Document Number: 990-00301
Product Part Number: 100-0B003, 100-0B004
Rev. 2.0
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1. General Introduction

The B003 and B004 beacon support detecting and advertising the battery level and advertises BLE packages according to a fixed interval. It supports a low battery alert and a panic button.

2. Product Specifications

Table 1: Product Specifications

Protocol	iBeacon
RF Power	0dBm in default, -20 to +5dBm TX power
Distance	Max 80m
Density for indoor tracking	>10m
Broadcasting	Minimum 100ms
Accelerometer	Optional
Power consumption	5μA @ 5s interval and 0dBm TX power
Battery	CR2032, 220mAh
Weight	7.7g
Dimension	38mm*38mm*7mm
Certification	FCCID: 2APPL-100-0B, CE

3. Function Description

3.1 On/Off Status

1) Turn on: Press the button for 3s and the LED flashes 10 times.
2) Turn off: Press the button for 3s, and the LED flashes 3 times quickly.

3.2 Low Battery Alter

The beacon checks the voltage every hour. If the battery power is below 20%, the beacon will beep every minute as a warning. To stop the alarm, press the button three times. The alarm will resume after the next voltage check if the battery power is still low.

3.3 Panic Button

When the panic button is enabled, the Major field's high bit (binary 1) signifies the panic state. The beacon advertises the status 10 times with the set interval. For example, if the Major is 0x0010 and the Minor is F1BC. Major becomes 0x8010.

0x02 01 06 1A FF 4C 00 02 15 F2 A5 2D 43 E0 AB 48 9C B6 4C 4A 83 00 14 67 20 00 10 F1 BC B3 (panic button not pressed)

0x02 01 06 1A FF 4C 00 02 15 F2 A5 2D 43 E0 AB 48 9C B6 4C 4A 83 00 14 67 20 80 10 F1 BC B3 (panic button pressed)

The panic button is enabled by default. Please get in touch with Lansitec if you do not need it.

3.4 TX Power

The signal strength sent by the beacon. The default value 06 (0dBm)

Table 2: TX Power

Value Type	Value	TX Power (dBm)
Hex	01	-20
	02	-16
	03	-12
	04	-8
	05	-4
	06	0
	07	4

3.5 Advertise Interval

The interval of beacon advertisement is 5s in default, this means that the beacon advertises the advertising packet once every 5s. The maximum Advertisement interval is 10s.

Table 3: Advertise Interval

Value Type	Value	Interval (ms)
Hex	01000000	100
	02000000	200
	03000000	300
	04000000	400
	05000000	500
	……	……
	64000000	10,000

3.6 Switch Configuration

The B003 and B004 beacon has a switch function "Battery Level Advert". It determines whether the beacon advertises with the battery level.

Table 4: Switch Configuration

Name	Value	Description
Battery Level Advert	00:Disabled, 01:Enabled,	This configuration determines whether the beacon advertises the battery level. The default value is 0.

4. Advertising Feature

4.1 Standard Advertising Packet

The beacon advertises a standard advertising packet when the battery level feature is not enabled.

Table 5. Standard iBeacon Advertising Packet

Byte Offset	Default Value	Description	Properties
0	0x02	Data length – 2 bytes	Constant Preamble
1	0x01	Data type – flags	Constant Preamble
2	0x06	LE and BR/EDR flag	Constant preamble
3	0x1A	Data length – 26 bytes	Constant preamble
4	0xFF	Data type – Manufacturer specific data	Constant preamble
5	0x4C	Manufacturer data	Constant preamble
6	0x00	Manufacturer data	Constant preamble
7	0x02	Manufacturer data	Constant preamble
8	0x15	Manufacturer data	Constant preamble
9	0xF2	Proximity UUID 1st byte	User UUID
10	0xA5	Proximity UUID 2nd byte	User UUID
11	0x2D	Proximity UUID 3rd byte	User UUID
12	0x43	Proximity UUID 4th byte	User UUID
13	0xE0	Proximity UUID 5th byte	User UUID
14	0xAB	Proximity UUID 6th byte	User UUID
15	0x48	Proximity UUID 7th byte	User UUID
16	0x9C	Proximity UUID 8th byte	User UUID
17	0xB6	Proximity UUID 9th byte	User UUID
18	0x4C	Proximity UUID 10th byte	User UUID
19	0x4A	Proximity UUID 11th byte	User UUID
20	0x83	Proximity UUID 12th byte	User UUID
21	0x00	Proximity UUID 13th byte	User UUID
22	0x14	Proximity UUID 14th byte	User UUID
23	0x67	Proximity UUID 15th byte	User UUID
24	0x20	Proximity UUID 16th byte	User UUID
25	AA	Major 1st byte	Major value
26	BB	Major 2nd byte	Major value

27	CC	Minor 1st byte	Minor value
28	CC	Minor 2nd byte	Minor value
29	0xB3	Signal power (Calibrated SSI@1m)	Signal power value

4.2 Advertising Package with Battery Level

The beacon also supports advertising battery-level information in the last byte. Chapter ***5.2 Battery Level Advert Configuration*** explains how to enable this feature via "LightBlue".

Table 6: Advertising Packet with Battery Level

Byte Offset	Default Value	Description	Properties
0	0x02	Data length – 2 bytes	Constant Preamble
1	0x01	Data type – flags	Constant Preamble
2	0x06	LE and BR/EDR flag	Constant preamble
3	0x1B	Data length – 27 bytes	Constant preamble
4	0xFF	Data type - Manufacturer specific data	Constant preamble
5	0x4C	Manufacturer data	Constant preamble
6	0x00	Manufacturer data	Constant preamble
7	0x02	Manufacturer data	Constant preamble
8	0x15	Manufacturer data	Constant preamble
9	0xF2	Proximity UUID 1st byte	User UUID
10	0xA5	Proximity UUID 2nd byte	User UUID
11	0x2D	Proximity UUID 3rd byte	User UUID
12	0x43	Proximity UUID 4th byte	User UUID
13	0xE0	Proximity UUID 5th byte	User UUID
14	0xAB	Proximity UUID 6th byte	User UUID
15	0x48	Proximity UUID 7th byte	User UUID
16	0x9C	Proximity UUID 8th byte	User UUID
17	0xB6	Proximity UUID 9th byte	User UUID
18	0x4C	Proximity UUID 10th byte	User UUID
19	0x4A	Proximity UUID 11th byte	User UUID
20	0x83	Proximity UUID 12th byte	User UUID
21	0x00	Proximity UUID 13th byte	User UUID
22	0x14	Proximity UUID 14th byte	User UUID
23	0x67	Proximity UUID 15th byte	User UUID
24	0x20	Proximity UUID 16th byte	User UUID
25	AA	Major 1st byte	Major value
26	BB	Major 2nd byte	Major value
27	CC	Minor 1st byte	Minor value
28	CC	Minor 2nd byte	Minor value
29	0xB3	Signal power (Calibrated SSI@1m)	Signal power value
30	**Battery level**	**Battery level**	**Battery level**

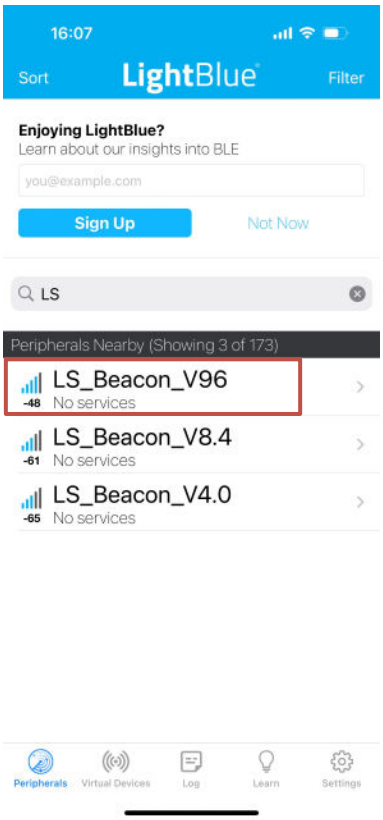
5. Configuring Lansitec BLE Beacon with an iPhone

Notice: all parameters are in hexadecimal coding.

Step 1: Search and download "LightBlue" in the App Store.

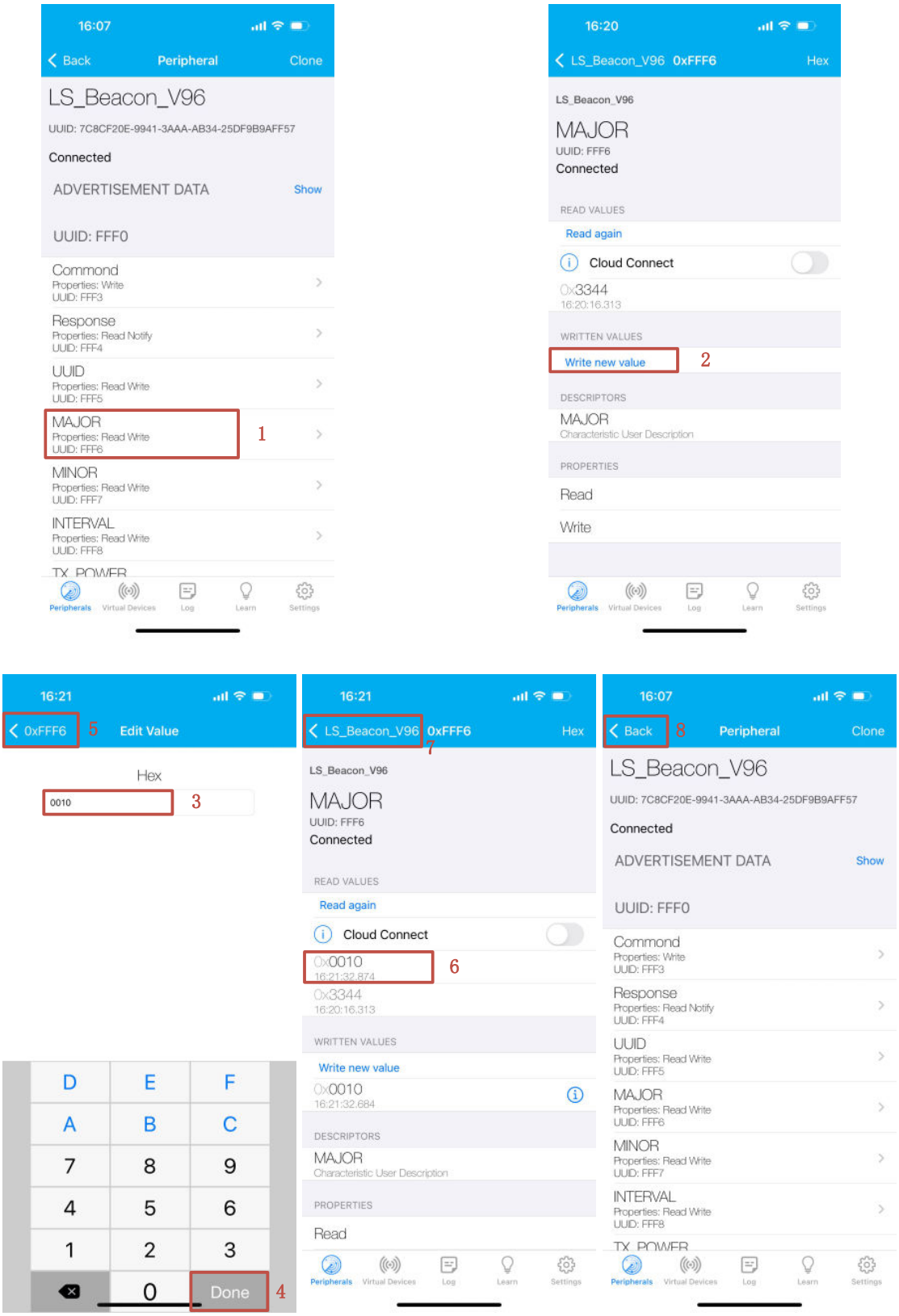
Step 2: Long press the button to turn the B003 and B004 beacon label. A red LED flashes 10 times.

Step 3: Open LightBlue and click a beacon with the name "LS_Beacon_V96" which will show up in the app. An enter password is required when connecting this beacon, otherwise you can only view the configuration and cannot modify it.



Step 4: Enter the password: 116321.

5.1 Major Configuration

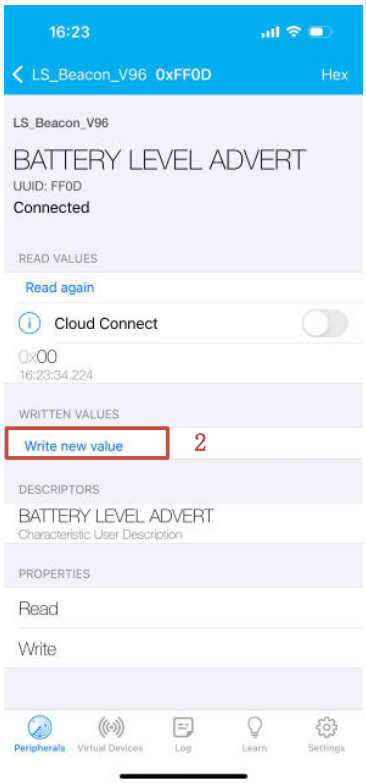


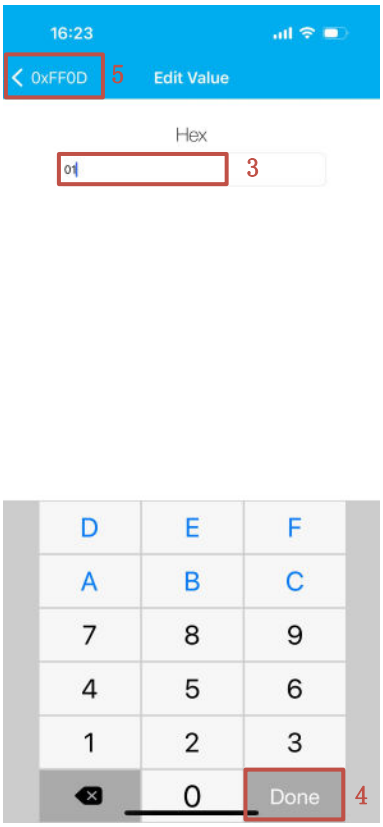
1) Click "Major" (step 1).
2) Click "Write new value" (step 2).

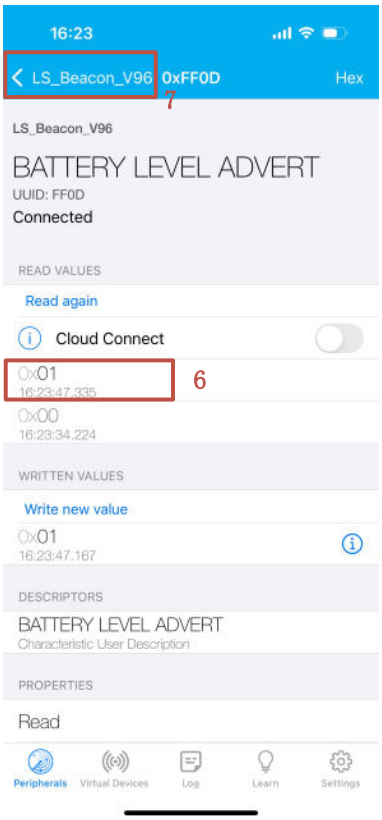
3) Enter a new value (step 3) and click "Done" (step 4) to save, and click "0xFFF6" (step 5) to return to the "Major" page.
4) The new value is shown in the value block (step 6) of the "Major" page, and the previous value is grey. Click the "LS_Beacon_V96" (step 7) to return to the previous page.
5) Click "Back" (step 8) to exit the configuration. Otherwise, the change will NOT be saved.

Configure "UUID", "Minor", "Interval", and "TX_power" in the same way. Please exit LightBlue after configuration. The light stops flashing after configuration.

5.2 Battery Level Advert Configuration







1) Click "Battery Level Advert" (step 1).
2) Click "Write new value" (step 2).
3) Enter the value "00," which means disable the battery level advertising function, and "01," which means enable this function (step 3). Click "Done" (step 4) to save and click "0xFF0D" (step 5) to return to the "Battery Level Advert" page.
4) The new value is shown in the value block (step 6) of the "Battery Level Advert" page, and the previous value is grey.
5) Click the " LS_Beacon_V96" (step 7) to return to the previous page. Then, exit the configuration. Otherwise, the change will NOT be saved.

We can also preprogram the "UUID", "Major", "Minor", "Interval", "TX_power", and "Battery Level Advert" for you and print it on housing before shipment.

6. Battery Life

Table 7: Battery Life (with the Acceleration Sensor)

Broadcast Interval (ms)	100	500	1,000	5,000	10,000
Average Current (μA)	161	33.8	17.5	5	3.5
Battery Life (Month)	1.5	7	14	48	69

Table 8: Battery Life (without the Acceleration Sensor)

Broadcast Interval (ms)	100	500	1,000	5,000	1,0000
Average Current (μA)	153	33	16	4.2	2.7
Battery Life (Month)	1.5	7	15	58	90

Note：

Regarding accuracy, several factors influence the accuracy of distance measurements with BLE RSSI.

1) *Shadow effect: Signals can be reflected by walls and glasses many times during transmission. Diffraction changes the signal path, Which results in receiving unstable signal strength.*
2) *There are many devices on 2.4G, Wi-Fi, Bluetooth, and Zigbee. The signal may overlap, making the received signal strength unstable.*
3) *Due to the semiconductor manufacturing limitation, TX power is not stable.*

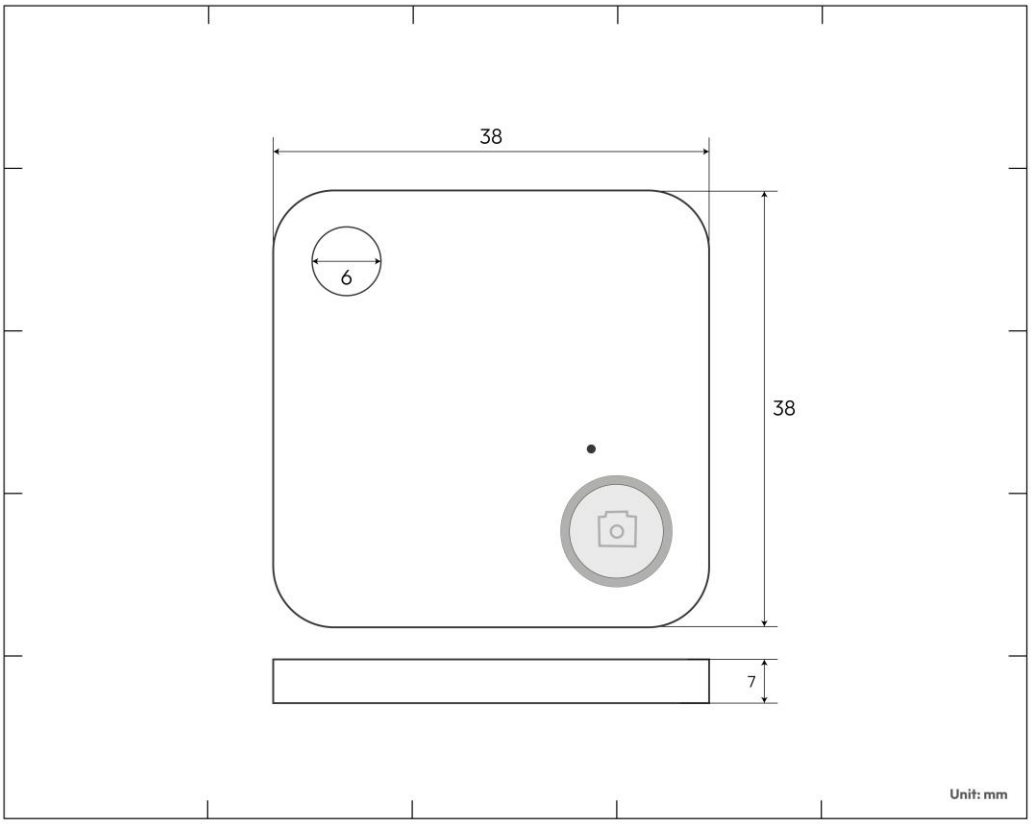
When using a beacon for positioning, please consider the following method for measuring the distance.

1) *While the beacon is advertising, repeatedly sample the RSSI at a 1-meter distance for a minimum of 10 seconds.*
2) *Discard the highest 10% of the RSSI samples.*
3) *Discard the lowest 20% of the RSSI samples.*
4) *Average the remaining samples to obtain the Measured Power value.*

We recommend another two algorithms for calculating the distance and position:

1) *Moving average algorithm, Lansitec document number 930-00171.*
2) *Position Calibration, Lansitec document number 930-00172.*

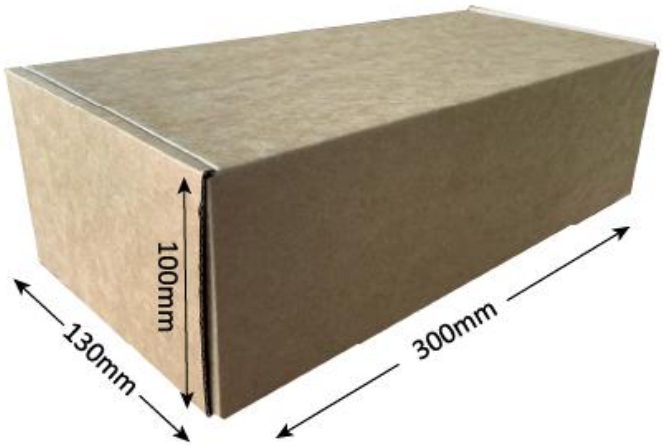
7. How to Install a Beacon



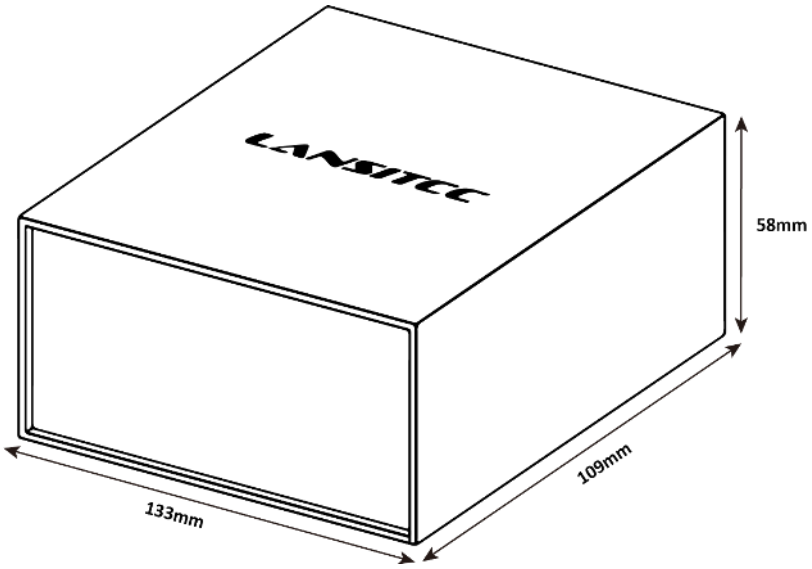
8. How to Replace the Batteries

9. Packaging

Batch packaging



Sample packaging



10. Ordering Information

Description	PN
B003 Bluetooth tag, 37mm side length, 230mAh	100-0B003
B004 Bluetooth tag, 38*38*7mm, 230mAh	100-0B004

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