

# Rejee SL111 LoRaWAN Temperature and Humidity Sensor User Manual

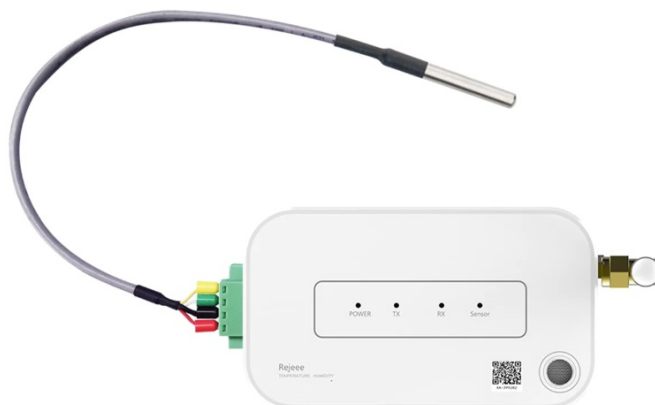
[Home](#) » [REJEEE](#) » Rejee SL111 LoRaWAN Temperature and Humidity Sensor User Manual 

## Contents

- [1 Rejee SL111 LoRaWAN Temperature and Humidity Sensor](#)
- [2 Product Information](#)
- [3 Product Usage Instructions](#)
- [4 Sensor Data Definition](#)
- [5 General Information](#)
- [6 Hang on the wall](#)
- [7 Wireless LoraWAN Sensor Data Format](#)
- [8 Sensor Data Definition](#)
- [9 Documents / Resources](#)
  - [9.1 References](#)
- [10 Related Posts](#)

# Rejee

## Rejee SL111 LoRaWAN Temperature and Humidity Sensor



## Product Information

|                      |                                                                                                                                                                                     |
|----------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Product Name</b>  | SL111 External Temp/Humi Sensor                                                                                                                                                     |
| <b>Manufacturer</b>  | Jiangsu Rejee Intelligent Technology Co., Ltd                                                                                                                                       |
| <b>Address</b>       | No. 20, Xinghuo Road, Jiangbei District, Nanjing, China                                                                                                                             |
| <b>Email</b>         | Jullie.zheng@rejee.com                                                                                                                                                              |
| <b>Telephone</b>     | 0086 158 6180 7793                                                                                                                                                                  |
| <b>Website</b>       | <a href="http://www.rejee.com">http://www.rejee.com</a>                                                                                                                             |
| <b>Main Features</b> | Sensirion High Sensitivity Sensor Type-C for Local Configuration, Internal Battery Up to 5 Years (LCP=5sLFT=600s @SF9), LoRa Long Range Low Power, Both built-in and external SHT30 |
| <b>Parameters</b>    | CPU, Wireless Encryption, Battery, Battery Capacity, Working Temperature, Working Humidity, Communication Accuracy, Lifespan, Data Speed, Size, TX Power, RX Sensitivity, Frequency |
| <b>Size</b>          | 102mm*60mm*25mm                                                                                                                                                                     |
| <b>Installation</b>  | Hang on the wall                                                                                                                                                                    |

## Product Usage Instructions

### Connect to LoRaWAN Network

LoRaWAN Network Structure:

LoRaWAN Network Structure

Set ID and Key:

Data analysis example for JavaScript:

```
function decodeUplink(input) {
    var obj = {};
    var warnings = [];
    var len = input.bytes ? input.bytes.length : 0;
    var offset = 0, dtype = 0, dlen = 0;

    obj.temperature = (((input.bytes[offset] & 0x80 ? input.bytes[offset] - 0x100 : input.bytes[
    obj.temperature1 = (((input.bytes[offset] & 0x80 ? input.bytes[offset] - 0x100 : input.bytes[
    obj.temperature2 = (((input.bytes[offset] & 0x80 ? input.bytes[offset] - 0x100 : input.bytes[
        offset += dlen;
    }
    } else if (0x15 == dtype) { /* Mutil-humidity sensor, value unit 1 %RH */
        dlen = input.bytes[offset++];
        if (dlen >= 1) {
            obj.humidity1 = input.bytes[offset++];
            dlen -= 1;
        }
        if (dlen >= 1) {
            obj.humidity2 = input.bytes[offset++];
            dlen -= 1;
        }
        if (dlen > 0) {
            offset += dlen;
        }
    } else {
        /* ignore all > 0x10 */
        if(dtype > 0x10){
            dlen = input.bytes[offset++];
            if (dlen > 0) {
                offset += dlen;
            }
        }
    }
} while (len > offset);

return { data: obj, warnings: warnings };
}
```



## Wireless LoRaWAN Sensor Data Format

LoRaWAN Format: Picture as below, FRMPayload is sensor data.

LoRaWAN Sensor Data Format

## Sensor Data Definition

### Multi-temperature (0x14)

Adapt N-way temperature according to length. If N is 1, the basic temperature type 0x04 can be directly used. If N

> 1 channel temperature needs to be transmitted, merge similar data items in the following order.

Type: 1 Byte 0x14

Length: 1 Byte

2\*N

Value int16\_t No.1 temp

Value ... ..

Value int16\_t No. N temp

### Multi-humidity (0x15)

According to the length, N channels of humidity can be adapted. If N is 1, the basic humidity type 0x05 can be directly used. If N > 1 channel of humidity needs to be transmitted, merge similar data items in the following order.

Type: 1 Byte 0x15

Length: 1 Byte

N

Value uint8\_t No. 1 humi

Value ... ..

Value uint8\_t No. N humi

### Local Configuration:

**Note:** Factory reset data uploading is every 10 mins, customers can change data uploading frequency as below: Connect sensor with a USB-C cable to computer for local configuration, through local configuration, you can change the packet frequency. Refer SensorTool Manual.

### General Information

SL111 is long range low power temperature and humidity sensor based on Semtech SX1262/SX1268.

| Sensor Type                 | Product Number                   |
|-----------------------------|----------------------------------|
| Built-in and external SHT30 | SL111CN, SL111EU,SL111US,SL111AS |

### Main features:

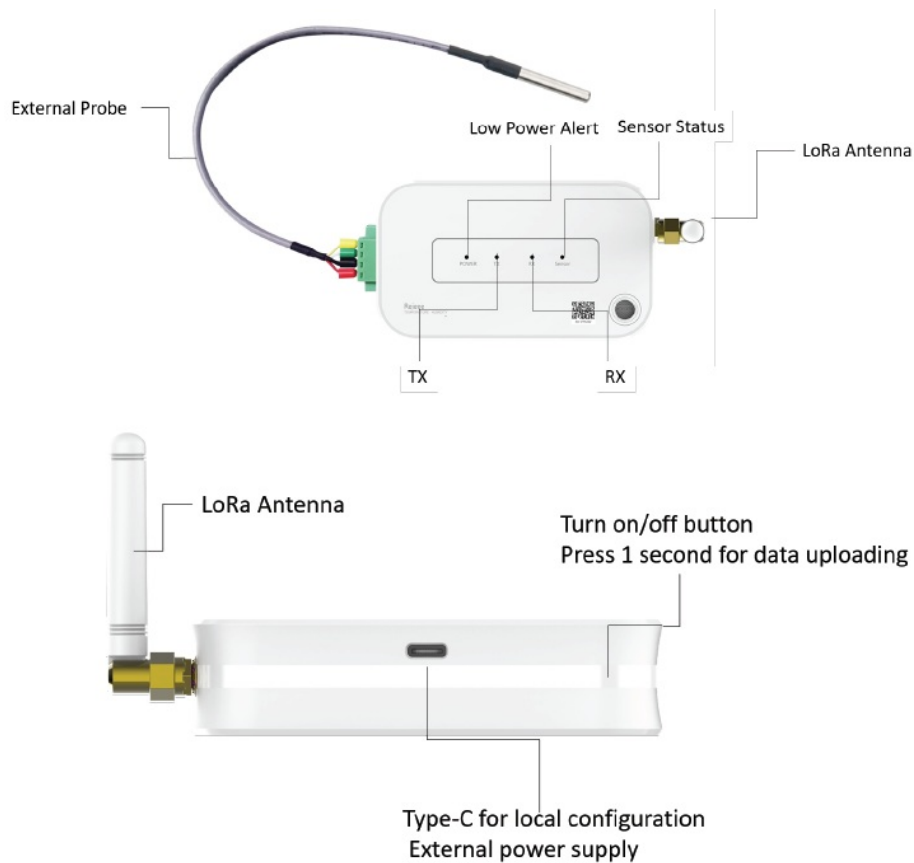
Sensirion High Sensitivity Sensor

### Type-C for Local Configuration

Internal Battery Up to 5 Years(LCP=5s LFT=600s @SF9) LoRa Long Range Low Power

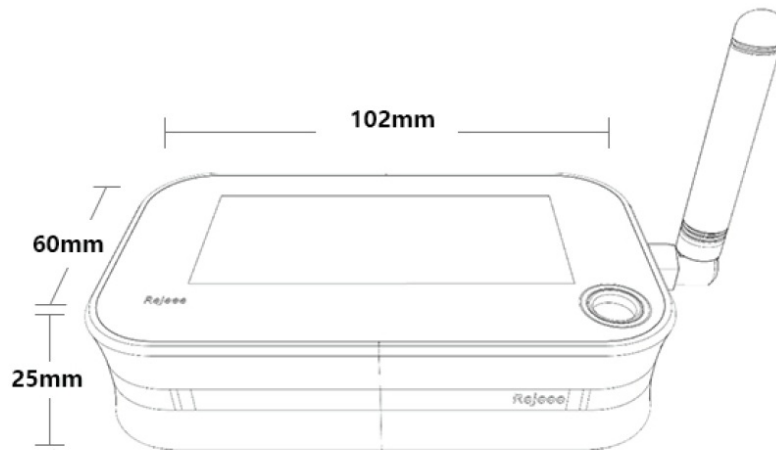
Both built in and external SHT 30

### Details



| Parameters          | Feature                                                               |
|---------------------|-----------------------------------------------------------------------|
| CPU                 | STM32L151                                                             |
| Wireless            | LoRaWAN(SX1262/SX1268)                                                |
| Encryption          | AES128                                                                |
| Battery             | Built-in Li-battery (Changeable, and No Recharge)                     |
| Battery Capacity    | 5400mAh                                                               |
| Working Temperature | -45°C~+ 85°C                                                          |
| Working Humidity    | 0-100%RH                                                              |
| Communication       | Half duplex                                                           |
| Accuracy            | Temperature : $\pm 0.3^{\circ}\text{C}$ , Humidity $\pm 3\%\text{RH}$ |
| Lifespan            | 5 Years(Every 10 Minutes for data uploading <a href="#">@SF9</a> )    |
| Data Speed          | 300bps-62.5k bps                                                      |
| Size                | 102mm*60mm*25mm                                                       |
| TX Power            | 22dBm Max                                                             |
| RX Sensitivity      | -140 dBm                                                              |
| Frequency           | SX1268: CN470<br>SX1262: EU868 / US915 / AS923                        |

**Size:** 102mm\*60mm\*25mm

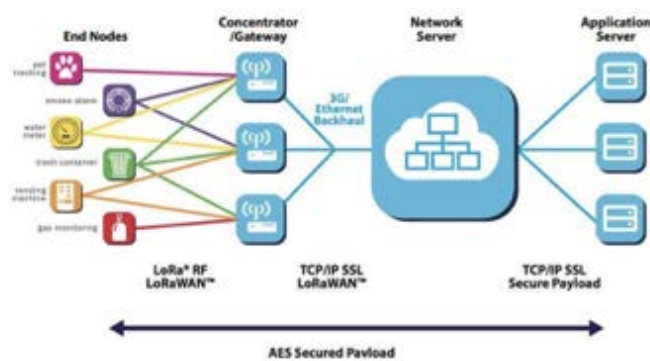


## Installation:



## Hang on the wall

## Connect to LoRaWAN Network



SL111 temperature and humidity sensor is based on standard LoRaWAN Class A, so you can connect to any LoRaWAN network as below:

## SL111 sensor data uplink format with LoRaWAN OTAA, OTAA parameter as below:

- **AppEUI:** CACBB80000000001
- **AppKey:** 11223344556677889900AABBCCDDEEFF
- **DevEUI:** Customer can find DevEUI on the product, also you can read DevEUI through Rejeee SensorTool SensorTool

You can also choose ABP, for ABP you can find the parameter as below:

- **APP KEY/APP EUI:** 11223344556677889900AABBCCDDEEFF
- **DevEUI:** Customer can find DevEUI on the product, also you can read DevEUI through Rejeeee SensorTool SensorTool

**For example:** Connecting to The Things Network, please make sure choose manually connect and OTAA as below:

Sensor LoRaWAN

## SL111CN

From The LoRaWAN Device Repository

Manually

Frequency plan ⓘ \*

China 470-510 MHz, FSB 11

LoRaWAN version ⓘ \*

MAC V1.0.3

Regional Parameters version ⓘ \*

PHY V1.0.3 REV A

Show advanced activation, LoRaWAN class and cluster settings ^

Activation mode ⓘ \*

☒ Over the air activation (OTAA)

## SL111EU

Frequency plan ⓘ \*

Europe 863-870 MHz (SF12 for RX2)

LoRaWAN version ⓘ \*

MAC V1.0.3

Regional Parameters version ⓘ \*

PHY V1.0.3 REV A

Show advanced activation, LoRaWAN class and cluster settings ^

Activation mode ⓘ \*

☒ Over the air activation (OTAA)

## SL111US

Frequency plan ⓘ \*

United States 902-928 MHz, FSB 2 (used by TTN) | ▾

LoRaWAN version ⓘ \*

MAC V1.0.3 | ▾

Regional Parameters version ⓘ \*

PHY V1.0.3 REV A | ▾

[Show advanced activation, LoRaWAN class and cluster settings](#) ^

Activation mode ⓘ \*

☒ Over the air activation (OTAA)

## SL111AS

Frequency plan ⓘ \*

Asia 923 MHz with only default channels | ▾

LoRaWAN version ⓘ \*

MAC V1.0.3 | ▾

Regional Parameters version ⓘ \*

PHY V1.0.3 REV A | ▾

[Show advanced activation, LoRaWAN class and cluster settings](#) ^

Activation mode ⓘ \*

☒ Over the air activation (OTAA)

## Set ID and Key

[Show advanced activation, LoRaWAN class and cluster settings](#) ▾

DevEUI ⓘ \*

.. .. . [Generate](#) 0/50 used

AppEUI ⓘ \*

.. .. . [Fill with zeros](#)

AppKey ⓘ \*

.. .. . [Generate](#)

End device ID ⓘ \*

my-new-device

This value is automatically prefilled using the DevEUI

After registration

- ☒ View registered end device
- ☐ Register another end device of this type

[Register end device](#)

## Data analysis example for JavaScript:

```
function
decodeUplink
(
input
)
{
var
obj
=
{};
var
warnings
=
[];
var
len
=
input
.
bytes
?
input
.
bytes
.
length
:
0
;
var
offset
=
0
,
dtype
=
0
,
dlen
=
0
;
do
{
dtype
=
input
.
bytes
[
offset
++];
if
(
0xFF
==
```

```

dtype
)
{
/* 0xFF is ACK from Device */
obj
.
ackcmd
=
input
.
bytes
[
offset
++];
obj
.
ackstatus
=
input
.
bytes
[
offset
++];
}
else
if
(
0x00
===
dtype
)
{
/* first is device information(0x00) */
obj
.
battery
=
(
input
.
bytes
[
offset
++] &
0x1F
);
obj
.
res
=
input
.
bytes
[
offset
++];
}
else

```

```

if
(
0x01
==
dtype
)
{
offset
+=
8
;
}
else
if
(
0x02
==
dtype
)
{
offset
+=
8
;
}
else
if
(
0x03
==
dtype
)
{
offset
+=
2
;
}
else
if
(
0x04
==
dtype
)
{
/* temperature sensor, value unit is 0.1 */
obj
.
temperature
=
(((
input
.
bytes
[
offset
] &
0x80

```

```

?
input
.
bytes
[
offset
]-
0x100
:
input
.
bytes
[
offset
])
<<
8
)
+
input
.
bytes
[
offset
+
1
])
/
10
;
offset
+=
2
;
}
else
if
(
0x05
==
dtype
)
{
/* humidity sensor, value unit is 1 %RH */
obj
.
humidity
=
input
.
bytes
[
offset
++];
}
else
if
(
0x06

```

```
==
dtype
)
{
obj
.
oxygen
=
input
.
bytes
[
offset
++];
}
else
if
(
0x07
==
dtype
)
{
offset
+=
4
;
}
else
if
(
0x08
==
dtype
)
{
/* ignore */
offset
+=
4
;
}
else
if
(
0x09
==
dtype
)
{
/* ignore */
offset
+=
1
;
}
else
if
(
```

```

0x14
==
dtype
)
{
/* Mutil-temperature sensor, value unit 0.1 */
dlen
=
input
.
bytes
[
offset
++];
if
(
dlen
>=
2
)
{
obj
.
temperature1
=
(((
input
.
bytes
[
offset
] &
0x80
?
input
.
bytes
[
offset
] -
0x100
:
input
.
bytes
[
offset
])
<<
8
)
+
input
.
bytes
[
offset
+
1

```

```

    ])
    /
    10
    ;
    offset
    +=
    2
    ;
    dlen
    -=
    2
    ;
    }
    .
    if
    (
    dlen
    >=
    2
    )
    {
    obj
    .
    temperature2
    =
    (((
    input
    .
    bytes
    [
    offset
    ] &
    0x80
    ?
    input
    .
    bytes
    [
    offset
    ] -
    0x100
    :
    input
    .
    bytes
    [
    offset
    ])
    << 8 ) +
    input .
    bytes [
    offset
    +
    1
    ])
    /
    10 ;
    offset
    +=

```

```

2
;
dlen
-= 2 ; } if (
dlen > 0 ) {
offset
+=
dlen
; } }
else
if
(
0x15 ==
dtype ) {
/* Mutil-humidity sensor, value unit 1 %RH */
dlen
=
input
.
bytes
[
offset
++; if (
dlen
>= 1 ) {
obj .
humidity1 =
input
.
bytes [
offset
++;
dlen
-= 1 ; } .
if
(
dlen
>= 1 ) {
obj
.
humidity2
=
input
.
bytes
[
offset
++;
dlen
-=
1
;
}
.
if
(
dlen
>
0

```

```

)
{
offset
+=
dlen
;
}
}
else
{
/* ignore all > 0x10 */
if
(
dtype
>
0x10
){
dlen
=
input
.
bytes
[
offset
++];
if
(
dlen
>
0
)
{
offset
+=
dlen
;
}
}
}
while
(
len
>
offset
);
.
return
{
data
:
obj ,
warnings :
warnings }; }

```

## Wireless LoRaWAN Sensor Data Format

### LoRaWAN Format:

Picture as below, FRMPayload is sensor data.

PHYPayload:

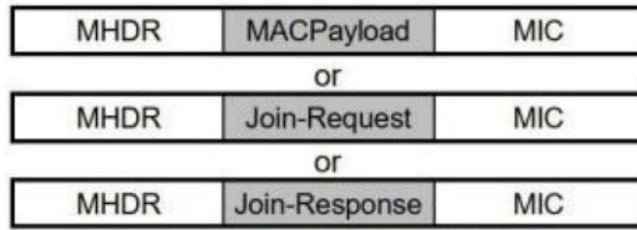


Figure 6: PHY payload structure

MACPayload:



Figure 7: MAC payload structure

| MHDR | FHDR | FPort | FRMPayload=Sensor Data(Message) |                      |                      | MIC<br>4 Bytes |
|------|------|-------|---------------------------------|----------------------|----------------------|----------------|
|      |      |       | Data 1                          | ...                  | Data N               |                |
|      |      |       | Type+Data<br>N Bytes            | Type+Data<br>N Bytes | Type+Data<br>N Bytes |                |

## Sensor Data Definition

### Multi-temperature 0x14

Adapt N-way temperature according to length, and if N is 1, the basic temperature type 0x04 can be directly used. If N>1 channel temperature needs to be transmitted, merge similar data items in the following order.

| Type   | Length | Value     | Value | Value      |
|--------|--------|-----------|-------|------------|
| 1 Byte | 1 Byte | int16_t   | ...   | int16_t    |
| 0x14   | 2*N    | No.1 temp | ...   | No. N temp |

### Multi-humidity 0x15

According to the length, N channels of humidity can be adapted. If N is 1, the basic humidity type 0x05 can be directly used.

If N>1 channel of humidity needs to be transmitted, merge similar data items in the following order.

| Type   | Length | Value      | Value | Value      |
|--------|--------|------------|-------|------------|
| 1 Byte | 1 Byte | uint8_t    | ...   | uint8_t    |
| 0x15   | N      | No. 1 humi | ...   | No. N humi |

### FRMPayload Example: 007F101404033C033A15024445

00 7F10 Device Information, 7F is battery level = 31 which means battery is 100%, we measure battery level from 0-31, which means 0-100%. Version is 0x10, which means Rejee temp/humi sensor.

033C and 033A is temperature, is 0x033C = 828 = 82.8°F, 0x033A = 826 =82.6°F. °F is only for US market, for other market sensor will send °C by default. The first temp is from built-in sensor, and the second one is from external sensor.

44 and 45 is humidity, is 0x44 = 68 = 68 %RH, is 0x45 = 69 = 69 %RH. The first humi is from built-in sensor and the second one is from external sensor.

Local Configuration:

Note: Factory reset data uploading is every 10 mins, customers can change data uploading frequency as below: Connect sensor with a USB-C cable to computer for local configuration, through local configuration, you can change the packet frequency. Refer [SensorTool Manual](http://doc.rejeee.com/web/#/32?page\_id=339)

Documents / Resources

|                                                                                   |                                                                                                                                                                                                                                                                                               |
|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | <p><a href="#">Rejeee SL111 LoRaWAN Temperature and Humidity Sensor</a> [pdf] User Manual<br/>SL111CN, SL111EU, SL111US, SL111AS, SL111, SL111 LoRaWAN Temperature and Humidity Sensor, LoRaWAN Temperature and Humidity Sensor, Temperature and Humidity Sensor, Humidity Sensor, Sensor</p> |
|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

References

- [\\_\\_\\_\\_\\_](#)
- [rejeee.com](#)
- [rejeee.com/](#)
- [sf9 · GitHub](#)