Product Specification

Product Name: Outdoor Beacon Sensor

Model Name: DSBC-060-1

Revision History

Specification		Sect.	Update Description	By
Rev	Date			
1.0	2022-09-21		New version release	

Approvals

Organization	*Name*	*Title*	*Date*

1 Introduction

1.1 Purpose& Description

DSBC-060-1 is an outdoor beacon sensor, is DUSUN developed intelligent sensor equipment. Suitable for outdoor environment temperature and humidity detection or position location function, a red LED lamp, and a button switch(low power setting, pairing setting). Reserved air pressure sensing function.

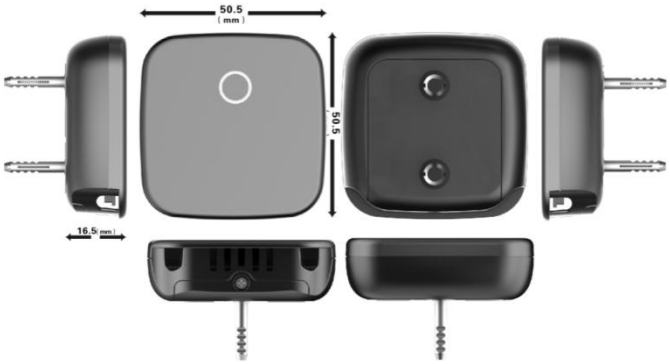
1.2 Product Feature

- High accuracy and stability
- Built-in highly sensitive temperature and humidity sensor SHTC3(Sensirion)
- Can be set normal storage temperature and humidity data interval and alarm storage temperature and humidity data interval
- Can update version by OTA
- Can support Eddystone and ibeacon
- Support local low voltage alarm

1.3 Application

- Archives
- Experimental (test) rooms
- Workshop
- Museums
- Pharmaceutical environment

2 Appearance



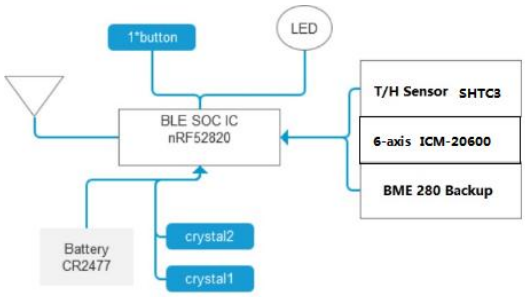
Model List

Feature / Mode	Bluetooth 5.1	Beacon	Long Range	T&H Detect
DSBC-060-1	•	•	•	•

Remark: (1) Can be designed as a standard iBeacon, Eddystone protocol, can also meet the needs of broadcast package customization

3 Hardware Description

3.1 Hardware Block



3.2 LED Status

Operation	DSBC-060-1
Connectivity status (pairing mode)	1Hz flashes 255 s
Power ON	2Hz flash 5 times
Power OFF	1Hz flashes 3 times
Battery low power status	LED flash once per 10s

3.3 Key function

Operation	DSBC-060-1
Press and hold 5 s	Enter pairing mode
Press and hold 15s when ON	Power OFF
Press and hold 3s when OFF	Power ON

4 Specifications

4.1 RF Performance

Protocol	Built-in PA	Performance
Bluetooth 5.1	**No**	●**Main IC:** nRF52820 ●**Transmission frequency:** 2.400 - 2.4835GHz ●**TX power:** 8dBm,adjustable ●**Communication rate:** 125kbps (long range) 1Mbps(not long range) ●**RX sensitivity:** -103 dBm (long range) -95 dBm (not long range) ●**Transmission distance：** 100~200 meters（open area ,and long range protocol） 50~100 meters （open area ,and not long range protocol）

4.2 Sensor Performance

Sensor type	Sensor IC	Performance
Temperature &humidity	**SHTC3**	●**Detect temperature range:** -30℃~ +65℃ ●**Temperature accuracy:** ±0.3°C (0~65°C) ， ±1°C （-40~0°C） ●**Detect humidity range:** 0 ~100%RH ●**Humidity accuracy:** ±3% (20~80%RH) ， ±5%（0~20%RH,80~100%RH）

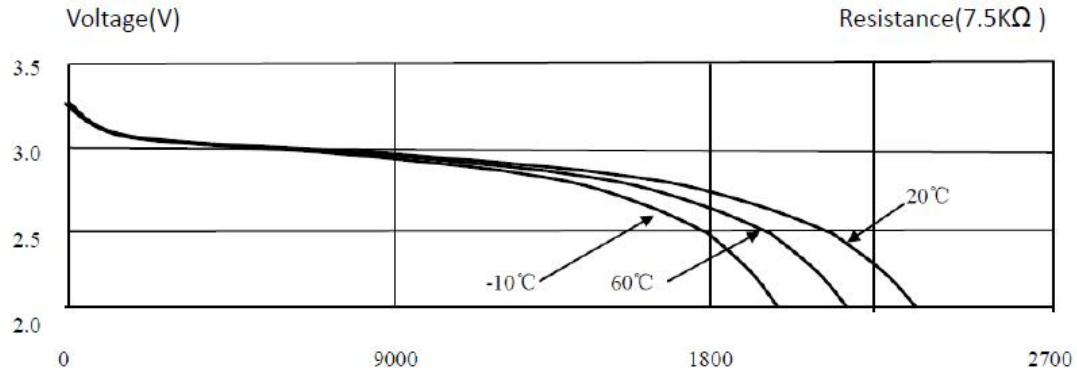
4.3 Electronic Performance

Item	Performance
Electronic	●Working voltage: 2.8~3.6VDC ●Average power consumption：<100uA (2S interval without PA) ●Built-in battery : CR2477 ,950mAh ●Battery life: 2~3 YEARS （Depends on the mode of operation） ●RTC: Not support

4.4 Basis Performance

Item	Performance
Basis	●Operation temperature: -20~65°C ●Outline size：50.5 mm ×50.5 mm x16.5mm ●Net weight：~65g ●IP protection: IP67
Certification	FCC,CE

4.5 Battery life



Discharge characteristic on load

4.5.1 iBeacon/Eddystone (Time Unit：day)

Broadcast interval	**1s**	**5s**	**10s**
Battery life	980	1350	2500

4.5.2 Temperature and humidity sensor (Time Unit：day)

Broadcast interval		**1s**	**10s**	**1min**	**15min**
Sample interval	1s	216	550	700	750
	10s	/	900	1200	1400
	1min	/	/	3000	3300
	15min	/	/	/	3800

Remark： The above data is based on the product working at 20 ° C
Operation Temperature： -10℃, it's only 80% efficient, the lower the temperature, the less efficient.
Operation Temperature： 60℃, it's only 90% efficient, the higher the temperature, the less efficient.

4.6 Pairing and LED status

5 Caution

1. Being close to a metal object will interfere with the signal, causing the signal to be weakened.
2. Note the distance between DSBC-060 and the receiver to guarantee the accuracy of receiving

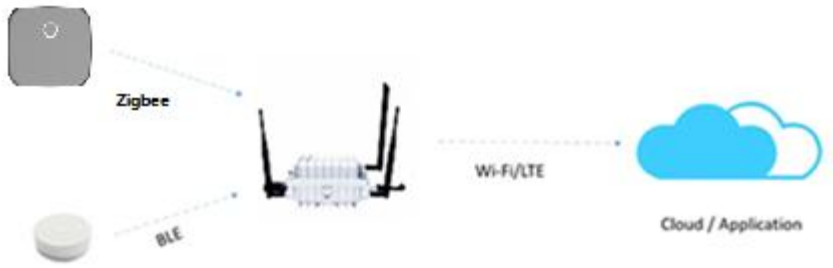
3. Keep away from corrosive objects.

6 Reference Usage

6.1 Gateway Usage

1. Beacon /sensor broadcast the data.

2. Zigbee Gateway gets the data from the beacon and sends the information to Cloud via Wi-Fi or LTE once per second.



7 Development Description

7.1.1 Bluetooth sensor data format

- Broadcast packet format

The sensor data are in the broadcast packet's vendor custom data.Large-end (MSB-LSB).Data format as below：

VID	Sensor type	Temperature	Relative humidity	Accelerator data	Accelerator range	Geomagnetism data	Geomagnetism range	Pressure data
2 Bytes	1 Bytes	2 Bytes	2 Bytes	6 Bytes	1 Bytes	6Byte	1 Bytes	3Bytes

For the two example broadcast as below：

Example 1	0xFF	5900 03 6E08 7B34
Example 2	0xFF	5900 04 003F 004B F800 01

In the broadcast package, 0xFF is for vendor custom Data, the next two bytes (0x59,0x00) represent vendor VID, The sensor type description as below:

Bit (from low to high)	1	2	3	4	5
	Temperature	Relative humidity	Accelerator	Geomagnetism	Air pressure

For example : 00000001 is the temperature sensor;
00000100 is the accelerometer senseor
00000011 is the temperature & humidity sensor

Note：If the product is not described in sensor Type without a certain sensor type, there will be no sensor data in the broadcast package

- Data conversion

The sensor data in the broadcast packet need to be converted to obtain the real senor data.

- Temperature conversion formula

$$T = \frac{X \times 175.72}{65536} - 46.85$$

X is for the temperature data in the broadcast packet.

For example 1 ,Temperature = 0x6E08 * 175.72/65536-46.85 = 28168 * 175.72/65536-46.85 = 28.67

- Humidity conversion formula

$$RH = \frac{X \times 125}{65536} - 6$$

X is for the humidity data in the broadcast packet.

For example 1 ,Humidity = 0x7B34 * 125.0 / 65536 -6.0 = 31540* 125 / 65536 -6 = 54.15%

- Air pressure conversion formula

$$P = X \quad \text{(Unit:Pa)}$$

X is for the pressure data in the broadcast packet, and it's a 6 byte signed data

For example,the X data is 0x 01 AD B0

P=110000Pa=1100hPa

- **Acceleror conversion formula**

$$ACC = \frac{X}{1024}$$

X is for the accelermeter data in the broadcast packet, and it's a 3x16 bit signed data.

For example 2, The x axis data is 0x003F，The y axis data is 0x004B，The z axis data is 0XF800，

1. x axis data= 63/1024=0.0615g
2. y axis data=75/1024=0.0732g
3. z axis data=-2048/1024=-2g

For the accelerator range, it describe as below

Accelerator range	0x01	0x02	0x03	0x04
Range	±2g	±4g	±8g	±16g

- **Gyroscope conversion formula**

$$GYO = \frac{X \times \pi}{1476}$$

X is for the Gyroscope data in the broadcast packet, and it's a 3x 16 bit signed data.

For the geomagnetism range, it describe as below

Accelerator range	0x01	0x02	0x03	0x04
Range	±250dps	±500dps	±100dps	±2000dps

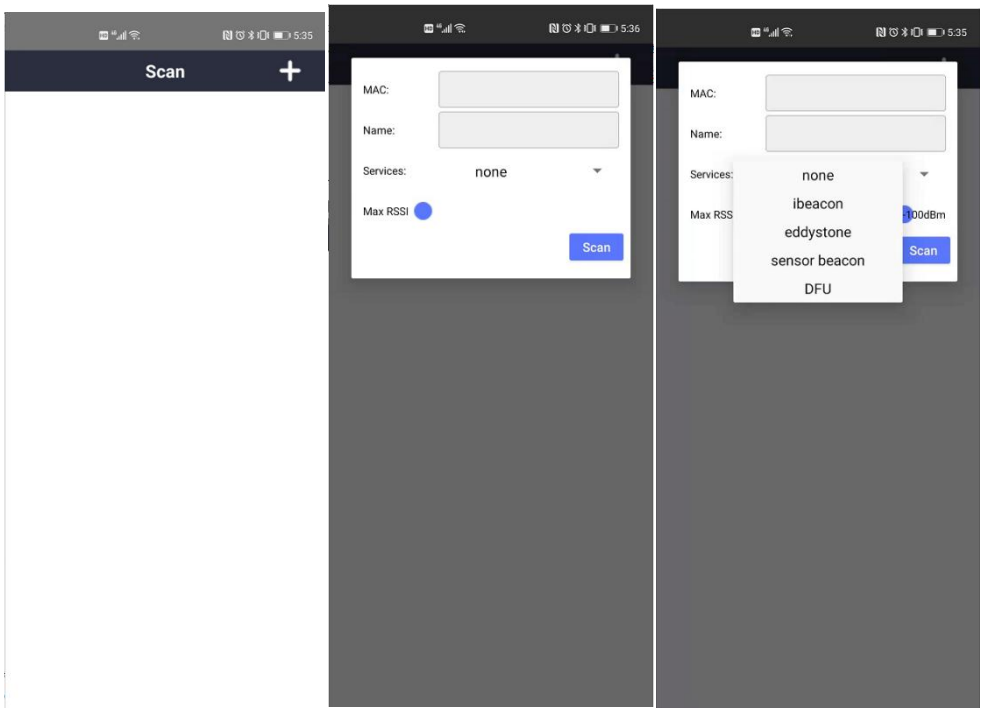
7.1.2 Bluetooth beacon / sensor data configuration

- **Device filtering**

Open the DushLot APP, click the "+" button in the upper right corner, and the filter page will pop

up. This page can filter the scanned Beacon devices by MAC, Name, Services and Max RSSI. Among them, MAC and Name support fuzzy query, and the Services drop-down options include ibeacon, eddystone, sensor beacon and DFU. After entering the query conditions, click the "Scan" button, the APP will return to the main page with the devices according to the query conditions.

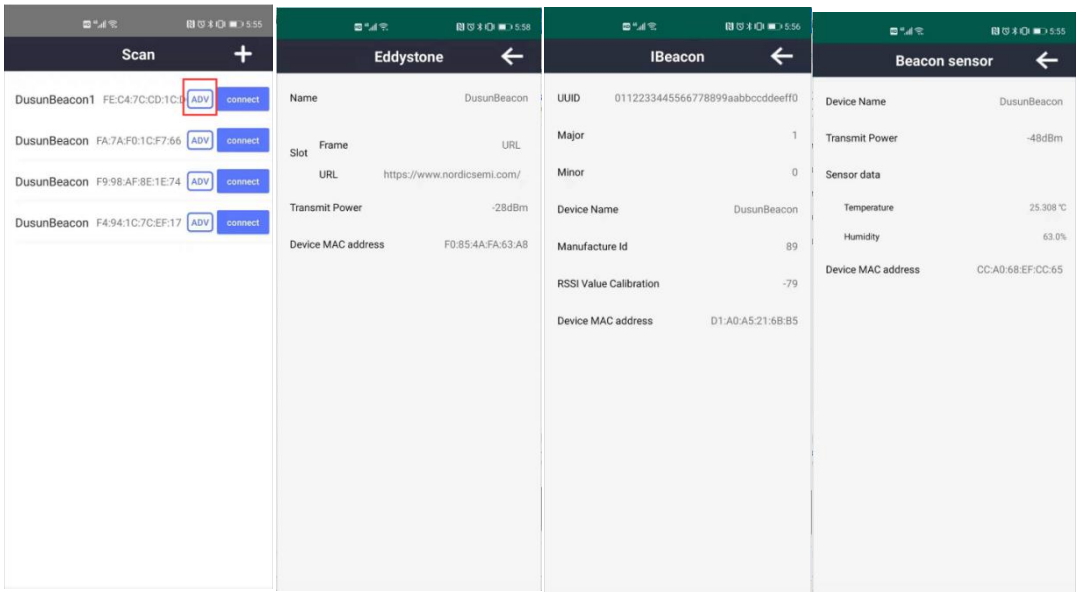
Remark: ensure the Bluetooth function is opened.



- **Broadcast data analysis**

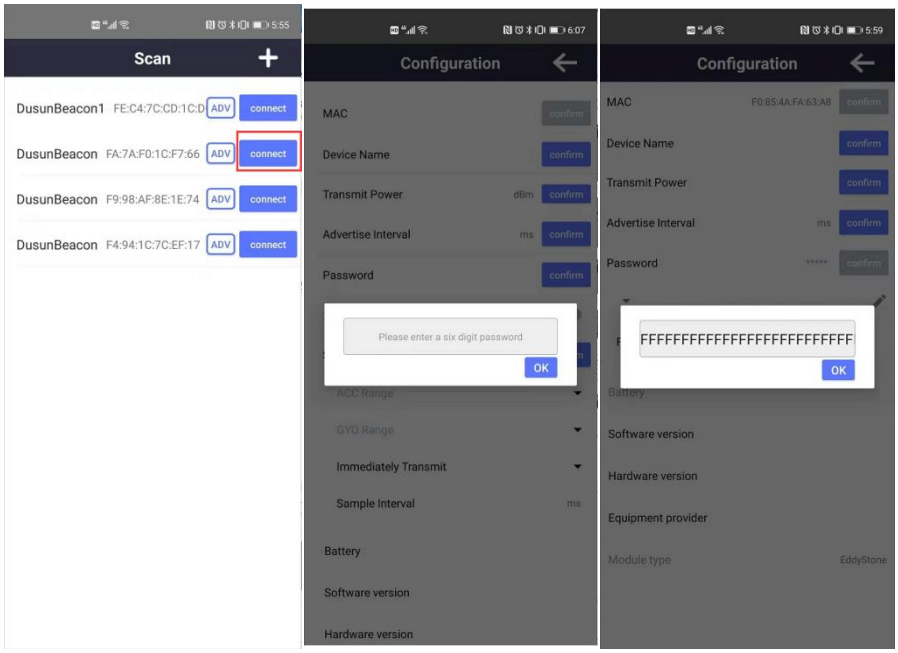
On the home page, select the queried device and click the "ADV" button to enter the device details page, as shown in the figure:

The app will recognize different types of devices and jump to the corresponding page.



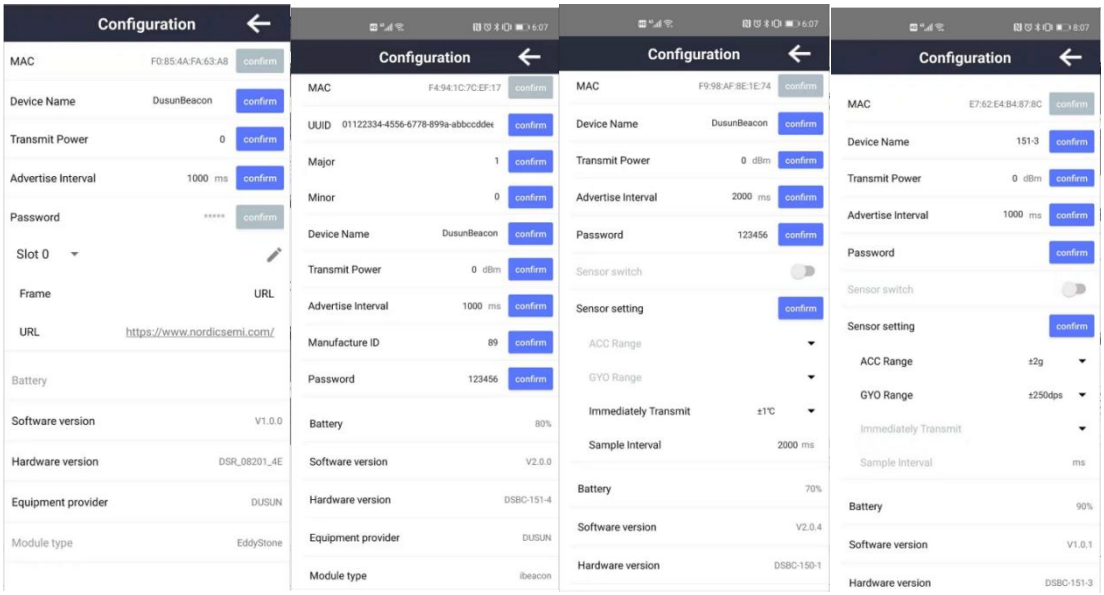
- **Device parameters setting**

On the home page, select the queried device, click the "connect" button, and the password input page will pop up (devices without a password will directly enter the parameter configuration page). The default password for ibeacon and sensor beacon devices is **123456**, and the default password for eddystone devices is **FFFF FFFF FFFF FFFF FFFF FFFF FFFF FFFF**, After entering the correct password, click the "OK" button to enter the device parameter configuration page.



Different types of equipment will enter different parameter setting pages, as shown in the figure below.

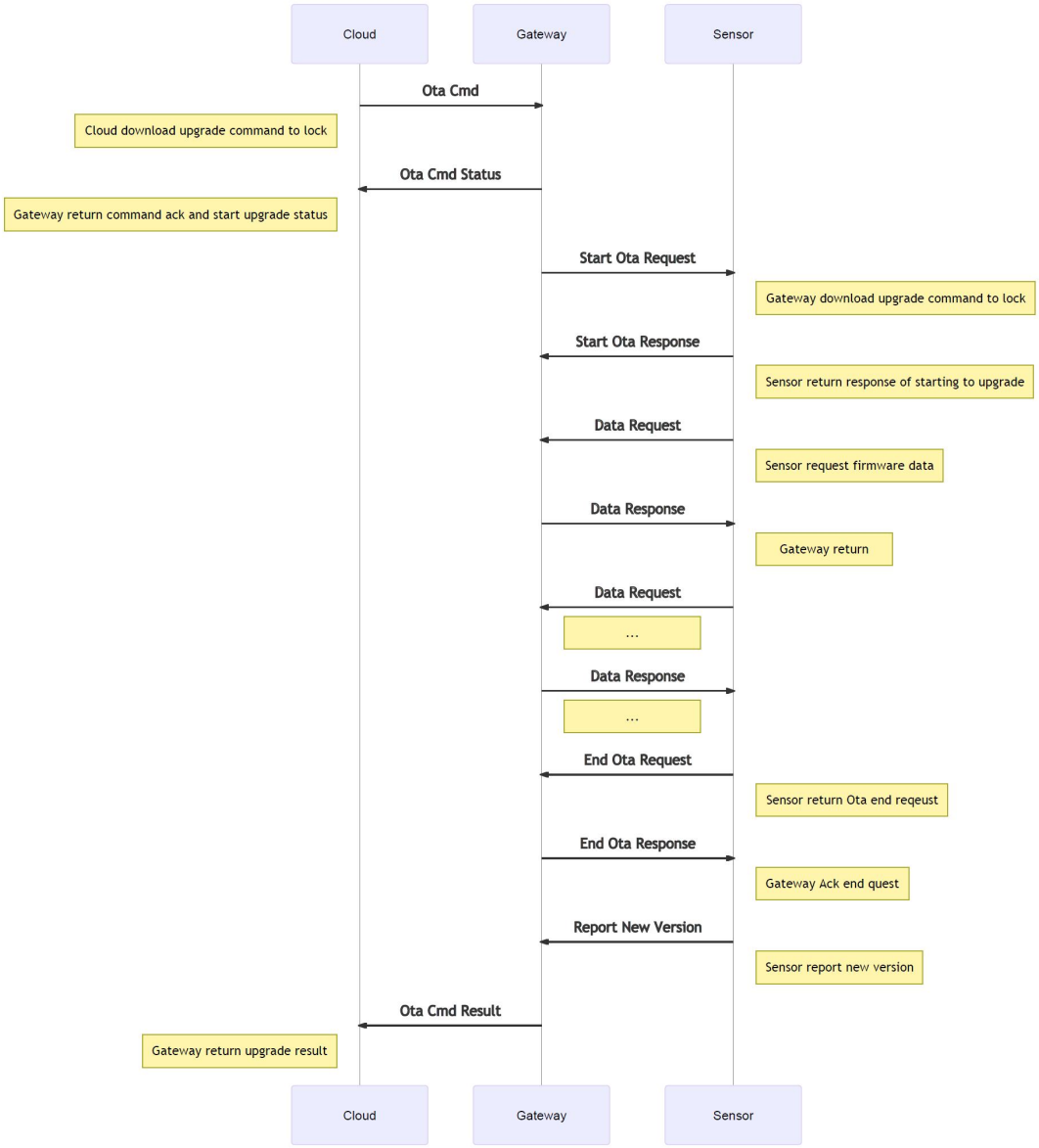
Remark: After the parameter is modified, you need to click the "confirm" button behind the parameter to submit. If exit the connection page without confirm, the modification will be invalid.



- **Parameter setting description**

Parameters	Setting	Remark
UUID	32 numbers or letters	**Just for ibeacon device**
Transmit Power	Can be set -20、-16、-12、-8、-4、0、3、8	If device have built-in PA,The actual transmit power is the set value +20 dbm
Advertise Interval	iBeacon ,eddystone : 100~10000ms Beacon sensor:100ms 到 900000ms	
Device Name	<12 bytes number,letter,Chinese words	
Password	Limite 6 numbers	● When changing the Password, you need to enter the old password + the new password at the same time, and the + sign is not required when entering ● If you need to cancel the connection password, enter the new password as 000000, and then click the "confirm" button to submit
Major、 Minor、 Manufacture	0~65536	
Immediately Transmit	±0.5℃、 ±1℃、 ±2℃、 0℃	**Just for temperature+humidity beacon sensor** When this parameter is set to 0℃, it means that the temperature and humidity sensor will report immediately after the temperature is detected. For other values, the temperature and humidity detection value needs to be compared with the last detected value, and the difference between the set value and above will be reported immediately. If the detection value change range has not exceeded the set range, the temperature and humidity data will be reported at the broadcast interval
Sample Interval	1000~900000ms	**Just for temperature+humidity beacon sensor** Temperature and humidity sensor sample interval
ACC Range	Can be set ±2g、 ±4g、 ±8g、 ±16g	Acceleration range setting
GYO Range	Can be set±250dps、 ±500dps、 ±1000dps 和 2000dps	Gyro range settings

7.2 OTA


Cloud
Gateway
Sensor
Ota Cmd
Cloud download upgrade command to lock
Ota Cmd Status
Gateway return command ack and start upgrade status
Start Ota Request
Gateway download upgrade command to lock
Start Ota Response
Sensor return response of starting to upgrade
Data Request
Sensor request firmware data
Data Response
Gateway return
Data Request
...
Data Response
...
End Ota Request
Sensor return Ota end reqeust
End Ota Response
Gateway Ack end quest
Report New Version
Sensor report new version
Ota Cmd Result
Gateway return upgrade result
Cloud
Gateway
Sensor

8 Installation

8.1 Installation

8.1.1 Screw Fixing Type

1.Drill holes （3mm） in the corresponding positions of the wall and plug the expansion screw cap into the hole
2.Place the bracket in the corresponding position and fix it with screws

8.1.2 3M adhesive type

1．Select the adhesive tape to stick to the back of the device, and tear off the adhesive tape on the back of the beacon sensor
2．Just stick the beacon sensor to the surface of the object

Note：
Although it's Operation temperature is between -30 and 65°C, the best sticking temperature is between 10 and 30°C.
Extrude and heat the hot melt adhesive and bonding surface

8.2 Battery replacement

Step1： Use a screwdriver to unscrew the screws located on the four corners, remove the back shell

Step2： Replace the battery (CR2477)

This device has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This device generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications.

However, there is no guarantee that interference will not occur in a particular installation. If this device does cause harmful interference to radio or television reception, which can be determined by turning the device off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

--Reorient or relocate the receiving antenna.

--Increase the separation between the device and receiver.

--Connect the device into an outlet on a circuit different from that to which the receiver is connected.

--Consult the dealer or an experienced radio/TV technician for help

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment

FCC Radiation Exposure Statement

The antennas used for this transmitter must be installed to provide a separation distance of at least 20 cm from all persons and must not be co-located for operating in conjunction with any other antenna or transmitter.

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.

IC STATEMENT

This device contains licence-exempt transmitter(s)/receiver(s) that comply with Innovation, Science and Economic Development Canada's licence-exempt RSS(s). Operation is subject
to the following two conditions:
(1) This device may not cause interference.
(2) This device must accept any interference, including interference that may cause undesired operation of the device.

Cet appareil contient des émetteurs / récepteurs exemptés de licence conformes aux RSS (RSS) d'Innovation, Sciences et Développement économique Canada. Le fonctionnement est soumis aux deux conditions suivantes :
(1) Cet appareil ne doit pas causer d'interférences.
(2) Cet appareil doit accepter toutes les interférences, y compris celles susceptibles de provoquer un fonctionnement indésirable de l'appareil.