

# NeuraTrack™

## Rugged Intelligent Tracker

Track What's Important to You Using AI,  
Geolocation and Long-range Connectivity

Product Code: A3b7v01



## ∞ General Information

### Fields of Application

- Man Down alarm system
- Lone worker monitoring
- Personal Protective Equipment (PPE)
- Inertial tracker
- GPS tracker
- Human motion tracking
- Ambient parameters monitoring

### System Description

NEURATRACK is a low-power, wireless, GPS/GNSS, sensing tracker specifically designed and manufactured to be intrinsically safe according to ATEX specifications. The system features sub-1 GHz long range communication via LoRaWAN and short-range communication via Bluetooth Low Energy. It can measure accelerations, angular rates and 3D rotations thanks to the on-board accelerometer and gyroscope IMU sensor, as well as ambient temperature, pressure and magnetic fields. Optimized for tracking applications, NeuraTrack features on-board RTC and memory storage to operate as a black box unit with data logging capabilities, and a 90 dB siren to function as acoustic alarm. A standard micro-USB port is used to recharge the battery and to communicate via wire with the system. The product can be supplied with a rugged techno-polymer encapsulation for harsh environments. NeuraTrack is enhanced by the use of 221e proprietary algorithms and embedded AI software for man-down applications (NeuraSafe) or driving style recognition (NeuraDrive).

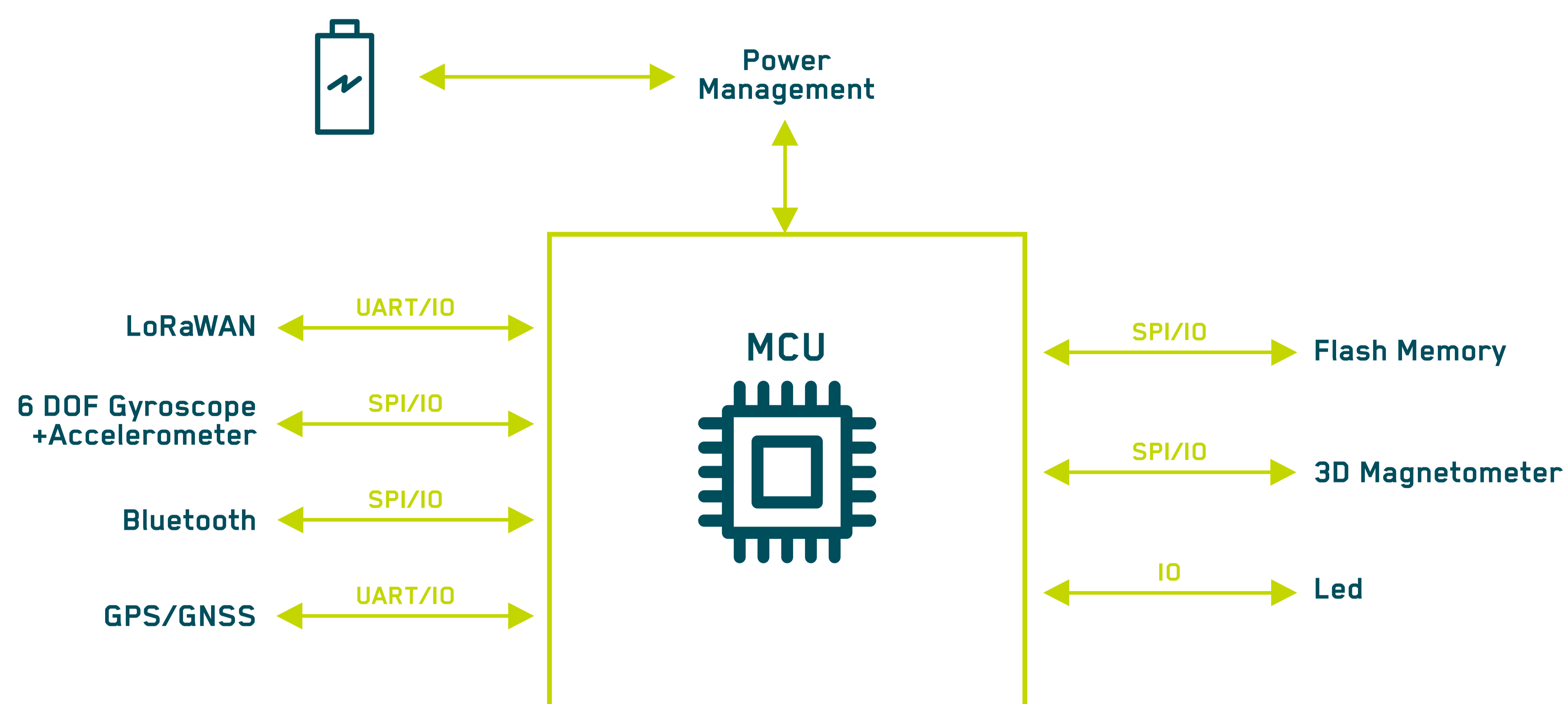
### System Summary

- Digital 3-axis Gyroscope (up to  $\pm 2000$  dps)
- Digital 3-axis Accelerometer (up to  $\pm 16g$ )
- Digital 3-axis Magnetometer ( $\pm 50$  gauss)
- Absolute pressure sensor (up to 126kPa)
- Absolute temperature sensor ( $\pm 1.5$  °C of accuracy)
- Real-Time Clock (tolerance  $\pm 20$  ppm)
- Integrated flash memory up to 1 Gbit
- Micro-USB , type B connector
- Rechargeable 3.7V Li-ion battery
- Bluetooth 4.2 low energy connectivity
- LoRaWAN connectivity
- GNSS receiver
- Magnetic Buzzer Transducer, 92dBA at 10 cm
- Intrinsically safe design for ATEX certification compliance

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## ∞ Block Diagram



## ∞ Ordering Information

Product number	Description
221e-A3b7v01	Wireless tracker

## ∞ Contact Information

For the latest specifications, additional product information, worldwide sales, and distribution locations, as well as information about 221e:

• *Web:* [www.221e.com](http://www.221e.com)

• *Email:* [info@221e.com](mailto:info@221e.com)

• *For technical questions:* [support@221e.com](mailto:support@221e.com)

## ∞ Certification

NeuraTrack is CE certified. CE conformity corresponds to the device being in compliance with the following European directives: ElectroMagnetic Compatibility (Directive 2014/30/EU), Radio Equipment Directive (Directive 2014/53/EU) and Safety (Low Voltage Directive 2014/35/EU). Bluetooth qualified module: CE, FCC, IC certified.

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### ∞ System Specifications

#### Microcontroller

Core	→	Arm® Cortex®-M4
Frequency	→	Up to 80 MHz

#### Data Storage

Data Memory	→	1 Gbit
Memory Type	→	NAND Flash

#### Communication Interface

Wired	→	USB 2.0, type B connector
Wireless	→	Bluetooth Low Energy v4.2
Wireless	→	868 MHz LoRa Wan communication

#### User Interaction

Visual	→	Blue LED
Acoustic	→	Buzzer
Touch	→	Button

### Embedded Software Libraries

#### MPE - Motion Processing Engine

MPE library enables IMU sensor fusion algorithm to estimate device orientation based on the input of linear accelerations (3-axis accelerometer) and angular velocities (3-axis gyroscope). Orientation is provided in quaternion form and it is referred to the earth gravity reference frame. The library includes logics and procedures for offset calibration of sensors, and the tuning of the internal Kalman filter.

#### NeuraSense

NeuraSense is a set of intelligent sensing libraries optimized for the edge. It provides real-time inertial sensor data analytics for activity tracking, man down detection, vehicle monitoring and vibration analysis.

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### Sensors - Raw Data

Inertial Sensor	
ACCELEROMETER	
Measurement range	±2 / ±4 / ±8 / ±16 / ±32 g
Sensitivity	0.061 / 0.122 / 0.244 / 0.488 mg/LSB
ODR	max 50 Hz
GYROSCOPE	
Measurement range	±125 / ±250 / ±500 / ±1000 / ±2000 dps
Sensitivity	4.375 / 8.75 / 17.50 / 35 / 70 mdps/LSB
ODR	max 50 Hz
MAGNETOMETER	
Measurement range	±50 Gauss
Sensitivity	1.5 mGauss/LSB
ODR	max 50 Hz

Environmental Sensor	
TEMPERATURE	
Measurement range	-40 °C - +85 °C
Accuracy	±1.5 °C
BAROMETER	
Measurement range	260 -1260 hPa
Sensitivity	±0.5 hPa

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### Electrical Specification

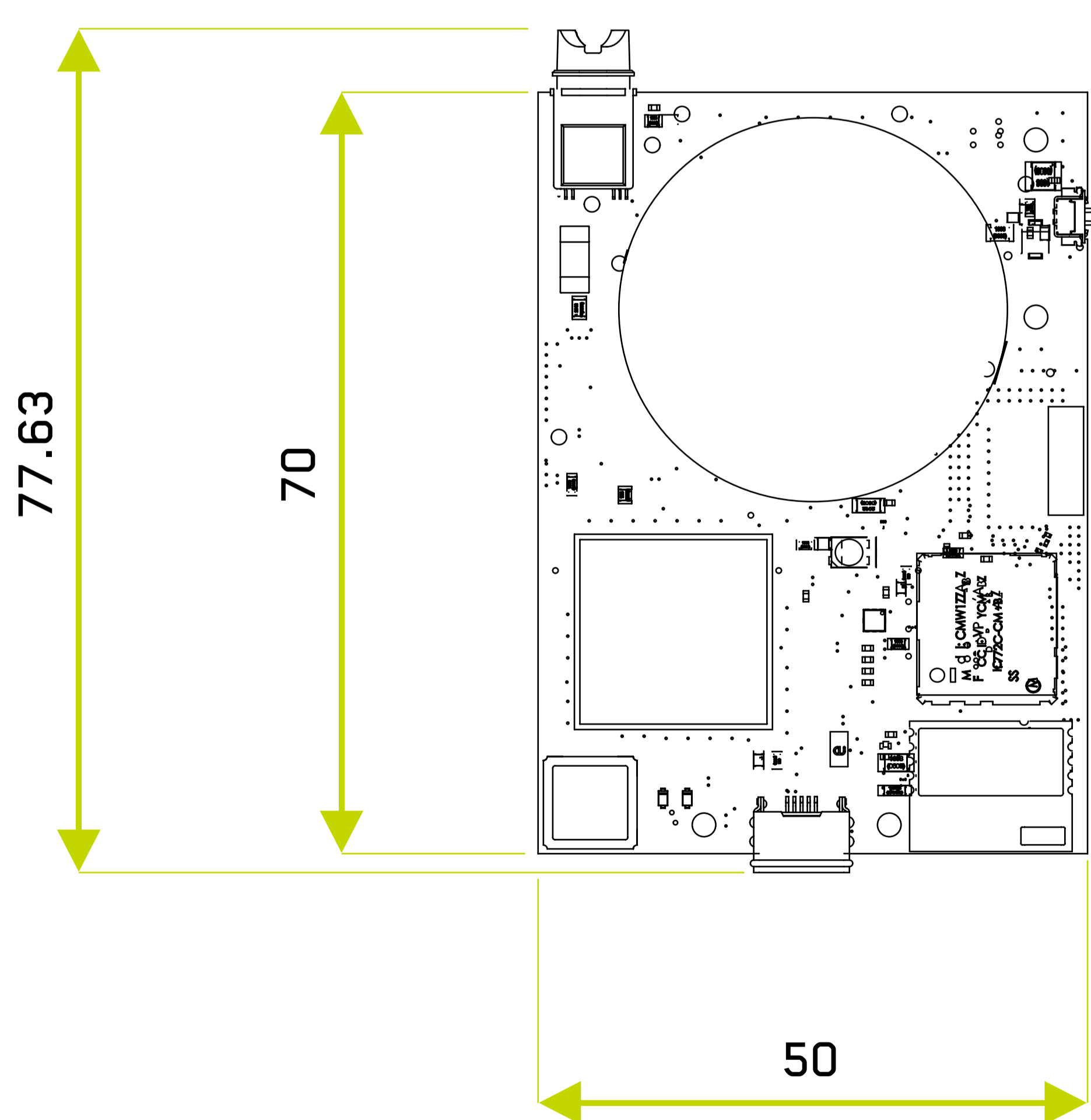
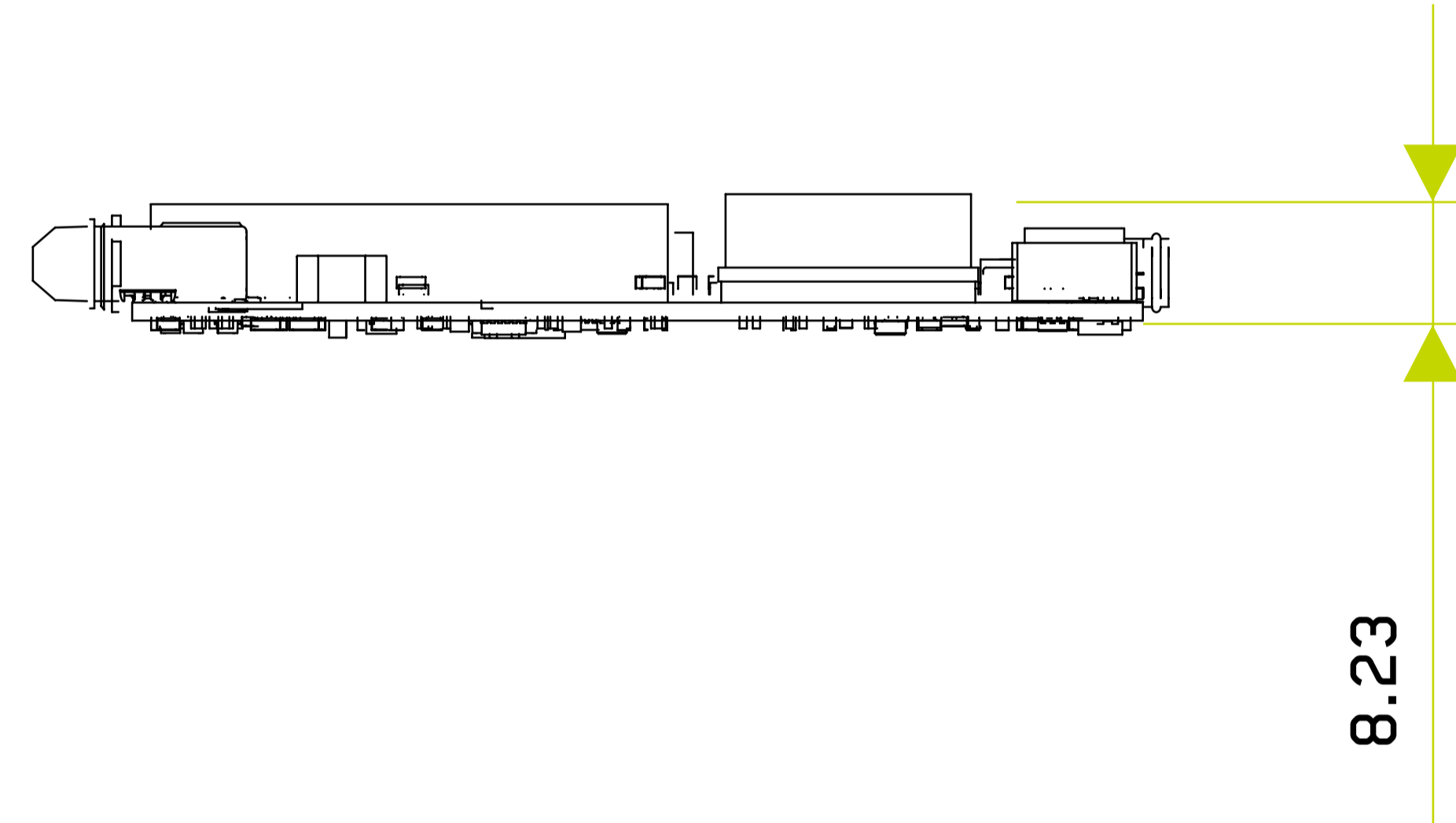
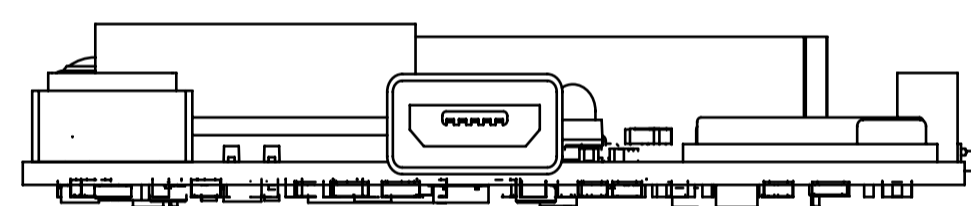
Power Supply	
BATTERY (LI-ION BATTERY)	
Core voltage	3.3 V - 4.2 V
Capacity	500 mAh
Full charge time	7.5 hr
USB	
Core voltage	5 V
Absolute Maximum Rating	
Rated voltage	6.5 V
Protection Circuit	
Cell protection	Over-charge, Over-discharge
Input protection	Over-voltage, Reverse-voltage detection
Power Consumption	
Standby	13 $\mu$ A
Run	2 mA
Temperature Range	
Minimum / Maximum	-20°C - 60 °C

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## Mechanical Specification

Mechanical Dimension	
Board	50 W x 70 L x 10 H mm
Weight	
Board	2 gr



Board dimension in mm.

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### Faqs & Further Informations

**Q: What is the duration of the memory? For how long can I save data?**

**A:** The internal memory dedicated to data is 1 Gbit. The duration of a log is limited by the memory (assuming the battery is charged) and is around 60 hours.

**Q: How long will it take to download my saved files?**

**A:** That depends on how big the file is. The entire memory can be downloaded in around 15 minutes.

**Q: How can I control the system?**

**A:** The system can be configured and controlled via Bluetooth commands. A documentation of the protocol is provided alongside the system. Contact [info@221e.com](mailto:info@221e.com) for more information.

**Q: How can I recharge the system?**

**A:** The system can be recharged by connecting it via a standard micro USB cable. To ensure full compatibility with the ATEX certification, the battery recharge rate is limited, and the system will reach full charge in about 7 hours.

**Q: How can I save power when I'm not using the system?**

**A:** The system, if not connected via Bluetooth, will automatically enter standby after 30 seconds of inactivity. The system will keep up the Bluetooth advertising in order to allow the system to wake up. The user should connect to the Bluetooth device in order to wake it and start a log.