 x AAA LR03 batteries.
- ✓ Datalog feature
- ✓ IP Rating: IP52

1.3 Specifications

Built-in Temperature Sensor:

- Resolution: 0.01 °C
- Accuracy Tolerance: Typ ± 0.3 °C
- Long Term Drift: < 0.02 °C/yr
- Operating Range: -20 ~ 50 °C

Built-in Humidity Sensor:

- Resolution: 0.1 %RH
- Accuracy Tolerance: Typ ± 3 %RH
- Long Term Drift: < 0.02 °C/yr
- Operating Range: 0 ~ 99.0 %RH(no Dew)

1.4 Power Consumption

LHT52 (without external sensor): Idle: 5uA, Transmit: max 110mA

LHT52 + External Temperature Probe (AS-01): Idle: 6uA, Transmit: max 110mA.

1.5 Storage & Operation Temperature

-20°C to +50°C

1.6 Applications

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

2. Operation Mode

2.1 How to activate LHT52?

1. Open enclosure from below position.



2. Insert 2 x AAA LR03 batteries.



3. Press the reset button to activate device.



User can check [LED Status](#) to know the working state of LHT52.

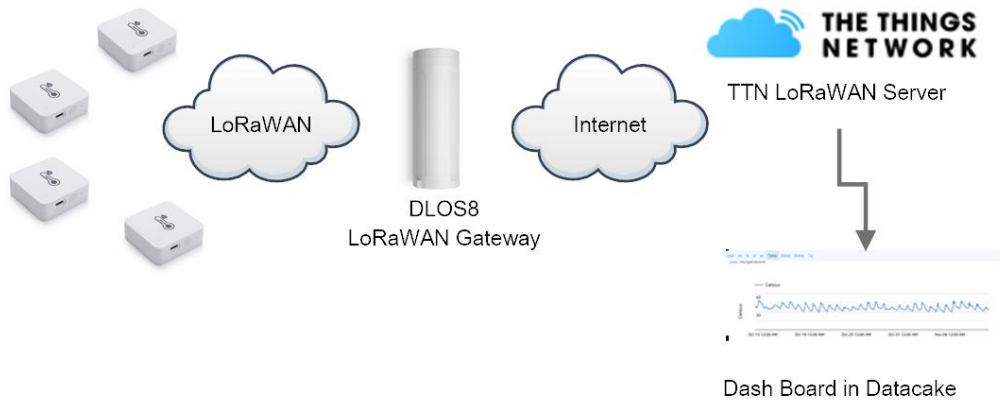
2.2 How it works?

Each LHT52 is shipped with a worldwide unique set of LoRaWAN OTAA keys. To use LHT52 in a LoRaWAN network, user needs to input the OTAA keys in LoRaWAN network server. After this, if LHT52 is under this LoRaWAN network coverage, LHT52 can join the LoRaWAN network and start to transmit sensor data. The default period for each uplink is **20 minutes**.

2.3 Example to use for LoRaWAN network

This section shows an example for how to join the [TheThingsNetwork](#) LoRaWAN IoT server. Usages with other LoRaWAN IoT servers are of similar procedure.

Use LHT52 in TTN and Datacake



Assume the DLOS8 is already set to connect to [TTN V3 network](#). We need to add the LHT52 device in TTN V3 portal.

Step 1: Create a device in TTN V3 with the OTAA keys from LHT52.

Each LHT52 is shipped with a sticker with the default DEV EUI as below:



Enter these keys in the LoRaWAN Server portal. Below is TTN V3 screen shot:

Add APP EUI in the application.

choose to create the device manually.

Add APP KEY and DEV EUI

Add application

Owner ^{*}
luherong

Application ID ^{*}
lht52001

Application name
LHT52_TEST

Description
Description for my new application

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

[Create application](#)

LHT52_TEST

General Information

Application ID	lht52001
Created at	Dec 30, 2021 13:56:29
Last updated at	Dec 30, 2021 13:56:29

End devices (0)

ID	Name	DevEUI	JoinEUI
No items found			

[+ Add end device](#)

Default mode OTAA

Applications > LHT52_TEST > End devices > Register manually

Register end device

From The LoRaWAN Device Repository Manually

Frequency plan [Ⓞ] *
 Europe 863-870 MHz (SF12 for RX2) | v

LoRaWAN version [Ⓞ] *
 MAC V1.0.3 | v

Regional Parameters version [Ⓞ] *
 PHY V1.0.3 REV A | v

Show advanced activation, LoRaWAN class and cluster settings v

DevEUI [Ⓞ] *
 25 32 12 45 65 26 12 35 Generate 0/50 used

AppEUI [Ⓞ] *
 25 32 12 45 65 26 32 16 Fill with zeros

AppKey [Ⓞ] *
 25 32 12 45 65 26 32 16 89 48 85 65 45 87 89 55 Generate

End device ID [Ⓞ] *

This value is automatically prefilled using the DevEUI

After registration
 View registered end device
 Register another end device of this type

Register end device

Step 2: Use ACT button to activate LHT52 and it will auto join to the TTN V3 network. After join success, it will start to upload sensor data to TTN V3 and user can see in the panel.

Applications > LHT52_TEST > End devices > lht52test01 > Live data

lht52test01

ID: lht52test01
 ↑ 1 ↓ N/A • Last activity 5 seconds ago Ⓞ

Overview Live data Messaging Location Payload formatters Claiming General settings

Verbose stream || Pause || Clear

Time	Type	Data preview
↑ 14:05:13	Forward uplink data message	Payload: [Ext: 1, Hum_Smf: 03.3, Systemtime: 1668844339, Temp_05: 327.47, Temp_Smf: 22.39] 00 0F 02 15 7F FF 0C 01 ... FPort: 2 Data rate: SF78M25 SRR: 7.8 RSSI: -87
↑ 14:05:15	Successfully processed data message	DevAddr: 26 08 60 72 FCnt: 1 FPort: 2 Data rate: SF78M25 SRR: 7.8 RSSI: -87
↑ 14:05:04	Schedule data downlink for transmission	Ret Delay: 8
↑ 14:05:04	Forward uplink data message	Payload: [84c_W1: 2874, Firmware_Version: "1.00", Freq_Band: 1, Sensor_Model: 9, Sub_Band: 0] 00 01 00 00 00 00 3A FPort: 8 Data rate: SF12M125 SRR: 9.8 RSSI: -87
↑ 14:05:04	Successfully processed data message	DevAddr: 26 08 60 72 FPort: 8 Data rate: SF12M125 SRR: 9.8 RSSI: -87
↑ 14:04:59	Forward join-accept message	
00 14:04:57	Accept join-request	
14:04:50	Console: Events cleared	The events list has been cleared

2.4 Uplink Payload

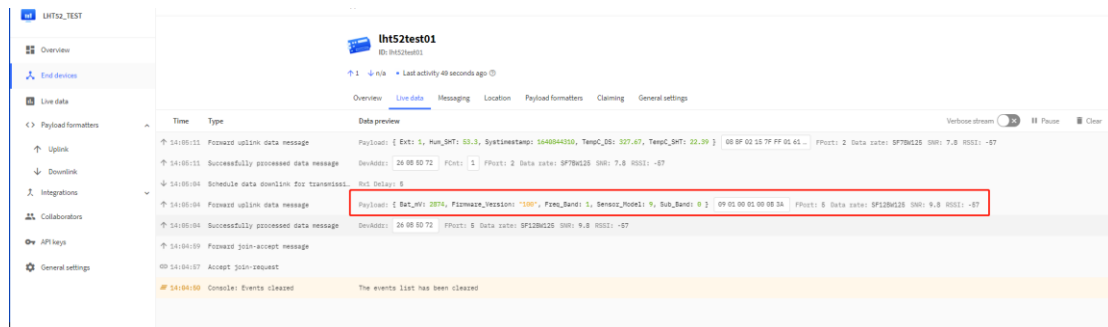
Uplink payloads include two types: Valid Sensor Value and other status / control command.

- Valid Sensor Value: Use FPORT=2
- Other control command: Use FPORT other than 2.

2.4.1 Uplink FPORT=5, Device Status

Uplink the device configures with FPORT=5. Once LHT52 Joined the network, it will uplink this message to the server. After first uplink, LHT52 will uplink Device Status every 12 hours.

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



Example Payload (FPort=5):

09 01 00 01 00 0B 3A

Sensor Model: For LHT52, this value is 0x09.

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

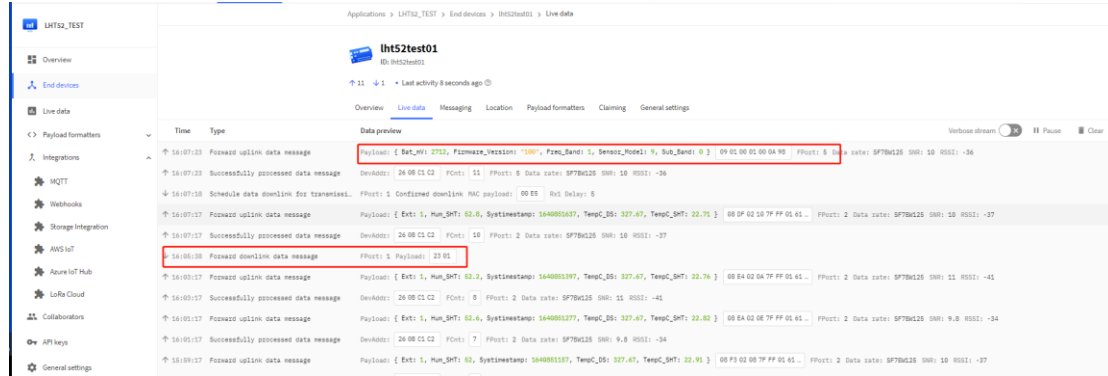
Sub-Band: value 0x00 ~ 0x08(only for CN470, AU915,US915. Others are0x00)

BAT: shows the battery voltage for LHT52.

Ex1: 0x0B3A = 2874mV

Use can also get the Device Status uplink through the downlink command:

Downlink:0x2301



2.4.2 Uplink FPORT=2, Real time sensor value

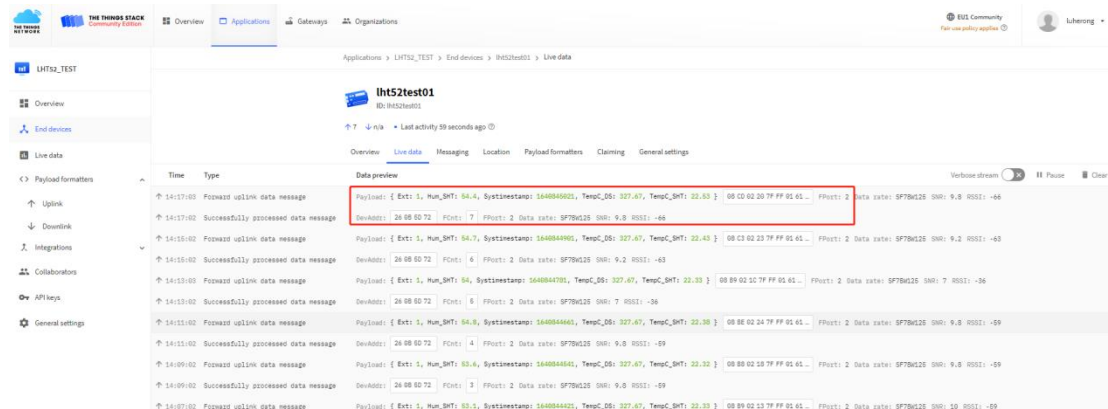
LHT52 will send this uplink after Device Status uplink once join LoRaWAN network successfully.

And it will periodically send this uplink. Default interval is 20 minutes and [can be changed](#).

Uplink uses FPORT=2 and every 20 minutes send one uplink by default.

Size(bytes)	2	2	2	1	4
Value	Temperature	Humidity	External Temperature	Ext #	Unix TimeStamp

Temperature:



Example Payload (FPort=2):

08 CD 02 20 7F FF 01 61 CD 4E DD

LHT52 Temperature & Humidity sensor

Temperature & External Temperature:

- Example1: 0x08CD/100=22.53°C
- Example2: (0xF5C6-65536)/100=-26.18°C

Humidity:

- Humidity: 0x0220/10=54.4%

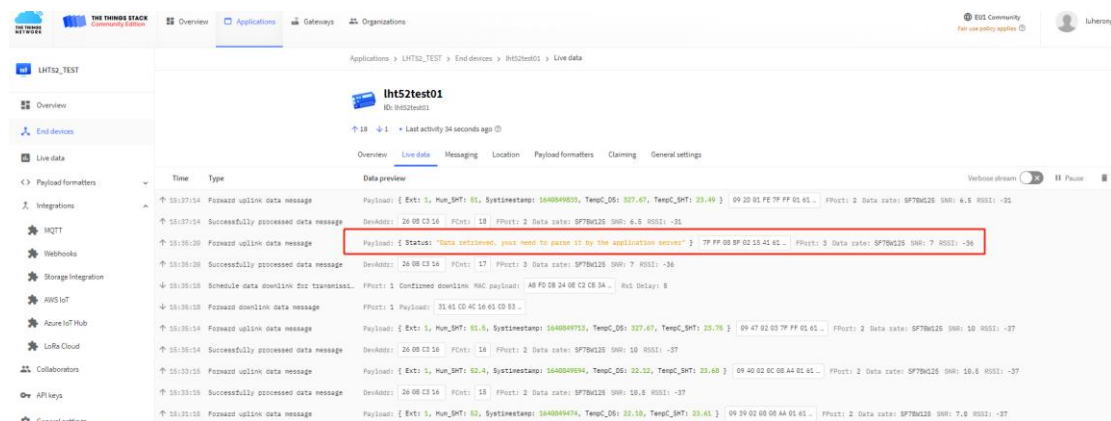
Extension

Bytes for External Sensor:

EXT # Value	External Sensor Probe
0x01	Sensor AS-01, Temperature

2.4.3 Uplink FPORT=3, Datalog sensor value

LHT52 stores sensor value and user can retrieve these history value via downlink command. The Datalog sensor value are sent via FPORT=3.



- Each data entry is 11 bytes, to save airtime and battery, LHT52 will send max bytes according to the current DR and Frequency bands.

For example, in US915 band, the max payload for different DR is:

- a) DR0: max is 11 bytes so one entry of data
- b) DR1: max is 53 bytes so devices will upload 4 entries of data (total 44 bytes)
- c) DR2: total payload includes 11 entries of data
- d) DR3: total payload includes 22 entries of data.

Notice: LHT52 will save 178 set of history data, If device doesn't have any data in the polling time. Device will uplink 11 bytes of 0.

See more info about the [Datalog feature](#).

2.4.4 Uplink FPORT=4, DS18B20 ID

User can get external DS18B20 ID through the downlink command.

Downlink:0x2302

The screenshot shows the 'Live data' tab for the 'lht52test01' application. A table of messages is displayed with columns for Time, Type, and Data preview. The highlighted message at 15:41:20 is a 'Successfully processed data message' with a payload of '0x2302: "288663b20000009f"'. The payload is shown in a red box.

Example Payload (FPort=4):

28 86 63 B2 00 00 00 9F

The External DS18B20 ID is 0x28 86 63 B2 00 00 00 9F

2.4.5 Decoder in TTN V3

In LoRaWAN protocol, the uplink payload is HEX format, user need to add a payload formatter/decoder in LoRaWAN Server to get human friendly string.

In TTN , add formatter as below:

The screenshot shows the 'Default uplink payload formatter' configuration page. The 'Formatter type' is set to 'javascript'. The 'Formatter parameter' field contains the following JavaScript code:

```
function str_pad(byte) {
    var zero = '0';
    var hex = byte.toString(16);
    var tmp = (2-hex.length);
    return zero.substr(0,tmp) + hex;
}

function Decoder(bytes, port) {
    var decode = [];
    if(port==4)
    {
        if(bytes.length==8)
        {
            decode.Temp_SHT=parseInt(((bytes[0]<<4)&0x00 | bytes[1]&0x0F).toString(16));
        }
    }
}
```

Red arrows point to the 'javascript' dropdown menu and the 'Save changes' button.

Please check the decoder from this link:

https://www.dragino.com/downloads/index.php?dir=LoRa_End_Node/LHT52/Decoder/

2.5 Show data on Datalog

Datalog IoT platform provides a human friendly interface to show the sensor data in charts, once we have sensor data in TTN V3, we can use Datalog to connect to TTN V3 and see the data in Datalog. Below are the steps:

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

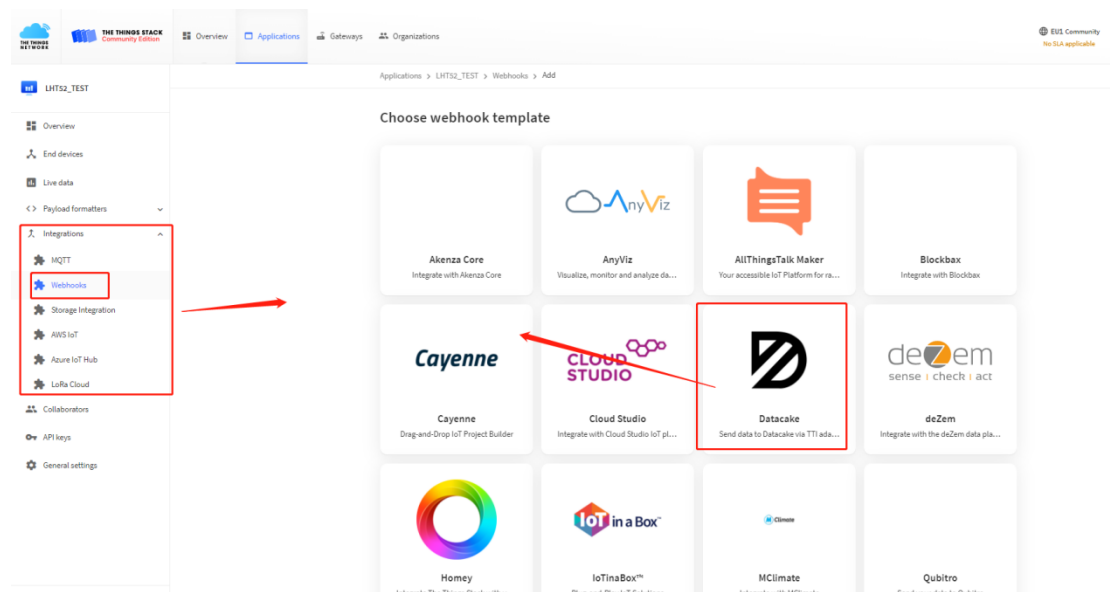
Step 2: Configure your Application to forward data to Datalog you will need to add integration. Go to TTN V3 Console --> Applications --> Integrations --> Add Integrations.

1.Add Datalog:

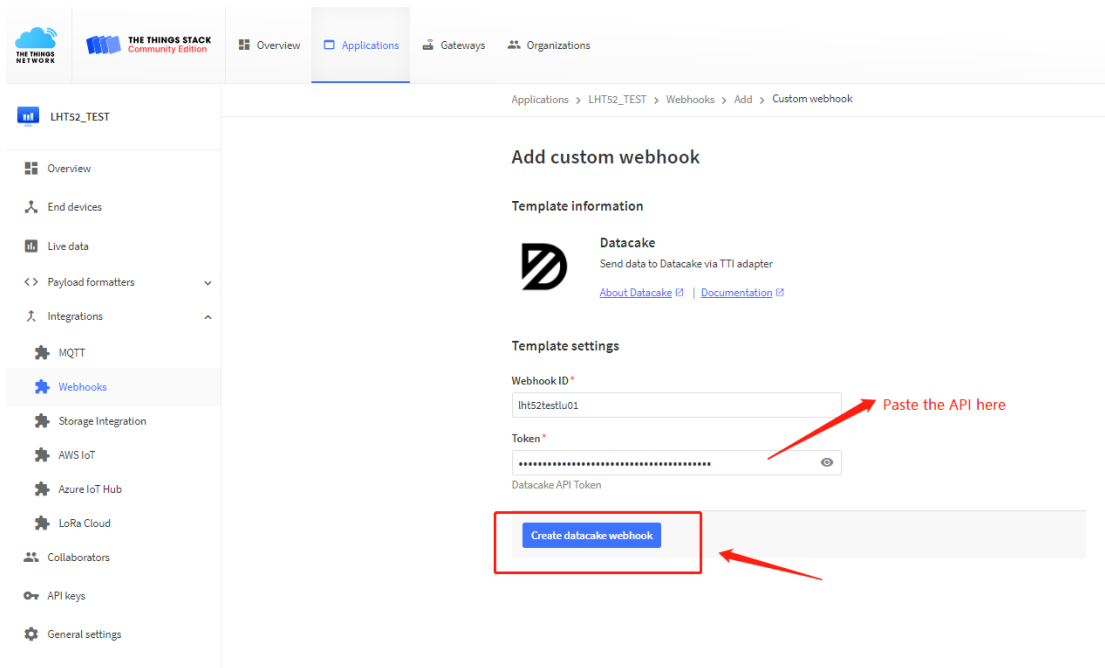
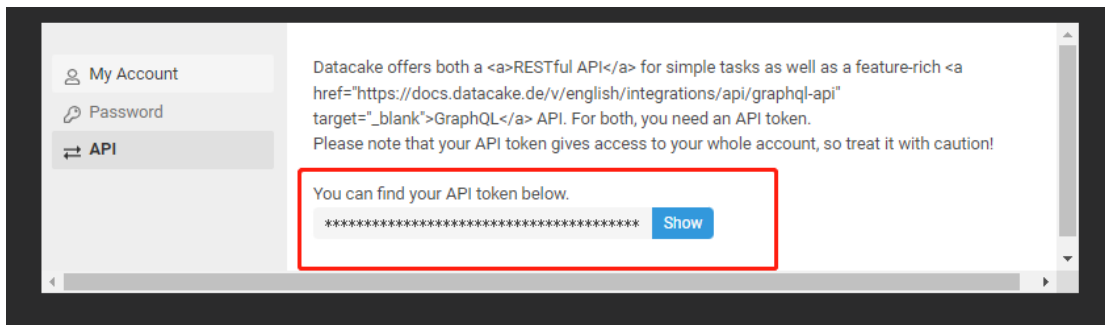
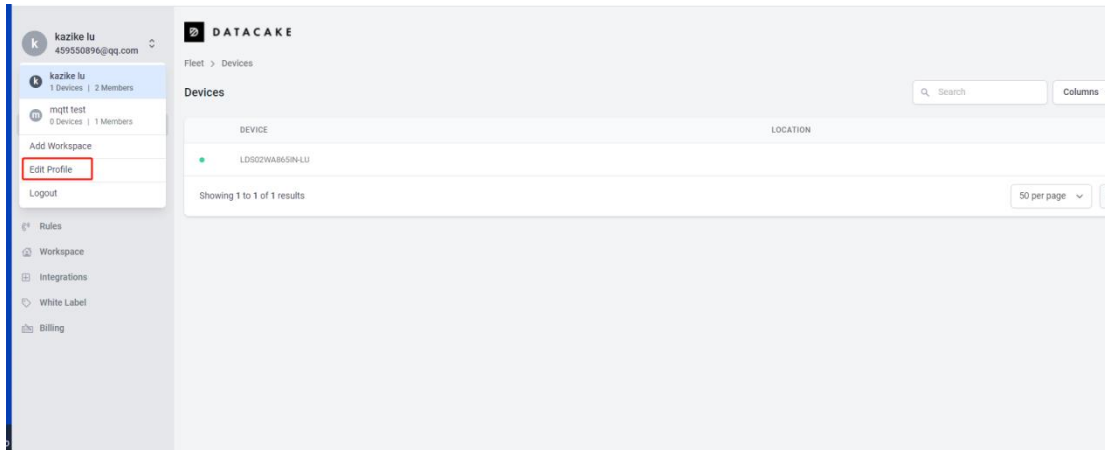
2.Select default key as Access Key:

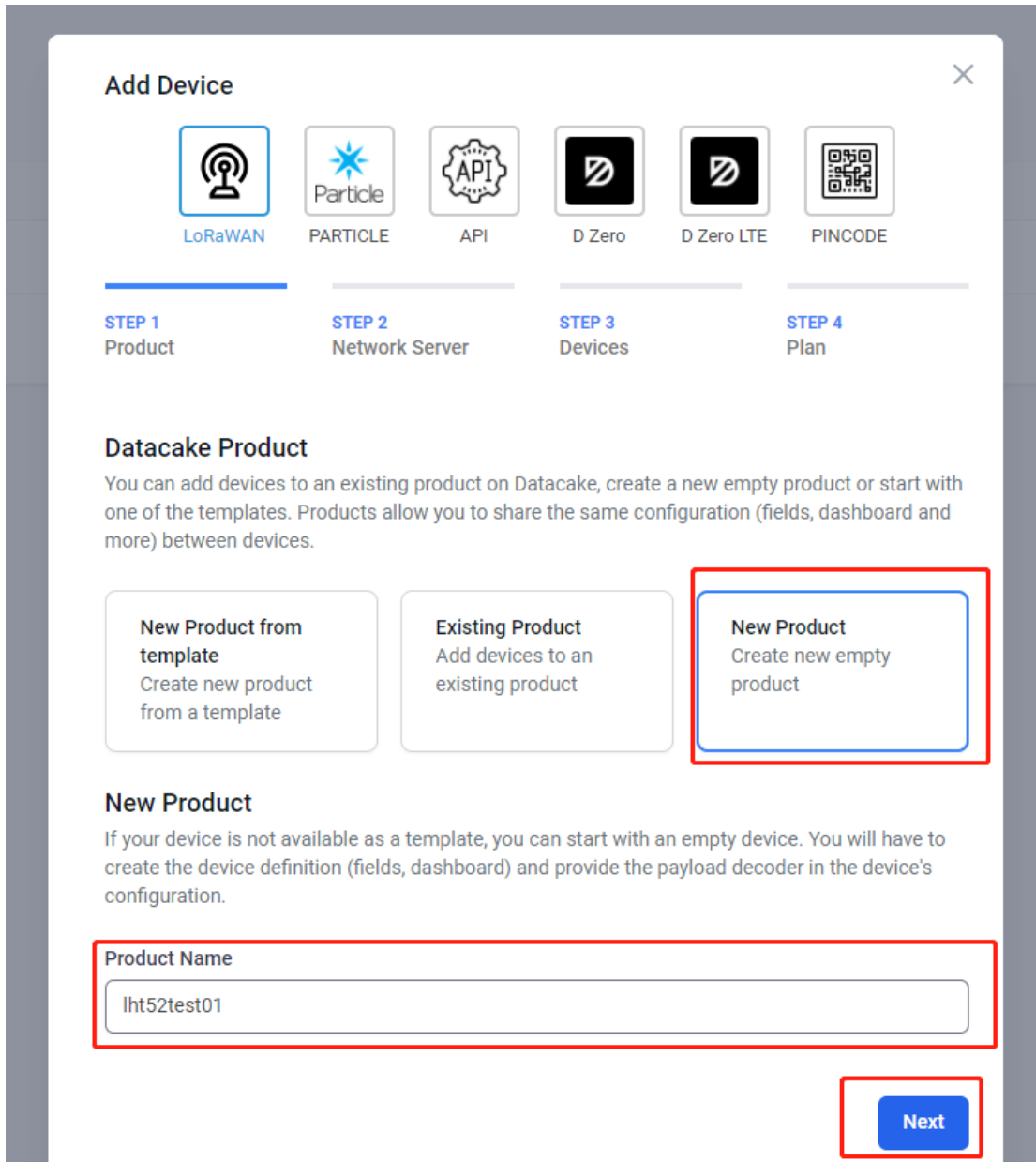
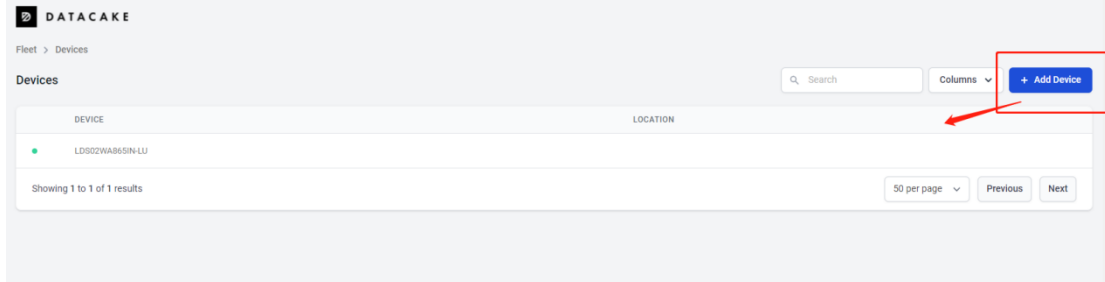
3.In Datalog console (<https://datalog.co/>) , add LHT52:

Please refer to the figure below



Log in to DATAKAKE, copy the API under the account





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.

<input checked="" type="radio"/>		The Things Stack V3 TTN V3 / Things Industries	<input type="button" value="Uplinks"/>	<input type="button" value="Downlinks"/>
<input type="radio"/>		The Things Network V2 The old Things Network	<input type="button" value="Uplinks"/>	<input type="button" value="Downlinks"/>
<input type="radio"/>		helium Helium	<input type="button" value="Uplinks"/>	<input type="button" value="Downlinks"/>
<input type="radio"/>		LORIoT	<input type="button" value="Uplinks"/>	<input type="button" value="Downlinks"/>
<input type="radio"/>		kerlink Kerlink Wanesy	<input type="button" value="Uplinks"/>	

Showing 1 to 5 of 8 results

Add Device



LoRaWAN



PARTICLE



API



D Zero



D Zero LTE



PINCODE

STEP 1
Product

STEP 2
Network Server

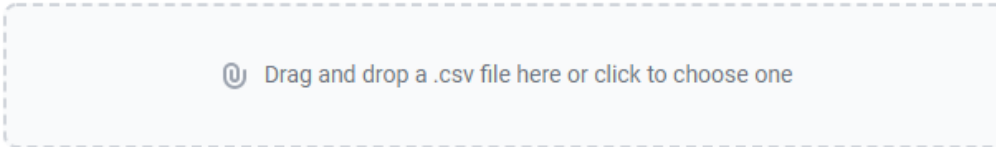
STEP 3
Devices

STEP 4
Plan

Add Devices

Enter one or more LoRaWAN Device EUIs and the names they will have on Datacake.

New: You can now upload a CSV file with either one column (just the device's DevEUI) or two columns (DevEUI and Name), which will populate the form below.



DEVEUI	NAME
25 32 12 45 65 26 12 30 8 bytes	LHT52

+ Add another device

Back

Next

The screenshot shows the Datacake dashboard interface. On the left is a navigation sidebar with options like 'Add Dashboard', 'Devices', 'Reports', 'Gateways', 'Members', 'Rules', 'Workspace', 'Integrations', 'White Label', and 'Billing'. The main content area is titled 'Fleet > Devices' and contains a table with columns 'DEVICE' and 'LOCATION'. The table lists two devices: 'LD802WAB5IN LU' and 'LHT52'. The 'LHT52' entry is highlighted with a red rectangular box. Below the table, it says 'Showing 1 to 2 of 2 results' and includes pagination controls for '50 per page', 'Previous', and 'Next'. At the top right of the table area, there are search and 'Add Device' buttons.

Fleet > LHT52

LHT52

Serial Number: 2532124565261235 | Last update: Tue Jan 04 2022 17:06:14 GMT+0800

Navigation: Dashboard | History | Downlinks | **Configuration** | Debug | Rules | Permissions

Message: This device does not have a dashboard, yet. Start by activating the edit mode using the switch in the top right.

Copy and paste the [TTN decoder](#) here and save

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.

```
1 Function Decoder(payload, port) {
2   /*
3   * return {
4   *   field: "TEST",
5   *   value: 123
6   * }
7   */
8 }
9
10 }
```

Input: Payload: Port: Try Decoder

Output: console.log Output | Recognized measurements

Visual widgets please read the [DATAKAKE documentation](#)

Fleet > LHT52

LHT52

Serial Number: 2532124565261235 | Last update: Mon Jan 03 2022 16:50:26 GMT+0800

Navigation: Dashboard | History | Downlinks | Configuration | Debug | Rules | Permissions

Temp_C_SHT (4 minutes ago): Line chart showing temperature over time. A tooltip shows: 2022年1月3日 GMT+8 下午4:30, Temp_C_SHT: 25.06.

Temp_C_DS (4 minutes ago): Line chart showing temperature over time.

Hum_SHT (4 minutes ago): Line chart showing humidity over time.

2.6 Datalog Feature

When user want to retrieve sensor value, he can send a poll command from the IoT platform to ask sensor to send value in the required time slot.

2.6.1 Unix TimeStamp

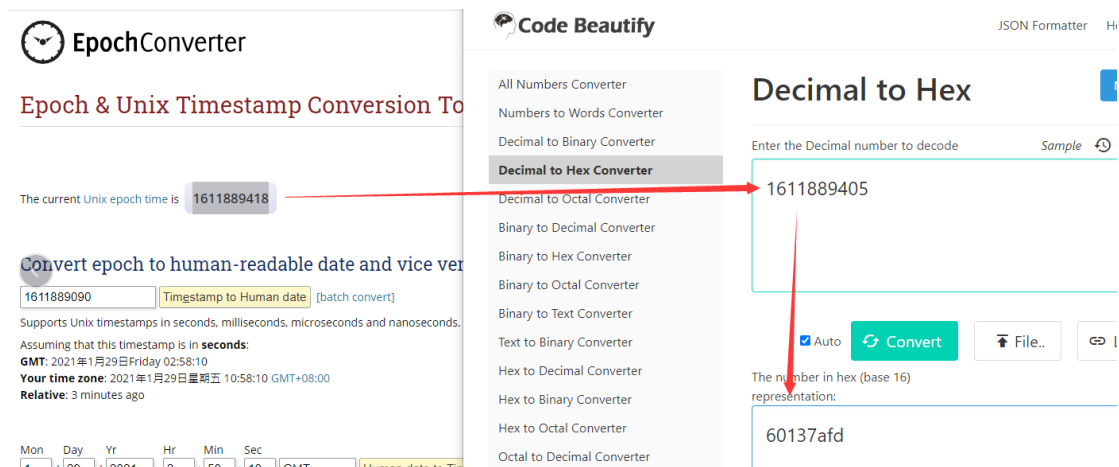
Unix TimeStamp shows the sampling time of uplink payload. format base on

Size (bytes)	4	1
DeviceTimeAns Payload	32-bit unsigned integer : Seconds since epoch*	8bits unsigned integer: fractional-second in 1/2^8 second steps

Figure 10 : DeviceTimeAns payload format

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

For example: if the Unix Timestamp we got is hex 0x60137afd, we can convert it to Decimal: 1611889405. and then convert to the time: 2021 – Jan -- 29 Friday 03:03:25 (GMT)



2.6.2 Poll sensor value

User can poll sensor value base on timestamps from server. Below is the downlink command.

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 log during this time period, use the uplink interval.

For example, downlink command `31 5FC5F350 5FC6 0160 05`

Is to check 2020/12/1 07:40:00 to 2020/12/1 08:40:00's data

Uplink Internal =5s, means LHT52 will send one packet every 5s. range 5~255s.

2.6.3 Datalog Uplink payload

See [Uplink FPORT=3, Datalog sensor value](#)

2.7 Alarm Mode

When device is in Alarm mode, it will check the built-in sensor temperature in a short interval. If the temperature exceeds the pre-configure range, it will send an uplink immediately.

The alarm mode can be modified by AT command or downlink, Alarm mode is disabled by default. If you need to enable the Alarm mode, please refer to the following

Note: Alarm mode will increase the power consumption, we recommend extending the normal uplink time (20 minutes default) when enable this feature.

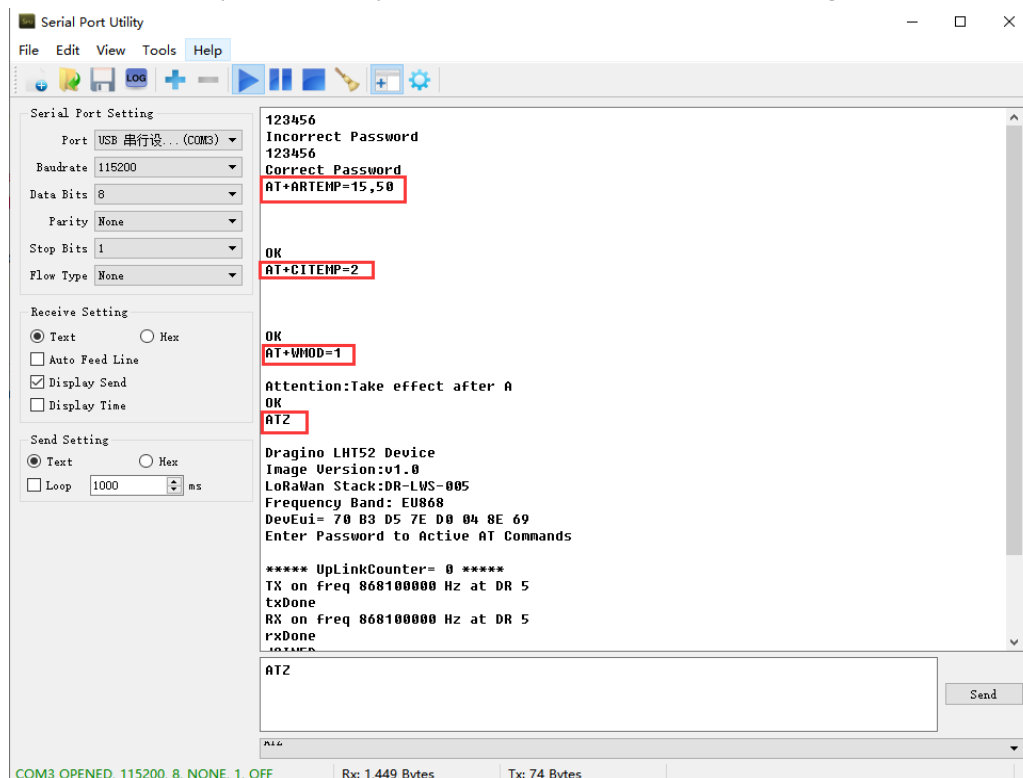
AT Commands for Alarm mode:

AT+WMOD=1: Enable/Disable Alarm Mode. (0:Disable, 1: Enable), need to reset the node to take effect

AT+CITEMP=1: The interval to check temperature for Alarm. (Unit: minute)

AT+ARTEMP=-40,125: Set the normal temperature range from -40° C to 125° C

Suppose you want to set the normal temperature from 15°C to 50°C, and turn on the alarm mode, and check the temperature every 2 minutes. Please refer to the following



Modification via downlink, Take TTN_V3 as an example (downlink commands, please refer to the [downlink command set for details](#))

In order to ensure that the node is indeed modified by downlink, I reset the node to factory settings first.

Or use a downlink directly: AA010002000F0032 ([See command info](#))

14:24:19	Fail to send webhook	Error:undefined:undefined
14:24:19	Schedule data downlink for transmissi...	FPort: 1 Confirmed downLink MAC payload: 08 83 73 08 30 C9 D6 76 Rx1 Delay: 5
14:24:19	Forward uplink data message	Payload: [Ext: 1, Hum_SMT: 61, Systimestamp: 1641960658, TempC_DS: 327.67, TempC_SMT: 21.77] 08 01 02 FE 7F FF 01 61 _ FPort: 2 Data rate: SF7B4125 SNR: 9.2 RSSI: -29
14:24:19	Successfully processed data message	DevAddr: 24 08 6A 14 FCnt: 9 FPort: 2 Data rate: SF7B4125 SNR: 9.2 RSSI: -29
14:22:46	Forward downlink data message	FPort: 1 Payload: AA 01 00 02 00 0F 00 32
14:22:19	Fail to send webhook	Error:undefined:undefined

2.8 LED Indicator

The LHT52 has a triple color LED which for easy showing different stage.

In a normal working state:

- ✓ When the node is restarted, **GREEN**, **RED** and **BLUE** are sequentially lit.
- ✓ During OTAA Join:
 - For each Join Request uplink**, the **GREEN LED** will blink once.
 - Once Join Successful**: the **GREEN LED** will be solid on for 5 seconds.
- ✓ After joined, for each uplink, the **BLUE LED** or **GREEN LED** will blink once.
 - ✧ **BLUE LED** when external sensor is connected
 - ✧ **GREEN LED** when external sensor is not connected
- ✓ For each success downlink, the **PURPLE LED** will blink once

In AT Command Mode:

If user use console cable to send AT Command to LHT52, the RED LED will always on until:

- Power off/on LHT52
- Press reset button of LHT52.
- Send an AT Command: AT+CLPM=1

2.9 Button

Press the button LHT52 will reset and join network again.

3. Configure LHT52 via AT Command or LoRaWAN Downlink

Use can configure LHT52 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 LHT52, 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(**Note****). These commands can be found on the wiki:

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

- **Commands special design for LHT52**

These commands only valid for LHT52, as below:

3.1 Downlink Command Set

Command Example	Function	Response	Downlink
AT+TDC=?	View current TDC time	1200000 OK	Default 1200000(ms)
AT+TDC=300000	Set TDC time	OK	0X0100012C: 01:fixed command 00012C:0X00012C=300(s econds)
ATZ	Reset node		0x04FF
AT+FDR	Restore factory settings		0X04FE
AT+CFM=?	View the current confirmation mode status	0 OK	Default 0
AT+CFM=1	Turn on confirmation mode	OK	0x0500:close 0x0501:open 05:fixed command
AT+CHE=?	View the current sub-band select 0-7, the default is 0	0 OK	Default 0

AT+CHE=2	Set subband to 2 (CN470,US915,AU915)	Attention:Take effect after ATZ OK	0X0702: 07:fixed command 02:Select subband 2
AT+WMOD=?	View the current alarm mode status	0 OK	Default 0
AT+WMOD=1	Turn on alarm mode	Attention:Take effect after ATZ OK	0xA501:open 0XA500:close A5:fixed command
AT+CITEMP=?	View the current temperature detection time interval	1 OK	Default 1(min)
AT+CITEMP=2	Set the temperature detection time interval to 2min	OK	0XA70002 A7:fixed command 0002:0X0002=2(min)
AT+NJM=?	Check the current network connection method	1 OK	Default 1
AT+NJM=0	Change the network connection method to ABP	Attention:Take effect after ATZ OK	0X2000:ABP 0x2001:OTAA 20:fixed command
AT+RPL=?	View current RPL settings	0 OK	Default 0
AT+RPL=1	set RPL=1	OK	0x2101: 21:fixed command 01:for details, check wiki
AT+ADR=?	View current ADR status	1 OK	Default 0
AT+ADR=0	Set the ADR state to off	OK	0x2200:close 0x2201:open 22:fixed command
AT+DR=?	View the current DR settings	OK	
AT+DR=1	set DR to 1 It takes effect only when ADR=0	OK	0X22000101: 00:ADR=0 01:DR=1 01:TXP=1 22:fixed command

AT+TXP=?	View the current TXP	OK	
AT+TXP=1	set TXP to 1 It takes effect only when ADR=0	OK	0X22000101: 00:ADR=0 01:DR=1 01:TXP=1 22:fixed command
	Upload node configuration or DS18B20 ID		0X2301:Upload node configuration 0x2302:Upload DS18B20 ID 23:fixed command
AT+DWELL=?	Check the high-rate upload settings	1 OK	Default 1
AT+DWELL=1	Set high rate upload (AS923,AU915)	Attention:Take effect after ATZ OK	0x2501:close 0x2500:open 25:fixed command for details, check wiki
AT+RJTDC=?	View current RJTDC set time	20 OK	Default 20(min)
AT+RJTDC=10	Set RJTDC time interval	OK	0X26000A: 26:fixed command 000A:0X000A=10(min) for details, check wiki
	Retrieve stored data for a specified period of time		0X3161DE7C7061DE8A800A: 31:fixed command 61DE7C70:0X61DE7C70=2022/1/12 15:00:00 61DE8A80:0X61DE8A80=2022/1/12 16:00:00 0A:0X0A=10(second) View details 2.6.2
AT+DDETECT=?	View the current DDETECT setting status and time	0,1440 OK	Default 0,1440(min)
AT+DDETECT=1,1440	Set DDETECT setting status and time (When the node does not receive the downlink packet within the set time, it will re-enter the network)	OK	0X320005A0:close 0X320105A0:open 32:fixed command 05A0:0X05A0=1440(min)
	Downlink Modification Alarm		0XAA010002000F00032: AA:fixed command

	Mode (AT+WMOD,AT+CITE MP,AT+ARTEMP)		01:0X01=1(AT+MOD) 0002:0X0002=2(AT+CITE MP) 000F:0X000F=15(AT+ART EMP) 0032:0X0032=50(AT+ART EMP)
--	---	--	---

3.2 Set Password

Feature: Set device password, max 9 digits

AT Command: AT+PASSWORD

Command Example	Function	Response
AT+PASSWORD=?	Show password	123456 OK
AT+PASSWORD=999999	Set password	OK

Downlink Command:

No downlink command for this feature.

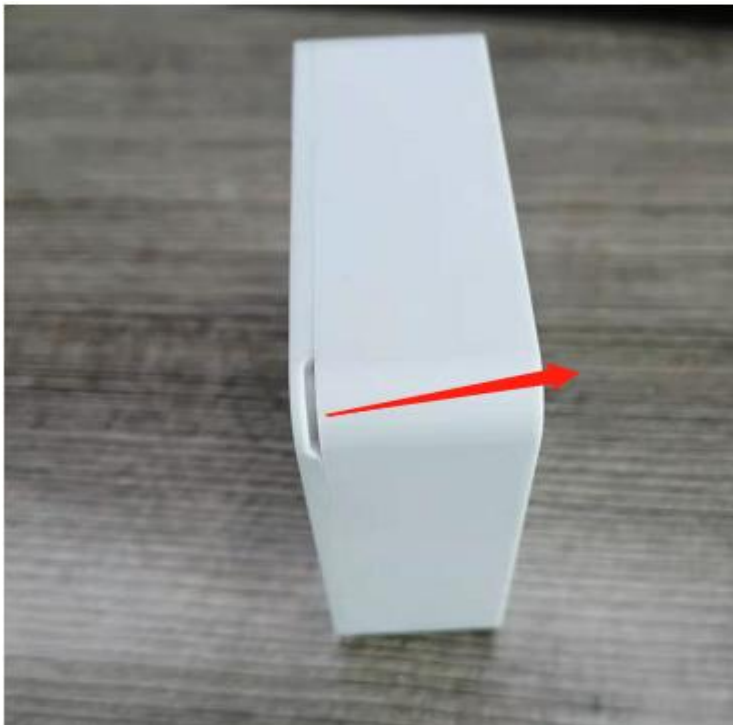
4. Battery Replacement

4.1 Battery Type and replace

LHT52 uses 2 x AAA LR03(1.5v) batteries. If the batteries running low (shows 2.1v in the platform). User can buy generic AAA battery and replace it.

Note:

- 1) The LHT52 doesn't have any screw, use can use nail to open it by the middle.



- 2) Make sure the direction is correct when install the AAA batteries.



4.2 Power 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.

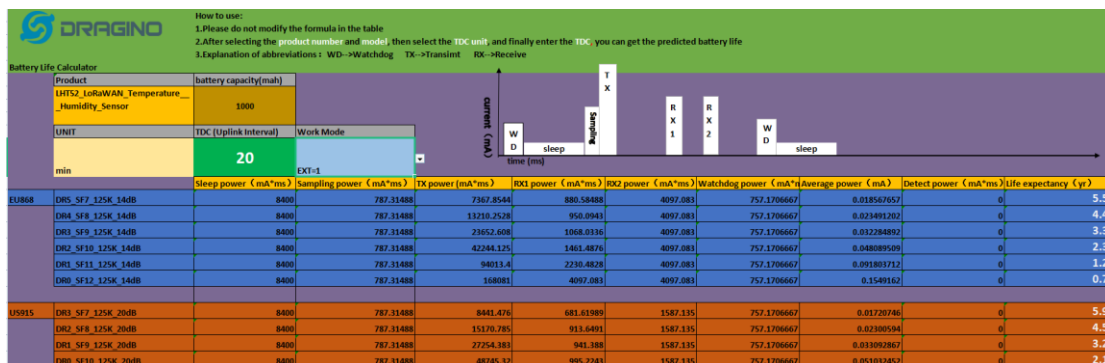
Instruction to use as below:

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.



5. Sensors & Accessories

5.1 Temperature Probe (AS-01)

External Temperature Probe base on DS18B20. (note: Default Package doesn't include AS-01)

AS-01 Temperature Probe



External Temperature Probe (AS-01):

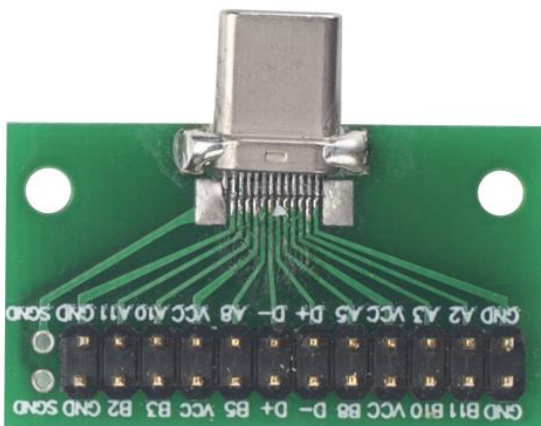
- Resolution: 0.0625 °C
- $\pm 0.5^{\circ}\text{C}$ accuracy from -10°C to $+85^{\circ}\text{C}$
- $\pm 2^{\circ}\text{C}$ accuracy from -55°C to $+125^{\circ}\text{C}$
- Operating Range: $-55^{\circ}\text{C} \sim 125^{\circ}\text{C}$
- Cable Length: 2 meters

5.2 Program Converter (AS-02)

AS-02 is an optional accessory, it is USB Type-C converter. AS-02 provide below feature:

- 1) Access AT console of LHT52 when used with USB-TTL adapter. [See this link.](#)
- 2) Update firmware to LHT52 when used with DAP-Link adapter. [See this link.](#)

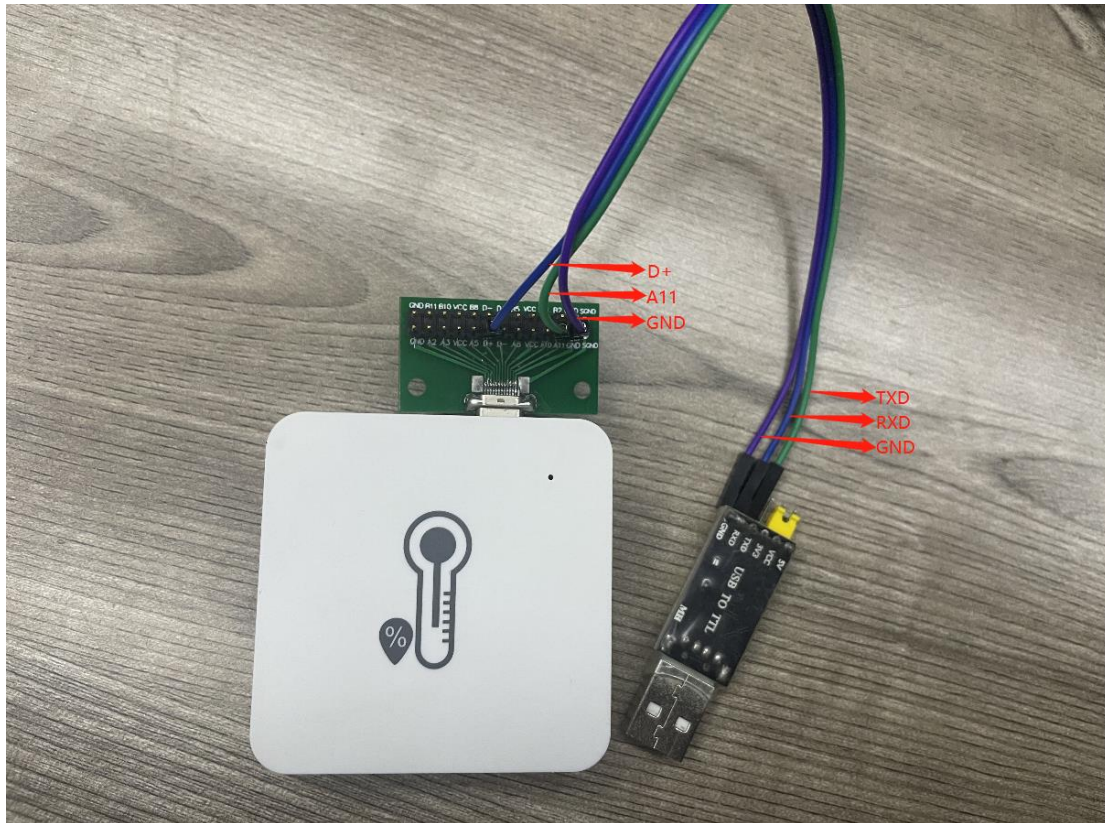
AS-02 USB Type-C Converter



6. FAQ

6.1 How to use AT Command to configure LHT52

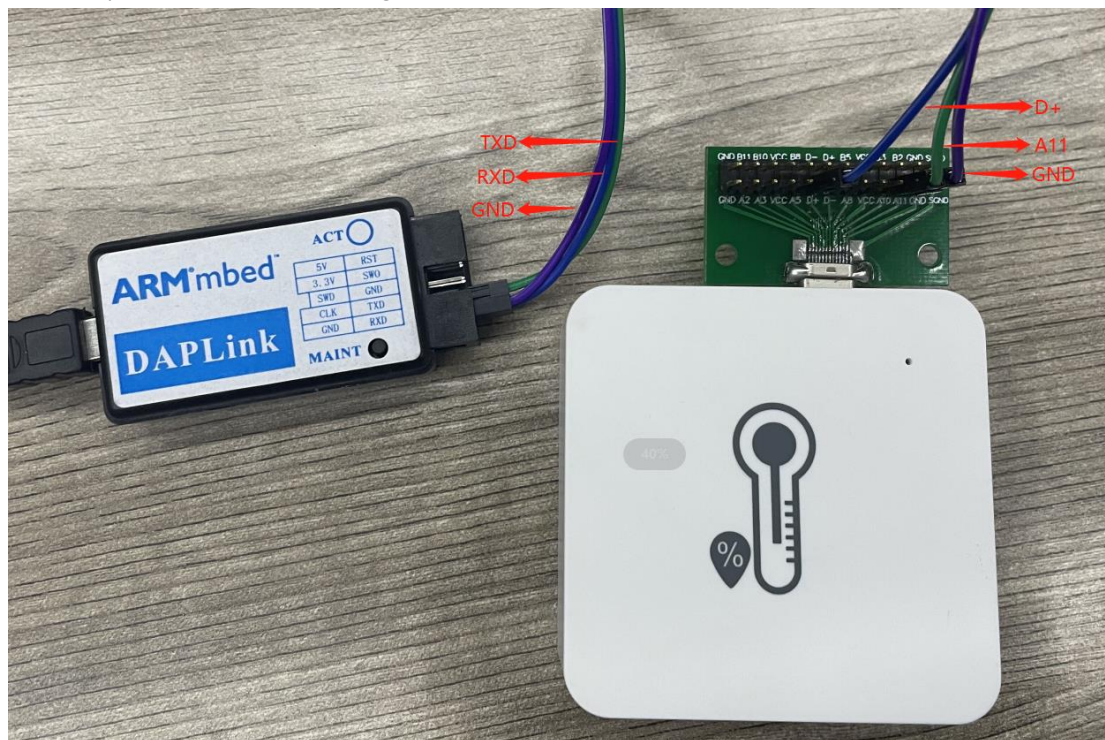
LHT52 supports AT Command set. User can use a USB to TTL adapter plus the Program Cable to connect to LHT52 for using AT command, as below.



Connection:

- ✓ USB to TTL GND <--> Program Converter GND pin
- ✓ USB to TTL RXD <--> Program Converter D+ pin
- ✓ USB to TTL TXD <--> Program Converter A11 pin

It is also possible to connect using DAPLink

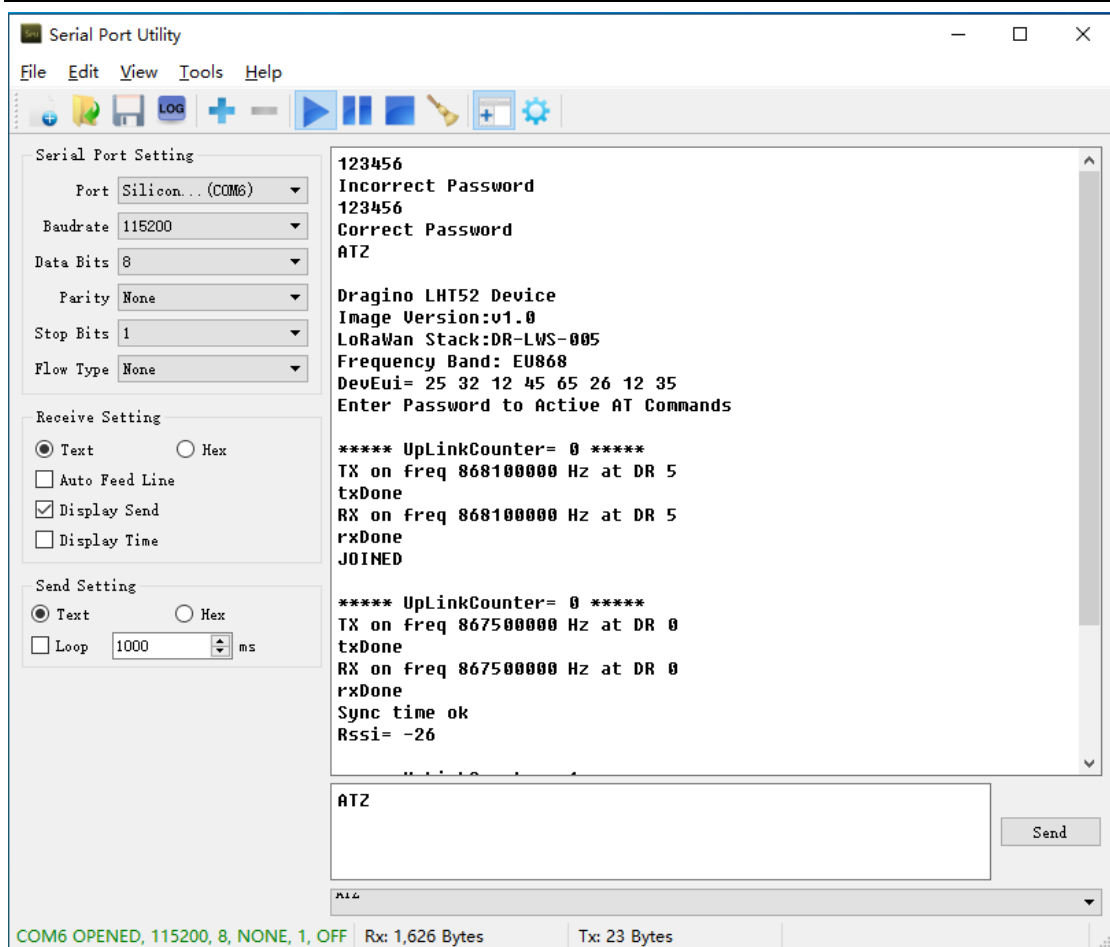


Connection:

- ✓ USB to DAP-LINK GND <--> Program Converter GND pin
- ✓ USB to DAP-LINK RXD <--> Program Converter D+ pin
- ✓ USB to DAP-LINK TXD <--> Program Converter A11 pin

In PC, User needs to set **serial tool**(such as [putty](#), SecureCRT) baud rate to **115200** to access to access serial console for LHT52. The AT commands are disable by default and need to enter password (default:**123456**) to active it. Timeout to input AT Command is 5 min, after 5-minute, user need to input password again.

Input password and ATZ to activate LHT52,As shown below:



6.2 AT Command and Downlink

Sending ATZ will reboot the node

Sending AT+FDR will restore the node to factory settings

Get the node's AT command setting by sending AT+CFG

Example:

AT+VER=EU868 v1.0

AT+NJM=1

AT+DEUI=25 32 12 45 65 26 12 35

AT+APPEUI=25 32 12 45 65 26 32 16

AT+APPKEY=25 32 12 45 65 26 32 16 89 48 85 65 45 87 89 55

AT+DADDR=00 00 00 00

AT+APPSKEY=00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00

AT+NWKSKEY=00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00

AT+NWKID=00 00 00 13

AT+ADR=1

AT+DR=5

AT+TXP=1

AT+CHS=0

AT+CLASS=A

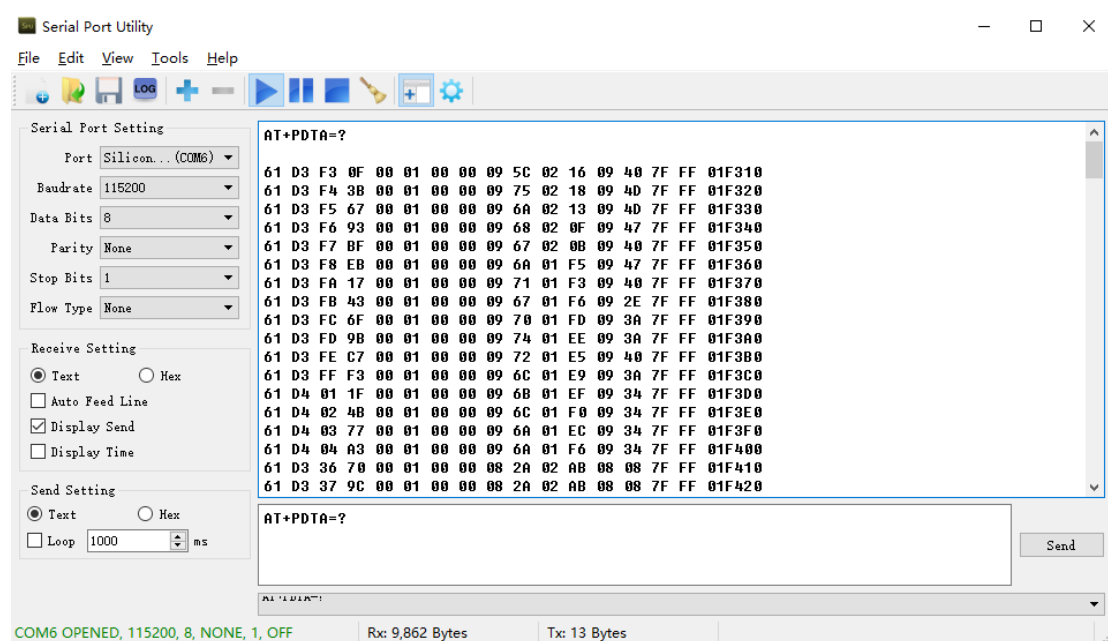
```

AT+CFM=0
AT+JN1DL=5000
AT+JN2DL=6000
AT+RX1DL=5000
AT+RX2DL=6000
AT+RX1WTO=24
AT+RX2WTO=6
AT+RX2FQ=869525000
AT+RX2DR=0
AT+RPL=0
AT+FCU=6
AT+FCD=0
AT+CFS=0
AT+NJS=1
AT+DCS=0
AT+PNM=1
AT+PASSWORD=123456
AT+EXT=1
AT+TDC=120000
AT+TIMESTAMP=1640851037 2021 12 30 7 57 17
AT+RJTDC=20
AT+DDETECT=0,1440
AT+WMOD=0
AT+CITEMP=1
AT+ARTEMP=-40,125

```

Send AT+PDTA=? to get the stored 174 data

Example:



6.3 How to upgrade the firmware?

LHT52 requires a program converter to upload images to LHT52, which is used to upload image to LHT52 for:

- ✓ Support new features
- ✓ For bug fix
- ✓ Change LoRaWAN bands.

User can check this link for the detail of operation of firmware upgrade.

https://wiki.dragino.com/index.php?title=Firmware_Upgrade_Instruction#LHT52

6.4 How to change the LoRa Frequency Bands/Region?

User can follow the introduction for [how to upgrade image](#). When download the images, choose the required image file for download.

7. Order Info

7.1 Main Device:

Part Number: **LHT52-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

7.2 Accessories:

Note: below accessories are not include in the main device package, need to order separately.

Temperature Probe: AS-01

Program Converter: AS-02

8. Packing Info

Package Includes:

- ✓ LHT52 Temperature & Humidity Sensor x 1

9. Support

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

support@dragino.com

10. FCC Warning

This device complies with part 15 of the FCC Rules.Operation is subject to the following two conditions:

- (1) This device may not cause harmful interference, and
- (2) this device must accept any interference received, including interference that may cause undesired operation