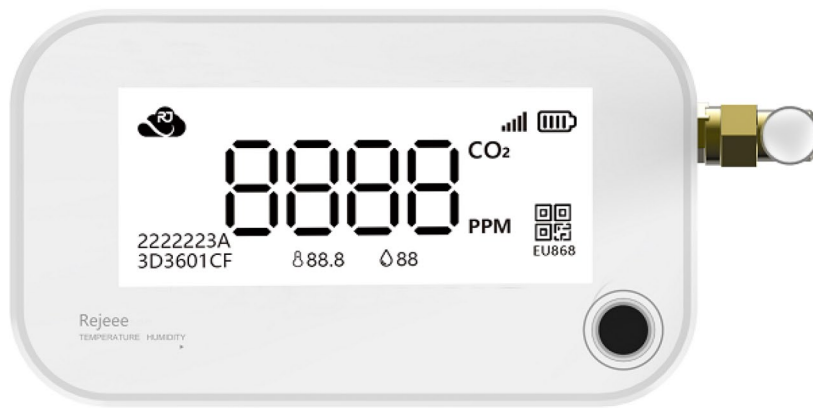




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## SL300 CO2 Sensor(E-paper)

### LoRaWAN CO2 Sensor (E-Paper)



## 1. General Information

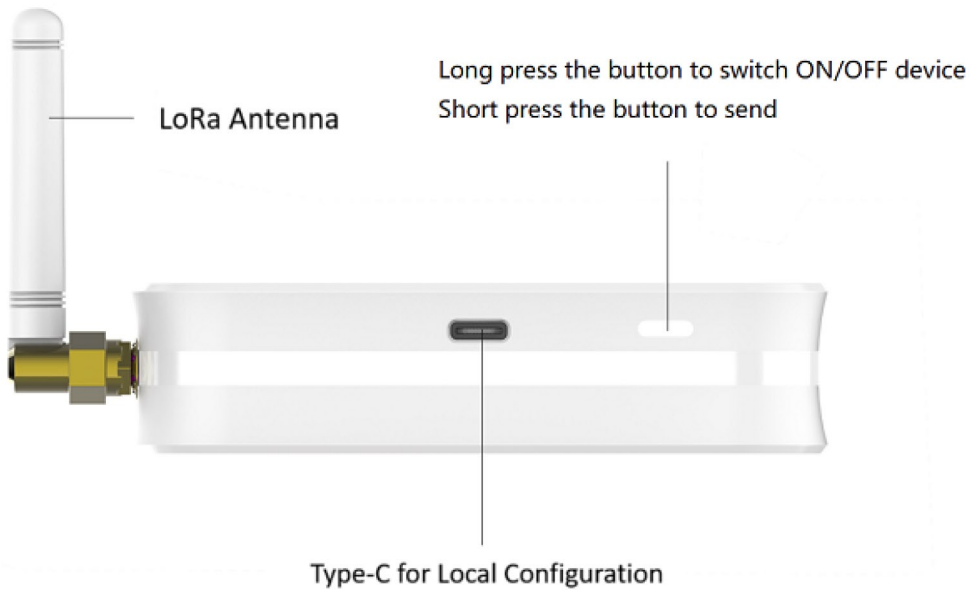
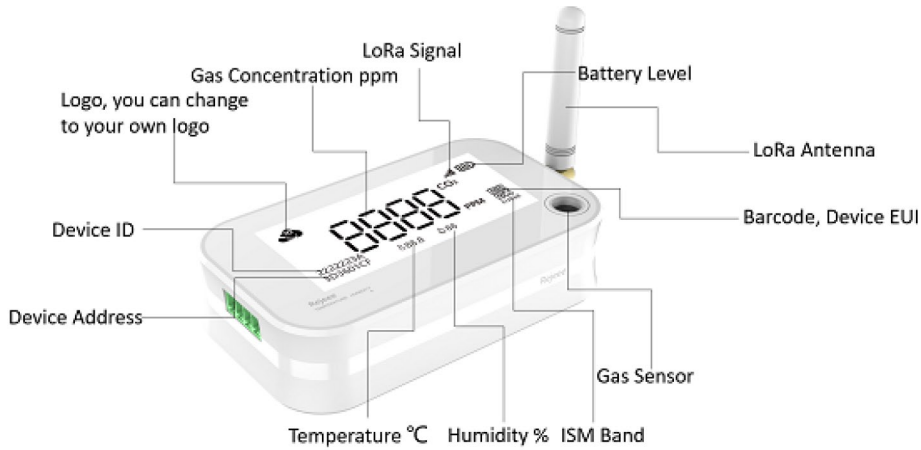
SL300 series is long range low power CO2 sensor based on Semtech SX1262/SX1268, which is standard LoRaWAN Class A compatible and is widely adopted in Environment Monitoring, Green House, Smart Agriculture etc.

Sensor Type	Product Number
CO2 Sensor, 2.9-inch E-Paper	SL311CN, SL311EU,SL311US,SL311AS

### 1.1 Main features:

- NDIR Tech for CO2 Sensor
- 2.9 inch screen local display
- Type-C for Local Configuration
- Internal Battery Up to 1 Years
- LoRa SX1262/SX1268, Long Range Low Power
- LoRaWAN Class A and Class C Compatible

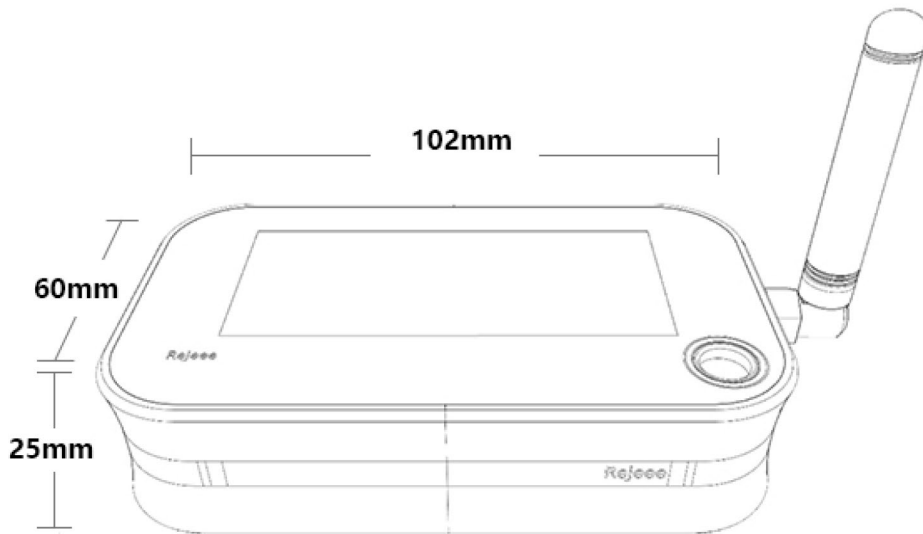
## 1.2 Details



Parameters	Feature
CPU	STM32L151
Wireless	LoRaWAN(SX1262/SX1268)
Encryption	AES128 Optional
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
Response Time	Less than 15 Seconds
CO2 Measuring Range	400ppm-5000ppm
CO2 Accuracy	±(40ppm+5%)

Parameters	Feature
<b>E-Paper Temperature</b>	0°C~+ 50°C
Lifespan	1 Year, Data Uploading for Every 10 mins
Data Speed	300bps-62.5k bps
Size	102mm*60mm*25mm
TX Power	22dBm Max
RX Sensitivity	-140 dBm
Frequency	SX1268: CN470 SX1262: EU868 / US915 / AS923

### 1.3 Size



### 1.4 Installation:



Lay the product flat on the table Hang on the wall

## 2. User Guide

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Make sure antenna is installed before turn on the device.

### 2.1 Turn on/off the device

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When you get the device, it is off, and on the screen, you can find the device EUI as below, the QR on the screen is Rejeee website. Just press the button for more than 5 seconds, then you can turn on the device. If you want to turn off the device, just press the button 5 seconds. The QR code is Rejeee company website, you can also change to your own website following this: [SensorTool Manual](#).



### 2.2 Information display on screen

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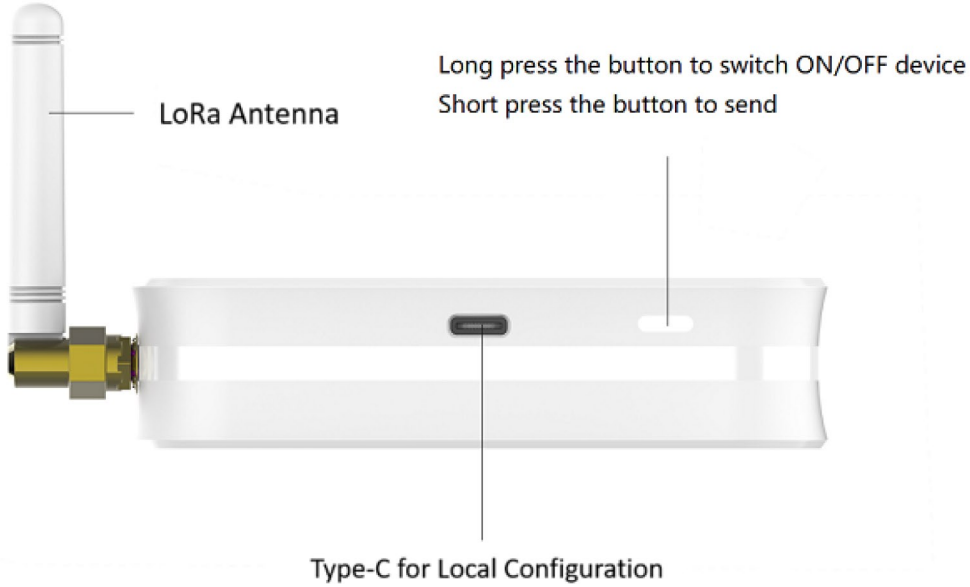
The device screen is 2.9-inch low power e-paper, and the CO2 sensor is embedded with temp and humi sensor, when turn on the device, you can find information displaying on the screen as below.



You can also change the logo, just follow this: [SensorTool Manual](#).

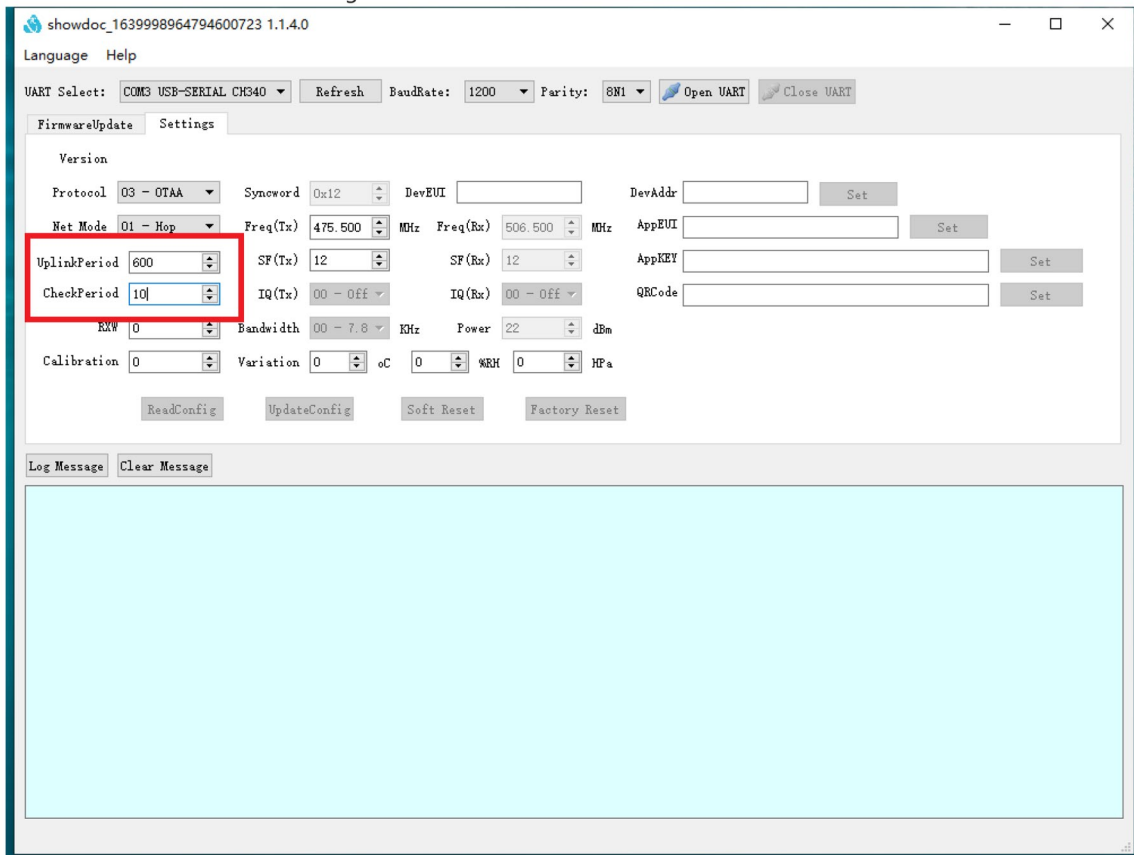
## 2.3 USB-C Port

There is one USB-C port as below, which is for power on and config, connect device to laptop with a USB-C cable, and you can config the device, make sure to install USB driver and here is the link for driver: [Serial Port Driver](#)

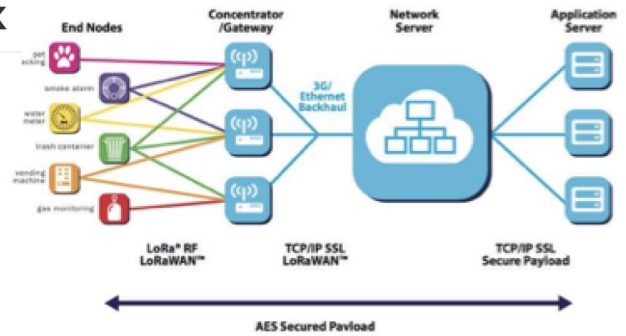


## 3.Data Uploading

When turn on the device, it will send data immediately, also you can press the button for 1 seconds, then the device will also send data. Normally when you get the device from factory, the reset time for data sending is every 10 mins, and if you want to change the time, you can connect the device to computer for config, here there is instruction about the time configuration. [SensorTool Manual](#).



## 4.Connect to LoRaWAN Network



SL300 CO2 sensor is based on standard LoRaWAN Class A, so you can connect to any LoRaWAN network through OTAA.

On the back of device, you can find information as below, with this information, you can connect to any LoRaWAN server.

```
Device EUI: CACBB80100002296
APP EUI: CACBB8000000001
APP Key: 1122334455667788
        9900AABBCCDDEEFF
```

Here below take TTN as an example about how to connect the device to TTN server:

From The LoRaWAN Device Repository [Manually](#)

Frequency plan

LoRaWAN version

Regional Parameters version

Show advanced activation, LoRaWAN class and cluster settings ^

Activation mode  Over the air activation (OTAA)  
 Activation by personalization (ABP)  
 Define multicast group (ABP & Multicast)

Additional LoRaWAN class capabilities

Network defaults  Use network's default MAC settings

Cluster settings  Use external LoRaWAN backend servers

DevEUI   0/30 used

AppEUI

AppKey

End device ID   
This value is automatically prefixed using the DevEUI

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

And here is the data decoder for TTN platform, just copy the information as below:

```
function decodeUplink(input) {
  var obj = {};
  var warnings = [];
  var len = input.bytes?input.bytes.length:0;
  var offset = 0;
  var dtype;
  offset++;
  /**
   * data of voltage level, voltage level is from0-31, 31 means 100% power ;
```

```

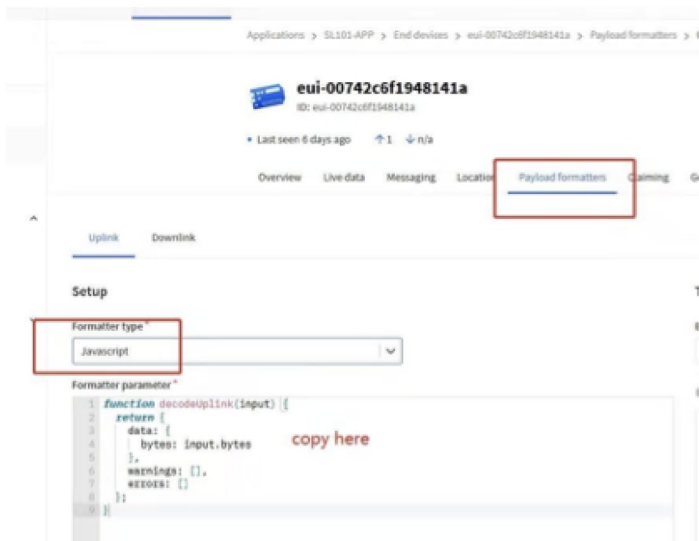
*/
obj.battery = (input.bytes[offset++] & 0x1F);
/**
 * Data of voltage, the value is 0.1V, if data is 33, that means voltage is 3.3V.
 */
obj.vol = (input.bytes[offset++]);
do {
  dtype = input.bytes[offset++];
  /**
   * dtype: Sensor type :
   */
  if(0x01 == dtype){
    /**
     * dtype 01: Vibration sensor data
     * evt: Event : 1: Vibration, 0: No vibration
     * acceX: X-axis acceleration
     * acceY: Y-axis acceleration
     * acceZ: Z-axis acceleration
     * angle: Rotation angle
     */
    obj.evt = input.bytes[offset++];
    obj.acceX = (((input.bytes[offset] & 0x80 ? input.bytes[offset] - 0x100 :
input.bytes[offset]) << 8) + input.bytes[offset+1])
    offset += 2;
    obj.acceY = (((input.bytes[offset] & 0x80 ? input.bytes[offset] - 0x100 :
input.bytes[offset]) << 8) + input.bytes[offset+1])
    offset += 2;
    obj.acceZ = (((input.bytes[offset] & 0x80 ? input.bytes[offset] - 0x100 :
input.bytes[offset]) << 8) + input.bytes[offset+1])
    offset += 2;
    obj.angle = input.bytes[offset++];
  } else if(0x04 == dtype){
    /**
     * dtype 04: Temperature sensor data
     * temperature: Temperature value is 0.1 °C
     */
    obj.temperature = (((input.bytes[offset] & 0x80 ? input.bytes[offset] - 0x100 :
input.bytes[offset]) << 8) + input.bytes[offset+1]) / 10;
    offset += 2;
    if (obj.temperature < -10) {
      warnings.push("it's cold");
    }
  } else if(0x05 == dtype){
    /**
     * dtype 05: Humidity sensor data
     * humidity: Humidity percentage, unit is %RH
     */
    obj.humidity = input.bytes[offset++];
  } else if(0x06 == dtype) {
    /**
     * dtype 06: O2 sensor data
     * oxygen: O2 concentration, unit is 0.1 %VOL
     */
    obj.oxygen = input.bytes[offset++];
  } else if(0x09 == dtype) {
    obj.switch = input.bytes[offset++];
  }
}

```

```

} else if(0x30 == dtype) {
    /**
     * dtype 30: Other gas sensor data, Like CO2, H2S etc.
     * volume: Other gas concentration, magnified 100 times
     */
    var l = input.bytes[offset++];
    var gastype = input.bytes[offset++];
    obj.volume = ((input.bytes[offset] << 24) + (input.bytes[offset+1] << 16) +
(input.bytes[offset+2] << 8) + input.bytes[offset+3])/100;
    offset += 4;
    if (obj.volume < 0) {
        warnings.push("it's invalid");
    }
}
len = len - offset;
} while(len > 0)
return {
    data: obj,
    warnings: warnings
};
}

```



## 5. Wireless LoRaWAN Sensor Data Format

Picture as below, FRMPayload is sensor data.

PHYPayload:

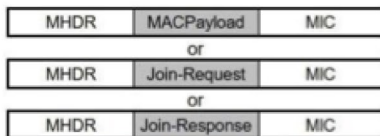


Figure 6: PHY payload structure

MACPayload:



Figure 7: MAC payload structure



MHDR	FHDR	FPort	FRMPayload=Sensor Data(Message)			MIC 4 Bytes
			Data 1	...	Data N	
			Type+Value N Bytes	Type+Value N Bytes	Type+Value N Bytes	

## 6. Sensor Data Definition

### 6.1 Device Information(0x00)

Type	Value	Value	Value
1 Byte	3 bit	5bit	1 Byte
0x00	Version	Battery Level	Reserve

### 6.2 Temperature(0x04)

Type 1 Byte	Value 2 Bytes	Comments
0x04	Temperature	2-byte signed integer with negative value below zero The default unit is 0.1 degrees, that is 201 means 20.1 degrees

e.g. 0xFF88 is -120 (-12°C), Network byte order mode is {04 FF 88}

### 6.3 Humidity(0x05)

Type 1 Byte	Value 1 Byte	Comments
0x05	Humidity	Unsigned integer of 1 byte. The default unit is 1%RH, that is 10 means 10%RH

## 6.4 CO2/CH4/CO etc.(0x30)

Type	Value		
1 Byte	length 1 Byte	Gas Type 1 Byte	Gas Value 4 Bytes
0x30	0x05	0x01 CH4 0X02 CO 0X03 HS 0X04 CO2 0X05 NH3	Resolution ratio is 0.01 CH4 is 0.01%LEL CO/HS/CO2/NH3 is 0.01ppm

### For Example:

↑ 34:08:34 eu1-cac0808100002290 Forward uplink data message Payload: { level: 31, vol: 30, volume: 686 } 00 3F 24 30 05 04 00 01 0B F8 ... PPrct: 3

FRM Payload is 00 3F24 30 05 04 00010BF8

00 Device Information type

3F (binary is 0011 1111b ), so version is 1 and level is 31(0x1F)

24 for reserve

30 is Gas

05 is length of gas data.

04 is Gas Type is CO2

00010BF8 is the content of 686.00ppm

1 0BF8	
HEX	1 0BF8
DEC	68,600
OCT	205 770
BIN	0001 0000 1011 1111 1000

## 7. 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.

### Parameters interpretation

**LFT:** Data uplink period

**LCP:** Sensor sample period

**RXW:** Preheat period for Gas Sensor, unit is seconds

**Calibration:** Gas Sensor calibration value

## 8. Shipping list

LoRaWAN gas sensor 1 pcs

Mounting brackets 1 pcs

LoRaWAN antenna 1 pcs