XT1520
Product Manual

Firmware Version: NV11.1125AA1

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1. Functional Description

1.1. Overview

The XT1520 series are Bluetooth beacons with a single chip Bluetooth 5 + ARM. The beacons allow the user to quickly identify a cart's location if it is within proximity of an XT49xx to determine whether a cart is at a distribution center or en route. Each device broadcasts a UID frame payload with a MAC address to an XT49xx at a 1 Hz frequency. This frequency, along with the namespace, are only configurable at the factory. The device is expected to last the duration of the cart's life.

1.2. Mechanical

Mechanical	
Dimensions	4.0 x 2.2 x 1.3 in (10.16 x 5.59 x 3.30 cm)
Weight	3.8 oz
Case Material	PC+PBT
IP Rating	IP67
Vibration	Mil. Std. 202G, SAE J1455

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2. General Operation

The XT1520 attaches to Amazon carts and is used in conjunction with an XT49xx mounted on an Amazon trailer. The XT49xx periodically captures the unique device IDs at a configurable rate of all beacons in range. The XT49xx then sends the information over the cellular network, which is received by AWS.

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3. Installation

The XT1520 offers two different means of mounting: zip ties, or 3M VHB tape. The back of the device casing is flat so the VHB tape can be adhered. The holes zip ties are indicated below.

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4. Bluetooth (BLE)

The XT1520 uses Bluetooth 5 network, utilizing the Eddystone(TM) message protocol from Google. This protocol has four frame types: UID, URL, TLM, and EID; however, URL and EID frames are not utilized in this application. In depth information on Eddystone(TM) can be found here: https://developers.google.com/beacons/eddystone

4.1. UID Frame

This frame type is very important in the XT15 as it comprises the primary functionality of the device. The UID is a unique 16-byte ID with a 10-byte namespace and 6-byte instance ID. The namespace portion is used to group sets of XT15s and the instance ID is used to identify individual devices.

UID Frame				
Frame Type	**Power at 1 M**	**Namespace ID**	**Instance ID**	**RFU**
1 byte	1 byte	10 bytes	6 bytes	2 bytes

4.2. TLM Frame

The TLM frame type is used to display telemetry data about the operations of the clients in use. It can be used to monitor beacons in the field. The frame is paired with an identifier frame because TLM has no beacon ID. This frame broadcasts at a 1/10 Hz frequency.

TLM Frame					
Frame Type	Version	Battery Voltage (mV)	Beacon Temperature	ADV PDU Count Since Boot	Time Since Boot (100ms incraments
1 byte	1 byte	2 bytes	2 bytes	4 bytes	4 bytes

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5. Bluetooth protocol Diagram

Preamble	Access Address		Protocol Data Unit (PDU)	CRC
1 Byte	4 Bytes		Up to 39 Bytes	3 Bytes

Header	Advertising Payload
2 Bytes	Up to 37 Bytes

Header						ADV Address	ADV Data
PDU TYPE	RFU	TxADDR	RxADDR	Length	RFU	6 Bytes	31 Bytes
4 Bits	2 Bits	1 Bit	1 Bit	6 Bits	2 Bits		

Eddystone ADV Data

AD0			AD1			AD2 Service Data			
AD Length	AD	Flags	AD Length	AD	ES UUID	AD Length	AD	ES UUID	ES Frame
1 Byte	1 Byte	1 Byte	1 Byte	1 Byte	2 Bytes	1 Byte	1 Byte	2 Bytes	Up to 20 Bytes
0x02	0x01	0x06	0x03	0x03	0xFEAA		0x16	2 Bytes	

Frame Type	Power @ 0m	Name Space ID	Instance ID	RFU
1 Byte	1 Byte	10 Bytes	6 Bytes	2 Bytes
0x00		16 Byte UUID		

} UID Frametype

Frame Type	Power @ 0m	URL Prefix	Encoded URL
1 Byte	1 Byte	1 Byte	Less than 17 Bytes
0x10			0x00 = http://www.
			0x01 = https://www.
			0x02 = http://
			0x03 = https://

} URL Frametype

Frame Type	Version	Battery Voltage (mV)	Beacon Temp	ADV PDU Count Since Boot	Time Since Boot (100 ms incraments)
1 Byte	1 Byte	2 Bytes	2 Bytes	4 Bytes	4 Bytes
0x20	0x00				

} TLM Frametype

Frame Type	Ranging Data	Ephemeral Identifier
1 Byte	1 Byte	8 Bytes

} EID Frametype

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6. Regulatory Statements

6.1. FCC

This equipment with FCC-ID: GKM-XT1520 and IC-ID: 10281A-XT1520, Model: XT1520 is subject to the Federal Communications Commission (FCC) and Industry Canada (IC) rules.

NOTICE:

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

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.

Changes or modifications made to this equipment not expressly approved by Xirgo Technologies, LLC may void the FCC authorization to operate this 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.

Radio frequency radiation exposure Information:

This equipment, XT1520, complies with FCC and ISED radiation exposure limits set forth for an uncontrolled environment. This equipment must be installed and operated with minimum distance of 20cm between the XT1520 and your body.

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6.2. IC

Antenna Statement

Under Industry Canada regulations, this radio transmitter may only operate using an antenna of a type and maximum (or lesser) gain approved for the transmitter by Industry Canada. To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropically radiated power (e.i.r.p.) is not more than that necessary for successful communication.

Conformément à la réglementation d'Industrie Canada, le présent émetteur radio peut fonctionner avec une antenne d'un type et d'un gain maximal (ou inférieur) approuvé pour l'émetteur par Industrie Canada. Dans le but de réduire les risques de brouillage radioélectrique à l'intention des autres utilisateurs, il faut choisir le type d'antenne et son gain de sorte que la puissance isotrope rayonnée équivalente (p.i.r.e.) ne dépasse pas l'intensité nécessaire à l'établissement d'une communication satisfaisante.

Licence exempt

This device complies with Industry Canada licence-exempt RSS standard(s). 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, et
2. l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

6.3. CE

The DOC (Declaration of Conformity) is either included in the packaging or can be found at the following link: www.xirgotech.com

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WARNING: This product can expose you to chemicals including Nickel (Metallic), which is known to the State of California to cause cancer and Bisphenol A (BPA), which is known to the State of California to cause birth defects or other reproductive harm.

For more information go to www.P65Warnings.ca.gov

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