



BAT-X
(BASIC ASSET TRACKER, ATD500X)

USER GUIDE

V5.0.2

1	CONTENTS	
2	Introduction	3
3	Firmware	3
3.1	Firmware Versions	3
4	Quick Start	3
4.1	How to turn BAT-X on	3
4.2	LED Status Indicators	3
5	Operating Modes	4
5.1	Normal Mode	4
5.2	Discovery Mode	5
5.3	Factory Mode	5
6	Hardware	6
6.1	Sensors	6
6.2	Electrical	6
6.3	Miscellaneous	6
6.4	Radios	7
7	Contacts	8
8	Disclaimers	8
9	Version History	9

2 INTRODUCTION

This document describes the Mobilogix BAT-X (Basic Asset Tracker, ATD500X). BAT-X is an asset tracker equipped with LTE CatM1/NB1, quad-band 2G, Bluetooth, GNSS, environmental, and IMU sensors. The BAT-X may be in one of three operating modes. Factory mode is set on BAT-X during production for initial delivery and long-term storage of BAT-X. In Factory mode no radios are on, BAT-X waits for 10 minutes of charging to switch to Normal Mode. While in Normal mode, BAT-X will collect the asset location and sensor data and report the data to a cloud platform via cellular air interface. During Normal mode BAT-X may also collect peripheral data via Bluetooth beacon scanning. After a report BAT-X will sleep until the next report (based on configured hold-off timers and thresholds). While not tracking any assets, or for short term storage, Discovery mode may be entered. Discovery mode shuts down all radios except Bluetooth until a wake-up command is received to push BAT-X into Normal mode.

3 FIRMWARE

3.1 FIRMWARE VERSIONS

- BAT (Dam App): V5.0.2-official
- BG96 (Cellular): BG96MAR02A10M1G
- BGM13P (Bluetooth): V502A3

4 QUICK START

4.1 HOW TO TURN BAT-X ON

From the factory BAT-X must be connected to charger for 10 minutes to enter Normal Mode. Once BAT enters Discovery Mode it will send BT advertisements a unique name based on the cellular IMEI. To Switch BAT-X from Discovery Mode to Normal Mode write 1 to the Cycling Power Vector.

4.2 LED STATUS INDICATORS

Data LED

- Slow, short blinks: Trying to register
- Slow, long blinks: Registered but idle
- Fast blinks: Data in transit

Power LED

- Green: 100% - 40%
- Yellow: 39% - 20%
- Red: 19% - 0%

GNSS LED

- Blinking: Acquiring location
- Solid: Location acquired



5 OPERATING MODES

5.1 NORMAL MODE

Normal Mode will allow BAT-X to go between sleeping and active work states to report data to the cloud. Active work states are triggered by hold-off timers and threshold values according to the BAT-X configuration.

Entry Triggers:

- Factory Mode to Normal Mode: Charge for 10 minutes
- Discovery Mode to Normal Mode: Write operation via Bluetooth

Exit Triggers:

- Normal Mode to Discovery Mode: REST API
- Normal Mode to Factory Mode: FOTA

Available Functions:

- Normal Reporting:
 - Login
 - Location Data
 - Sensor Data
 - Beacon Report
- Alarm Reporting:
 - Lux
 - Movement
 - Impact/Drop
- Configuration
- FOTA

Radio Modes:

- Cellular (BG96): Follows configured settings for wake/sleep
- Bluetooth (BG13): Scanning for beacons

5.2 DISCOVERY MODE

Discovery Mode is an ultra-low-power mode where BAT-X acts as a Bluetooth beacon. Since no tracking is possible in Discovery Mode it can be used to conserve battery during periods of inactivity.

Entry Triggers:

- Normal Mode to Discovery Mode: REST API

Exit Triggers:

- Discovery Mode to Normal Mode: Write operation via Bluetooth

Available Functions:

- BT OTA
- BT Advertising

Radio Modes:

- Cellular (BG96): Off
- Bluetooth (BG13): Bluetooth advertising

5.3 FACTORY MODE

BAT-X shall be configured in Factory Mode from factory production line. Factory Mode can be used for extended storage and long (untracked) transport of BAT-X. The only exit trigger for Factory Mode requires **physical access** to BAT-X for charging.

Entry Triggers:

- Normal Mode to Factory Mode: FOTA

Exit Triggers:

- Factory Mode to Normal Mode: Charge for 10 minutes

Available Functions:

- No functions are available while in Factory Mode, all radios are **off**.

Radio Modes:

- Cellular (BG96): Off
- Bluetooth (BG13): Off

6 HARDWARE

6.1 SENSORS

Type	Units	Minimum	Maximum
<i>Temperature</i>	Celsius (° C)	-20	60
<i>Pressure</i>	Hectopascals (hPa)	300	1100
<i>Humidity</i>	% Relative Humidity (%RH)	0	100
<i>Light</i>	Lux (lx)	0	64000
<i>Shock Magnitude</i>	G Forces	1	25.5
<i>Shock X-axis</i>	G Forces	1	25.5
<i>Shock Y-axis</i>	G Forces	1	25.5
<i>Shock Z-axis</i>	G Forces	1	25.5
<i>Tilt X-axis</i>	Degrees	0	180
<i>Tilt Y-axis</i>	Degrees	0	180
<i>Tilt Z-axis</i>	Degrees	0	180

6.2 ELECTRICAL

Capacity:	4000 mAh
Operating Voltage:	>3.8 V
Chemistry:	Li-ion (rechargeable)
Runtime:	Up to 1-year battery life on a single charge
Charging:	Micro USB 2.0 (type B receptacle)
Max Charge Rate:	1.2 A

6.3 MISCELLANEOUS

Dimensions:	23 x 122 x 60 (mm)
Processor:	ARM A7
SIM Card:	3FF

6.4 RADIOS

Cellular Module:	Quectel® BG96 (Qualcomm® MDM9206)
Bluetooth Module:	Silabs® BG13P
Antenna:	Embedded Cellular/GPS/Bluetooth/WiFi (rx)

Radio Frequencies:

	TX (MHz)			RX (MHz)		
LTE-FDD B1	1920	~	1980	2110	~	2170
LTE-FDD B2	1850	~	1910	1930	~	1990
LTE-FDD B3	1710	~	1785	1805	~	1880
LTE-FDD B4	1710	~	1755	2110	~	2155
LTE-FDD B5	824	~	849	869	~	894
LTE-FDD B8	880	~	915	925	~	960
LTE-FDD B12	699	~	716	729	~	746
LTE-FDD B13	777	~	787	746	~	756
LTE-FDD B18	815	~	830	860	~	875
LTE-FDD B19	830	~	845	875	~	890
LTE-FDD B20	832	~	862	791	~	821
LTE-FDD B28	703	~	748	758	~	803
LTE-TDD B39	2570	~	2620	2570	~	2620
850 (B5)	824.2	~	848.8	869.2	~	893.8
900 (B8)	880.2	~	914.8	925.2	~	959.8
1800 (B3)	1710.2	~	1784.8	1805.2	~	1879.8
1900 (B2)	1850.2	~	1909.8	1930.2	~	1989.8
GPS	-	~	-	1575.4	±	1.023
Bluetooth	2400	~	2483.5	2400	~	2483.5
WiFi	-	~	-	2400	~	2483.5

Max Output Power:

LTE-FDD	23 dBm	±	2 dB
LTE-TDD	23 dBm	±	2 dB
850 (B5) / 900 (B8)	33 dBm	±	2 dB
1800 (B3) / 1900 (B2)	30 dBm	±	2 dB
1800 (B3) / 1900 (B2) 8-PSK	27 dBm	±	2 dB

7 CONTACTS

- support@mobilogix.com
- <https://mobilogix.com/contact/>

8 DISCLAIMERS

8.1 FCC INTERFERENCE STATEMENT (PART 15.105 (B))

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 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.

8.2 FCC PART 15 CLAUSE 15.21

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

8.3 FCC PART 15.19(A) [INTERFERENCE COMPLIANCE STATEMENT], UNLESS THE FOLLOWING STATEMENT IS ALREADY PROVIDED ON THE DEVICE LABEL

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.

8.4 ISED RSS-GEN NOTICE

This device complies with Industry Canada's licence-exempt RSSs. Operation is subject to the following two conditions:

- (1) This device may not cause interference; and
- (2) This device must accept any interference, including interference that may cause undesired operation of the device.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes:

- (1) l'appareil ne doit pas produire de brouillage;
- (2) l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'encompromettre le fonctionnement.

8.5 FCC RF EXPOSURE GUIDANCE STATEMENT

In order to comply with FCC/ISED RF Exposure requirements, this device must be installed to provide at least 20 cm separation from the human body at all times.

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In order to comply with FCC/ISED RF Exposure requirements, this device must be installed to provide at least 20 cm separation from the human body at all times.

Afin de se conformer aux exigences d'exposition RF FCC / ISED, cet appareil doit être installé pour fournir au moins 20 cm de séparation du corps humain en tout temps.

9 VERSION HISTORY

Date	Description
2020-06-16	Initial document version.
2020-06-19	Disclaimers included.