atomsenses
Modular Sensing Solutions

Atomsenses

LoRaWAN Indoor Ambiance Monitoring Sensor

Configuration Guide

V1.04

Contents

1. General

1.1 Applicability

This guide applies to the following sensors, unless otherwise specified:

Model	Description
AS-201 AS202/AS203/AS-204	- AS-10x : Indoor Ambiance Sensor (3-IN-1 functional series) - AS-20x : Indoor Ambiance Sensor (advanced series) - ES-10x : Indoor Ambiance Sensor (advanced series)
IAQ Combo Flex	Indoor Ambiance Sensor (Sensors of your choice)

1.2 Declaration of Conformity

Atomsenses sensors comply with the essential requirements and relevant provisions of CE/EMC, and RoHS standards.

1.3 Device EUI and information

Each device is shipped with a sticker with the default device EUI, below is an example of AS-201 :

2. Connect to LoRaWAN network

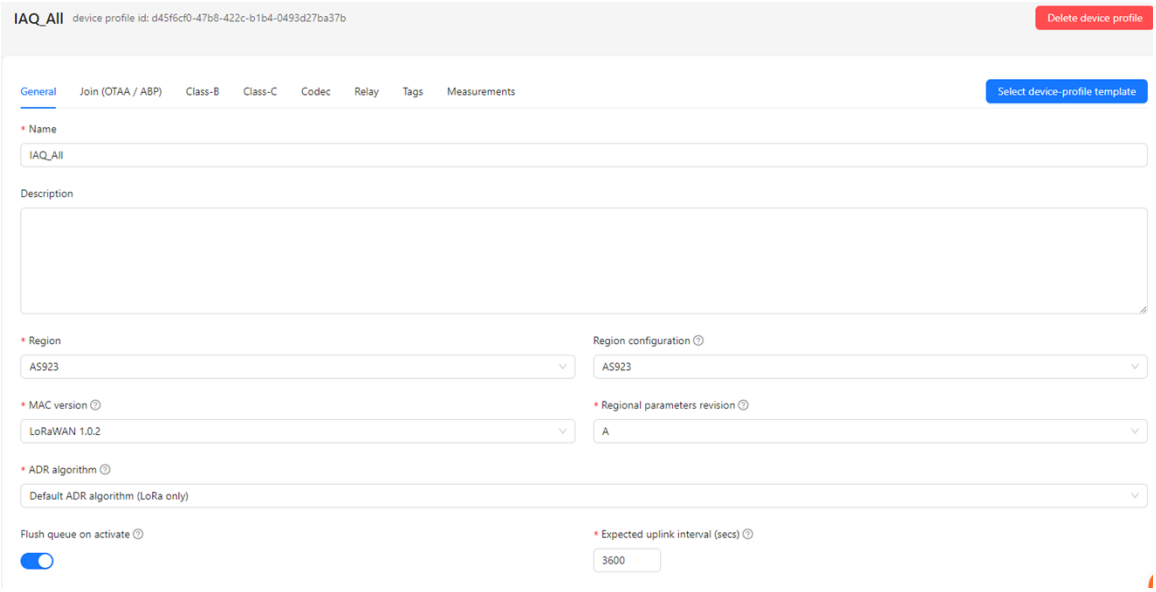
2.1 How it works

By default, the sensor is configured in LoRaWAN OTAA Class A mode and has OTAA keys for joining the LoRaWAN network. To connect to a local LoRaWAN network, input the OTAA keys in the LoRaWAN IoT server and press the button to activate the sensor. It will then automatically join the network via OTAA and start sending sensor values. The default uplink interval is 20 minutes.

2.2 Connect to LoRaWAN server – ChirpStack

The following is an example of joining the ChirpStack V4. Assuming the LoRaWAN gateway is already connected:

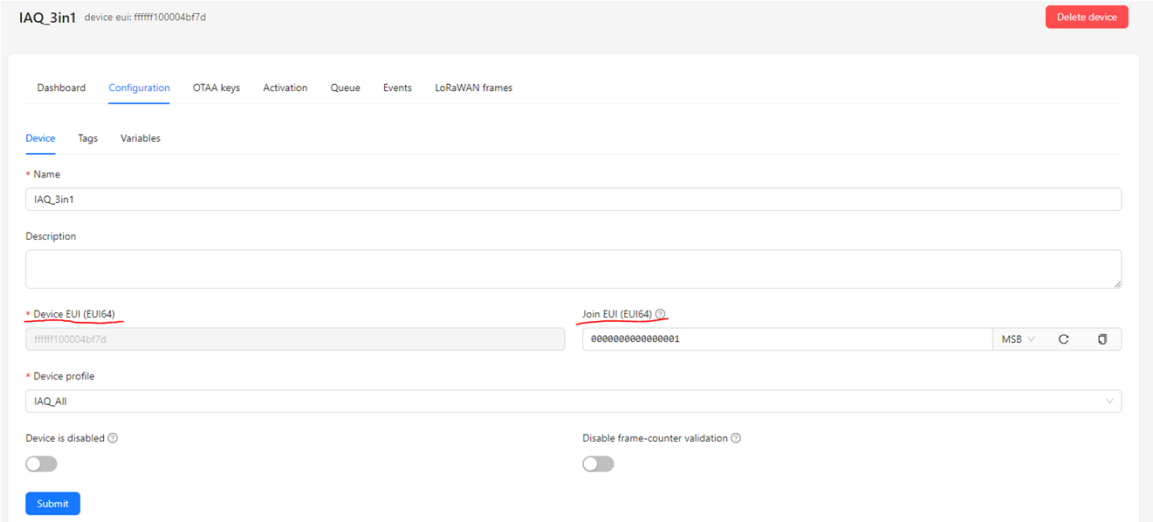
Step 1: Add device profile with the corresponding region:



And update Payload codec functions, you can find the corresponding codec function in github: https://github.com/atomsenses/atomsenses-decoder

Click “And device” under Applications – find the corresponding application, enter Device EUI/DevEUI which can be found from the sticker on the

sensor, then input Join EUI, and select the previously created device profile :

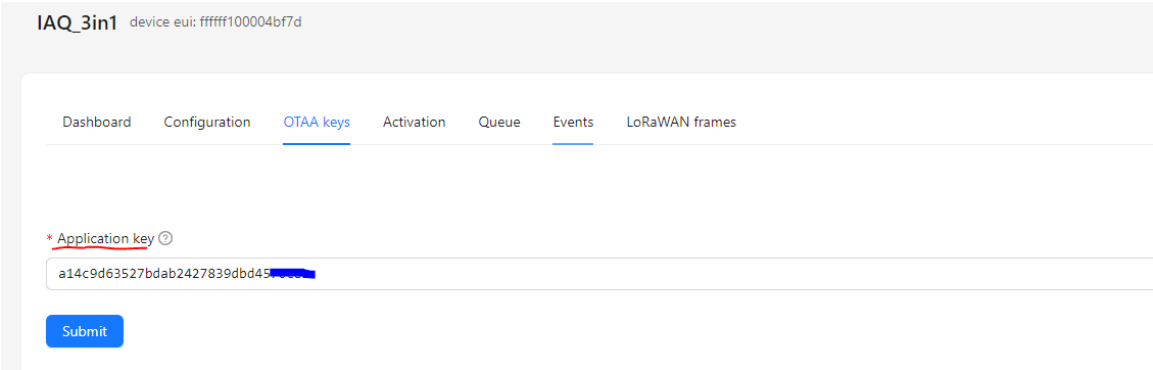


Step 2: Add APP Key

App Key will be sent via email (usually it's included in the shipping notification email)

Device will be in OTA mode by factory setting.

Navigate to "OTAA Keys" then enter App Key:



Step 3 : Activate the sensor

Press the button to restart the device. It will then attempt to join the LoRaWAN network. Upon successful join, it will start uploading messages. You can view the messages on Events & LoRaWAN Frames screen.

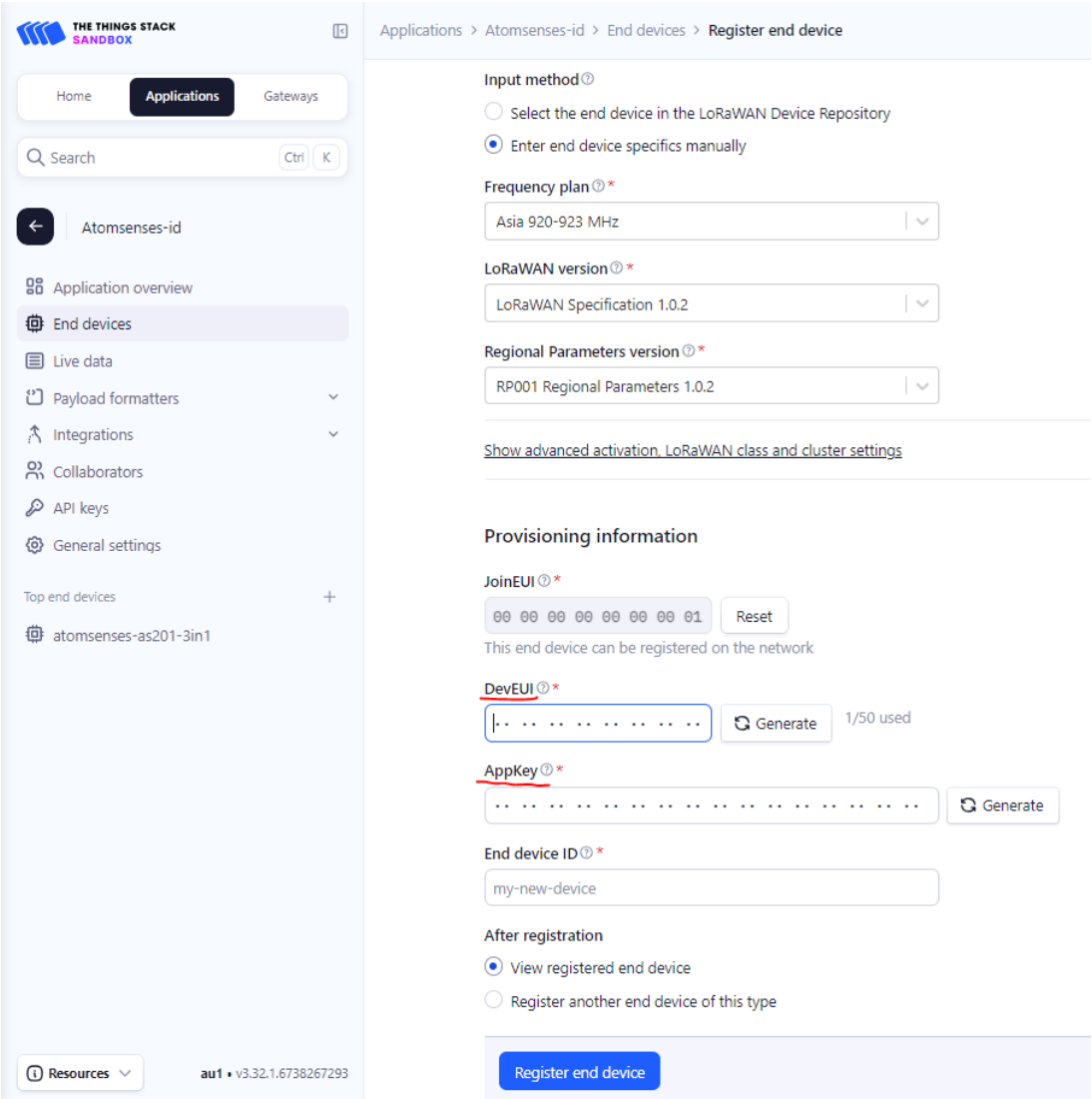
2.3 Connect to LoRaWAN server – The Things Network

The following is an example of joining the. Assuming the LoRaWAN gateway is already connected to TTN network :

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

Register the device – Add DevEUI

Navigate to TTN console and click “Register end device”, then input JoinEUI (e.g.: as below), then enter DevEUI which can be found from the sticker on the sensor:



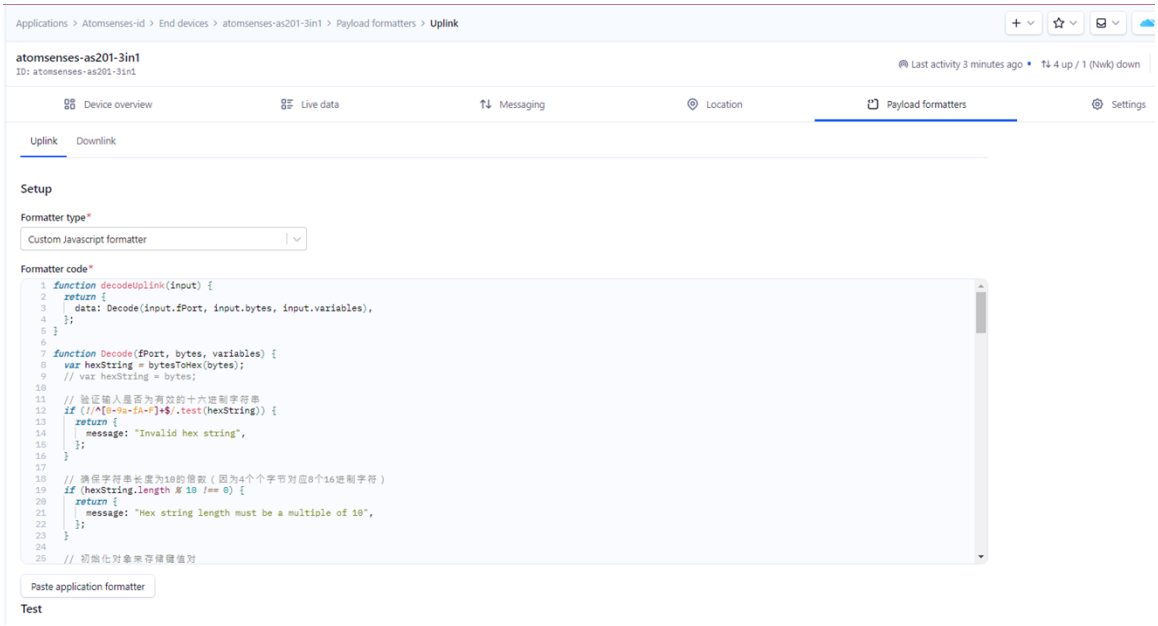
Add APP Key

App Key will be sent via email (usually it's included in the shipping notification email)

Device will be in OTA mode by factory setting.

Setup Payload decoder

update Payload codec functions, you can find the corresponding codec function in github : https://github.com/atomsenses/atomsenses-decoder



Step 2: Activate the sensor

Press the button to restart the device. It will then attempt to join the LoRaWAN network. Upon successful join, it will start uploading messages to TTN. You can view the messages on the TTN end device Live Data screen.

3. Data Report

3.1 Payload Definition

Type		Id		Length	Description
Temperature		01		4	temperature, unit: ℃
Humidity		02		4	humidity, unit: %RH
Pressure		03		4	pressure, unit: hPa
PM1.0		04		4	pm1_0, unit: ug/m^3
PM2.5		05		4	pm1_0, unit: ug/m^3
PM10		06		4	pm1_0, unit: ug/m^3
CO2		07		4	co2, unit: ppm
TVOC		08		4	tvoc, unit: mg/m^3
Light		09		4	light, unit: lux
H2S		11		4	h2s, unit: ppm
NH3		12		4	nh3, unit: ppm
CO		13		4	co, unit: ppm
HCHO		14		4	hcho, unit: ppb
O3		15		4	o3, unit: ppb
NO2		16		4	no2, unit: ppm
SO2		17		4	so2, unit: ppm
Voltage		20		4	voltage, unit: V

3.2 Example of PayloadData

0141d50d78 0242771974 0300006627 040000000e 0500000013
0600000013 0700000408 0800000000 0900000329 1100000000
1200000000 1300000000 1400000018 1500000001 1600000002
1700000008 20405c55cc


```
{
    "Temperature":  26.632,
    "Humidity":  61.775,
    "Pressure":  1008.6,
    "PM1_0":  14,
    "PM2_5":  19,
    "PM10":  19,
    "CO2":  1032,
    "TVOC":  0,
    "Light":  809,
    "H2S":  0,
    "NH3":  0,
    "CO2":  0,
    "HCHO":  0,
    "O3":  0,
    "NO2":  0.024,
    "SO2":  0.008,
    "Voltage":  3.443
}
```

4.IAQ Command

4.1 CMD A0: Upload interval setting

Header 1	Header 2	CMD	Value [0]	Value [1]	Checksum	Checksum
0xFF	0x00	0xA0	XX	XX	CRC High	CRC Low

Value [0]: Value High

Value [1]: Value Low

Set the upload interval to 600 seconds (10 minutes)

e.g. FF00A0025830AC

4.2 CMD A2: MCU reset

Header 1	Header 2	CMD	Value [0]	Value [1]	Checksum	Checksum
0xFF	0x00	0xA1	Reserved	Reserved	CRC High	CRC Low

Reset MCU and Lora, note the all the parameter remain unchanged

e.g. FF00A2000091F6

4.3 CMD A3: LoRa setting

Header 1	Header 2	CMD	Value [0]	Value [1]	Checksum	Checksum
0xFF	0x00	0xA3	Reserved	XX	CRC High	CRC Low

Value [1]:

00 – Disable

01 – Enable

Enable ADR function

e.g. FF00A3000101F6

4.4 CMD A4: Offset

CMD C0: Temperature offset

Header 1	Header 2	CMD	Value	Checksum	Checksum
0xFF	0x00	0xC0	XX	CRC Low	CRC High

Value: Temperature offset * 10 (in signed char format)

e.g. Temperature + 2.0 degree Celsius: 0x14

Command line: FF00C014603F

CMD C1: Humidity offset

Header 1	Header 2	CMD	Value	Checksum	Checksum
0xFF	0x00	0xC1	XX	CRC Low	CRC High

Value: Humidity offset * 10 (in signed char format)

e.g. Humidity -1.0%: 0xF6

Command line: FF00C1F6E1E6

CMD C2: Pressure offset

Header 1	Header 2	CMD	Value	Checksum	Checksum
0xFF	0x00	0xC2	XX	CRC Low	CRC High

Value: Pressure offset (in signed char format)

e.g. Pressure + 15 hPa: 0x0F

Command line: FF00C20F2154

CMD C3: CO2 offset

Header 1	Header 2	CMD	Value	Checksum	Checksum
0xFF	0x00	0xC3	XX	CRC Low	CRC High

Value: CO2 offset / 10 (in signed char format)

e.g. CO2 -350 ppm: 0xDD

Command line: FF00C3DDA099

CMD C4: TVOC offset

Header 1	Header 2	CMD	Value	Checksum	Checksum
0xFF	0x00	0xC4	XX	CRC Low	CRC High

Value: TVOC offset * 100(in signed char format)

e.g. TVOC -0.34 ppb: 0xDE

Command line: FF00C4DEE2A8

CMD C5-C7: PM1/2.5/10 offset

Header 1	Header 2	CMD	Value	Checksum	Checksum
0xFF	0x00	0xC5	XX	CRC Low	CRC High

Header 1	Header 2	CMD	Value	Checksum	Checksum
0xFF	0x00	0xC6	XX	CRC Low	CRC High

Header 1	Header 2	CMD	Value	Checksum	Checksum
0xFF	0x00	0xC7	XX	CRC Low	CRC High

Value: PM10 offset (in signed char format)

e.g. PM1 +33: 0x21

Command line: FF00C721A218

4.5 Change APPKEY

Header 1	Header 2	CMD	APPKEY [0-15]	Checksum	Checksum
0xFF	0x00	0xB0	XX	CRC High	CRC Low

e.g. FF00B000112233445566778899AABBCCDDEEFFDCE4