LoRaWAN Configuration

V2.2 03/26

inBiot

Table of Contents

First steps

Read before starting

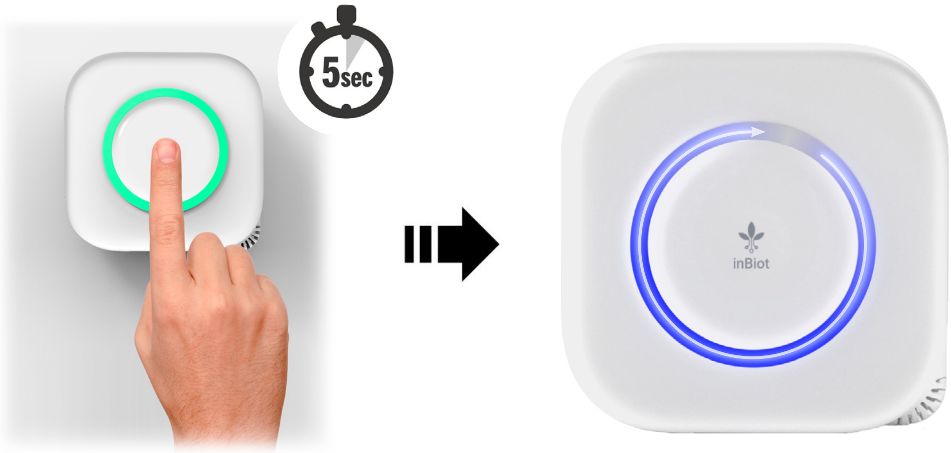
1. To complete this configuration, you will need to install the inBiot Setup app on your mobile device.

Download on the App Store

GET IT ON Google Play

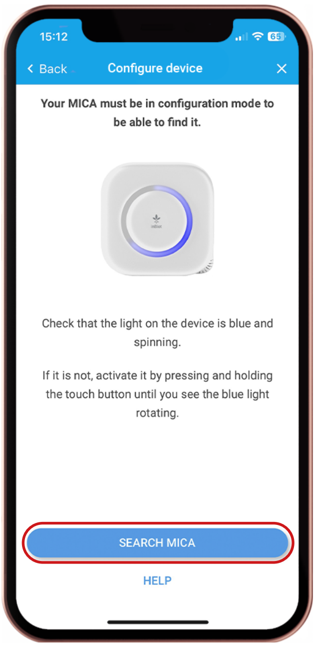
2. You will also need access to the LoRaWAN server, preferably using a different device (computer/laptop/tablet).

3. Before beginning the configuration, ensure that the device is in access point mode: This happens automatically the first time the MICA is powered on. If not, press the touch button located on the MICA logo until the light turns blue and begins to rotate.



Configuration

1. Open the inBiot Setup application on your mobile device. Follow the on-screen instructions to complete the initial configuration of the device.



15:12

‹ Back Configure device ✕

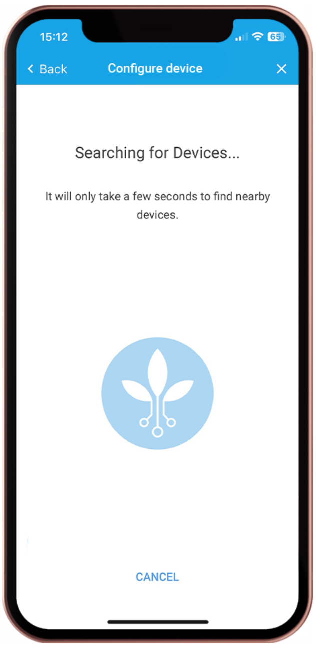
Your MICA must be in configuration mode to be able to find it.

Check that the light on the device is blue and spinning.

If it is not, activate it by pressing and holding the touch button until you see the blue light rotating.

SEARCH MICA

HELP



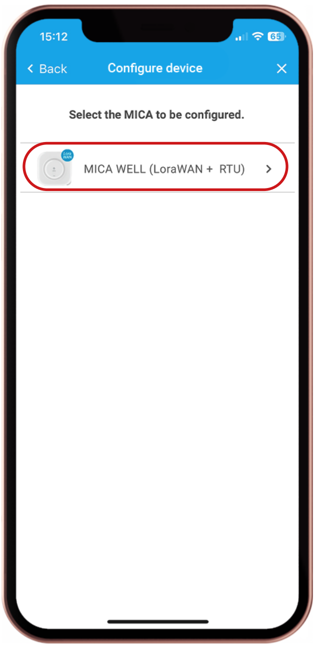
15:12

‹ Back Configure device ✕

Searching for Devices...

It will only take a few seconds to find nearby devices.

CANCEL



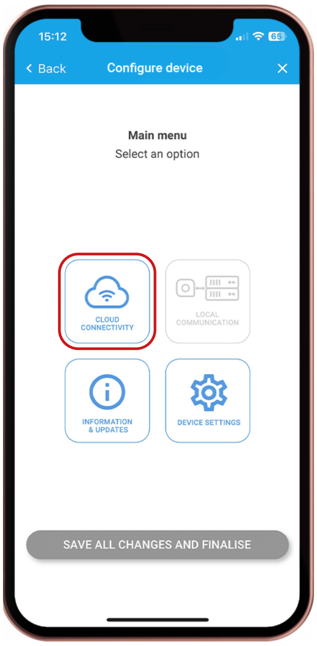
15:12

‹ Back Configure device ✕

Select the MICA to be configured.

MICA WELL (LoraWAN + RTU) ›

2. In the main menu, select the "Cloud Connectivity" option and locate the "Device EUI" field. Carefully note down this unique and immutable value, as it is crucial for the device's configuration on the LoRaWAN server. On the same screen, you will find the "App EUI" and "AppKey" fields with default values. You can modify these values if you wish, as long as they match the ones configured on your LoRaWAN server. Do not press "Continue" until you have completed step number 3.



15:12

‹ Back Configure device ✕

Main menu

Select an option

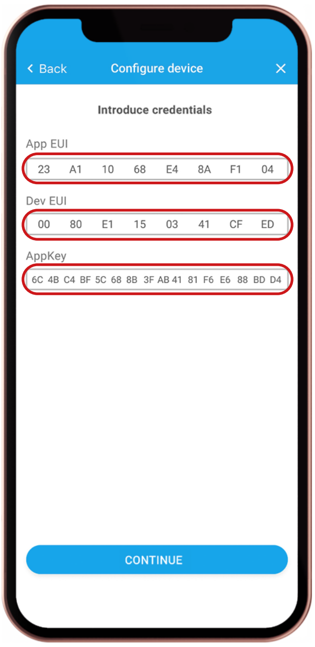
CLOUD CONNECTIVITY

LOCAL COMMUNICATION

INFORMATION & UPDATES

DEVICE SETTINGS

SAVE ALL CHANGES AND FINALISE



‹ Back Configure device ✕

Introduce credentials

App EUI

23 A1 10 68 E4 8A F1 04

Dev EUI

00 80 E1 15 03 41 CF ED

AppKey

6C 4B C4 BF 5C 68 8B 3F AB 41 81 F6 E6 88 BD D4

CONTINUE

Default values

App EUI

23 A1 10 68 E4 8A F1 04

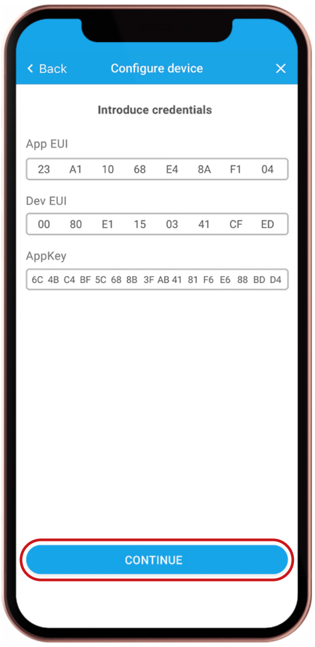
AppKey

6C 4B C4 BF 5C 68 8B 3F AB 41 81 F6 E6 88 BD D4

3. Access your LoRaWAN server and start the process of registering a new end device. In the “DevEUI” field, enter the values you obtained in step 2 of the guide. In the “AppEUI” and “AppKey” fields, enter the values you configured or found as default in the configuration application (make sure they match the device exactly).

4. Save the device configuration on your LoRaWAN server.

5. Once the device is registered, continue with the LoRaWAN configuration and verify the device’s proper connection to the server.

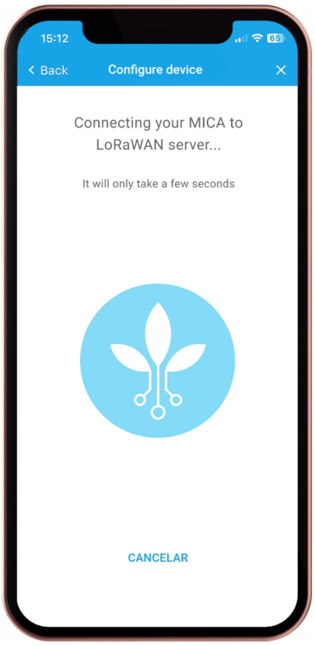


Introduce credentials

App EUI: 23 A1 10 68 E4 8A F1 04

Dev EUI: 00 80 E1 15 03 41 CF ED

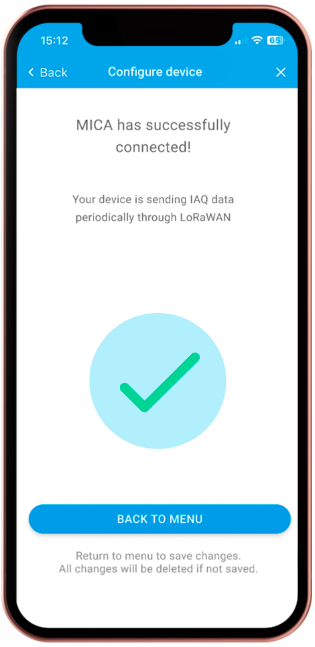
AppKey: 6C 4B C4 BF 5C 68 8B 3F AB 41 81 F6 E6 88 BD D4



Connecting your MICA to LoRaWAN server...

It will only take a few seconds

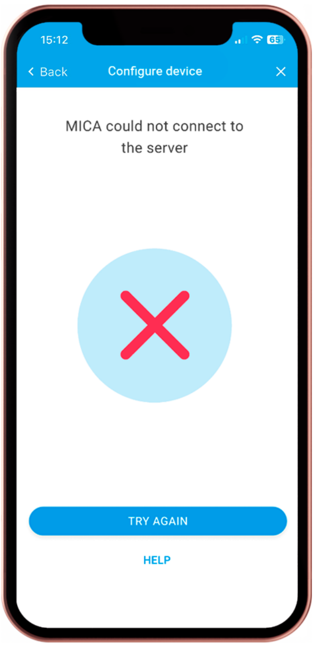
6. If MICA has sufficient coverage and the credential configuration has been done correctly, you will see a green flashing light indicating a successful connection to the server. If not, the flashing will be red, and you will need to check the configured credentials or the network coverage range.



MICA has successfully connected!

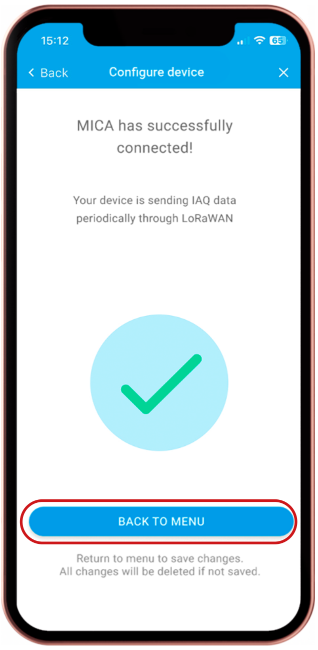
Your device is sending IAQ data periodically through LoRaWAN

Return to menu to save changes.
All changes will be deleted if not saved.



MICA could not connect to the server

7. After validating the proper connection of the device to the server, return to the main menu and save the changes made to finalize and exit the access point. At this point, your MICA device should be correctly configured and connected to your LoRaWAN server.



15:12

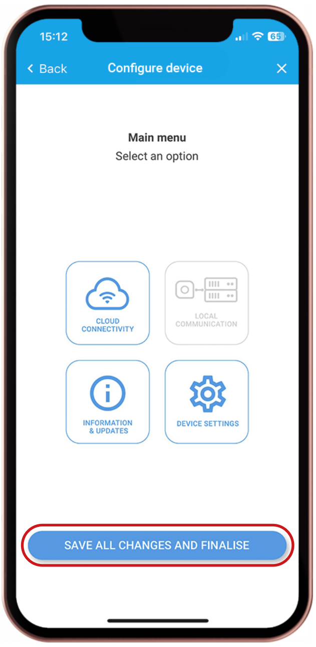
< Back Configure device ✕

MICA has successfully connected!

Your device is sending IAQ data periodically through LoRaWAN

BACK TO MENU

Return to menu to save changes.
All changes will be deleted if not saved.

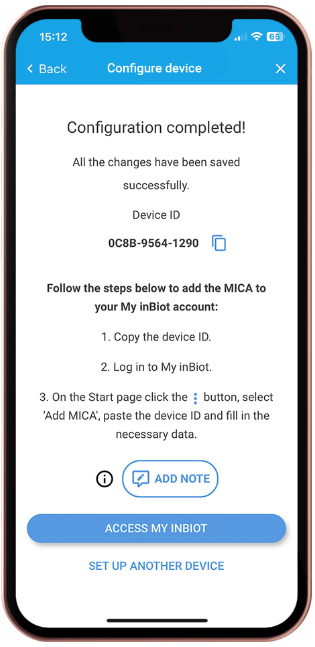


15:12

< Back Configure device ✕

Main menu
Select an option

SAVE ALL CHANGES AND FINALISE



15:12

< Back Configure device ✕

Configuration completed!

All the changes have been saved successfully.

Device ID

0C8B-9564-1290

Follow the steps below to add the MICA to your My inBiot account:

1. Copy the device ID.

2. Log in to My inBiot.

3. On the Start page click the ⋮ button, select 'Add MICA', paste the device ID and fill in the necessary data.

ADD NOTE

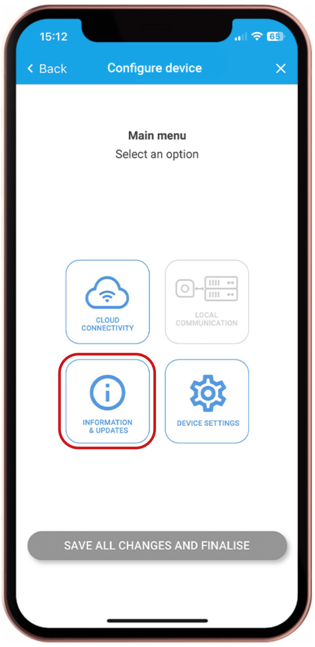
ACCESS MY INBIOT

SET UP ANOTHER DEVICE

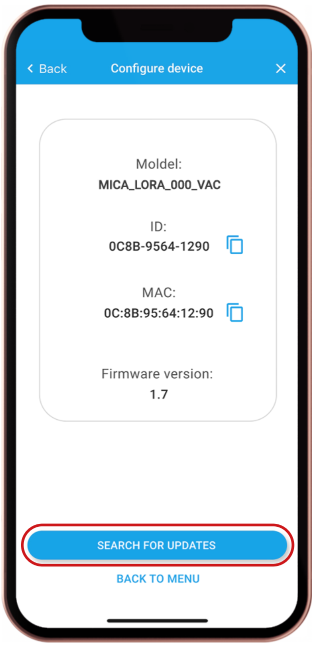
Software update

Update steps

1. In the main menu of the inBiot Setup app, select the "Information & Updates" option, then click on "Check for Updates," and then select "Update".



Main menu
Select an option

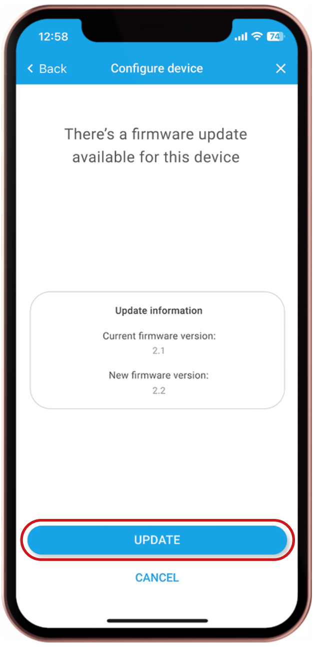


Moldel:
MICA_LORA_000_VAC

ID:
0C8B-9564-1290

MAC:
0C:8B:95:64:12:90

Firmware version:
1.7



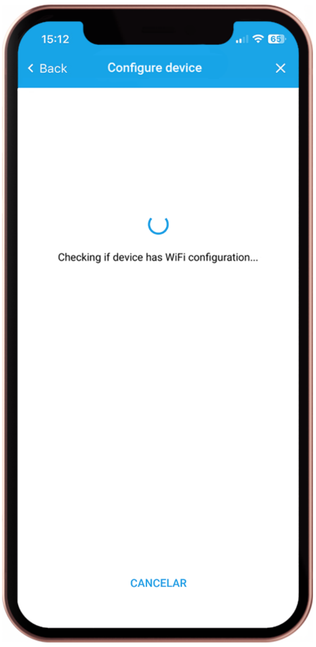
There's a firmware update available for this device

Update information

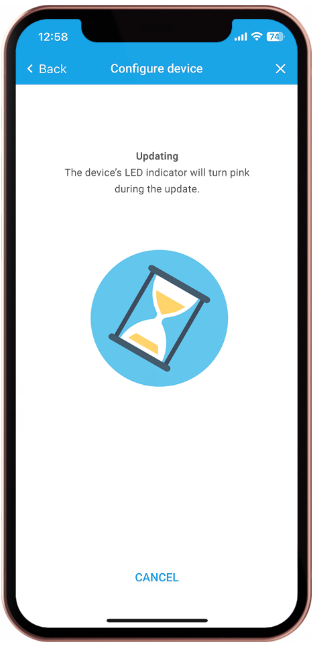
Current firmware version:
2.1

New firmware version:
2.2

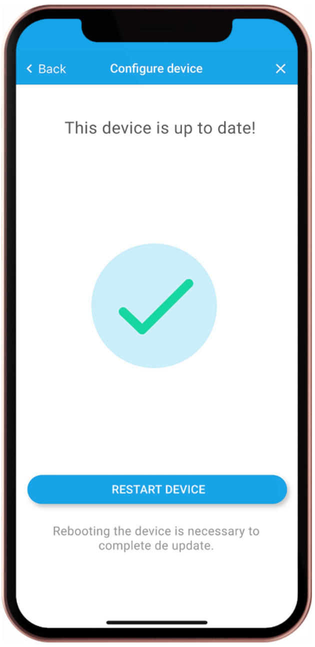
2. The device will check the internet connection. If it is not connected, you should follow the steps to configure a Wi-Fi network. Otherwise, the device will update automatically.



Checking if device has WiFi configuration...



Updating
The device's LED indicator will turn pink during the update.



This device is up to date!

Rebooting the device is necessary to complete de update.

Downlink

This section outlines the configurable parameters that can be transmitted to the MICA device via LoRaWAN downlink messages. Parameters can be sent individually or combined into a single message, either using a supported JSON encoder or directly in raw byte array format.

1. JSON-Based Configuration (via Encoder)

A custom encoder is available to convert JSON-formatted commands into the appropriate byte payload. This encoder is compatible with Chirpstack v3/v4, The Things Network (TTN), and Milesight LoRaWAN gateways.

Supported parameters

`ledStatus` - Enable/Disable device LED

Type: `boolean`

Values:

- `true:` Enable LED
- `false:` Disable LED

Example: `{"ledStatus": true}`

`timeToSend` - Uplink transmission interval (in minutes)

Type: `uint8`

Values: 0 and 5 to 60

- `0:` Default interval (15 minutes)
- `5 - 60:` Custom interval in minutes

Example: `{"timeToSend": 30}`

`ventilation` - CO_2 auto-calibration cycle

Type: `uint8`

Options:

- `1:` Every 48 hours - Manual ventilation
- `2:` Every 24 hours (default) - Mechanical ventilation
- `3:` Every 7 days - Low ventilation
- `4:` Every 15 days - No ventilation
- `5:` Disabled

Example: `{"ventilation": 3}`

`ledConfiguration` - LED indicator mode

Type: `uint8 (0-15)`

Modes:

- `0:` Ventilation Efficiency (default)
- `1:` Thermohygrometric Comfort
- `2:` Temperature
- `3:` Humidity
- `4:` CO_2
- `5:` TVOC
- `6:` PM2.5
- `7:` PM10
- `8:` Virus Spread Risk
- `9:` Indoor Air Quality (IAQ)
- `10:` PM1.0
- `11:` PM4.0
- `12:` Formaldehyde (CH_2O)
- `13:` Ozone (O_3)
- `14:` Nitrogen Dioxide (NO_2)
- `15:` Carbon Monoxide (CO)
- `16:` Mold Persistence

Example: `{“ledConfiguration”: 9}`

`touchEnable` - Enable/Disable capacitive touch button

Type: `boolean`

Values:

- `true:` Enable touch button
- `false:` Disable touch button

Example: `{“touchEnable”: true}`

`ADREnable` - Enable/Disable Adaptative data rate

Type: `boolean`

Values:

- `true:` Enable ADR (default)
- `false:` Disable ADR

Example: `{“ADREnable”: true}`

`DR` - Data Rate

Type: `uint8 (0-5)`

Modes:

- `0:` LoRa SF12 / 125 kHz, bit rate 250 bit/s
- `1:` LoRa SF11 / 125 kHz, bit rate 440 bit/s
- `2:` LoRa SF10 / 125 kHz, bit rate 980 bit/s
- `3:` LoRa SF9 / 125 kHz, bit rate 1760 bit/s
- `4:` LoRa SF8 / 125 kHz, bit rate 3125 bit/s
- `5:` LoRa SF7 / 125 kHz, bit rate 5470 bit/s

Example: `{“DR”: 5}`

`sendRetransmissions` - Confirmed / Unconfirmed uplink retransmissions

Type: `uint8`

Valid range: `0 to 15`

- `5:` Default value

Example: `{“sendRetransmissions”: 10}`

`confirmationEnable` - Enable/Disable uplink confirmation

Type: `boolean`

Values:

- `true:` Enable confirmation (default)
- `false:` Disable confirmation

Example: `{“confirmationEnable”: true}`

`resetDevice` - Software reset the device

Type: `boolean`

Values:

- `true:` Reset device
- `false:` No reset needed

Example: `{“resetDevice”: true}`

Full example

```
{
“ledStatus”: true,
“timeToSend”:30,
“ventilation”:1,
“ledConfiguration”:4,
“touchEnable”:true,
“ADREnable”:false,
“DR”:2,
“sendRetransmissions”:5,
“confirmationEnable”:true,
“resetDevice”: false
}
```

Note: Parameter order within the JSON object is irrelevant. The encoder will handle correct arrangement and packing.

2. Raw Byte Array Format

In platforms where JSON encoders are not supported, parameters may be sent directly as a byte array. Each parameter is structured using the format:

```
[ <Command ID>, <Length>, <Value(s)> ]
```

Multiple parameter blocks can be concatenated to create a composite payload.

Parameter Byte Structures

	Parameter	Command ID	Length	Values (Hex)
1	`ledStatus`	`0x01`	`0x01`	`0x01:` enable, `0x00:` disable
2	`timeToSend`	`0x02`	`0x01`	`0x0F:` default (15min), or custom `uint8` value
3	`ventilation`	`0x03`	`0x01`	`0x00: 24h` (default), `0x01:` 48h, `0x03:` 7d, etc
4	`ledConfiguration`	`0x04`	`0x01`	`0x00` to `0x010` per available modes
5	`touchEnable`	`0x05`	`0x01`	`0x01:` enable, `0x00:` disable
6	`ADREnable`	`0x09`	`0x01`	`0x01:` enable, `0x00:` disable
7	`DR`	`0x0A`	`0x01`	`0x00` to `0x05` per available options
8	`sendRetransmissions`	`0x0B`	`0x01`	`0x00` to `0x0F` per available values
9	`confirmationEnable`	`0x0D`	`0x01`	`0x01:` enable, `0x00: disable`
10	`resetDevice`	`0x0F`	`0x01`	`0x01`: reset, `0x00:` no reset

Example

To configure the device with:

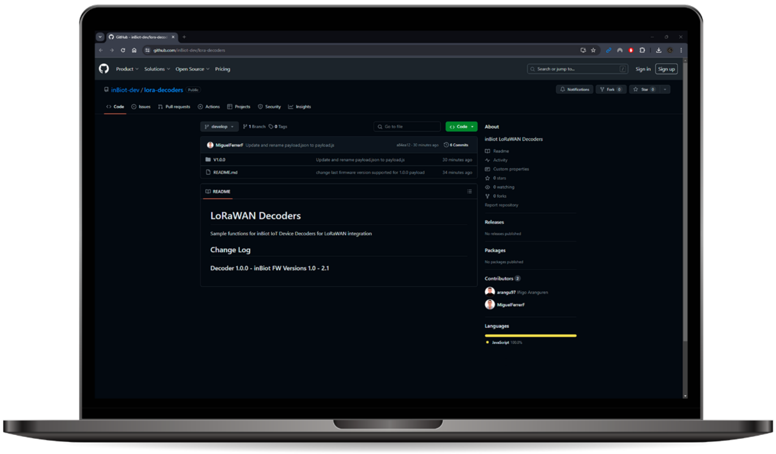
- LED enabled
- Uplink interval: 30 minutes
- CO_2 calibration every 7 days
- LED mode: IAQ indicator
- Touch button disabled
- ADR Disable
- DR 2 (SF 10)
- 9 Retransmissions
- Uplink confirmation enabled
- No reset device

Payload:

```
[0x01, 0x01, 0x01,  0x02, 0x01, 0x1E,  0x03, 0x01, 0x03,  0x04, 0x01,
0x09,  0x05, 0x01, 0x00, 0x10, 0x01, 0x00, 0x0A, 0x01, 0x02, 0x0B,
0x01, 0x09, 0x0D, 0x01, 0x01, 0x0E, 0x01, 0x00]
```

Payload Encoders/Decoders Repository

The decoding (Uplink) and encoding (Downlink) scripts used by this device are publicly available in the following repository:



MiguelFerrerF Update and rename payload.json to payload.js a84ea12 · 30 minutes ago 6 Commits

V1.0.0	Update and rename payload.json to payload.js	30 minutes ago
README.md	change last firmware version supported for 1.0.0 payload	34 minutes ago

inBiot LoRaWAN Decoders

LoRaWAN Decoders

Sample functions for inBiot IoT Device Decoders for LoRaWAN integration

Change Log

Decoder 1.0.0 - inBiot FW Versions 1.0 - 2.1

LoRaWAN ENCODERS/DECODERS

ACCESS

These scripts enable proper interpretation of the data sent by the device (Uplink payloads) and the generation of valid commands to be sent from the network to the device (Downlink payloads), in compliance with the communication protocol format defined by the device's LoRaWAN specification.

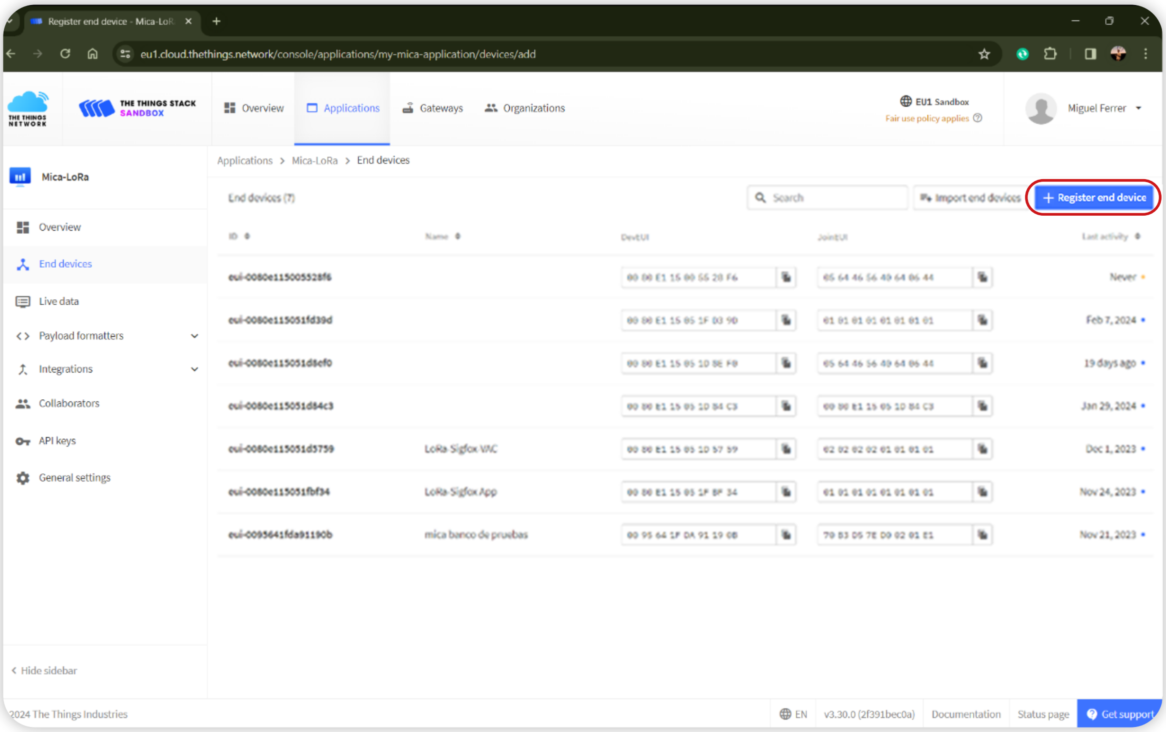
Compatibility

The scripts are ready for direct use on platforms such as:

- The Things Network
- Chirpstack v3 / Chirpstack v4
- Milesight DeviceHub V2

Example of configuring the LoRaWAN server with TTN

After checking the LoRaWAN credentials through the inBiot Setup configuration app, you can proceed to register the device on the TTN platform.

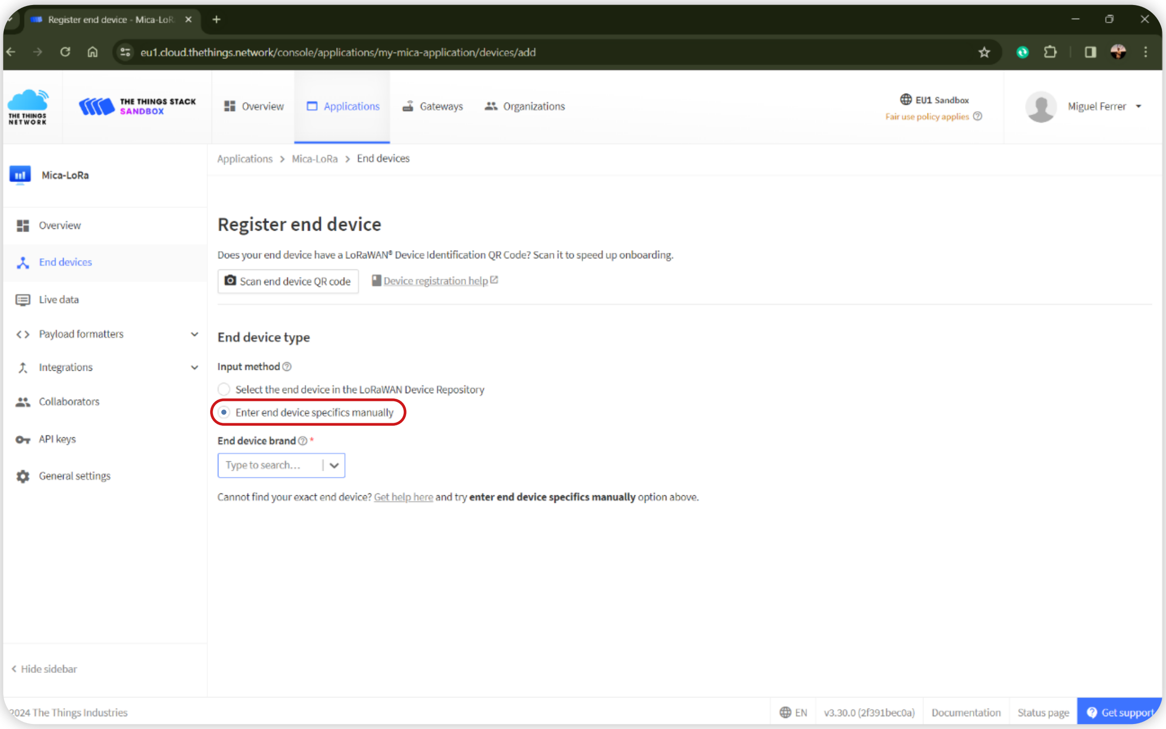


Applications > Mica-LoRa > End devices

End devices (7)

ID	Name	DevEUI	JoinEUI	Last activity
eui-0080e115005528f6		00 80 E1 15 00 55 28 F6	65 64 46 56 40 64 06 44	Never
eui-0080e115051fd39d		00 80 E1 15 05 1F D3 9D	01 01 01 01 01 01 01 01	Feb 7, 2024
eui-0080e115051d8ef0		00 80 E1 15 05 1D 8E F0	65 64 46 56 40 64 06 44	19 days ago
eui-0080e115051d84c3		00 80 E1 15 05 1D 84 C3	00 80 E1 15 05 1D 84 C3	Jan 29, 2024
eui-0080e115051d5759	LoRa-Sigfox VAC	00 80 E1 15 05 1D 57 59	02 02 02 02 01 01 01 01	Dec 1, 2023
eui-0080e115051fbf34	LoRa-Sigfox App	00 80 E1 15 05 1F BF 34	01 01 01 01 01 01 01 01	Nov 24, 2023
eui-0095641fda91190b	mica banco de pruebas	00 95 64 1F DA 91 19 0B	70 B3 D5 7E D0 02 01 E1	Nov 21, 2023

In this new tab, select “Enter end device specifics manually” to configure the credentials of your MICA.



Applications > Mica-LoRa > End devices

Register end device

Does your end device have a LoRaWAN® Device Identification QR Code? Scan it to speed up onboarding.

End device type

Input method

○ Select the end device in the LoRaWAN Device Repository

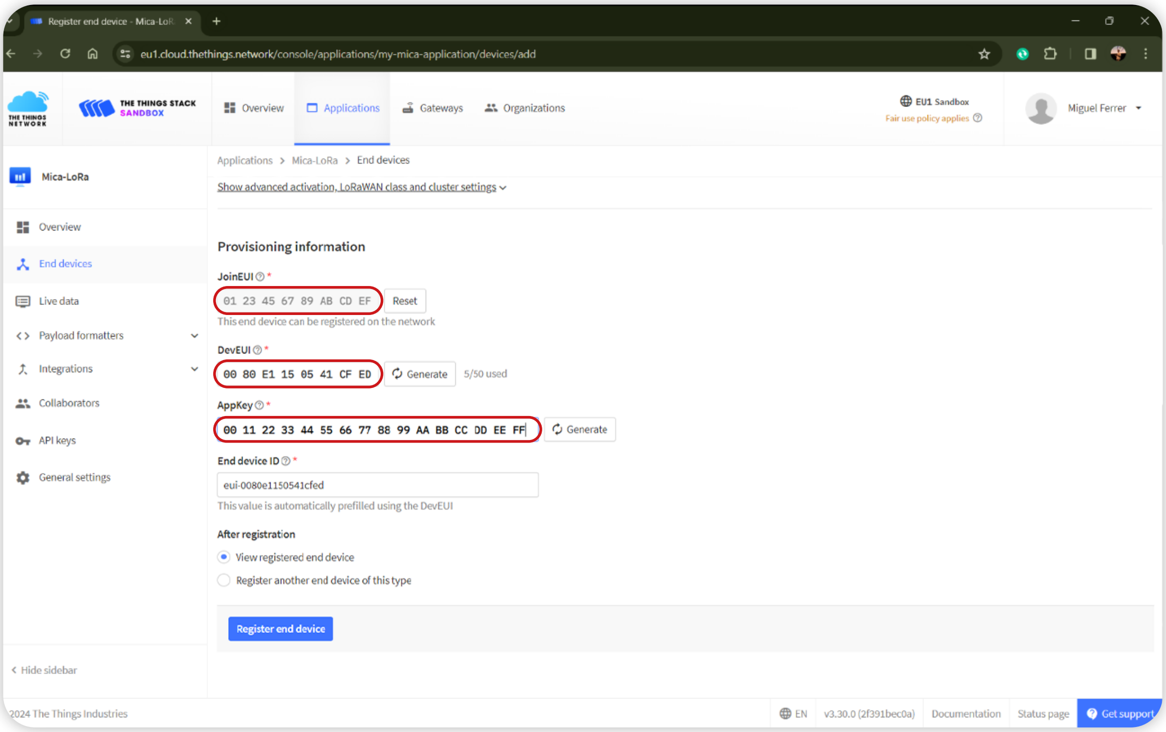
● Enter end device specifics manually

End device brand *

Type to search...

Cannot find your exact end device? Get help here and try **enter end device specifics manually** option above.

Enter the credentials for the device you are registering.



Provisioning information

JoinEUI *: 01 23 45 67 89 AB CD EF

This end device can be registered on the network

DevEUI *: 00 80 E1 15 05 41 CF ED (5/50 used)

AppKey *: 00 11 22 33 44 55 66 77 88 99 AA BB CC DD EE FF

End device ID *: eui-0080e1150541cfed

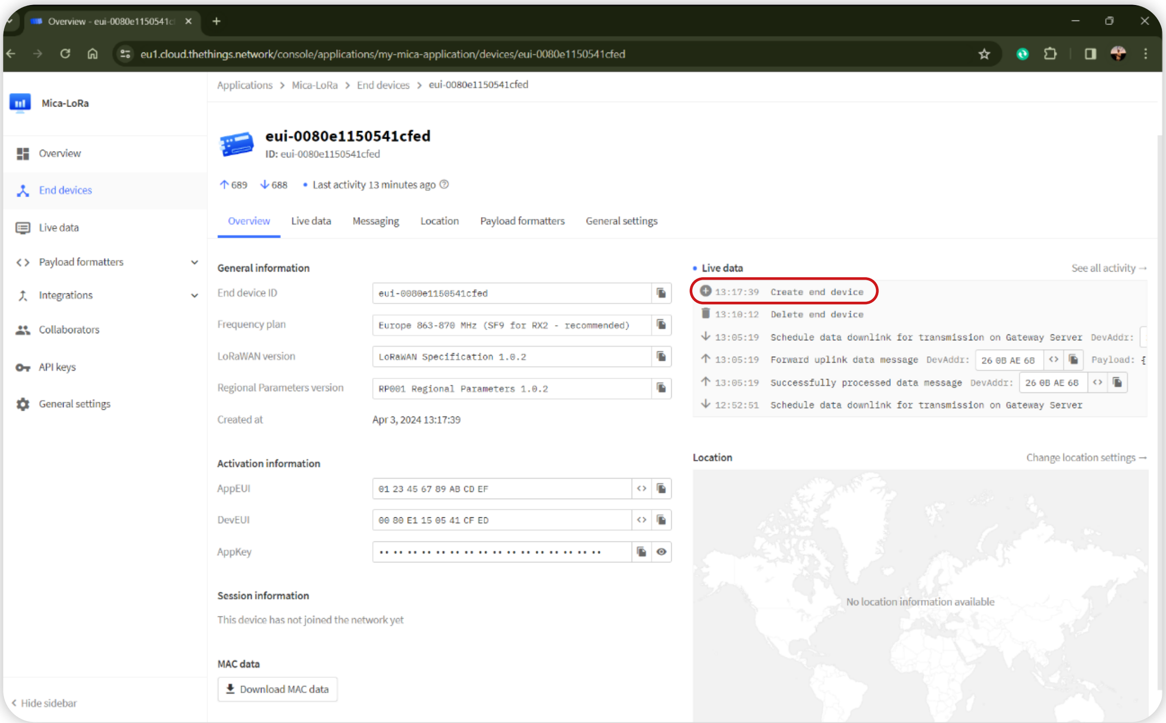
This value is automatically prefilled using the DevEUI

After registration

● View registered end device

○ Register another end device of this type

Once you have set up the credentials you want and created the device on the LoRaWAN server, you can complete the configuration of the MICA from the configuration app.


Overview - eui-0080e1150541c
eu1.cloud.thethings.network/console/applications/my-mica-application/devices/eui-0080e1150541cfed
Mica-LoRa
Overview
End devices
Live data
Payload formatters
Integrations
Collaborators
API keys
General settings
Hide sidebar
Applications > Mica-LoRa > End devices > eui-0080e1150541cfed
↑689 ↓688
Last activity 13 minutes ago
Overview
Live data
Messaging
Location
Payload formatters
General settings
See all activity →
Change location settings →
No location information available
Download MAC data

eui-0080e1150541cfed
ID: eui-0080e1150541cfed

General information

End device ID	eui-0080e1150541cfed
Frequency plan	Europe 863-870 MHz (SF9 for RX2 - recommended)
LoRaWAN version	LoRaWAN Specification 1.0.2
Regional Parameters version	RP001 Regional Parameters 1.0.2
Created at	Apr 3, 2024 13:17:39

Activation information

AppEUI	01 23 45 67 89 AB CD EF
DevEUI	00 80 E1 15 05 41 CF ED
AppKey	•• •• •• •• •• •• •• •• •• •• •• •• •• •• •• ••

Session information

This device has not joined the network yet

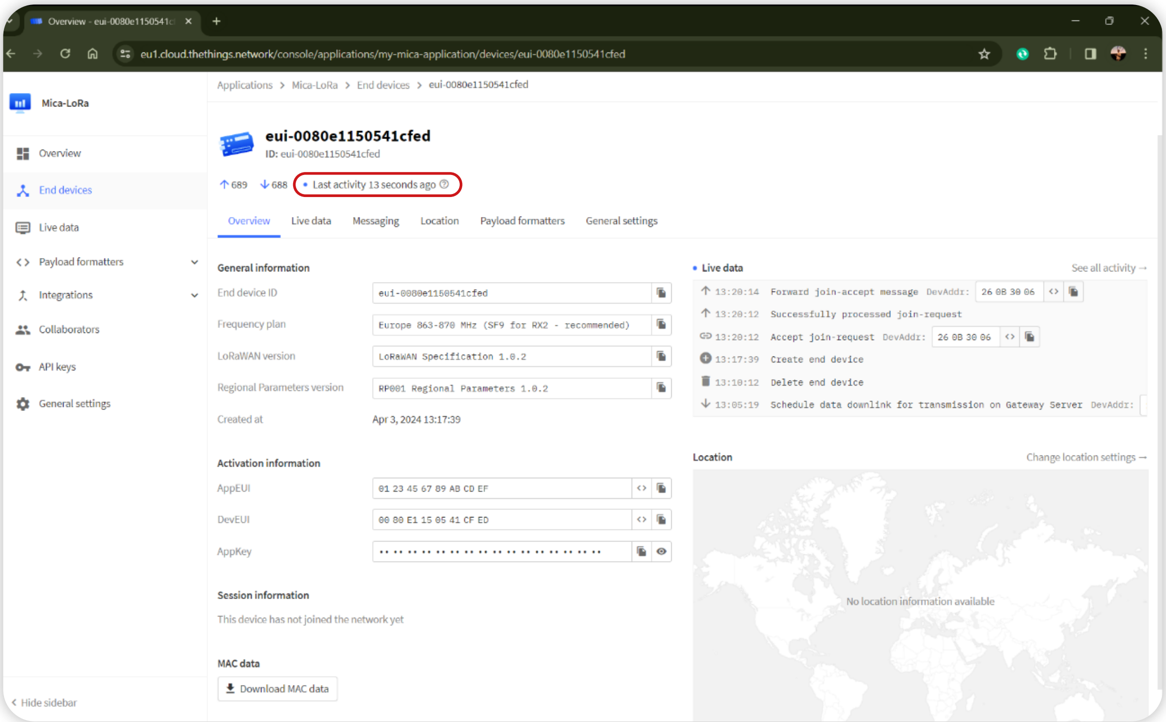
MAC data

Live data

```
13:17:39  Create end device
13:10:12  Delete end device
13:05:19  Schedule data downlink for transmission on Gateway Server  DevAddr:
13:05:19  Forward uplink data message  DevAddr: 26 0B AE 68  Payload: {
13:05:19  Successfully processed data message  DevAddr: 26 0B AE 68
12:52:51  Schedule data downlink for transmission on Gateway Server
```

Location

After validating the device’s connection from the inBiot Setup application, you will be able to observe the device’s activity, and it will begin to send information periodically.



eu1.cloud.thethings.network/console/applications/my-mica-application/devices/eui-0080e1150541cfed

eui-0080e1150541cfed
ID: eui-0080e1150541cfed

↑689 ↓688 • Last activity 13 seconds ago

General information

End device ID	eui-0080e1150541cfed
Frequency plan	Europe 863-870 MHz (SF9 for RX2 - recommended)
LoRaWAN version	LoRaWAN Specification 1.0.2
Regional Parameters version	RP001 Regional Parameters 1.0.2
Created at	Apr 3, 2024 13:17:39

Activation information

AppEUI	01 23 45 67 89 AB CD EF
DevEUI	00 80 E1 15 05 41 CF ED
AppKey	•• •• •• •• •• •• •• •• •• •• •• •• •• •• •• ••

Session information

This device has not joined the network yet

MAC data

Live data

```
↑ 13:20:14  Forward join-accept message  DevAddr: 26 0B 30 06
↑ 13:20:12  Successfully processed join-request
  13:20:12  Accept join-request  DevAddr: 26 0B 30 06
  13:17:39  Create end device
  13:10:12  Delete end device
↓ 13:05:19  Schedule data downlink for transmission on Gateway Server  DevAddr:
```

Location

No location information available

Note: To avoid potential DevNonce-related errors, it is recommended to use one of the LoRaWAN MAC protocol versions between 1.0.1 and 1.0.3.

www.inbiot.es
support@inbiot.es