

Operating Manual

iTAG X3i



Document Number X134576(1) (See Extronics DDM for the latest Version)

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1 Introduction

Thank you for purchasing the iTAG X3i. This document provides an overview of the product, its features and instructions for configuration and maintenance. The iTAG X3i module allows seamless integration of Extronics' hybrid RTLS technology into your solution, delivering real-time worker location reporting. Designed to work with the Extronics Location Engine (ELE), the iTAG X3i enables precise 'dot-on-a-map' data visualization.

1.1 What is inside the box?

Box reserve image of X3i module and User manual image
Packing list:
1 x X3i module
1 x User Guide
Box reserve image of X3i module and User manual image

1.2 Pre-requisites

Refer to iTAG X Platform Compatibility Matrix (X124937) for compatible software required to be used with the iTAG X3i.

The host product must be labelled with "Contains FCC ID: 2AIZEEXTRFID00006"

1.3 Reference documentation

The datasheets can be referenced for product variants and accessories.

- iTAG X3i Datasheet X133681(1)

1.4 Nomenclature

Acronym	Description
BLE	Bluetooth Low Energy
CCX	Cisco Compatible Extensions
EDM	Extronics Device Manager (proprietary software)
ELE	Extronics Location Engine (proprietary software)
IBSS	Independent Basic Service Set
LF	Low Frequency
OTA	Over The Air update
RSSI	Received Signal Strength Indication
TED	Tag & Exciter Detector Device
WDS	Wireless Domain Services

2 Safety Information

2.1 Storage of this manual

Keep this user manual safe and in the vicinity of the product. All persons required to work with the product should be advised on where the manual is stored.

2.2 Warnings / Avertissements

Warning!	Any repairs or replacement of parts MUST be performed by the manufacturer or its nominated sub-contractor or agent.
	Toute réparation ou remplacement de pièce DOIT être effectué par le fabricant ou son sous-traitant ou agent désigné.

Warning!	Before setting the units to work read the technical documentation carefully.
	Avant d'utiliser les unités, lisez attentivement la documentation technique.

2.3 Marking information

Reserve for product label if necessary

3 iTAG X3i Features

3.1 Compact board design

The iTAG X3i is an unenclosed tag. The compact design allow users to easily embed the tag within other product enclosures.

3.2 Single streamlined power source

The iTAG X3i is powered by the product's own power source.

3.3 Function button interface

The iTAG X3i includes a button interface that, when pressed, activates a trigger signal to initiate a call button or OTA.

3.4 Serial interface for telemetry

A serial interface connector is integrated for connecting with a host unit for receiving telemetry information.

3.5 Indoor-Outdoor reliability

The system ensures seamless and accurate performance across diverse environments. Supported by the iTAG XB range of anchors, both indoors and outdoors, the same tag can be used for real-time tracking and management across various industries.

3.6 Simple board management

The iTAG X3i module can be configured easily using the Extronics Device Manager software and a TED/Wi-Fi or BLE connection. The iTAG X3i can be configured wirelessly in batches of up to 50 units at a time using the EDM. The EDM software streamlines tag configuration, activation, deactivation and programming, making the process easy and efficient.

Refer to EDM Manual X129265 for further information on configuring the tags.

3.7 Visual indication

The iTAG X3i features an on-board LED to indicate module status, button activation, and any errors. Additionally, a programmable GPIO pin at P1 can be wired for an external LED indicator in customer enclosures.

3.8 Wi-Fi based firmware updates

The iTAG X3i supports firmware updates using Wi-Fi. OTA update capability can be used when new functionality becomes available. This eliminates the need to return the iTAG X3i to the factory to enable new features.

3.9 Wi-Fi beaconing

The iTAG X3i utilises lightweight beaconing communication and can be configured for CCX, IBSS or WDS protocols.

3.10 Wi-Fi range

Outdoor – Up to 200m (line of sight to an Access Point)

Indoor – Up to 60m (infrastructure dependant)

3.11 LF receiver

The iTAG X3i sends out specific location reports upon arrival at a chokepoint or gateway where an LF exciter is positioned. The iTAG X3i behaviour can be automatically modified whilst in certain areas after passing through a chokepoint such as a doorway or gate. (Only when used with MobileView software).

3.12 BLE trilateration

The iTAG X3i contains a Bluetooth receiver that is capable of measuring the RSSI from BLE anchors (iTAG XB40). BLE anchors can be positioned around a site to facilitate improved positional accuracy at a low infrastructure cost. The anchor's identification and RSSI are transmitted in the tag's beacon message. This information, along with any other location information, is used by the ELE to enable more accurate positioning on the map.

3.13 Motion detection

The iTAG X3i contains an on-board motion sensor. When the iTAG X3i is configured utilising the motion sensor it will enable different transmission intervals whether it is stationary or in motion, reducing unnecessary network traffic and conserving the battery.

4 iTAG X3i Usage Instructions

4.1 iTAG X3i configuration

The iTAG X3i can be configured using the Extronics Device Manager.

To configure using the Extronics Device Manager refer to document X129265.

4.2 Visual indications (LED indicator)

The iTAG X3i has one bi-colour LED . Indications are shown in Table 1.

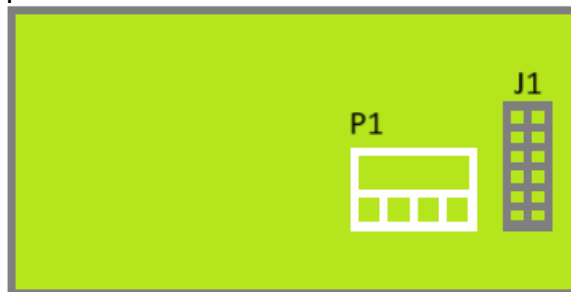
Indication	LED colour
Tag on	Green Flashing
Function button activated	Red Solid
Error – failed OTA	Rapid Orange Flashing

Table 1.

4.3 Connectors and electrical interfaces

The X3i is equipped with a 4-pin(P1) and 12-pin(J1) connector.

X3i connection diagram with a 4-pin and a 12-pin connector



4.3.1 12-pin Connector (J1)

The 12-pin serial connector can be used for configuration the tag, upgrading the tag's firmware and receiving telemetry data.

Table 2 describes the pins.

Pin Number	Pin Name	Pin Description
1	+5V	+5VDC/+3.6VDC external battery voltage input. Maximum rating is +6VDC. The power source should be able to provide 1A pulse current for at least 1ms.
2	TxD1	UART serial communication receive data. Used for reading data from the tag. Voltage levels 0 to 3.3V.
3	RxD1	UART serial communication transmit data. Used for sending telemetry data from a host to the tag. Voltage levels 0 to 3.3V
4		Reserved. Should be disconnected
5	GND	Ground
6		Reserved. Should be disconnected.
7		Reserved. Should be disconnected.
8		Reserved. Should be disconnected.
9	PROGEN	When held low, the micro-controller enters the serial communication mode. Voltage levels 0 to 3.3V. There is an internal pull-up resistor.
10		Reserved. Should be disconnected.
11		Reserved. Should be disconnected.
12		Reserved. Should be disconnected.

Table 2

4.3.2 4-pin connector (P1)

The pin functions are designed for the integration of the power, ground and call button. A fourth signal can be customized on request.

Table 3 describes the pins.

Pin Number	Pin Name	Pin Description
1	+5V	+5VDC external voltage input. Maximum rating is +6VDC. The power source should be able to provide 1A pulse current for at least 1ms.
2	IO1	Interruptible general purpose I/O. Used as an X3i module function button input. Voltage levels 0 to 3.3V. There is an internal pull-up resistor.
3	IO2	Interruptible general purpose I/O. Can be customized to control external devices or external signal input pin. Voltage levels 0 to 3.3V. There is an internal pull-up resistor.
4	GND	System Ground

Table 3

4.4 Firmware update (Procedure to be final)

The Firmware can be updated using the EDM.

4.5 Serial Port Interface

The X3i tag includes a UART interface. It transfers data at 19,200bps, 8-bits with no parity and one stop bit.

In order to send a command, the following process shall be applied:

1. Pull down the 'PROGEN' pin.
2. Wait two milliseconds.
3. Send the command message through the serial port.
4. Wait for the tag's response message.
5. Allow 15 milliseconds to receive the tag response.
6. Pull up the PROGEN pin.

The next sections will present specific commands that can be sent through the serial port for several practical applications.

4.5.1 Sending Telemetry Data through the Serial Port

In order to send telemetry data through the tag's serial port, apply the 'send data' command. The command structure is as follows:

Byte 0	Byte 1	Byte 2-17
1+data length in bytes (max=0x10)	0x67	User data (up to 15 bytes of data). As a result, the data will be transmitted by the tag in its payload.

The tag will then send the telemetry data through the Wi-Fi network as part of the tag's message payload. The tag will acknowledge sending the message through the serial port. The tag's acknowledgement has the following format:

Byte 0	Byte 1
1	0 x 0F

4.5.2 Retrieving the Tag Status through the Serial Port

In order to obtain the tag's status through the tag's serial port apply the 'get tag status' command. The command structure is as follows:

Byte 0	Byte 1
1	0 x 33

In this case, there will be no tag transmission. The tag will reply through the serial port with the following Get Status ACK message:

Byte 0	Byte 1	Byte 2-3	Byte 4	Byte 5
5	0 x 5	Tag Software Version Byte 2 - MSB Byte 3 - LSB	(Undefined)	Tag activation status: 0 x 00 Tag is non-active. 0 x FF Tag is active

4.6 Transport

All iTAG X3i must be transported and stored such that they are not subjected to excessive mechanical or temperature stresses.

4.7 Authorised persons

The iTAG X3i is provided semi-assembled module and must be handle with care. Only persons trained for the purpose are authorised to install the X3i module on the desired device. They must be familiar with the unit and must be aware of the regulation and provisions required for explosion protection as well as the relevant accident prevention regulations.

4.8 Maintenance

The iTAG X3i and all its components require no maintenance and are self-monitoring. Any work on the iTAG X3i must be carried out and performed by Extronics approved personnel.

The iTAG X3i module must not be subjected to excessive stresses e.g. vibration, shock, heat and impact.

5 Tag Specifications

Performance

Outdoor range: Up to 200m (656 feet)

Indoor range: Up to 60m (180 feet)

Physical and Mechanical

Dimensions: 27mm x 59mm x 9mm (1.1in x 2.32in x 0.35in)

Weight: 10g (0.35 oz)

Radio

802.11b/g radio compliant (2.4GHz)

RFID low frequency receiver (125kHz)

Transmission power: up to +19dBm, ~81mW

Clear channel sensing avoids interference with wireless networks.

Programmability

Transmission interval programmable, XX msec to XX hours

Wi-Fi channel programmable (1-13)

Wireless tag programming

Environmental Specifications

Temperature: -40°C to +80°C (-40°F to 176°F)

Electrical

Input: +5VDC

Average Consumption: 50µA when transmitting as 5-minute intervals.

Peak Current Consumption: 70mA

6 EU Declaration of Conformity

Reserved space

7 Applicable Standards

Reserved space

8 Manufacturer

The iTAG X3i is manufactured by:

**Extronics Ltd,
1 Dalton Way,
Midpoint 18,
Middlewich
Cheshire
CW10 0HU
UK**

**Tel. +44(0)1606 738 446
E-mail: info@extronics.com
Web: www.extronics.com**

9 FCC Statements

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.

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.

The user manual or instruction manual for an intentional or unintentional radiator shall caution the user that changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. The End user must follow the specific operating instructions for satisfying RF exposure compliance. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

10 Appendix 1

Image	Order reference