

USER GUIDE

BAT-X



Contents

1	Introduction	5
1.1	Purpose.....	5
1.2	Contact information	5
1.3	Related Publications and Downloads	5
2	Product Description	6
2.1	Product Overview.....	6
2.2	Product Applications and Benefits	6
2.2.1	Indoor and Outdoor Location Tracking	6
2.2.2	Configurable Bluetooth Beacon or Gateway Modes.....	6
2.2.3	Long Term Operation	6
2.3	Indicators and Accessories	7
2.3.1	Indicators	7
2.3.2	Accessories.....	7
3	Product Features.....	8
3.1	Communication	8
3.2	Sensors	8
3.2.1	Accelerometer.....	8
3.2.2	Temperature	8
3.2.3	Pressure	9
3.2.4	Humidity.....	9
3.2.5	Ambient Light.....	9
3.2.6	Drop and Impact	9
3.2.7	Tilt	9
3.3	Battery.....	11
3.4	Enclosure	11
3.5	Services.....	11
3.6	Security.....	11
4	Product Specifications.....	12
4.1	Mechanical	12
5	Packaging and Handling	13
5.1	Product Marking and Serialization	13

5.1.1	Description	13
5.1.2	Part number	13
6	Environmental Specifications	14
7	Compliances	15
7.1		15
7.2		16
7.3		16
7.4		16
7.5		16
7.6		Error! Bookmark not defined.
8	Safety Recommendations/Disposal	17
8.1	Battery Safety	17
8.2	Battery Disposal.....	17
9	Warranties	18
9.1	Warranty Device & Parts	18
10	Glossary and Acronyms.....	19
11	Document History	21

Figures

Figure 2-1	BAT-X, Front view.....	7
Figure 2-2	BAT-X, Top view	7
Figure 4-1	Mechanical Drawing	12
Figure 5-1	BAT-X Label Format	13

Tables

Table 3-1 Communication Features	8
Table 3-2 Accelerometer Sensor Specifications.....	8
Table 3-3 Temperature Sensor Specifications	8
Table 3-4 Pressure Sensor Specifications.....	9
Table 3-5 Humidity Sensor Specifications.....	9
Table 3-6 Ambient Light Sensor Specifications	9
Table 3-7 Drop and Impact Sensor Specifications	9
Table 3-8 Tilt Sensor Specifications	9
Table 3-9 Tilt Orientation Table	10
Table 3-10 Battery Specifications	11
Table 4-1 Mechanical Dimensions Summary.....	12
Table 5-1 BAT-X Label Description	13
Table 6-1 Environmental Specifications.....	14

1 INTRODUCTION

1.1 PURPOSE

The purpose of this document is to provide information regarding the function, features and usage of the BAT-X product.

1.2 CONTACT INFORMATION

Email us at support@mobilogix.com

Call us on (949) 748-8895

1.3 RELATED PUBLICATIONS AND DOWNLOADS

- Product Brief
- Quick Start Guide

2 PRODUCT DESCRIPTION

2.1 PRODUCT OVERVIEW

The BAT-X is a battery-operated global tracking device utilizing low power LTE CAT-M1 technology with embedded Bluetooth gateway capabilities. The BAT-X is smart logic-enabled to maximize battery life and comes with a fully configurable sensor feature set. Pair the BAT-X with Fusion-IoT for a mobile and modular end-to-end solution to smart asset management. On its own, the BAT-X is a fully capable indoor/outdoor tracking solution providing location and environmental data about asset condition. Combined with BTM250 series of Bluetooth beacons, BAT-X combines data from these sources with its own location and environmental data for aggregation of actionable data to Fusion-IoT.

2.2 PRODUCT APPLICATIONS AND BENEFITS

2.2.1 INDOOR AND OUTDOOR LOCATION TRACKING

BAT-X provides location data information from multiple on-board sources. Using GNSS, BAT-X provides accurate outdoor location information for asset management. Utilizing Wi-Fi and Bluetooth, BAT-X provides seamless indoor location tracking as assets move into a distribution center, a warehouse or multistory structure. Pair BAT-X with Fusion IoT cloud platform for a complete end to end supply chain or cold chain tracking solution.

2.2.2 CONFIGURABLE BLUETOOTH BEACON OR GATEWAY MODES

BAT-X can be used with Bluetooth 5 technology to aggregate data and act as a gateway solution for BTM250 series and other Bluetooth devices. BAT-X can also smartly operate as a beacon in advertise mode to conserve battery power during extended idle periods between operations.

2.2.3 LONG TERM OPERATION

BAT-X is the optimum device for highly dynamic tracking solutions. Leveraging smart-logic, configurable operation modes and increased battery density, BAT-X provides extended tracking and data collection capacity between charges.

2.3 INDICATORS AND ACCESSORIES

2.3.1 INDICATORS



Figure 2-1 BAT-X, Front view



Figure 2-2 BAT-X, Top view

2.3.2 ACCESSORIES

Charge with any USB Adapter.

3 PRODUCT FEATURES

3.1 COMMUNICATION

Parameter	Value
Cellular Module	Quectel® BG95-M3 (Qualcomm® MDM9205)
Antenna	Internal
Radio	LTE (CatM1, NB1): B1, B2, B3, B4, B5, B8, B12, B13, B18, B19, B20, B25, B26, B27, B28, B66 GPRS/EGPRS: 850, 900, 1800, 1900
Max Output Power	23 dBm
GNSS	GPS, GLONASS
Processor	ARM A7
SIM Card	3FF

Table 3-1 Communication Features

3.2 SENSORS

3.2.1 ACCELEROMETER

Parameter	Value
IMU	6-axis Accelerometer & Gyro
Start time	10 ms (warm), 55 ms (cold)
Sensitivity	~16.4 LSB/°/s (@ 2000°/s range)

Table 3-2 Accelerometer Sensor Specifications

3.2.2 TEMPERATURE

Parameter	Value
Range	-40°C – 85 Celsius (°C)

Table 3-3 Temperature Sensor Specifications

3.2.3 PRESSURE

Parameter	Value
Range	300 hPa – 1100 Hectopascals (hPa)
Offset temp. coefficient	±1.5 Pa/K

Table 3-4 Pressure Sensor Specifications

3.2.4 HUMIDITY

Parameter	Value
Range	0 - 100 %Relative Humidity (%RH)
Accuracy	± 3%

Table 3-5 Humidity Sensor Specifications

3.2.5 AMBIENT LIGHT

Parameter	Value
Range	0 – 64000 lux

Table 3-6 Ambient Light Sensor Specifications

3.2.6 DROP AND IMPACT

Parameter	Value
Range	1 – 25.5 G

Table 3-7 Drop and Impact Sensor Specifications

3.2.7 TILT

Parameter	Value
Range	0 - 180 (non-negative) Degrees

Table 3-8 Tilt Sensor Specifications

The following figures describe the expected values to be output by the tilt sensor when it is in various positions. There is a minimum value of 0 in any direction, maximum 180 (no negative values).

<i>BAT flat, LED Facing up (sky)</i> x= 90, y= 90, z= 0 	<i>BAT flat, LED Facing down (ground)</i> x= 90, y= 90, z=180 
<i>BAT on side, LED facing user, light sensor on right</i> x= 90, y= 0, z= 90 	<i>BAT on side, LED facing user, light sensor on left</i> x= 90, y=180, z= 90 
<i>BAT on side, LED facing user, light sensor on top (sky)</i> x= 0, y= 90, z= 90 	<i>BAT on side, LED facing user, light sensor on bottom (ground)</i> x=180, y= 90, z= 90 

Table 3-9 Tilt Orientation Table

3.3 BATTERY

Parameter	Value
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)

Table 3-10 Battery Specifications

3.4 ENCLOSURE

- Dimensions: 122 x 60 x 23 mm
- Increased rigidity and environmental resistance
- Ambient light window
- Power, Network, and GPS LED status indicators
- Humidity vents (optional membrane)

3.5 SERVICES

- FOTA (firmware over the air) updates
- Fusion LaaS (indoor and outdoor location services)
- Indoor Location via BLE5 beacons

3.6 SECURITY

- Qualcomm® Trusted Execution Environment
- Crypto Engine
- Secure Boot
- Silabs Hardware Cryptographic Accelerators
- AES 128/256
- SHA-1, SHA-2 (SHA-224 and SHA-256) and ECC

4 PRODUCT SPECIFICATIONS

4.1 MECHANICAL

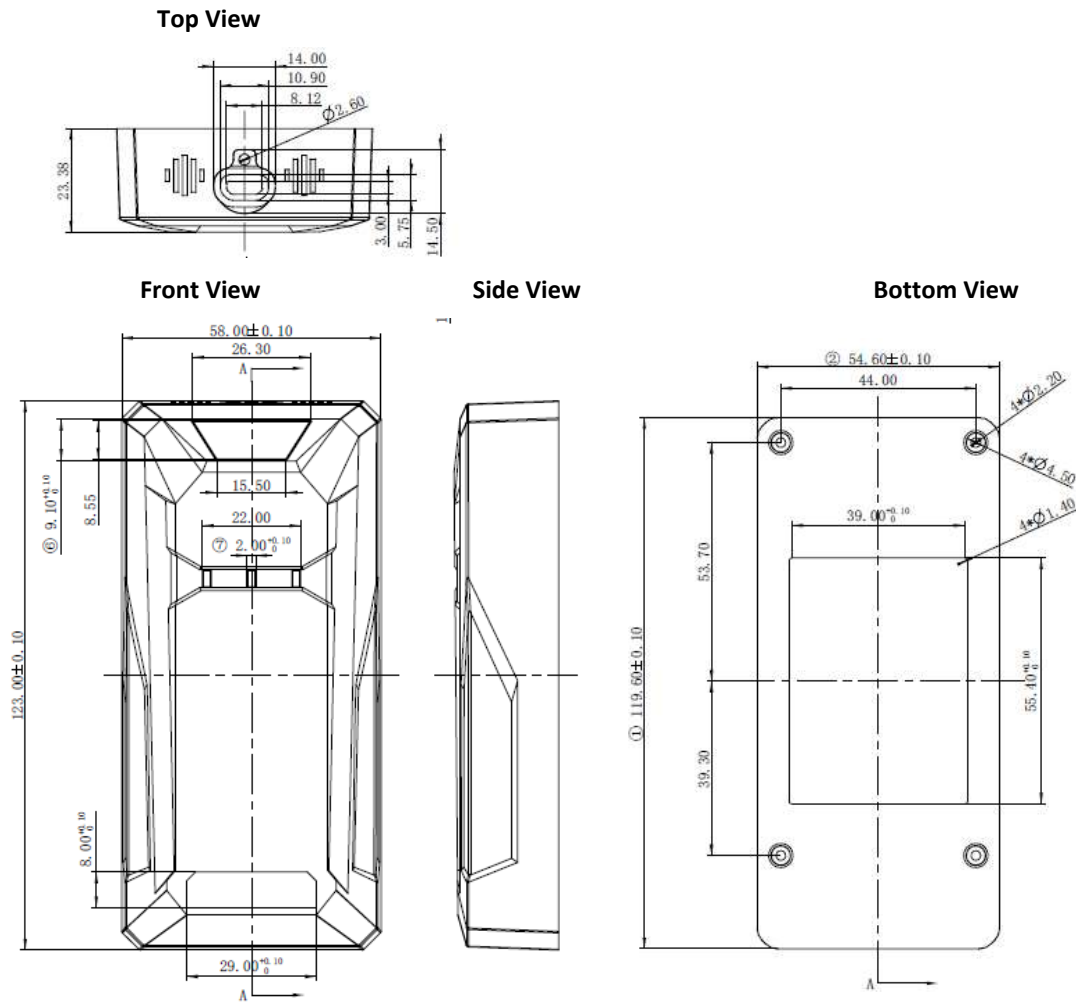


Figure 4-1 Mechanical Drawing

Parameter	Value
Length (mm)	123.00 ± 0.10
Width (mm)	58.00 ± 0.10
Height (mm)	23.38
Weight (g)	153

Table 4-1 Mechanical Dimensions Summary

5 PACKAGING AND HANDLING

5.1 PRODUCT MARKING AND SERIALIZATION

5.1.1 DESCRIPTION

The BAT-X product has labels identifying the product's FCC ID, ISED, as well as barcodes identifying the ICC ID, IMEI and Serial Number.

5.1.2 PART NUMBER



Figure 5-1 BAT-X Label Format

Number	Description
1	Mobilogix logo
2	Model name
3	FCC ID
4	IC ID
5	QR Code (example: ICC ID:12345678901234567890,IMEI:123456789012345,S/N:A500X20010000S)
6	ICCID
7	IMEI
8	S/N
9	Date Code

Table 5-1 BAT-X Label Description

6 ENVIRONMENTAL SPECIFICATIONS

Parameter	Value
Operating Temperature	-20°C - 60°C
Operating Humidity	0%RH - 100%RH
Storage Temperature	-20°C - 60°C
Storage Humidity	0%RH - 60±25%RH
Extended Storage Temperature	-20°C - 25°C
Extended Storage Humidity	0%RH - 60±25%RH

Table 6-1 Environmental Specifications

7 COMPLIANCES

7.1

DISCLAIMERS

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.

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.

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.

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.

7.2 IC

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.

ISED 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.

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.

7.3 verizon

7.4

7.5

8 SAFETY RECOMMENDATIONS/DISPOSAL

8.1 BATTERY SAFETY

UN3481 Lithium ion batteries contained in equipment: "P.I. 967-II"

Improper handling and use can cause permanent damage to the product. There is also the possible risk of personal injury from mechanical trauma or choking hazard.

Do not disassemble the product. Evidence of tampering will invalidate the warranty.

Never incinerate nor dispose the product in fire, which is extremely dangerous as this may cause explosion of the battery

The product should never be soaked with liquids.

Battery replacement shall be done only by the device supplier and never by the user.

Caution – Risk of explosion if Battery is replaced by an incorrect type.

Dispose of used batteries according to the instructions

8.2 BATTERY DISPOSAL

"This product must not be treated as household waste. For more detailed information about recycling electronic components contact your local waste management authority."

9 WARRANTIES

9.1 WARRANTY DEVICE & PARTS

The warranty for device and parts is 1 year.

Limited Warranty. Mobilogix, Inc. warrants the Unit to be free from manufacturing defects in material and workmanship for a period of one (1) year from the date of shipment of the Unit to the end user from Mobilogix, Inc. or the authorized reseller, as applicable. No employee, agent, distributor, or other person is authorized to give any warranties on behalf of Mobilogix, Inc. not expressly set forth in this Limited Warranty.

For warranty concerns:

- Email us at support@mobilogix.com
- Call us on (949) 748-8895

10 GLOSSARY AND ACRONYMS

FCC: Federal Communications Commission

An independent U.S. government agency overseen by Congress, the Commission is the federal agency responsible for implementing and enforcing America's communications law and regulations.

FCC ID: Federal Communications Commission Identifier

Unique identifier used for FCC certified products.

GNSS: Global Navigation Satellite System

GNSS refers to a constellation of satellites providing signals from space that transmit positioning and timing data to GNSS receivers. The receivers then use this data to determine location. By definition, GNSS provides global coverage.

ICC ID: Integrated Circuit Card ID

The ICCID identifies the SIM card. It is a 20-digit globally unique serial number that is printed on the back of a SIM card.

ISED: Innovation, Science and Economic Development

ISED (formerly IC, Industry Canada) regulates the radio spectrum for all transmitters operated in Canada similar to FCC for USA.

LTE CAT-M1: LTE Cat-M1 or Long Term Evolution (4G), category M1

Cat-M1 is a low power wide area radio technology category of LTE. CatM1 provides lower power usage for IoT devices without high bandwidth requirements. CatM1 is not interchangeable with Cat1, the CatM1 device requires specific network operator support.

NB-IoT: Narrow Band Internet of Things

NB-IoT is a low power wide area radio technology. NB-IoT provides more power savings than CatM1 due to offering less bandwidth. Typically NB-IoT is used for stationary or semi-fixed device installations but features vary by network operator.

Gateway

Devices acting as a Gateway will receive data from beacons and post to Fusion with via T-Message.

Beacon

Devices acting as a Beacon will advertise their data to a gateway for post to Fusion via T-Message.

BTM250

BTM250 is a series of Bluetooth Beacon devices. Multiple variants are available supporting various sensor data including: temperature, humidity, and pressure.

Fusion IoT

Fusion IoT is a cloud-based application with web and mobile support. Fusion IoT provides visualizations of the data recorded from devices in real time. BAT-X and BTM250 are supported by Fusion IoT out of the box.

Operating Modes

Operating modes define the behavior of BAT.

Normal Mode

Normal Mode is the standard Operating Mode for BAT. Normal Mode is used for tracking of assets and reporting to data using Cellular connections.

Discovery Mode

Discovery Mode is the lower power intermediary Operating Mode for BAT. Discovery Mode turns off all T-Messages and BAT becomes a Bluetooth Beacon.

Factory Mode

Factory Mode is the Operating Mode set on all BAT out of the box. Factory Mode disables all tracking and beacon features for long term storage without monitoring.

LaaS: Location as a Service

LaaS is a method of using non-location data to estimate the actual location of an asset. LaaS provides estimated locations and as such GPS location fixes are preferred by BAT.

FLaaS: Fusion Location as a Service

FLaaS provides LaaS to Fusion IoT connected devices by offloading computing to the cloud to save power on the device.

11 DOCUMENT HISTORY

Version	Date	Note of change
1.0	11/17/2020	Original release
1.1	6/24/2021	ATD500Y release