MerryIoT Leak Detection

Reference Manual

WL10-915

WL10-868

Model Name: WL10

Table of Content

1. Description

The Water Leakage Sensor utilizes LoRaWAN connectivity to send uplink notifications and buzzer alarms when a water leak is detected.

There are also vibration and tilt detection in case of tampering.

2. Specifications

2.1 Mechanical

2.1.1 Sensor

Length x Width x Height	26.5mm x 70mm x 70 mm
Weight	54g without battery 89g with battery
Sensor	• Combined with temperature, humidity, and water leak detection functions • Buzzer for notifying the user • Tamper detection

2.2 Environmental

Temperature	0°C to +50°C
IP Rating	IP 67 equivalent

2.4 Radio

Frequency	Either 863–870MHz for EU models and 902–928MHz for North America
Rx Sensitivity (Conducted)	-137 dBm
Antenna Gain (Lora)	0.34 dBi (Peak)
Antenna Gain (BLE)	2.24 dBi (Peak)

2.3 Power

Source	1.5V AA Alkaline 2700 mAh battery x 2pcs
Max. System Voltage	3.0V
Min. System Voltage	2.6V
Max. Current	120 mA
Min. Current	25 µA (Sleeping mode)

2.5 User Interface

LEDs	One blue LED
Button	Test Button
Buzzer	Alarm 0cm 75dB

2.6 Certifications and Conformity

FCC	2AAS9WL10
CE	Certified.
IC	26296-WL10

2.7 Additional Features

Battery Monitoring	

3. Operation

3.1 Transport Mode

They are shipped with batteries inside the sensor. Default the sensor is in transport mode which means not to activate operation.

3.2 Installation Mode

- Users need to press the button for over 5 seconds to activate the operation into installation mode. When the Sensor tries to join the network, it will keep blinking for 3 seconds.

- Once the sensor joins the network, the LED will keep on for 3 seconds and send an uplink.

- Users can press the button for over 5 seconds to try to join the network again.

- The device will send uplink three times with the FW version when the device joined successfully.

3.3 Default Operation

- During default operation the device will send a message to the network anytime there is a sufficient delta in the environmental conditions

  - Water leakage status change dry/wet (dry to wet Buzzer alarm)

  - Tamper detected (Buzzer alarm)

  - Button pressed (No buzzer alarm)

  - Keepalive messages (No buzzer alarm).

- Users can press the button to send a test message to the network.

- The device will send a message saying it has been inactive for 60 minutes.

- While in default mode the device will flash the LED 3 times within 100ms only when the user presses the test button.

4. Messages

LoRaWAN Packets for this device use port 126.

4.1 Status

4.1.1 Triggers

Packet Triggers

- The device will message that it has been inactive for 60 minutes.

- Water leakage detected (when the status changes from dry to wet), will send 3 uplinks with an interval of 5 seconds.

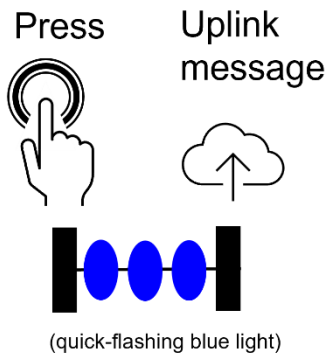- Every 5 minutes message will be sent during wet status

Tamper Trigger:

Immediately send a message

*Note: During water leakage or button event, the tamper event will only be triggered 10 seconds after.

Button Pressed Trigger:

- **A single press-send uplink message**

(quick-flashing blue light)

- **Long press more than 5s-Rejoin trigger:**

4
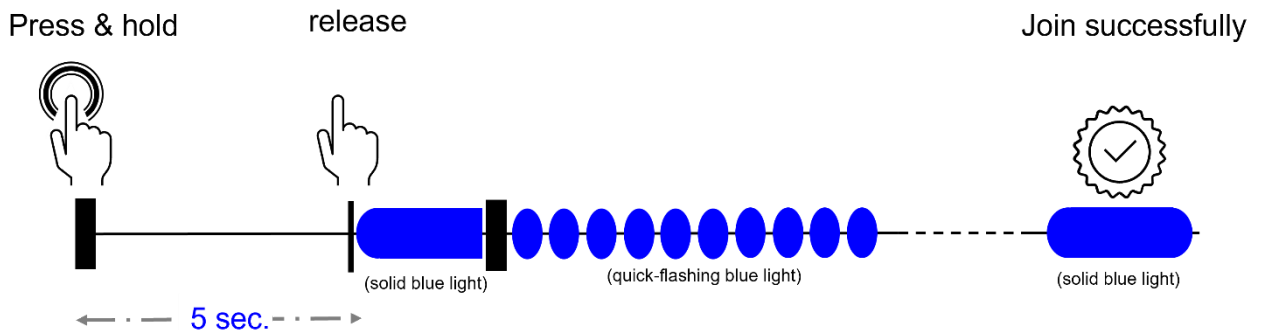
- **Long press more than 10s-BLE DFU Mode:**

Press & hold   release   BLE disable   Join successfully

(solid yellow light)   (slow-flashing blue light)   (quick-flashing blue light)   (solid blue light)

← 5 sec. → ← 5 sec. → ← · — · — About 1 min. · — · — · →

BLE enable
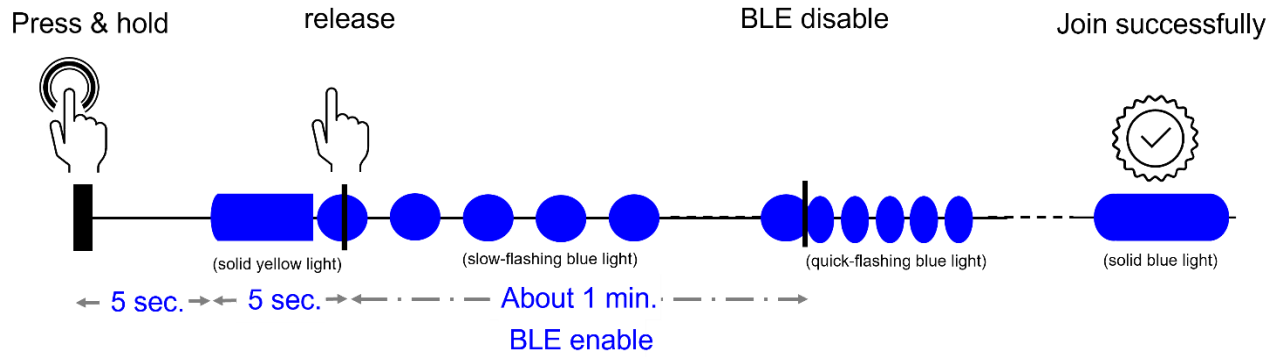
Press and hold the button for over 10 seconds until the BLUE LED starts blinking. when the BLUE LED starts blinking (like a breathing light), the DFU mode is enabled. Users can upgrade the device FW via BLE.

4.1.2 Payload

Port	126
Payload Length	5 bytes

Bytes	0	1	2	3	4
Field	Status	Battery	Temp.		RH

Status	**Sensor status** Bit [0] 1 – Water leakage detected, 0 – Dry Bit [1] 1 – Button pressed, 0 - Button released Bit [2] 1 – Tamper detected, 0 - No tamper detected Bits [7:3] RFU
Battery	**Battery level** Bits [3:0] unsigned value v, range 0 – 15; battery voltage in V = (21 + v) ÷ 10. Bits [7:4] RFU
Temperature	**Environment Temperature** Bits [15:0] Signed value x, little-endian format. Temperature measurement range : -40.0 ~ 125.0 °C Ex. Positive number: EF01 => 01EF = 495, Temp = 495 ÷ 10 = 49.5 °C Negative number: F0FF => FFF0 = 65520 +(-65535) -1 =-16 Temp = -16 ÷ 10 = -1.6 °C
RH	**Relative humidity** as measured by a digital sensor Bits [6:0] unsigned value in %, range 0-100. The value 127 indicates measurement error. Bit [7] RFU

5. Battery

5.1 Replacement

1   **Tools: Cross-type screw driver x 1(PH1), Star-type screw driver x 1(T8H), Plastic disassembly stick(recommended)**
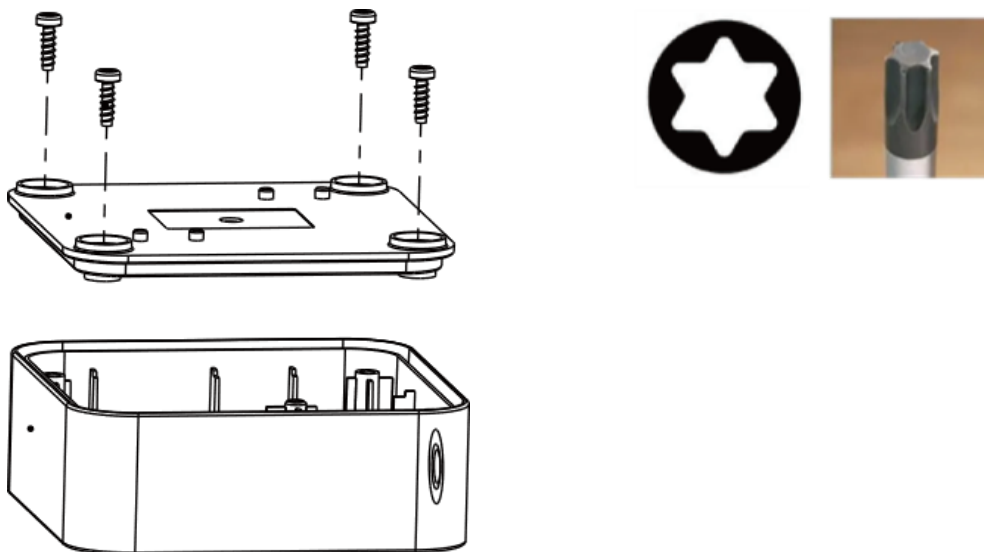
**2**   **Remove 4 rubber stands of the sensor with a disassembly stick.**
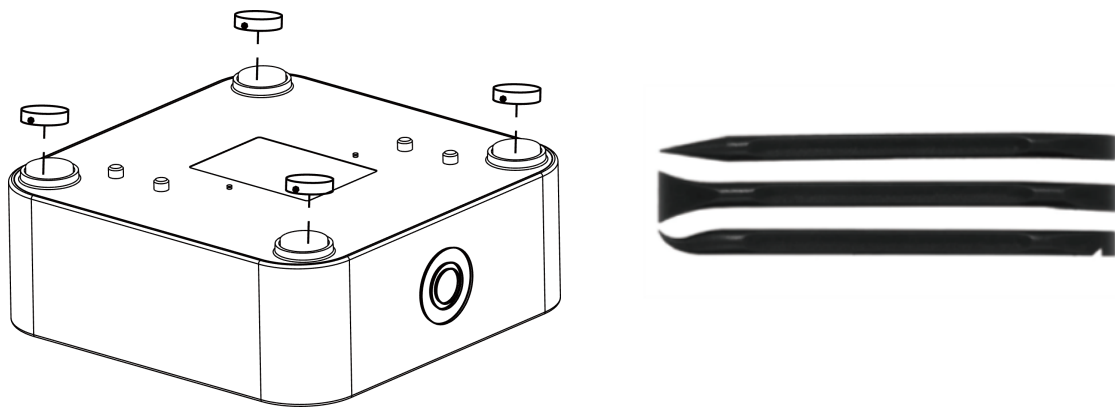
3   **Remove the bottom cover of the sensor with a star-type screwdriver(T8H size).**

*Caution: Removing the bottom cover may affect the water-tightness. Please get help from the Browan team before you do so.

4   Remove the circuit board of the sensor with a cross-type screwdriver x 1(PH1)
*Caution: Avoid touching the circuit board with your bare hand. Touching boards can release static discharge. Please wear a plastic/rubber glove.
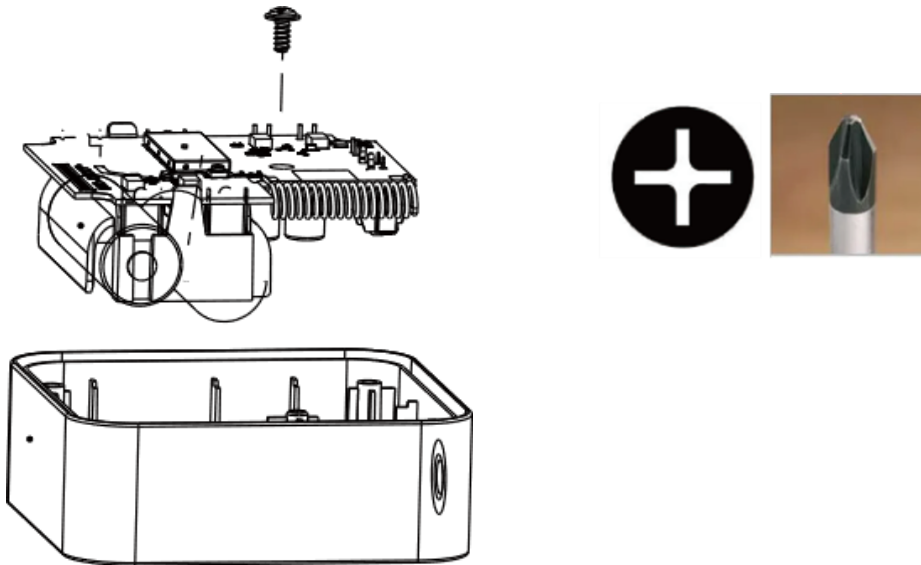
5   Replace the battery with new ones(Alkaline Battery,"LR6", AA x 2 pcs)

*Caution: DO NOT remove the battery holder.

*Caution: Using batteries other than the ones provided may result in loss of performance and battery life, and also damage to the device. Dispose of

properly, observing environmental protection rules. Mixing of cells can result in battery leakage and sub-optimal device performance.

X2

Alkaline AA

LR6 Alkaline battery, AA
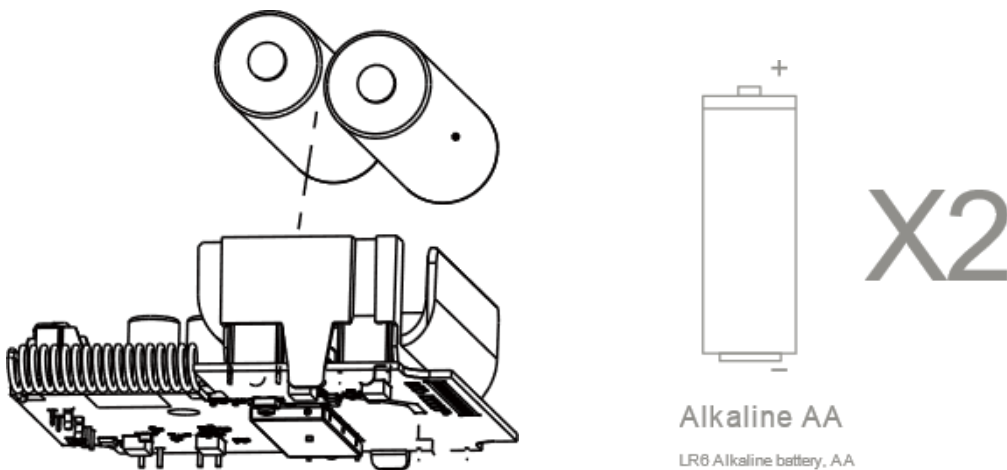
6   Re-assemble the battery cover.
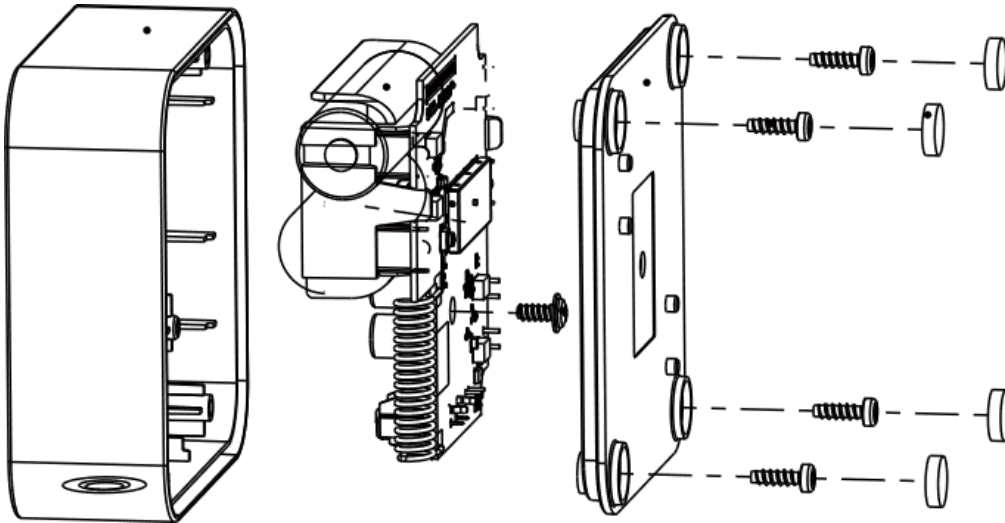
5.2 Cautions

CAUTION: Disposal of a battery (or battery pack) into a fire or a hot oven, or mechanically crushing or cutting of a battery (or battery pack) can result in an EXPLOSION!

Leaving a battery (or battery pack) in an extremely high temperature surrounding environment can result in an EXPLOSION or leakage of flammable liquid or gas.

A battery (or battery pack) subjected to extremely low air pressure may also result in an EXPLOSION or leakage of flammable liquid or gas.

Discard used batteries according to the manufacturer's instructions.

CAUTION: The unit is provided with a battery-powered circuit.

There is a danger of explosion if the battery is incorrectly replaced.

Replace only with the same or equivalent type recommended by the manufacturer.

Discard used batteries according to the manufacturer's instructions.

Risk of Explosion if Battery is replaced by an Incorrect Type. Dispose of Used Batteries according to the Instructions.

6. Label format information

6.1 Device back label
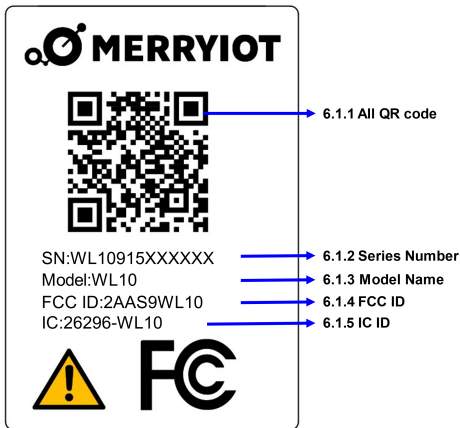
6.1.1 All QR code

URN:LW:D0: 0016160000000007:0016160000XXXXXX:01632004

The total maximum resulting character sentence is 48 alphanumeric characters long.

6.1.1.1 JoinEUI

900MHz: 0016160000000007. (US)

800MHz: 0016160000000008. (EU)

Uses a hexadecimal representation resulting in 16 characters.

6.1.1.2 DevEUI

0016160000XXXXXX.

Uses a hexadecimal representation resulting in 16 characters

6.1.1.3 ProfileID

The profile identifier encodes a Vendor Identifier and a Vendor Profile Identifier as a hexadecimal representation resulting in 8 characters.

6.1.1.3.1 VendorID

0163

VendorID is assigned by the LoRa Alliance.

6.1.1.3.2 VendorProfileID

900MHz: 2004 (US)

800MHz: 3004 (EU)

6.1.2 Serial Number

SN: WL10915XXXXXX

Not included in the QR code.

6.1.3 Model Name

MODEL: WL10.

Fixed code, not including in QR code.

6.1.4 FCC ID

2AAS9WL10

6.1.5 IC ID

26296-WL10

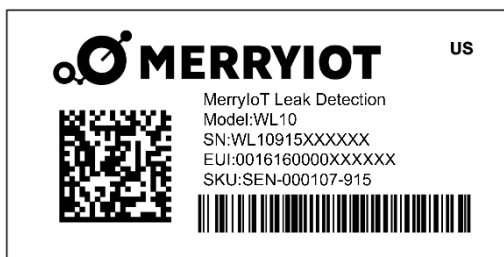### 6.1.6 Caution!

⚠️ For more information, please refer to chapter 5.2. and 10.

6.2 Packaging label

GS1 DataMatrix

- The GS1 Application Identifier (21) indicates that the GS1 Application Identifier data field contains a serial number.
- The GS1 Application Identifier (92) assigned to the company's internal information is DevEUI.

7. Important Product & Safety Instructions

For the most current and more detailed information about Browan features and settings and safety instructions, please download the user manual for the products online at www.browan.com before using any Browan products or services.

Certain sensors contain magnets. **Keep away from ALL Children!** Do not put it in your nose or mouth. Swallowed magnets can stick to intestines causing serious injury or death. Seek immediate medical attention if magnets are swallowed.

These products are not toys and contain small parts that can be dangerous to children under 3 years old. Do not allow children or pets to play with products.

Observe proper precautions when handling batteries. Batteries may leak or explode if improperly handled.

Observe the following precautions to avoid a sensor

explosion or fire:

- Do not drop, disassemble, open, crush, bend, deform, puncture, shred, microwave, incinerate, or paint the sensors, Hub, or other hardware.

- Do not insert foreign objects into any opening on the sensors or Hub, such as the USB port.

- Do not use the hardware if it has been damaged—for example, if cracked, punctured, or harmed by water.

- Disassembling or puncturing the battery (whether integrated or removable) can cause an explosion or fire.

- Do not dry the sensors or battery with an external heat source such as a microwave oven or hairdryer.

8. Warnings

- Do not place naked flame sources, such as lighted candles, on or near the equipment.
- The battery shall not be exposed to excessive heat such as sunshine, fire, or the like.
- Do not dismantle, open or shred battery packs or cells.
- Do not expose batteries to heat or fire. Avoid storage in direct sunlight.
- Do not short-circuit the battery. Do not store batteries in a box or drawer where they may short-circuit each other or be short-circuited by

- Observe the plus (+) and minus (-) marks on the battery and equipment and ensure correct use.
- Do not use any which is not designed for use with the product.
- Do not mix cells of different manufacture, capacity, size, or type within a device.
- Keep batteries out of the reach of children.
- Seek medical advice immediately if a battery has been swallowed.
- Always purchase the correct battery for the

other metal objects.

- Do not remove a battery from its original packaging until required for use.

- Do not subject batteries to mechanical shock.

- In the event of a battery leaking, do not allow the liquid to come in contact with the skin or eyes. If contact has been made, wash the affected area with copious amounts of water, and seek medical advice.

- Do not use any charger other than that specifically provided for use with the equipment.

equipment.

- Keep batteries clean and dry.

- Wipe the battery terminals with a clean dry cloth if they become dirty.

9. Notices

- Avoid exposing your sensors or batteries to very cold or very hot temperatures. Low or high-temperature conditions may temporarily shorten the battery life or cause the sensors to temporarily stop working.

- Take care in setting up the Hub Gateway and other hardware. Follow all installation instructions in the User Guide. Failure to do so may result in injury.

- Do not install hardware equipment while standing in water or with wet hands. Failure to do so can result in electric shock or death. Use caution when setting up all electronic equipment.

- When charging the sensors, do not handle the sensors with wet hands. Failure to observe this precaution could result in electric shock.

- PROP 65 WARNING: This product contains chemicals known to the State of California to cause cancer and birth defects or other reproductive harm

- Cleaning Browan Products: Use a clean dry cloth or wipe to clean Browan products. Do not use detergent or abrasive materials to clean the Browan products, as this may damage the sensors.

10. Cautions

CAUTION: Disposal of a battery (or battery pack) into a fire or a hot oven, or mechanically crushing or cutting of a battery (or battery pack) can result in an **EXPLOSION!**

Leaving a battery (or battery pack) in an extremely high temperature surrounding environment can

CAUTION: The unit is provided with a battery-powered circuit.

There is a danger of **EXPLOSION** if the battery is incorrectly replaced.

Replace only with the same or equivalent type recommended by the manufacturer. Discard used

result in an **EXPLOSION** or leakage of flammable liquid or gas.

A battery (or battery pack) subjected to extremely low air pressure may also result in an **EXPLOSION** or leakage of flammable liquid or gas.

Discard used batteries according to the manufacturer's instructions.

batteries according to the manufacturer's instructions.

Risk of **EXPLOSION** if Battery is replaced by an Incorrect Type. Dispose of Used Batteries According to the Instructions.

11. Regulatory

Hereby, Browan Communications Inc. declares that the radio equipment for Browan products complies with Directive 2014/53/EU.

This device complies with Part 15 of the FCC Rules and RSS Standards of Industry Canada.

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.

This symbol means that according to local laws and regulations your product should be disposed of separately from household waste. When this product reaches its end of life, take it to a collection point designated by local authorities. Some collection points accept products for free. The separate collection and recycling of your product at the time of disposal will help conserve natural resources and ensure that it is recycled in a manner that protects human health and the environment.

11.1 Federal Communication Commission Interference Statement

This equipment has been tested and found to comply with the limits for a Class B digital device, according to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used under 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 equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and the receiver.
- Connect the equipment to 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.

FCC Caution: Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.

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.

IMPORTANT NOTE:

Radiation Exposure Statement:

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with a minimum distance of 20cm between the radiator & your body.

11.2 Industry Canada statement:

This device contains license-exempt transmitter(s)/receiver(s) that comply with Innovation, Science, and Economic Development Canada's license-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 exempts de licence qui sont conformes au (x) RSS (s) exemptés de licence d'Innovation, Sciences et Développement économique Canada. L'opération est soumise aux deux conditions suivantes :

(1) Cet appareil ne doit pas causer d'interférences

(2) Cet appareil doit accepter toute interférence, y compris les interférences pouvant provoquer un fonctionnement indésirable de l'appareil

Radiation Exposure Statement:

This equipment complies with Canada's radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with a minimum distance of 20cm between the radiator & your body.

Déclaration d'exposition aux radiations:
Cet équipement est conforme Canada limites d'exposition aux radiations dans un environnement non contrôlé. Cet équipement doit être installé et utilisé à distance minimum de 20cm entre le radiateur et votre corps.

12. Configuration Downlink Command

12.1 Configuration Command

Port	204

12.2 Payload

Bytes	0	1	2
Field	Cmd	Config	

Cmd	Command	1 byte
	Bit [7:0]	**0x00 – Set keepalive interval.**
		default: 3600 sec. (Min: 15 sec.)
		*Note: If keep alive interval value < detection interval value, "detection interval" will be used as the uplink time.)
		0x03 – Set sensor detection interval
		default value: 300 sec
		value range: 15~65535
		0x04 – Set tamper detection on/off
		default: enable

	0x05 – Set buzzer alarm period(seconds)	
	default: 3	

	Configuration (1 or 2 bytes)
Config	See the table as follows:

Command	Command Description	Data Length
0x00	Get Sensor Configuration **(Only for unconfirmed downlinks)** *Note: little-endian format.	0 byte
0x00	Set keepalive interval. *Note: little-endian format.	2 bytes
0x03	Set detection interval *Note: little-endian format.	2 bytes
0x04	Bit[0] = 1: Enable tamper detection, 0: Disable tamper detection Bit[7:1] = RFU	1 byte
0x05	Buzzer alarm period in seconds	1 byte

	Command content
Payload Content	Ex:

00100E || 032C01 || 0401 || 0503

00 100E => Set keepalive interval: 0x0E10 -> 3600 (sec)

03 2C01 => Set detection interval: 0x012C -> 300(seconds)

04 01 => Enable tamper detection: 0x01

05 03 => Buzzer alarm period in 3 seconds: 0x03

12.3 Response Content

(Only for unconfirmed downlinks)

Port	204
Payload Length	10 bytes
Payload Content	**Response content**
	Example:
	00100E 032C01 0401 0503
	00 100E => Set keepalive interval: 0x0E10 -> 3600 (sec)
	03 2C01 => Set detection interval: 0x012C -> 300(seconds)
	04 01 => Enable tamper detection: 0x01
	05 03 => Buzzer alarm period in 3 seconds: 0x03

12.4 Frame Count 1 Content

Payload Length	9 bytes
Payload Content	Frame count 1 content
	Ex:
	01 04200000 7ff1f102
	01 => command ID
	04200000 => HW ID: 0x00002004 (little-endian format)
	7ff1f102 => FW version: 0x02f1f17f (little-endian format)

13. BLE FOTA Downlink Command

Port	206
Payload Length	3 bytes

13. 1 Payload

Bytes	0~2
Payload	0x444655

14. Reboot Downlink Command

Port	206
Payload Length	5 bytes

14. 1 Payload

Bytes	0~5
Payload	0x5245424F4F54