



LW003-B PRO User Guide

Version 1.0

MOKO TECHNOLOGY LTD.

www.mokosmart.com

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1 Product Introduction

1.1 Overview

LW003-B PRO is Bluetooth-LoRaWAN Bridge that integrate Bluetooth and LoRaWAN wireless technologies. It can scan BLE data, and report to server by LoRaWAN network to realize asset tracking, environment monitoring and staff safety ensuring.

LW003-B PRO supports IP67 rating, can be used for different outdoor scenarios. LW003-B PRO has different battery solutions to meet various needs, and the built-in sensor can support environment temperature and humidity detection.

1.2 Key Feature

- Various mounting kit for different application
- Long wireless transmission distance
- Impact-Resistant Shell, withstands harsh environments
- Offering different battery solution to meet different scenarios
- LiFePO4 batteries provide enhanced safety, long lifecycle and stable performance
- Flexible filtering setting
- Robust IP67 rating

2 Product specification

2.1 Appearance

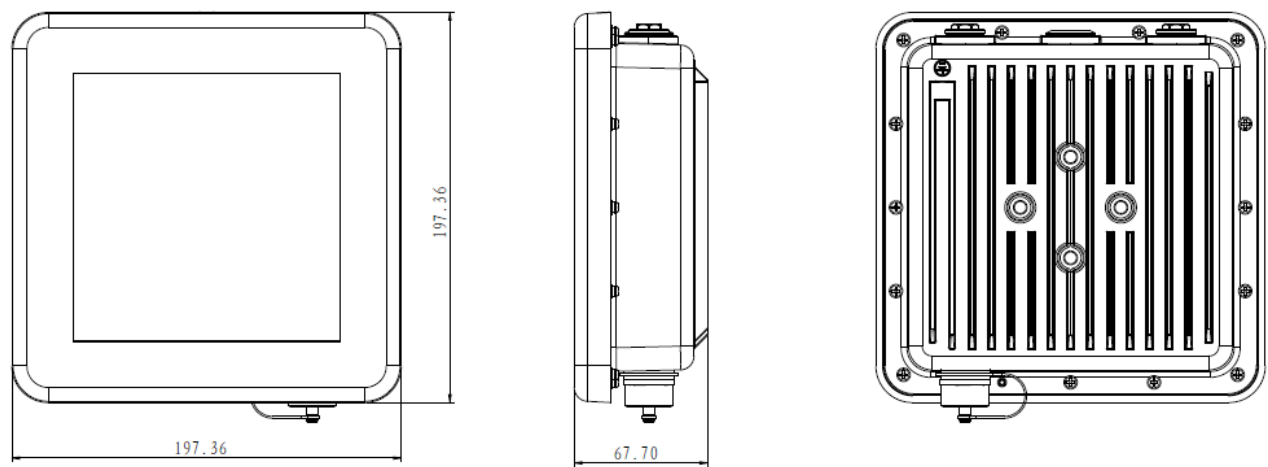


LW003-B PRO-A

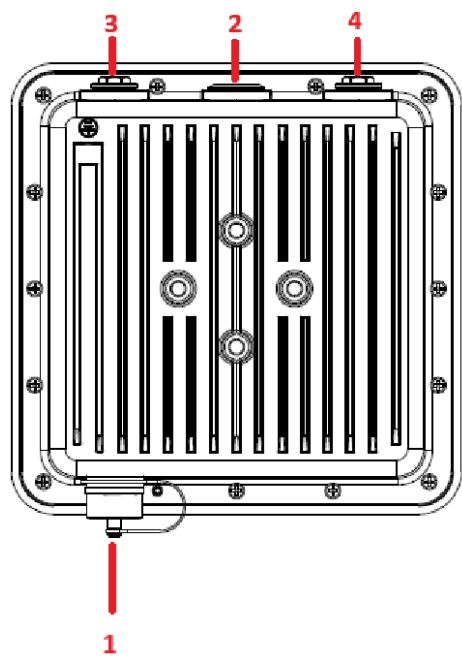


LW003-B PRO-B

2.2 Dimensions



2.3 Interface



No.	Interface Description
1	DC charging port (available for LW003-B PRO-B and LW003-B PRO-C version)
2	Power Button
3	External Bluetooth antenna reserved
4	External LoRaWAN antenna reserved

2.4 LED Indicator

Indicator Color	Status	LED	Button Operation
Red	Power off	Flash red 3s	long press the power button
	Bluetooth disconnect	Flash red quickly 1s	/
	OTA upgrade fail	Solid red 3s	/

	low power	Flash red every 30s	/
	self-inspection fail	Solid red	/
Green	Join LoRaWan network success	Solid green 3s	/
	Bluetooth broadcasting	Flash green	double press the power button
	Bluetooth connect success	Flash green 1s	/
	OTA undergoing	Solid green	/
Blue	Power on	Solid blue 3s	/
	OTA success	Solid blue 3s	/
	Charging	Flash blue	/
	Full charged	Solid blue	/
All indicators	reset	alternatively Flash red , green and blue	/

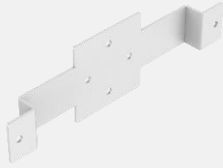
3 Packing List



Standard Packing List

No.	Description	Quantity
1	LW003-B PRO individual packing	1
2	power cable(available for LW003-B PRO-B)	1

Optional Accessories List

Sku	Description	Photo for reference
AE008	Mounting base	
AP011	Fiberglass Bluetooth antenna	
AP012	Fiberglass LoRaWAN antenna	
AP013	Antenna jumper cable	
AE031	adjustable mounting base	

4 Installation

With the mounting base, LW003-B PRO can be installed on the wall via screw, or mounted on the pole via cable ties.

Two kinds of adaptive installation



And for the solar panel version, there is special mounting base for the product as below:



5 Access to the device

5.1 Power On/Off

- **Power On:** open the top cover, there is a Key1 button, long press the button 5S
- **Power Off:** There are 2 ways to power off the device.
 - ✧ 1. Power off the badge via MKLoRa APP.
 - ✧ 2. Power off the badge via LoRaWAN downlink command.

5.2 Enable Bluetooth Connect Function

The device can make a Bluetooth broadcast and can be connected in the following three cases.

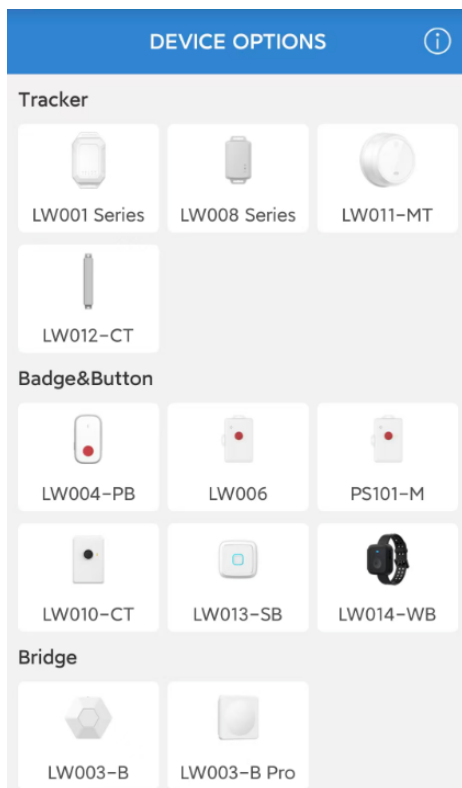
- ✧ Within the first N minutes after the device is turned back on.
- ✧ .LoRaWAN server sends LoRa command to turn on Bluetooth broadcast for N minutes.

Note: N is the broadcast timeout duration which can be set via MKLoRa APP, the unit is s, can be configured by the user. If the device is successfully connected and then disconnected, the broadcast timeout will be refreshed, and the user can choose to establish Bluetooth connection with the device again within this time.

6 APP Configuration Guide

6.1 Connect to APP

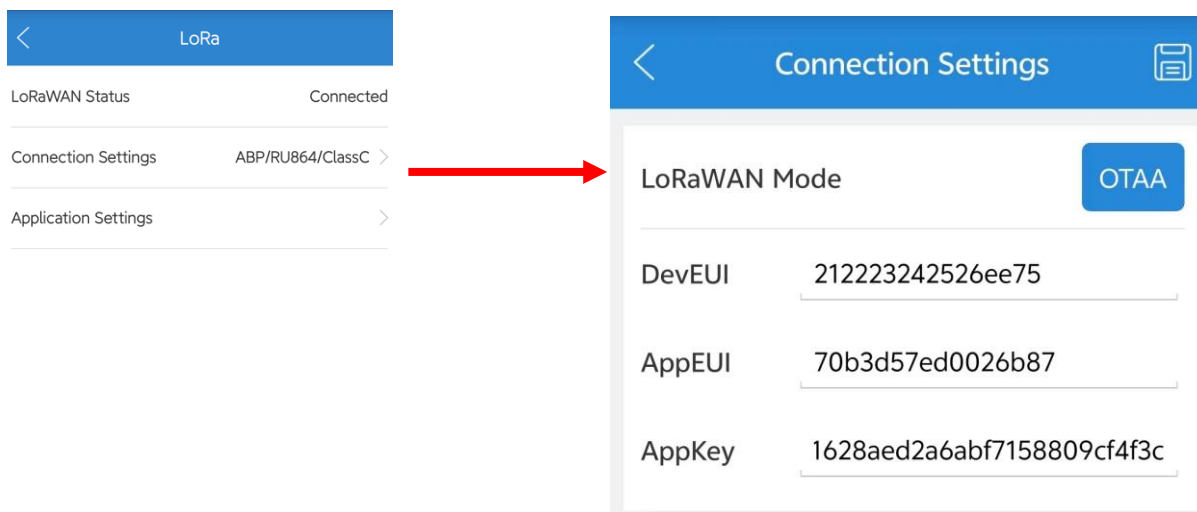
Please download “MKLoRa” APP from app store directly. Please allow Bluetooth to be enabled during the installation process. This APP communicates with the device via Bluetooth, and it only supports above android 4.4 and IOS 9.0 system.



After the device is turned on, the device Bluetooth will start broadcasting. Open the MKLoRa APP and choose Bridge->LW003-B Pro, then you can search the LW003-B PRO device by click the refresh icon. The default broadcast name of the device: LW003-B PRO -XXXX. Then click “Connect” button, the default login password is Moko4321. The Edit Filter at the top can help user filter the keywords and RSSI. RSSI ranges from -127dBm to 0dBm;

6.2 Configure LW003-B PRO Parameters

6.2.1 LORA Parameters



Configure/Read the LoRaWAN mode and the key parameters, such as DevEUI, AppEUI and AppKey.

6.2.2 SCANNER Parameters

In this page, users can set parameters for position.

Scan& Report Strategies:

Scan & Report strategies select. The default is Periodic Scan & Immediately report. When it is set to OFF, the LW003-B PRO will disable Bluetooth scan function.

Payload Contents Selection:

Depending on the type of beacon, users can choose what to report. You can choose to report the whole beacon raw data or a certain field.

RSSI Filter:

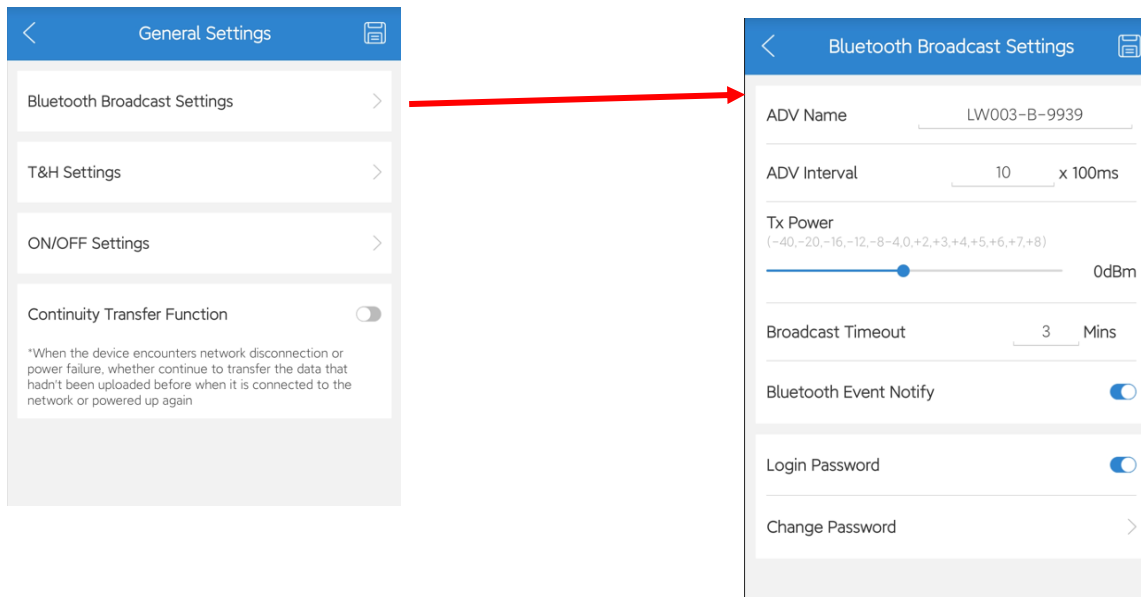
LW003-B PRO will upload the beacon advertising data with RSSI no less than the setting value.

The value ranges from -127~0dBm, the default is -127dBm.

Duplicate Data Filter:

Filter out duplicate data within one scan period. The default value is NO and Filter Repeating Data can be configured as one of the following data: NO, MAC, MAC+Data Type, MAC+Raw Data.

6.2.3 General Parameters

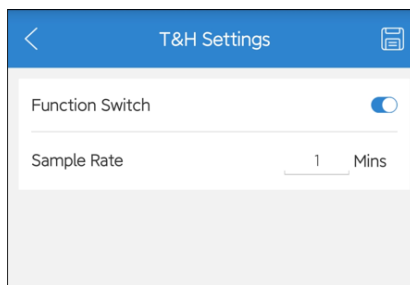


Heartbeat Interval:

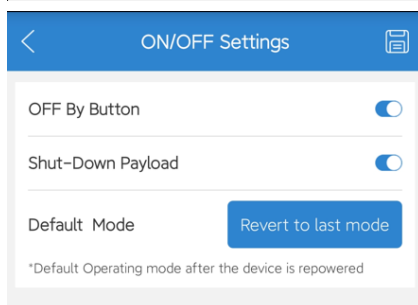
The Report interval of heartbeat payload. The value ranges from 1 -14400 mins. The default is 720 mins.

Bluetooth Broadcast Settings:

Bluetooth broadcast parameters (ADV name, ADV interval, broadcast timeout, password and Tx power) can be set



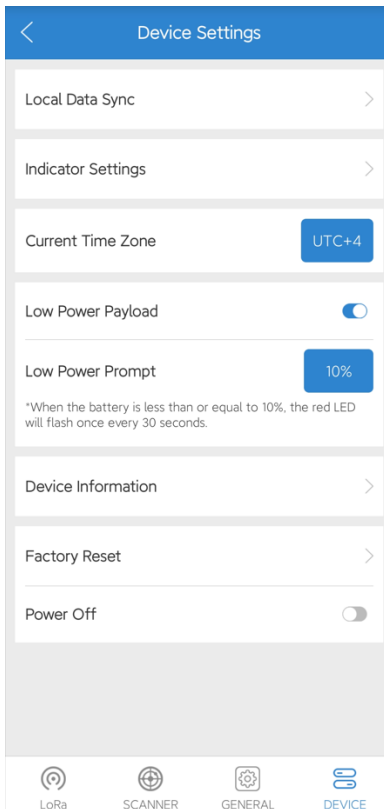
Sample Rate: The sample rate of T&H monitoring function. The default is 1min, it ranges from 1~10mins.



OFF by Button: The user can choose whether the device can be turned off by pressing the button.

Default Mode: The default mode after the device is repowered.

6.2.4 Device Parameters

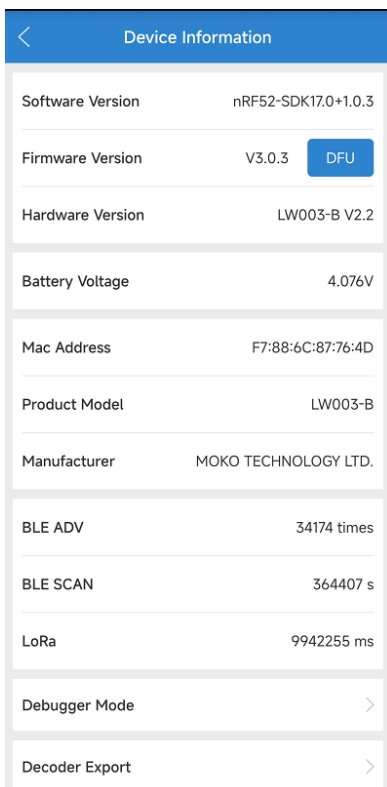


Current Time Zone: Selection of the time zone in which the current device is located.

The value ranges from UTC-12 to UTC+14. The default time zone is UTC.

Low Power Prompt: The default is 10%. It can be set 10% or 20% or 30% or 40% or 50%.

Low-power Payload: Whether to report heartbeat payload when the device enters low power.



Update Firmware (DFU): To update the firmware via the DFU should use the upgrade package that MOKO provides with ZIP format. If you use an android phone, place the ZIP file of firmware upgrade package into the phone folder, select the upgrade package file from the OTA page of the APP, and click to upgrade.

IOS phones need to share the upgrade package file with MKLoRa via computers and iTunes tools. and then select the upgrade package file from the OTA page of the APP, and click to upgrade.

Decoder Export: The LW003-B PRO can export the corresponding decoder file in Javascript language format according to the current parameter settings.

Note: for more APP configuration details, pls refer to [MKLoRa APP guide](#).

7 Communication Protocol

7.1 Uplink Payload

7.1.1 Device Information Payload

When the device is successfully connected to the LoRaWAN network, the device will immediately send a Device Information Payload to server, and periodically report Device Information Payload thereafter.

Device information payloads will be sent in Port 1.

Byte Index	Type	Description
Byte 0 (Bit 7)	Battery charging status	0 means no charging; 1 means in charging.
Byte 0 (Bit 6~Bit0)	Battery level	Convert to decimal, unit is %.
Bytes 1-2	Battery Voltage	The voltage value of battery, the byte order is Big-Endian. The actual voltage need divide 1000 after the hexadecimal data convert to decimal. Example: 3C 0E convert to decimal is 3644, the actual voltage is 3.644V.
Byte 3	Firmware Version	Firstly, convert to 8-bit binary number. Example: 0x86 is 1000 0110 in binary number, 10 equals to 2, 00 equals to 0, 0110 equals to 6, so the firmware version is V 2.0.6
Byte 4	Hardware Version	Firstly, convert to 8-bit binary number. Example: 0x23 is 0010 0011 in binary number, 0010 equals to 2, 0011 equals to 3, so the hardware version is V 2.3
Byte 5-6	Temperature	Converts directly to decimal numbers, then divide 100. The unit is degree centigrade.
Byte 7-8	Humidity	Converts directly to decimal numbers, then divide 100. The unit is %.
Byte 9	Time zone	It is a signed number, convert to decimal, then then divide by 2, and this is UTC time zone.
Byte 10	charging method	0: no charging 1: DC charging 2: solar panel charging

7.1.2 Shut Down Payload

Shut Down payloads will be sent in Port 2.

Byte Index	Type	Description
Byte 0 (Bit 7)	Battery charging status	0 means no charging;

		1 means in charging.
Byte 0 (Bit 6~Bit0)	Battery level	Convert to decimal, unit is %.
Bytes 1-2	Battery Voltage	The voltage value of battery, the byte order is Big-Endian. The actual voltage need divide 1000 after the hexadecimal data convert to decimal. Example: 3C 0E convert to decimal is 3644, the actual voltage is 3.644V.
Byte 3~6	Timestamp	Standard UTC time
Byte 7	Time zone	It is a signed number, convert to decimal, then then divide by 2, and this is UTC time zone.
Byte 8	Shut Down Type	The reason of power off. 00 means Bluetooth command or App; 01 means LoRaWAN Command; 02 means power button; 03 means battery run out.
Byte 9	charging method	0: no charging 1: DC charging 2: solar panel charging

7.1.3 Heartbeat Payload

Heartbeat Payload will be sent in Port 3.

Byte Index	Type	Description
Byte 0 (Bit 7)	Battery charging status	0 means no charging; 1 means in charging.
Byte 0 (Bit 6~Bit0)	Battery level	Convert to decimal, unit is %.
Bytes 1-2	Battery Voltage	The voltage value of battery, the byte order is Big-Endian. The actual voltage need divide 1000 after the hexadecimal data convert to decimal. Example: 3C 0E convert to decimal is 3644, the actual voltage is 3.644V.
Byte 3	Firmware Version	Firstly, convert to 8-bit binary number. Example: 0x86 is 1000 0110 in binary number, 10 equals to 2, 00 equals to 0, 0110 equals to 6, so the firmware version is V 2.0.6
Byte 4	Hardware Version	Firstly, convert to 8-bit binary number. Example: 0x23 is 0010 0011 in binary number, 0010 equals to 2, 0011 equals to 3, so the hardware version is V 2.3
Byte 5-6	Temperature	Converts directly to decimal numbers, then divide 100. The unit is degree centigrade.
Byte 7-8	Humidity	Converts directly to decimal numbers, then divide 100. The unit is %.

Byte 9	Time zone	It is a signed number, convert to decimal, then then divide by 2, and this is UTC time zone.
Byte 10	charging method	0: no charging 1: DC charging 2: solar panel charging

7.1.4 Event Payload

Heartbeat Payload will be sent in Port 4.

Byte Index	Type	Description
Byte 0 (Bit 7)	Battery charging status	0 means no charging; 1 means in charging.
Byte 0 (Bit 6~Bit0)	Battery level	Convert to decimal, unit is %.
Bytes 1-2	Battery Voltage	The voltage value of battery, the byte order is Big-Endian. The actual voltage need divide 1000 after the hexadecimal data convert to decimal. Example: 3C 0E convert to decimal is 3644, the actual voltage is 3.644V.
Byte 3	Firmware Version	Firstly, convert to 8-bit binary number. Example: 0x86 is 1000 0110 in binary number, 10 equals to 2, 00 equals to 0, 0110 equals to 6, so the firmware version is V 2.0.6
Byte 4	Hardware Version	Firstly, convert to 8-bit binary number. Example: 0x23 is 0010 0011 in binary number, 0010 equals to 2, 0011 equals to 3, so the hardware version is V 2.3
Byte 5-6	Temperature	Converts directly to decimal numbers, then divide 100. The unit is degree centigrade.
Byte 7-8	Humidity	Converts directly to decimal numbers, then divide 100. The unit is %.
Byte 9	Time zone	It is a signed number, convert to decimal, then then divide by 2, and this is UTC time zone.
Byte 10	Event type	0: downlink trigger

7.1.5 Beacon Payload

Beacon Payload will be sent in Port 5.

Byte Index	Type	Description
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Byte 0	Packet sequence	Packet serial number of the current reporting cycle
Byte 1-5	Reporting time of the payload	Standard UTC time and timezone
Byte 6	The total number of beacons in this payload	
Bit7 of Byte 7	Response packet loss identifier	If the value is 1, it means the response packet is lost.
Bit0~6 of Byte7	The length of 1 st beacon	
Byte 8	The type of 1 st beacon	Convert to decimal: 0 means Unknow; 1 means iBeacon ; 2 means EddyStone-UID ; 3 means EddyStone-URL ; 4 means EddyStone-TLM ; 5 means BXP-ACC ; 6 means BXP-T&H ; 7 means BXP-T&S; 8 means BXP- DeviceInfo ; 9 means BXP-Button ; 10 means BXP-PIR 11 means BXP-TOF 12 means BXP-iBeacon
Byte XX-XX	The report data of this beacon	It can be check on SCANNER-Payload Content Selection in MKLoRa app.
Byte XX-XX	The length of next beacon	
	The type of next beacon	
	The report data of next beacon	
		
		
		

User can select **the report content** via MKLoRa. Before parsing the data, please check which data is selected to be reported, the corresponding position of the data not selected to be reported will be replaced by the latter data.

7.1.5.1 The report content of each type

The report data of iBeacon type:

Byte Index	Type	Description
Byte 0 ~5	MAC	In HEX format.
Byte 6	RSSI	Convert to decimal, minus 256, the unit is dBm
Byte 7~10	Timestamp	Standard UTC time and time zone
Byte 11~26	UUID	In HEX format.

Byte 27~28	Major	Convert to decimal.
Byte 29~30	Minor	Convert to decimal.
Byte 31	Measured RSSI@1M	Convert to decimal, minus 256, the unit is dBm
Byte 32~XX	Raw data	

The report data of Eddystone-UID type:

Byte Index	Type	Description
Byte 0 ~5	MAC	In HEX format.
Byte 6	RSSI	Convert to decimal, minus 256, the unit is dBm
Byte 7~10	Timestamp	Standard UTC time and time zone
Byte 11	RSSI@0M	Convert to decimal, minus 256, the unit is dBm
Byte 12~21	Namespace	In HEX format.
Byte 22~27	Instance	In HEX format.
Byte 28~XX	Raw data	

The report data of Eddystone-URL type:

Byte Index	Type	Description
Byte 0 ~5	MAC	In HEX format.
Byte 6	RSSI	Convert to decimal, minus 256, the unit is dBm
Byte 7~10	Timestamp	Standard UTC time and time zone
Byte 11	RSSI@0M	Convert to decimal, minus 256, the unit is dBm
Byte 12	The length of URL	Convert to decimal. For example, 0x20 means the length of URL is 32Bytes.
Byte 13~XX	Encoded URL	Input example URL (characteristics). For more detail, please visit https://github.com/google/eddystone/blob/master/eddystone-url/README.md
Byte (XX+1) ~ (XX+N)	Raw data	

The report data of Eddystone-TLM type:

Byte Index	Type	Description
Byte 0 ~5	MAC	In HEX format.
Byte 6	RSSI	Convert to decimal, minus 256, the unit is dBm
Byte 7~10	Timestamp	Standard UTC time and time zone
Byte 11	TLM Version	0x00 means Unencrypted TLM; 0x01 means Encrypted TLM;
Byte 12~13	Battery Voltage	Convert to decimal, the unit is mV.
Byte 14~15	Temperature	For example, the beacon temperature is 0x0D 80: Convert the 1 st byte to decimal, so 0D>>13. Convert the 2 nd byte to decimal, so 80>>128. In 8.8 notation, the temperature should be 13+(128/256) = 13.5, the unit is °C
Byte 16~19	ADV_CNT	Convert to decimal.
Byte 20~23	SET_CNT	Convert to decimal.

Byte 24~XX	Raw data	
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The report data of BXP-iBeacon type:

Byte Index	Type	Description
Byte 0 ~5	MAC	In HEX format.
Byte 6	RSSI	Convert to decimal, minus 256, the unit is dBm
Byte 7~10	Timestamp	Standard UTC time and time zone
Byte 11~26	UUID	In HEX format.
Byte 27~28	Major	Convert to decimal.
Byte 29~30	Minor	Convert to decimal.
Byte 31	Measured RSSI@1M	Convert to decimal, minus 256, the unit is dBm
Byte 32	TX Power	It is a signed integer number, unit is dBm.
Byte 33	ADV Interval	Convert to decimal, the unit is 100ms.
Byte 34~XX	Raw data	

The report data of BXP-Device Info type:

Byte Index	Type	Description
Byte 0 ~5	MAC	In HEX format.
Byte 6	RSSI	Convert to decimal, minus 256, the unit is dBm
Byte 7~10	Timestamp	Standard UTC time and time zone
Byte 11	TX Power	It is a signed integer number, unit is dBm.
Byte 12	Ranging Data	Value that's put into the advertising data that declares to receiving devices what the power should be at a specific distance. Configuration range: -100~0dBm
Byte 13	ADV Interval	Convert to decimal, the unit is 100ms.
Byte 14~15	Battery Voltage	Convert to decimal, the unit is mV.
Byte 16	Device Property	1 byte to indicate device property info in Beacon. Bit 0-1: Password verification status (00-Enabled; 10-Disabled) Bit 2: Ambient light sensor status (0-Not equipped; 1-Equipped) Bit 3-7: RFU Example content parse: 00(HEX)>>>0000 0000(BIN)>>>Ambient light sensor not equipped & Password verification enabled
Byte 17	Switch Status	1 byte to indicate feature switch status in Beacon. Bit 0: Connectable status (0-Unconnectable; 1-Connectable) Bit 1: Ambient light status (0-Ambient light not detected; 1-Ambient light detected) Bit 2-7: RFU Example content parse: 01(HEX)>>>0000 0001(BIN)>>>Ambient light not detected & Connectable
Byte 18~19	Firmware Version	Firmware version. Main version: 0x11 >>> V1.1.x; Sub version:

		0x00 >>> Vx.x.0; 0x11 00 >>> V1.1.0; 0x11 0A >>> V1.1.10
Byte 20	The length of Device Name	Convert to decimal. For example, 0x08 means the length of Device Name is 8 Bytes.
Byte 21~XX	Device Name	Convert to ASCII.
Byte (XX+1) ~ (XX+N)	Raw Data	

The report data of BXP-ACC type:

Byte Index	Type	Description
Byte 0 ~5	MAC	In HEX format.
Byte 6	RSSI	Convert to decimal, minus 256, the unit is dBm
Byte 7~10	Timestamp	Standard UTC time and time zone
Byte 11	TX Power	It is a signed integer number, unit is dBm.
Byte 12	Ranging Data	Value that's put into the advertising data that declares to receiving devices what the power should be at a specific distance. Configuration range: -100~0dBm
Byte 13	ADV Interval	Convert to decimal, the unit is 100ms.
Byte 14~15	Battery Voltage	Convert to decimal, the unit is mV.
Byte 16	Sample Rate	Sampling rate of 3-axis accelerometer sensor, 10Hz by default. 0x00: 1Hz; 0x01: 10Hz; 0x02: 25Hz; 0x03: 50Hz; 0x04: 100Hz
Byte 17	Full Scale	Full-scale of 3-axis accelerometer sensor, $\pm 2g$ by default. 0x00: $\pm 2g$; 0x01: $\pm 4g$; 0x02: $\pm 8g$; 0x03: $\pm 16g$
Byte 18	Motion Threshold	Motion threshold to judge movements, unit: 0.1g/digit. Example content parse: 0.1g
Byte 19~20	X-axis Data	2 Bytes, calculated acceleration value in X-axis. You will just need to convert this HEX value to DEC. (Signed integer)
Byte 21~22	Y-axis Data	2 Bytes, calculated acceleration value in Y-axis. You will just need to convert this HEX value to DEC. (Signed integer)
Byte 23~24	Z-axis Data	2 Bytes, calculated acceleration value in Z-axis. You will just need to convert this HEX value to DEC. (Signed integer)
Byte 25~XX	Raw Data	

The report data of BXP-T&H type:

Byte Index	Type	Description
Byte 0 ~5	MAC	In HEX format.
Byte 6	RSSI	Convert to decimal, minus 256, the unit is dBm
Byte 7~10	Timestamp	Standard UTC time and time zone
Byte 11	TX Power	It is a signed integer number, unit is dBm.

Byte 12	Ranging Data	Value that's put into the advertising data that declares to receiving devices what the power should be at a specific distance. Configuration range: -100~0dBm
Byte 13	ADV Interval	Convert to decimal, the unit is 100ms.
Byte 14~15	Battery Voltage	Convert to decimal, the unit is mV.
Byte 16~17	Temperature	Sampling temperature in 2 bytes (Signed integer), unit: 0.1°C/digit. Example content parse: 0x00 C8(HEX)>>>200(DEC)>>>20.0°C
Byte 18~19	Humidity	Sampling humidity in 2 bytes (Unsigned integer), unit: 0.1%/digit. Example content parse: 0x01 37(HEX)>>>311(DEC)>>>31.1%(Humidity)
Byte20~XX	Raw Data	

The report data of BXP-Button type:

Byte Index	Type	Description
Byte 0 ~5	MAC	In HEX format.
Byte 6	RSSI	Convert to decimal, minus 256, the unit is dBm
Byte 7~10	Timestamp	Standard UTC time and time zone
Byte 11	Frame Type	MOKO-Defined advertisement frame type; 0x20: "Single press mode" advertisement 0x21: "Double press mode" advertisement 0x22: "Long press mode" advertisement 0x23: "Abnormal inactivity mode" advertisement 0x24 – 0x3F: RFU
Byte 12	Status Flags	Bit 0: Password verification status. 0: Password verification disabled; 1: Password verification enabled; Bit 1: Trigger status of alarm mode. 0: Alarm not be triggered. 1: Alarm be triggered; Bit 2 - Bit 7: Reserved for future use.
Byte 13~14	Trigger Count	Trigger record count of different alarm mode, it will be broadcast separately in different frame type. For this example, it means that the trigger record of single press alarm mode is 0.
Byte 15	The length of Device ID	Convert to decimal. For example, 0x02 means the length of Device ID is 2 Bytes.
Byte 16 - XX	Device ID	"Device ID" was designed to adapt some special rules of serial ID or combination of Major/Minor and etc. It was defined as a global variable and should be full-filled with 1-6 hexadecimal value.

		Default value: 0x00 00 01
Byte (XX+1)	Firmware Type	“Firmware type” was designed to distinguish the different firmware with different chipset or major function updates in button series. Default: 0x00
Byte (XX+2)	The length of Device Name	Convert to decimal. For example, 0x08 means the length of Device Name is 8 Bytes.
Byte (XX+2+N)	Device Name	Convert to ASCII.
Byte (XX+3+N)	Full scale	Full-scale of 3-axis accelerometer sensor. Default: $\pm 2g$ 0x00: $\pm 2g$; 0x01: $\pm 4g$; 0x02: $\pm 8g$; 0x03: $\pm 16g$
Byte (XX+4+N) ~ (XX+5+N)	Motion Threshold	Motion threshold to judge movements. Default: 16mg For more, please refer to “Chapter 2.5 – Access to 3-axis accelerometer sensor”.
Byte (XX+6+N) ~ (XX+7+N)	X-axis Data	2 Bytes, calculated acceleration value in Z-axis. You will just need to convert this HEX value to DEC. (Signed integer)
Byte (XX+8+N) ~ (XX+9+N)	Y-axis Data	2 Bytes, calculated acceleration value in Y-axis. You will just need to convert this HEX value to DEC. (Signed integer)
Byte (XX+10+N) ~ (XX+11+N)	X-axis Data	2 Bytes, calculated acceleration value in Z-axis. You will just need to convert this HEX value to DEC. (Signed integer)
Byte (XX+12+N) ~ (XX+13+N)	Temperature	Beacon temperature is the temperature in degrees Celsius sensed by the beacon and expressed in a signed 8.8 fixed-point notation. Content Parse: 0D>>>13, 80>>>128. In 8.8 notation, it should be $13+128/256=13.5^{\circ}\text{C}$.
Byte (XX+14+N)	Ranging Data	Value that’s put into the advertising data that declares to receiving devices what the power should be at a specific distance. Configuration range: -100 - 0dBm; Default: 0x00
Byte (XX+15+N) ~ (XX+16+N)	Battery Voltage	Battery voltage is the current battery charge in millivolts, expressed as 1 mV per bit. Example content parse: 0x0B C4 >>> 3012mv
Byte (XX+17+N)	TX Power	It is a signed integer number, unit is dBm.
Byte (XX+17+N) ~XXXX	Raw Data	

The report data of BXP-Tag&Sensor-Info type:

Byte Index	Type	Description
Byte 0 ~5	MAC	In HEX format.
Byte 6	RSSI	Convert to decimal, minus 256, the unit is dBm
Byte 7~10	Timestamp	Standard UTC time and time zone
Byte 11	Sensor Status	1 byte to indicate the sensor status.

		Bit0: Hall sensor status. 1: Magnet away/absent; 0: Magnet approach/present. Bit1: Accelerometer sensor status. 1: In move; 0: In static. Bit2: Accelerometer sensor equipped status. 1: Equipped; 0: Not equipped. Bit3-Bit7: RFU.
Byte 12~13	Hall Trigger Event Count	Trigger event count of hall sensor. 2 bytes from 0-65535. When magnet present and then away, it counts 1. And it will count +1 only when magnet present and away again.
Byte 14~15	Motion Trigger Event Count	Trigger event count of hall sensor. 2 bytes from 0-65535. When motion trigger function be enabled and device moves, it counts 1. And it will count +1 only when next cycle triggered.
Byte 16~17	X-axis Data	2 Bytes, calculated acceleration value in Z-axis. You will just need to convert this HEX value to DEC. (Signed integer)
Byte 18~19	Y-axis Data	2 Bytes, calculated acceleration value in Y-axis. You will just need to convert this HEX value to DEC. (Signed integer)
Byte 20~21	Z-axis Data	2 Bytes, calculated acceleration value in Z-axis. You will just need to convert this HEX value to DEC. (Signed integer)
Byte 22~23	Temperature	Sampling temperature in 2 bytes (Signed integer), unit: 0.1°C/digit. Example content parse: 0x00 C8(HEX)>>>200(DEC)>>>20.0°C
Byte 24~25	Humidity	Sampling humidity in 2 bytes (Unsigned integer), unit: 0.1%/digit. Example content parse: 0x01 37(HEX)>>>311(DEC)>>>31.1%(Humidity)
Byte 26~27	Battery Voltage	Battery voltage is the current battery charge in millivolts, expressed as 1 mV per bit. Example Content parse: 3141mV
Byte 28	The length of Tag ID	Convert to decimal. For example, 0x02 means the length of Tag ID is 2 Bytes.
Byte 29~XX	Tag ID	Convert to ASCII.
Byte (XX+1)	The length of Device Name	Convert to decimal. For example, 0x08 means the length of Device Name is 8 Bytes.
Byte (XX+2) ~ (XX+N)	Device Name	Convert to ASCII.
Byte (XX+N+1) ~ XXX	Raw Data	

The report data of BXP-PIR type:

Byte Index	Type	Description
Byte 0 ~5	MAC	In HEX format.
Byte 6	RSSI	Convert to decimal, minus 256, the unit is dBm
Byte 7~10	Timestamp	Standard UTC time and time zone
Byte 11	delay response status	10: high delay 01: medium delay 00: low delay
Byte 12	door status	0: close 1: open
Byte 13	sensor sensitivity	10: high sensitivity 01: medium sensitivity 00: low sensitivity
Byte 14	sensor detection status	0: no effective motion detected 1: effective motion detected
Byte 15~16	battery voltage	2 Bytes, Battery voltage is the current battery charge in millivolts, expressed as 1 mV per bit. Example Content parse: 3141mV
Byte 17~18	major	Convert to decimal.
Byte 19~20	minor	Convert to decimal.
Byte 21	RSSI@1m	Convert to decimal, minus 256, the unit is dBm
Byte 22	The length of ADV Name	Convert to decimal. For example, 0x08 means the length of ADV Name is 8 Bytes.
Byte 23~XX	ADV Name	Convert to ASCII.
Byte XX+1~XX+N	Raw Data	

The report data of BXP-TOF type:

Byte Index	Type	Description
Byte 0 ~5	MAC	In HEX format.
Byte 6	RSSI	Convert to decimal, minus 256, the unit is dBm
Byte 7~10	Timestamp	Standard UTC time and time zone
Byte 11~12	MFG code	
Byte 13~14	beacon code	
Byte 15~16	battery voltage	2 Bytes, Battery voltage is the current battery charge in millivolts, expressed as 1 mV per bit. Example Content parse: 3141mV
Byte 17~18	Ranging distance	convert to decimal, unit is mm
Byte 19~20	User data	
Byte 21	Sub type	01: TOF sensor
Byte 22	The length of ADV Name	Convert to decimal. For example, 0x08 means the length of ADV Name is 8 Bytes.
Byte 23~XX	ADV Name	Convert to ASCII.
Byte XX+1~XX+N	Raw Data	

The report data of other type:

Byte Index	Type	Description
Byte 0 ~5	MAC	In HEX format.
Byte 6	RSSI	Convert to decimal, minus 256, the unit is dBm
Byte 7~10	Timestamp	Standard UTC time and time zone
Byte 11	The number of reported data blocks	Convert to decimal.
Byte 12: bit 6~7	The instruction code of data block 1	0b 00 means normal; 0b 01 means that the currently reported Bluetooth beacon data didn't contain this data type which was select by user via MKLoRa app; 0b 02 means that data block 1 start position or data block 1 end position was set incorrectly via MKLoRa app.
Byte 12: bit 0~5	The length of data block 1	Convert to decimal, the unit is bytes. If the instruction code of data block 1 is 1 or 2, the length of data block 1 will be 1 byte, only report data type of data block 1.
Byte 13	The data type of data block 1	
Byte 14~XX	The content of data block 1	Raw data
Byte (XX+1): bit 6~7	The instruction code of data block 2	0b 00 means normal; 0b 01 means that the currently reported Bluetooth beacon data didn't contain this data type which was select by user via MKLoRa app; 0b 02 means that data block 2 start position or data block 1 end position was set incorrectly via MKLoRa app.
Byte (XX+1): bit 0~5	The length of data block 2	Convert to decimal, the unit is bytes. If the instruction code of data block 2 is 1 or 2, the length of data block 2 will be 1 byte, only report data type of data block 2.
Byte (XX+2)	The data type of data block 2	
Byte (XX+3) ~XXX	The content of data block 2	Raw data
.....		
Byte XXXX~XXXX	Raw Data	

7.2 Downlink Command

LW003-B PRO supports to configure the device via downlink commands. Application port is 7 by default

7.2.1 Payload Format

- A complete downlink command will consist of several parts

The downlink command depends on the described in the following table.

Byte Index	Type	Content	Description
Byte 0	FLAG	0x00, 0x01, or 0x02	Command type. 0x00: device control command; 0x01: read device parameters; 0x02: configure device parameters
Byte 1~2	CMD	0x0001 ~ 0xFFFF	Message ID. Each parameter has a unique ID
Byte 3	LEN	0x00 ~ 0XF0	The length of Command Data 0x00 means the command type is 0x00.
Byte 4 – XX	DATA	Maximum 177 bytes	Command Data The Command Data is available only if the instruction type is 0x01. Other instruction types don't have this part.

When the device receives the command, the device will send the Response message. The sample is as follows:

- ① When FLAG is 0x01. It means the instruction type is Read device parameters.

Downlink Command: 0x 01 00 21

Response message: 0x 01 00 21 01 02

(The contents of the first four bytes are the same as the Downlink Command, the remaining of response message is the value of this parameter and the length of the value.

01 02 is the remaining of this response message, 01 means that the length of parameter value is one byte, 02 means that the value of this parameter is 02)

- ② When FLAG is 0x02. It means the instruction type is Configure device parameters.

Downlink command: 02 00 22 02 00 05

Response message: 02 01 (If the parameters are set successfully)

02 00 + 2 bytes sum of downlink command (If the parameters aren't set

successfully)

7.2.2 Common Downlink Command

FLAG	CMD	LEN	Description
02	0000	0	Turn off the device
	0001	0	Reboot the device
	0002	0	Factory reset the device
	0022	2	Heartbeat interval, parse rule: convert to decimal, the unit is min
	0701	1	Configure scan& report strategy: 00 means Bluetooth scan off; 01 means Timing Scan & Immediately Report; 02 means Periodic Scan & Immediately Report; 03 means Scan Always On & Periodic Report; 04 means Periodic Scan & Periodic Report; 05 means Scan Always On & Timing Report; 06 means Timing Scan & Timing Report; 07 means Periodic Scan & Timing Report.

Example:

1. Turn off the device

02000000		
FLAG	CMD	LEN
02	0000	00

2. Reboot the device:

02000100		
FLAG	CMD	LEN
02	0001	00

3. Factory reset the device

02000200		
FLAG	CMD	LEN
02	0002	00

4. Set heartbeat interval as 60 mins

020022023C			
FLAG	CMD	LEN	DATA
02	0022	02	3C

5. Set scan mode as Periodic Scan & Immediately Report

0207010102			
FLAG	CMD	LEN	DATA
02	0701	01	02

Note: For more downlink command, user can refer to **LW003-B PRO Downlink Command v1.0**

8 Revision History

Version	Description	Editor	Date
1.0	Initial version	Damon	2025-10-20

MOKO TECHNOLOGY LTD.

 4F,Buidling2, Guanghui Technology Park,
MinQing Rd, Longhua, Shenzhen, Guangdong, China

 Tel:86-755-23573370-829

 Support_lora@mokotechnology.com

 <https://www.mokosmart.com>



FCC STATEMENT

1. 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.

(2) This device must accept any interference received, including interference that may cause undesired operation.

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

NOTE: This equipment 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 equipment 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 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 or more of the following measures:

Reorient or relocate the receiving antenna.

Increase the separation between the equipment and receiver.

Connect the equipment 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.

RF warning statement:

The device has been evaluated to meet general RF exposure requirement. The device can be used in portable exposure condition without restriction.