



## LBT1 LoRaWAN Bluetooth Tracker User Manual

## Document Version: 1.1.1

Image Version: v1.0

Version	Description	Date
1.0	Release	2020-Nov-21
1.1.0	Add description of BLEMASK.	2021-Jan-12
1.1.1	Make payload description clearer	2021-Jan-22



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#### 1. Introduction

#### 1.1 What is LBT1 LoRaWAN Bluetooth Tracker

LoRaWAN

LBT1 is a Long Range / low power consumption LoRaWAN Bluetooth tracker. LBT1 scans and find the nearest i-Beacon info and send to IoT server via LoRaWAN wireless network. IoT Server should have a pre-configure position mapping for beacons in order to trace the location of LBT1 tracker.

LBT1 targets for indoor positioning for people and things.LBT1 has motion detect feature, it will also detect walk steps and uplink the value.

LBT1 is powered by 1000mA rechargeable Li-on battery and charge circuit, which target for real time tracking with short tracking uplink interval.

#### LBT1 in a LoRaWAN Network







LBT1 LoRaWAN Bluetooth Tracker

LG308 LoRaWAN Gateway

LoRaWAN Server



## 1.2 Specifications

#### **Micro Controller:**

- MCU: STM32L072CZT6
- Flash:192KB
- RAM:20KB
- ➢ EEPROM: 6KB
- Clock Speed: 32Mhz

#### **Common DC Characteristics:**

- Supply Voltage: 5V via USB port or Internal 1000mAh battery
- Operating Temperature: -40 ~ 85°C

#### LoRa Spec:

- Frequency Range,
  - ✓ Band 1 (HF): 862 ~ 1020 Mhz
- > 168 dB maximum link budget.
- ➢ High sensitivity: down to −148 dBm.
- Bullet-proof front end: IIP3 = -12.5 dBm.
- Excellent blocking immunity.
- > Built-in bit synchronizer for clock recovery.
- Preamble detection.
- 127 dB Dynamic Range RSSI.
- Automatic RF Sense and CAD with ultra-fast AFC.
- LoRaWAN 1.0.3 Specification

#### Battery:

> 1000mA Li-on Battery power

#### **Power Consumption**

- Sleeping Mode: 25uA
- BLE Scanning Mode: 30mA
- > LoRa Transmit Mode: 125mA @ 20dBm 44mA @ 14dBm

### 1.3 Features

- ✓ LoRaWAN 1.0.3 Class A
- ✓ STM32L072CZT6 MCU
- ✓ Frequency bands KR920/US915/IN865/EU868/AS923/AU915
- ✓ Bluetooth iBeacon scanning
- ✓ Walking steps counter
- ✓ Power Monitoring
- ✓ Charging circuit via USB port

#### LBT1 LoRaWAN Bluetooth Tracker





✓ Tri-color LED, Alarm button

## 1.4 Applications

- ✓ Logistics and Supply Chain Management
- ✓ Things / Asserts management.
- ✓ Human tracking

## 1.5 Hardware Change log

LBT1 v1.0:

Release.

### 2. How to use LBT1?

#### 2.1 Activate LBT1

The LBT1 has three working modes:

- ✓ <u>Deep Sleep Mode-1</u>: LBT1 doesn't have any LoRaWAN activate. This mode is used for shipping to save battery life. User need to use needle to press the side button to activate device.
- ✓ <u>Deep Sleep Mode-0</u>: LBT1 doesn't have any LoRaWAN activate. This mode is used for storage to save battery life. User can double click Alarm button or use needle to press the side button to activate device.
- ✓ <u>Keep Alive Mode</u>: In this mode, LBT1 works as LoRaWAN Sensor to Join LoRaWAN network and send out iBeacon's UUID & ADDR to LoRaWAN server, default interval is 7 minutes. Between each scanning/tx/rx periodically, LBT1 will be in <u>STOP status</u> (IDLE status), in STOP mode, device has the same power consumption as Deep Sleep mode.
- ✓ <u>Walking Mode</u>: In this mode, LBT1 sends the iBeacon's UUID & ADDR to LoRaWAN server in a much shorter interval (10 seconds exclude scanning time).

Action on Alarm	Function	Result:
Button		
Fast press alarm	Active Device	If LBT1 is in Deep Sleep Mode-0, it will switch to Keep
twice	or	Alive Mode. Green led will fast blink 5 times, device will
	Enter into	be activated and start to join LoRaWAN network. If Joined
	Walking mode	successfully, green led will turn on solidly for 5 seconds
		and vibrate.
		If LBT1 is in Keep Alive Mode, it will enter into walking
		mode.
Pressing alarm for	Exit walking	When pressing the alarm button, the green led will be on,
15 seconds	mode	after 15 seconds, <u>red led</u> will solid on for 5 seconds.
		Means LBT1 exit walking mode and enter to Keep Alive
		Mode

The LBT1 is set in deep sleep mode by default; the alarm button is used to switch to different modes:

Note: After device is activate, there are two ways to deactivate:

- a) Use AT Command (Need USB to TTL Adapter)
- b) Or through downlink command (<u>0x0901</u>).

### 2.2 How it works?

The LBT1 is working as LoRaWAN OTAA Class A end node. Each LBT1 is shipped with a worldwide unique set of OTAA and ABP keys. User needs to input the OTAA or ABP keys in the LoRaWAN network server so to register. LBT1 will join the LoRaWAN network and start to transmit data. The default period for each uplink is <u>7 minutes (AT+TDC timer)</u>.





## 2.3 Quick guide to connect to LoRaWAN server (OTAA)

Here is an example for how to join the <u>TTN LoRaWAN Server</u>. Below is the network structure, in this demo we use LG308 as LoRaWAN gateway.

## LBT1 in a LoRaWAN Network



The LG308 is already set to connect to TTN. What the rest we need to is register the LBT1 to TTN:

**Step 1**: Create a device in TTN with the OTAA keys from LBT1. Each LBT1 is shipped with a sticker with the default device EUI as below:





Input these keys in their LoRaWAN Server portal. Below is TTN screen shot:

#### Add APP EUI in the application

CONNOLE COMMENTITY EDITION	Applications	Gateways	Suppor
Applications > 🤤 dragino_test_application1			
Application ID dragino_test_application1 Description a test application for Dragino Created 2 years ago Handler ttr-handler-eu (current handler)		documentat	ion
APPLICATION EUIS		🌣 <u>manage e</u>	zis
↔ 二     70 83 D5 7E F0 00 46 18     回       ↔ 二     3F 77 AD E3 68 CA AB 65     回			

#### Add APP KEY and DEV EUI

THE THINGS	CONNOLE	Applications	Gateways	Suppo
	Applications > 🤤 dragino_test_application1 > Devices			
	REGISTER DEVICE		bulk import devi	285
	Device ID This is the unique identifier for the device in this app. The device ID will be immutable.			
	BO		0	
	Device EUI The device EUI is the unique identifier for this device on the network. You can change the EUI later. A8 40 41 00 01 81 85 48		🔗 8 bytes	
	App Key         The App Key will be used to secure the communication between you device and the network.           x         57 4E 37 E6 8A EC FC CD B3 B9 3D 87 A9 3B 4B 2C		👩 16 bytes	
	App EUI			Í.
	3F 77 AD E3 68 CA A8 65		0	J



Step 2: Double click alarm button to activate the LBT1

**Step 3:** LBT1 will auto join to TTN network via the LoRaWAN coverage by LG308. After join success, LBT1 will start to scan nearby valid iBeacon and upload message to IoT server. If LBT1 can't find a valid iBeacon in three scanning ( 3 times x 5second/scan), it will fill the uuid and addr with all 0x00 and upload

APP	LICAT	ION	DATA															II pa	iuse 1	<b>r</b> <u>clear</u>
Filte	rs	plink	downlink	activation	ack	error														
	ti	me	counter	port																
•	23:19:	52	1	2		payload: <b>OF</b>	0E 00 30 3	1 31 32	32 33 3	33 34 34	35 35 3	36 36 3	37 37 3	38 38 3	9 39 41	1 41 42	2 42 43	43 44	1 44 4	5 45
•				III																- P-
	23:19:	36	0	0		payload: [not	provided]													
+	23:19:	32				devaddr: 26	01 2A3D	app eui:	: A0 00	00 00 0	0 00 01	L 02 (	lev eui:	A8 40	41 00	01 81	B6 C0			
APPI	ICAT	ION	DATA															Ш	pause	t <u>clea</u>
Filter	u	plink	downlink	activation	ack	error														
	tir	ne	counter	port																
414	2 42 43	43 44	44 45 45 46	46 30 FF 45	39 32 37	30 46 31 43	3 32 37 44	<b>41</b> AD	DDR: "E	9270F1C2	7DA"	BatV:	.854	UUID:	"01122	334455	667788	99AABB	BCCDDE	EFF0"
•																				•
	23:19:	36	0	0		payload: [not	provided]													
+	23:19:	32				devaddr: 26	5012A3D	app eu	ii: <b>A0 0</b>	00 00 0	0 00 00	1 02	dev eu	ii: <b>A8 4</b>	0 41 0	0 01 8	1 B6 C0	C		



## 2.4 Uplink Payload

### 2.4.1 Payload Analyze

Different MODE has different payload:

MODE=1

Size(bytes)	2	1	2	1	5
Value	BAT	Alarm + Steps	Steps	0x01	Last 2.5 bytes of
				MODE	UUID

Filters	uplink	downlink	activation	ack	error	
	time	counter	port			
<b>•</b> 1	4:46:20		0		BAT Alarm Steps Mode Last 5 bytes of iBeacon UUID	
<b>^</b> 1	4:46:21	0	2		payload: OF 39000000145 45 46 46 30 ALARM: 0 BatV: 3,897 STEP: 0 UUID: "EEFF0"	

#### 0FC700000014545464630

4C000215:0112233445566778899AABBCCDDEEFF0:01000400C3:E9270F1C27DA

APPI	LICATION	DATA							<b>II</b> <u>p</u> a	ause 🛍	<u>clear</u>
Filte	uplink	downlink	activation	ack	error						
Filte	time	counter	port								
•	08:59:43	0	2		devid: <u>Ibt1 v12</u>	payload: 0F C7 00 00 00 01 45 45 46 46 30	ADDR: ""	ALARM: 0	BatV: 4.039	MAJO	
										- F	



#### Uplink

```
Payload
```

0F C7 00 00 00 01 45 45 46 46 30 🖹

#### Fields

```
{
    "ADDR": "",
    "ALARM": 0,
    "BatV": 4.039,
    "MAJOR": 1,
    "MINOR": 1,
    "RSSI": 0,
    "STEP": 0,
    "UUID": "EEFF0"
}
```

#### MODE=2

Size(bytes)	2	1	2	1	32	12
Value	BAT	Alarm +	Steps	0x02	iBeacon UUID	iBeacon ADDR
		Steps		MODE		

## OFC1000000241383430303232373032353033303131343234303238323030364445 45463132454433334432313541453039

4C000215:A8400227025030114240282006DEEF12:01000400C3:ED33D215AE09

uplink       downlink       ack       error         time       counter       port         09:07:32       1       2       devid:       [b11 v12]       payload:       OF C1 00 00 00 02 41 38 34 30 30 32 32 37 30 32 35 30 33 30 31 31 34 32 34 \$         Uplink       Payload       0F C1 00 00 00 02 41 38 34 30 30 32 32 37 30 32 35 30 33 30 31 31 34 32 34 30 32 38 32 30 30       Fields         fields       { <ul> <li>"ADDR":</li> <li>"ED33D215AE09",</li> <li>"ALARM":</li> <li>0,</li> <li>"BatV":</li> <li>4.033,</li> <li>"MAJOR":</li> <li>1,</li> <li>"RSSI":</li> <li>0,</li> <li>"UUID":</li> <li>"A84400227025030114240282006DEEF12"</li> </ul>																
time       counter       port         09:07:32       1       2       devid:       lpt1 v12       payload:       0F C1 00 00 00 02 41 38 34 30 30 32 32 37 30 32 35 30 33 30 31 31 34 32 34 30         Uplink       Payload       0F C1 00 00 00 02 41 38 34 30 30 32 32 37 30 32 35 30 33 30 31 31 34 32 34 30 32 38 32 30 30         0F C1 00 00 00 02 41 38 34 30 30 32 32 37 30 32 35 30 33 30 31 31 34 32 34 30 32 38 32 30 30         Fields         {       "AADR":       "ED33D215AE09",         "ALARM":       0,       "BatV":       4.033,         "MAJOR":       1,       "MINOR":       1,         "RSSI":       0,       "UUID":       "A840002270250301142402820060DEEF12"	lters	uplink	downlink	activation	ack	error										
1 2 devid: <u>lbt1 v12</u> payload: OF C1 00 00 00 241 38 34 30 30 32 32 37 30 32 35 30 33 30 31 31 34 32 34 <b>Uplink</b> Payload OF C1 00 00 00 02 41 38 34 30 30 32 32 37 30 32 35 30 33 30 31 31 34 32 34 30 32 38 32 30 30 Fields  {     "ADR": "ED33D215AE09",     "ALARM": 0,     "BatV": 4.033,     "MAJOR": 1,     "RSSI": 0,     "STEP": 0,     "UUID": "A8400227025030114240282006DEEF12" }		time	counter	port												
<pre>visit of the second secon</pre>	• 09:	07:32	1	2		devid: <u>lbt1 v1</u> 2	payload	0F C1 00	00 00 02 4	1 38 34 3	0 30 32 3:	2 37 30 3	2 35 30 3	3 30 31 3	1 34 32 3	34 3
Uplink Payload 0F C1 00 00 00 2 41 38 34 30 30 32 32 37 30 32 35 30 33 30 31 31 34 32 34 30 32 38 32 30 30 Fields { "ADDR": "ED33D215AE09", "ALARM": 0, "BatV": 4.033, "MAJOR": 1, "MINOR": 1, "RSSI": 0, "STEP": 0, "UUID": "A8400227025030114240282006DEEF12" }																•
Uplink Payload 0F C1 00 00 00 02 41 38 34 30 30 32 32 37 30 32 35 30 33 30 31 31 34 32 34 30 32 38 32 30 30 Fields { "ADDR": "ED33D215AE09", "ALARM": 0, "BatV": 4.033, "MAJOR": 1, "MSSI": 0, "STEP": 0, "UUID": "A8400227025030114240282006DEEF12" }																
Payload 0F C1 00 00 00 02 41 38 34 30 30 32 32 37 30 32 35 30 33 30 31 31 34 32 34 30 32 38 32 30 30 Fields { "ADDR": "ED33D215AE09", "ALARM": 0, "BatV": 4.033, "MAJOR": 1, "MINOR": 1, "RSSI": 0, "STEP": 0, "UUD": "A8400227025030114240282006DEEF12" }	Upl	ink														
<pre>0F C1 00 00 00 02 41 38 34 30 30 32 32 37 30 32 35 30 33 30 31 31 34 32 34 30 32 38 32 30 30 Fields {</pre>	Pav	load														
<pre>0F C1 00 00 00 02 41 38 34 30 30 32 32 37 30 32 35 30 33 30 31 31 34 32 34 30 32 38 32 30 30 Fields {</pre>																
<pre>Fields {     "ADDR": "ED33D215AE09",     "ALARM": 0,     "BatV": 4.033,     "MAJOR": 1,     "MINOR": 1,     "RSSI": 0,     "STEP": 0,     "UUID": "A8400227025030114240282006DEEF12" }</pre>	ЮF	C1 00	9 99 99	02 41 38	R 34 36	3 3 9 3 2 3	2 3 7 3	A 32 3	5 30 33	30 31	31 3	4 32 3	34 30	32 38	32 36	30
<pre>Fields {     "ADDR": "ED33D215AE09",     "ALARM": 0,     "BatV": 4.033,     "MAJOR": 1,     "MINOR": 1,     "SSI": 0,     "STEP": 0,     "UUID": "A8400227025030114240282006DEEF12" }</pre>	•															
<pre>Fields {     "ADDR": "ED33D215AE09",     "ALARM": 0,     "BatV": 4.033,     "MAJOR": 1,     "MINOR": 1,     "SSI": 0,     "STEP": 0,     "UUID": "A8400227025030114240282006DEEF12" }</pre>																
<pre>{     "ADDR": "ED33D215AE09",     "ALARM": 0,     "BatV": 4.033,     "MAJOR": 1,     "MINOR": 1,     "RSSI": 0,     "STEP": 0,     "UUID": "A8400227025030114240282006DEEF12" }</pre>	Field	ds														
*	{	ADDR" ALARM BatV" MAJOR MINOR RSSI" STEP" UUID"	: "ED3: ": 0, : 4.03: ": 1, ": 1, : 0, : 0, : 8, : "A840	3D215AE0 3, 00227025	09", 503011	42402820	Ø6DEE	F12"								
		- 4 - 4 -														



#### www.dragino.com

						0		e
						Overview	Data	Settin
APPLIC	ATION	DATA					II paus	se 🛍 cl
	unlink	doumlink						
Filters	opinite	downink	activation	ack	error			
Filters	time	counter	port	ack	error BAT Alarm Steps Mode			
Filters	time :39:38	counter	port 0	ack	error BAT Alarm Steps Mode			
Filters ▼ 09 ▲ 09	time :39:38	counter	port 0 2	ack	error <u>BAT</u> Alarm Steps Mode Mode Mode <u>55000000</u> 231 32 33 34 35 36 33 34 34 35 35 36 36 37 37 38 3	38 39 39 41 4	41 42 42 4	13 43 44

										Overview	Data	Settin
APPLIC	CATION	DATA									II paus	e 🛍 d
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	time	counter	port	liBoacor					Beacon ADD			
- 0	9:39:38		0									
00 02	31 32 33 34	35 36 33 34	4 34 35 35 3	6 36 37 37	38 38 39	39 41 41 42	42 43 43 44 44 4	5 45 46 46 30 45 3	39 32 37 30 46 31 4	3 32 37 44 41	ADDR:	"E9270F:
4												÷
÷ 0	9:39:19				dev addr:	26 01 24 6C	app eui: A0 00 0	0 00 00 00 99 99	dev eui: A8 40 41	00 01 81 B6 B4	4	

#### MODE=3

Size(bytes)	2	1	2	1	12	4	4	2	4
Value	BAT	Alarm	Steps	0x03	iBeacon	iBeacon	iBeacon	iBeacon	iBeacon
		+		MODE	UUID	MAJOR	MINOR	Measured	RSSI
		Steps						Power	

## **OFBF000000341424243434444545464630303034443030314243332D303734** 4C000215:0112233445566778899AABBCCDDEEFF0:004D001BC3:C406AB5DC9D8:-0 74

A	PPLIC	ATION	DATA			II pause	t <u>clea</u>
	Filters	uplink	downlink activation	ack	error		
		time	counter port				
	3	2	devid: <u>lbt1 v12</u>	payload:	0F BF 00	00 00 03 41 42 42 43 43 44 44 45 45 46 46 30 30 30 34 44 30 30 31 42 43 33 2D 30 37 34	A
	4						•



 O9:23:08
 3
 2
 dev id:
 Ibt1 v12
 payload:
 0F BF 00 00 00 03 41 42 42 43 43 44 44 45 45 46 46 30 30 30 5

Uplink	
Payload	
0F BF 00 00 00 03 41 42 42 43 43 44 44 45 45 46 46 30 30 30 34 44 30 30 31 42 43 33 2D 30 37 34	]
Fields	-
<pre>{     "ADDR": "",     "ALARM": 0,     "BatV": 4.031,     "MAJOR": 77,     "MINOR": 27,     "RSSI": -74,     "STEP": 0,     "UUID": "ABBCCDDEEFF0" }</pre>	
Matadata	
pplications > 😸 Igt92-ble > Devices > 🐖 peter > Data	
Overview	Data Settings
APPLICATION DATA	II pause 🛍 <u>clear</u>
Filters uplink downlink activation ack error	
time counter port	
<ul> <li>▼ 11:19:54</li> <li>0</li> </ul>	
11:19:53         0         2         retry         payload:         0E 74 00 00 00 03 41 42 42 43 43 44 44 45 45 46 46 30 30 30 34 44 30 30 31 42 4	3 33 2D 30 37 37

<sup>✓</sup> **BAT**: Ex1: 0x4B45 & 0x3FFF  $\Rightarrow$  3901 (mV).

- ✓ Alarm: it is the highest bit of the 3<sup>rd</sup> byte of the payload, when this bit is 0, it is a normal uplink message, if this bit is 1, it is a uplink message triggered by Alarm.
- ✓ Steps: The 0 ~ 6 bits of 3<sup>rd</sup> byte and 4<sup>th</sup>, 5<sup>th</sup> byte compose the steps. It increases when walk. Range is from
   Min: 0b(000 0000 0000 0000 0000) = 0
   Max: 0b(111 1111 1111 1111 1111) = 0x(7F FF FF) = 8,388,607
- ✓ MODE: Define the payload format.
- ✓ **UUID:** The uuid from the strongest iBeacon.
- ✓ ADDR: The ADDR from the strongest iBeacon
- ✓ **MAJOR**: The MAJOR from the strongest iBeacon.
- ✓ **MINOR**: The MAJOR from the strongest iBeacon.
- ✓ **Measured Power**: The Measured Power from the strongest iBeacon.
- ✓ RSSI: The RSSI from the strongest iBeacon.



## 2.4.2 Add Payload format in TTN

In TTN, use can add a custom payload so it shows friendly.

In the page Applications --> Payload Formats --> Custom --> decoder to add the decoder from: <u>http://www.dragino.com/downloads/index.php?dir=LoRa\_End\_Node/LBT1\_LoRaWAN\_BLE\_Track</u> <u>er/Decoder/</u>



#### 2.5 Downlink Payload

LBT1 supports configuration via LoRaWAN downlink command. See this link to check how to use them in different platform:

http://wiki.dragino.com/index.php?title=Main Page#Use Note for Server

There are two parts of commands for downlink:

#### 2.5.1 General Downlink commands:

These commands are to configure:

- ✓ General system settings like: uplink interval.
- ✓ LoRaWAN protocol & radio related command.

These commands can be found on the downlink command wiki:

http://wiki.dragino.com/index.php?title=End\_Device\_Downlink\_Command

#### 2.5.2 Commands special design for LBT1

These commands are to design for the working LBT1:

#### Set Payload Mode:

 $\geq$ 

AT Command:	
AT+MOD=2	// Set Payload MOD =2
AT+MOD=?	// Get current work MOD

Downlink Payload:

0xA101	<pre>// Same as AT+MOD=1</pre>
0xA102	<pre>// Same as AT+MOD=2</pre>

#### Set BLEMASK:

BLEMASK is to filter the unwanted BLE iBeacons during scan. For example, if BLEMASK is 123456. LBT1 will only uplink uuid info which include 123456. It will ignore all other iBeacons which doesn't contact 123456 in the uuid.

Note: BLEMASK range is 6 ~ 10 bytes

- AT Command: AT+BLEMASK=123456 // Set BLEMASK = 123456 AT+BLEMASK=0 // disable BLEMASK
   Downlink Payloads (Brefix + 0xAE)
- Downlink Payload: (Prefix : 0xA5) Example:



// Set BLEMASK to 123456

#### Set AT+SLEEP:

Set device to Deep Sleep Mode, if device is in Deep Sleep Mode, user need to double click the Alarm button to active it.

> AT Command:

0x0901: AT+SLEEP=1	$\rightarrow$ Set to <u>Deep Sleep Mode 1</u> .
0x0900: AT+SLEEP=0	$\rightarrow$ Set to <u>Deep Sleep Mode 0</u> .

Downlink Payload: (prefix: 0x09)
 0x0900 // Same as AT+SLEEP=1
 0x0901 // Same as AT+SLEEP=0

### 2.6 LED Status

See work flow

#### 2.7 Button Function

**RESET button:** 

Press this button will reboot the device. Device will process OTAA Join to network again.

#### **RED alarm button:**

See work flow

#### 2.8 USB Port Function

The USB interface of LBT1 has below functions:

- ✓ Power on the device
- ✓ Recharge the LBT1 battery
- ✓ Access UART console of LBT1
- ✓ Upgrade the firmware of LBT1

## 2.9 Firmware Change Log

See this link.



#### 3. Case Study

#### 3.1 User Mapwize service for indoor positioning.

#### Network Structure:

#### Use LBT1 and Mapwize for indoor positioning



Please check this URL for instruction:

http://wiki.dragino.com/index.php?title=Mapwize



#### 4. Use AT Command

#### 4.1 Access AT Command

LBT1 supports AT Command. User can use a USB to TTL adapter to connect to LBT1 for using AT command, as below.



In PC, User needs to set serial tool baud rate to **9600** to access serial console for LBT1. LBT1 will output system info once power on and user will be able to send AT commands:

R PuTTY Configuration	Serial-COM45 - SecureCRT
Category:	文件(F) 编辑(E) 查看(V) 选项(O) 传输(T) 脚本(S) 工具(L)
Category: Category: Secsion Clogging Terminal Contection type: Contection	文件(F) 編輯(E) 査看(V) 选项(O) (特領(T) 脚本(S) 工具(L) 文件(F) 編輯(E) 査看(V) 选项(O) (特領(T) 脚本(S) 工具(L) (1) Senal-COM45 ***** UpLinkCounter= 0 ***** [7221]TX on freq 904300000 Hz at DR 0 [7595]tXDONE LORAWAN BLE Indoor Tracker Image Version: V1.0 LORAWAN Stack: DR-LWS-001 Frequency Band: US915 DevEuTi= A8 40 41 00 01 81 EB A0 ***** UpLinkCounter= 0 ***** [185]TX on freq 904600000 Hz at DR 4 [217]tXDONE [5205]Rx on freq 923900000 Hz at DR 13 [5229]rxTimeout [6220]Rx on freq 923300000 Hz at DR 8 [6281]rxTimeout
Serial Close window on exit: Always Never Only on clean	ext
About Open (	Cancel



Below are the available commands, a more detail AT Command manual can be found at AT

Command Manual

AT+ <cmd>?</cmd>	: Help on <cmd></cmd>
AT+ <cmd></cmd>	: Run <cmd></cmd>
AT+ <cmd>=<value> :</value></cmd>	Set the value
AT+ <cmd>=?</cmd>	: Get the value

General Command AT: Attention AT?: Short Help ATZ: MCU Reset AT+TDC: Application Data Transmission Interval

Keys, IDs and EUIs management

AT+APPEUI: Application EUI

AT+APPKEY: Application Key

AT+APPSKEY: Application Session Key

AT+DADDR: Device Address

AT+DEUI: Device EUI

AT+NWKID: Network ID(You can enter this command change only after successful network

connection)

AT+NWKSKEY: Network Session Key

Joining and sending date on LoRa? network

AT+CFM: Confirm Mode

AT+CFS: Confirm Status

AT+JOIN: Join LoRa? Network

AT+NJM: LoRa? Network Join Mode

AT+NJS: LoRa? Network Join Status

AT+RECV: Print Last Received Data in Raw Format

AT+RECVB: Print Last Received Data in Binary Format

AT+SEND: Send Text Data

AT+SENB: Send Hexadecimal Data

LoRa network management

AT+ADR: Adaptive Rate

AT+CLASS: LoRa Class(Currently only support class A

AT+DCS: Duty Cycle Setting

AT+DR: Data Rate (Can Only be Modified after ADR=0)

AT+FCD: Frame Counter Downlink

- AT+FCU: Frame Counter Uplink
- AT+JN1DL: Join Accept Delay1



AT+JN2DL: Join Accept Delay2 AT+PNM: Public Network Mode AT+RX1DL: Receive Delay1 AT+RX2DL: Receive Delay2 AT+RX2DR: Rx2 Window Data Rate AT+RX2FQ: Rx2 Window Frequency AT+TXP: Transmit Power AT+SLEPP: device is in Deep Sleep Mode

Information

AT+RSSI: RSSI of the Last Received Packet

AT+SNR: SNR of the Last Received Packet

AT+VER: Image Version and Frequency Band

AT+FDR: Factory Data Reset

AT+PORT: Application Port

AT+CHS: Get or Set Frequency (Unit: Hz) for Single Channel Mode

AT+CHE: Get or Set eight channels mode, Only for US915, AU915, CN470

### 4.2 Common AT Command Sequence

#### 4.2.1 Multi-channel ABP mode (Use with SX1301/LG308)

If device has not joined network via OTAA:

AT+FDR AT+NJM=0 ATZ

If device already joined network:

AT+NJM=0 ATZ



#### 5. Upload Firmware

User can upload firmware for bug fix or new feature added.

Firmware Location:

http://www.dragino.com/downloads/index.php?dir=LoRa\_End\_Node/LBT1\_LoRaWAN\_BLE\_Track er/Image/

Upgrade Instruction:

http://wiki.dragino.com/index.php?title=Firmware Upgrade Instruction for STM32 base prod ucts#Hardware Upgrade Method Support List



## 6. FAQ

## 6.1 What is the frequency range of LT LoRa part?

Different LBT1 version supports different frequency range, below is the table for the working frequency and recommend bands for each model:

Version	LoRa IC	Working Frequency	Best Tune	Recommend Bands
			Frequency	
433	SX1278	Band2(LF): 410 ~525 Mhz	433Mhz	CN470/EU433
868	SX1276	Band1(HF):862~1020 Mhz	868Mhz	EU868/IN865/RU864
915	SX1276	Band1(HF):862 ~1020 Mhz	915Mhz	AS923/AU915/
				KR920/US915

## 6.2 How to change the LoRa Frequency Bands/Region?

User can follow the introduction for <u>how to upgrade image</u>. When download the images, choose the required image file for download.

## 6.3 What is the pin mapping for the USB program cable?



## USB Micro-B

Pin	Color	USB Pin	UART pin	ST-Link Pin
1	Red	VCC	N/A	+5V
2	White	D- (N/A)	LGT-RXD	SWDIO
3	Green	D+(N/A)	LGT-TXD	SWCLK
4		ID (N/A)	N/A	
5	Black	GND	GND	GND

### 7. Trouble Shooting

### 7.1 Why I can't join TTN in US915 /AU915 bands?

It is about the channels mapping. Please see <u>this link</u> for detail.

## 7.2 I see AT\_ERROR when I type commands?

LBT1 LoRaWAN Bluetooth Tracker



When you type command, it is possible that the ibeacon scanning conflict with serial input so you see AT\_ERROR. Especially in walking mode where this is in a short scanning period.

To overcome this issue, you can:

- 1) Try to type the command in a txt file and paste it to the console to shorter the input time for command.
- 2) Try to run AT+FDR first to reset the device to factory default and type.

### 7.3 Why I am getting Empty payload?

The LBT1 payload if include motion sensor will have 52 bytes, according to the LoRaWAN protocol. The LoRaWAN server will discard this payload on DR0 in AU915/US915 bands. So each packet sent in DR0 will be seen as empty payload

#### 8. Order Info

Part Number: LBT1-XXX

XXX: The default frequency band

- ✓ AS923: LoRaWAN AS923 band
- ✓ AU915: LoRaWAN AU915 band
- ✓ EU433: LoRaWAN EU433 band
- ✓ EU868: LoRaWAN EU868 band
- ✓ KR920: LoRaWAN KR920 band
- ✓ US915: LoRaWAN US915 band
- ✓ IN865: LoRaWAN IN865 band
- ✓ CN470: LoRaWAN CN470 band

#### 9. Packing Info

#### Package Includes:

- ✓ LBT1 LoRaWAN Bluetooth Tracker x 1
- ✓ USB program cable x 1
- ✓ USB recharge cable x 1
- ✓ Sling x 1

#### Dimension and weight:

- ✓ Device Size: 85 x 48 x 15 cm
- ✓ Device Weight: 50g

#### LBT1 LoRaWAN Bluetooth Tracker



- ✓ Package Size: 10 x 8.5 x 4 cm
- ✓ Package Weight: 111g

## 10. Support

- Support is provided Monday to Friday, from 09:00 to 18:00 GMT+8. Due to different timezones we cannot offer live support. However, your questions will be answered as soon as possible in the before-mentioned schedule.
- Provide as much information as possible regarding your enquiry (product models, accurately describe your problem and steps to replicate it etc) and send a mail to

# support@dragino.com

#### 11. Reference

- ♦ Product Page , DataSheet
- ♦ Image Download