pytrack 2.0 X

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USB serial
port

JST connector
for LiPo
battery

Battery charging
in progress
indication
LED

USB to
serial
converter

Lithium battery
charger
4.2V/ 450mA

Sensor connector

Accelerometer

Active antenna
jumper

Tact switch RESET
(MCLR)

GLONASS
GPS

Micro SD
slot

SMA GPS
Antenna
connector

Tactile switch
for Safe boot

GPS Chip
Antenna

Size
57(L)mm x40(W)mm x10(H)mm (excluding headers)

1.0   Overview

The PyTrack is a GPS receiver board that comes in the shape of a shield. It's got the well-known form factor from our other shields and you can connect your much loved WiPy, LoPy or GPy to it. Hook in your Pycom development boards up and you have yourself a nifty little decentralized IoT network in one go. PyTrack also fits inside the Universal IP67 Case so you don't have to limit yourself to indoors. There is a new sensor header to attach sensors and SMA connector for external GPS antennas. Connect a WiPy,

LoPy or a GPy to this shield anhave yourself multiple sensors for your smart application in IoT.

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2.0 Features

- GNSS module receiver with multiple GNSS systems supported as GPS or GLONASS
- 3 axis 12-bit accelerometer
- Compatible with development board as WiPy, FiPy, GPy and LoPy
- Ultra-low power standby mode
- Powered via USB or LiPo Battery
- JST header 2mm pitch for PHR-2 battery connector (pin 1 [+], pin 2 [-]
- Sensor header for sensors as temperaterature, motion or fingerprint
- SMA connector with auto mechanical switch for external GPS antenna (external antenna not included)

- USB to serial connection for the Pycom module with auto-programming features
- MicroSD card compatibility
- Same form factor as PyTrack
- Dimensions: 57mm (L) x 40mm (W) x 10mm (H)
- Fits the 'IP67 Case for Pysense/Pytrack' for outdoor use
- Use with PyBytes platform to gather, organise and display your data free of charge in the cloud
- LiPo battery charging (BQ24040) via the USB port or Ethernet PoE daughter board

3.0 Specifications

3.1 Hardware configuration

- GNSS module from Quectel, L76-L. 33 tracking and 99 acquisition channels. Low power of 18mA and high sensitivity -165dBm @Tracking and -148dBm @Acquisition
- 3-axis linear accelerometer LIS2HH12. Full scales of ±2g/±4g/±8g and is capable of measuring accelerations
- Ultra low power standby mode allows backup battery operation
- Same form factor as the PySense
- Compatible with WiPy, GPy and LoPy
- USB to serial connection for the Pycom module with auto-programming features
- Micro SD card reader
- SMA connector for external GPS antenna with internal mechanical switch

3.2 Power supply options:

- Micro USB
- LiPo or Li-Ion battery of 3.7V
- LiPo battery charging via the USB at 4.2V and 450mA

3.3 Signals available on headers

- Power GND, 3V3 and 3V3AUX lines
- RUN pin to switch off/on the power of Pycom Module (VCC)
- 5x external input/output pins

3.4 Wireless connectivity options

- WiFi and Bluetooth: In combination with the WiPy, LoPy or the GPy
- LTE: In combination with the GPy
- LORA using LoPy or FiPy

3.5 Absolute maximum ratings:

- Industrial temperature range: -40 to +85 °C
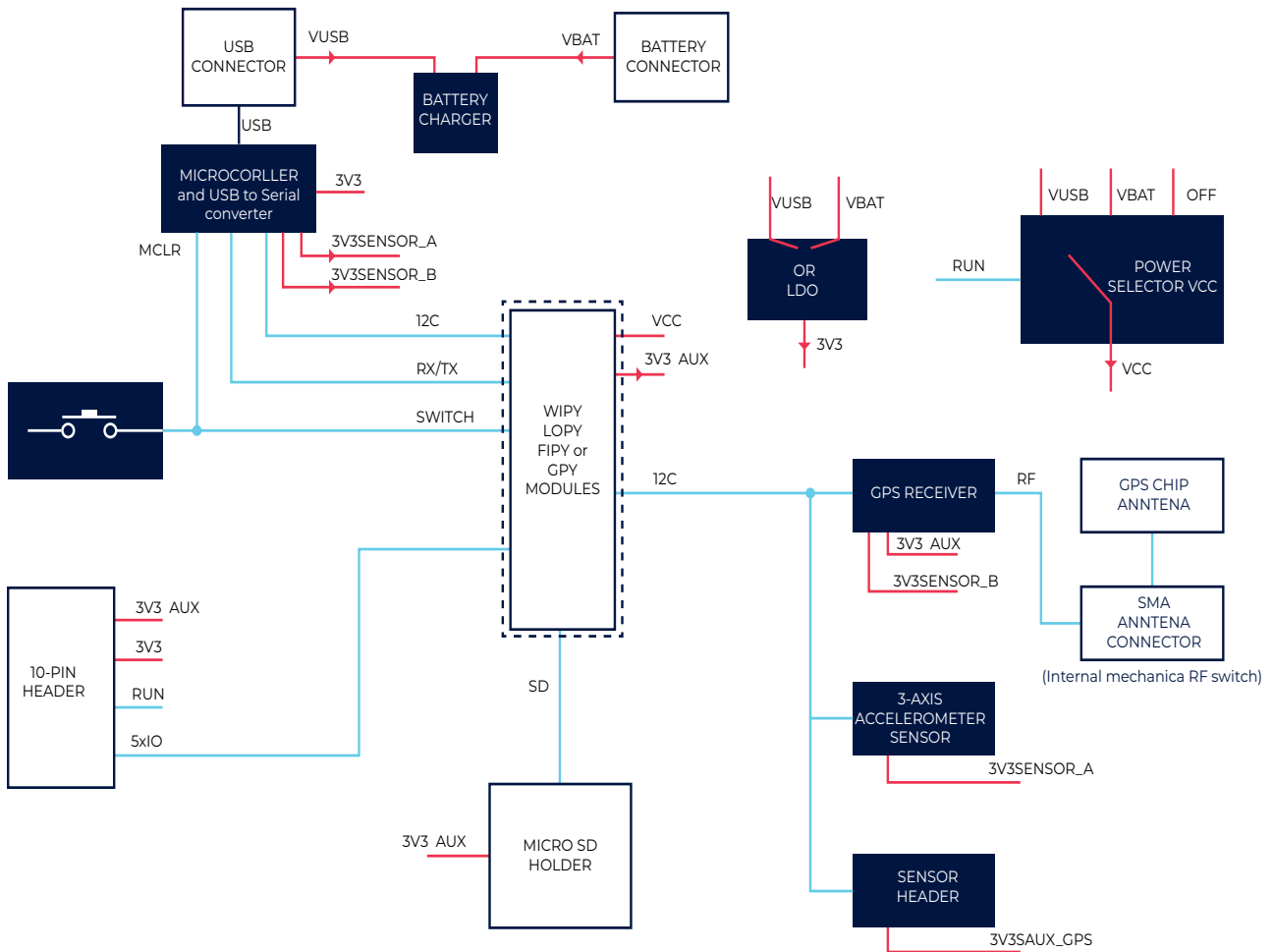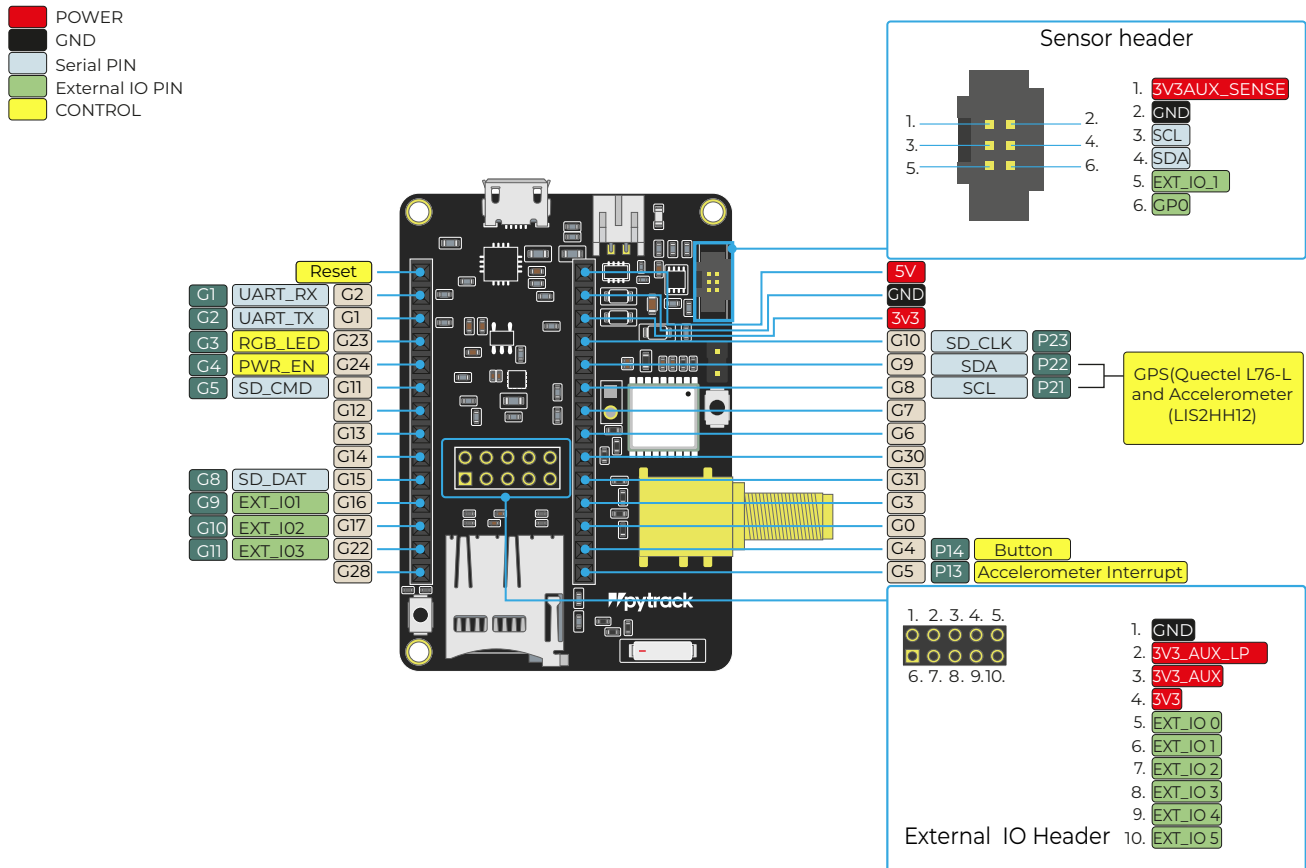
4.0   Block Diagram

Figure 1 – PyTrack Block diagram

Note: * in dashed outline shown modules plugged

   ** Some functions requieres external components as the development board, SD card, USB cable and battery (not included)

5.0   Pinout

Legend:
- POWER
- GND
- Serial PIN
- External IO PIN
- CONTROL

Sensor header
1. 3V3AUX_SENSE
2. GND
3. SCL
4. SDA
5. EXT_IO_1
6. GP0

Board pins (left):
Reset
G1 UART_RX G2
G2 UART_TX G1
G3 RGB_LED G23
G4 PWR_EN G24
G5 SD_CMD G11
G12
G13
G14
G8 SD_DAT G15
G9 EXT_IO1 G16
G10 EXT_IO2 G17
G11 EXT_IO3 G22
G28

Board pins (right):
5V
GND
3v3
G10 SD_CLK P23
G9 SDA P22
G8 SCL P21
G7
G6
G30
G31
G3
G0
G4 P14 Button
G5 P13 Accelerometer Interrupt

GPS(Quectel L76-L and Accelerometer (LIS2HH12)

External IO Header
1. 2. 3. 4. 5.
6. 7. 8. 9.10.
1. GND
2. 3V3_AUX_LP
3. 3V3_AUX
4. 3V3
5. EXT_IO 0
6. EXT_IO 1
7. EXT_IO 2
8. EXT_IO 3
9. EXT_IO 4
10. EXT_IO 5

5.1   Lithium battery connector pinout

+BATT   BATTERY
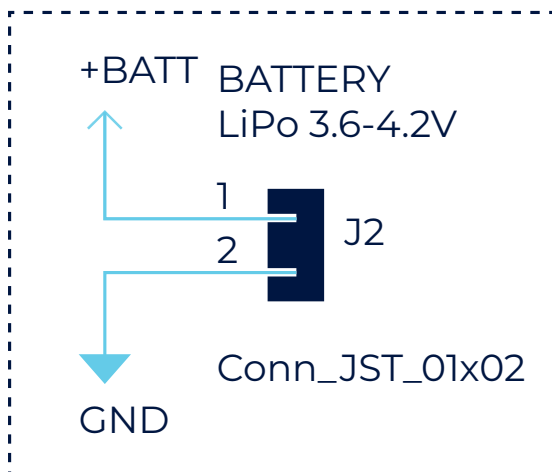LiPo 3.6-4.2V

1
2   J2

Conn_JST_01x02

GND

Figure 2 – JST (S2B-PH-K-S) Header to Lithium battery

5.2   Module (WiPy, GPy or LoPy) socket pinout
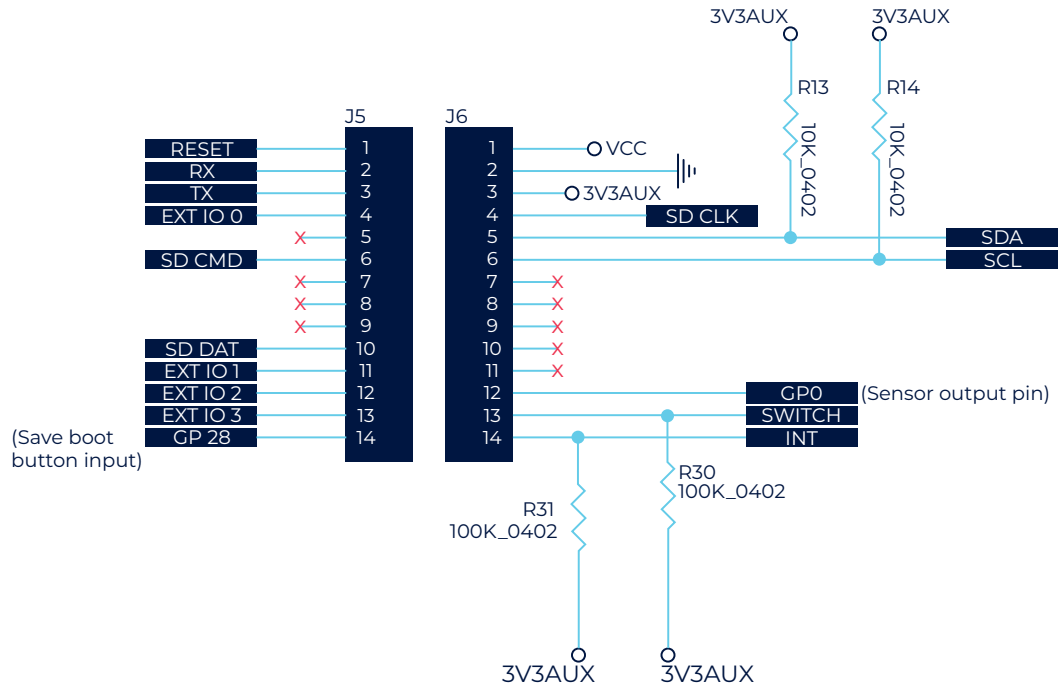
Figure 3 –   Socket to Pycom module

5.3 External IO Header pinout

J4

Pin	Signal
1	
2	O 3V3AUX_LP
3	O 3V3AUX
4	O 3V3
5	EXT IO 0
6	EXT IO 1
7	EXT IO 2
8	EXT IO 3
9	EXT IO 4
10	EXT IO 5

CON 10
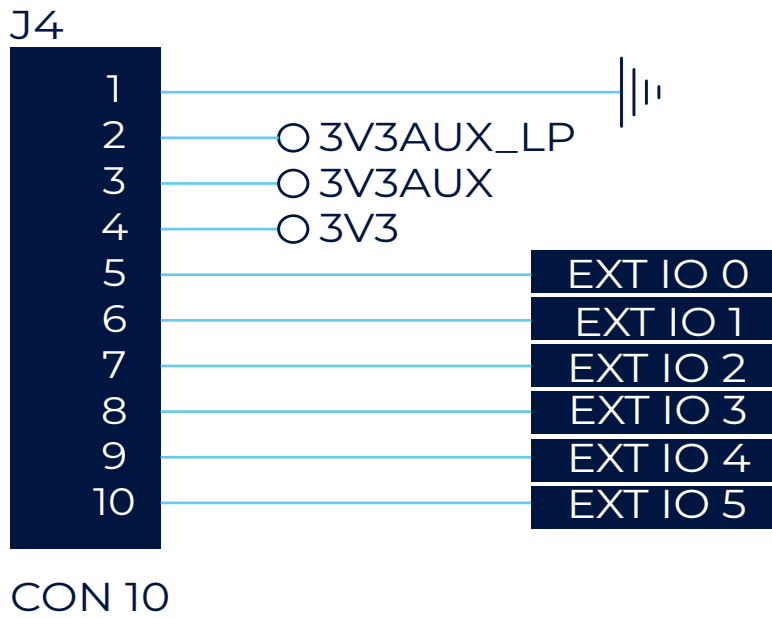
5.4 Sensor header connector P2 (PYPORT)

COMM PORT 'PyPort'

3V3AUX_ GPS

3V3
4K7_0402

3V3AUX_ GPS   P2

	1	2	
SCL	3	4	SDA
EXT IO 1	5	6	GP0

PORT 3X2

Figure 5 – Header for external sensors

6.0　Pin Details

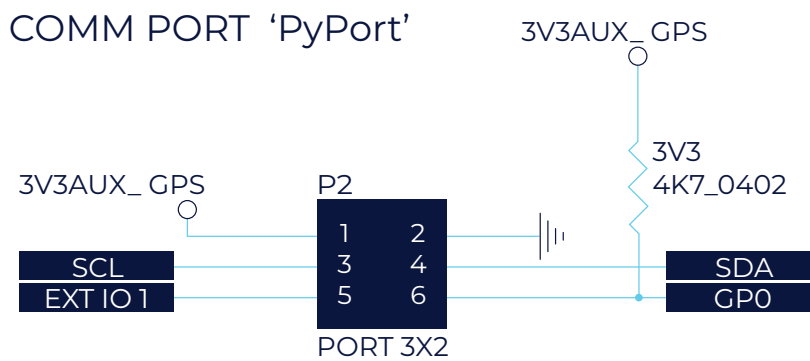### 6.1　Lithium battery connector pinout

Table 1 – J2 Battery connector pins

Module Pin	Pin Name	Type	Description
1	+BATT	Power In(+3.7V)	Power comming from Lithium Polymer battery
2	GND	Power(GND)	Ground

6.2　Module (WiPy, GPy or LoPy) socket pinout

Table 2 – J5 socket to a Pycom module

Module Pin	Pin Name	Type	Description
1	RESET	Output	Pycom Module reset, active low
2	UART_RX	Output	Module UART RX used for communication with PC and to program module in bootloader mode
3	UART_TX	Input	Module UART TX used for communication with PC and to program module in bootloader mode
4	EXT_IO_0	Input	Port RC0 from PIC16LF1459 microcontroller
5	-	-	-
6	SD_CMD	Input	SD card Command line
7	NC	Floating	Reserved
8	NC	Floating	Reserved
9	NC	Floating	Reserved
10	SD_DAT	Input	SD card data line

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Module Pin	Pin Name	Type	Description
11	EXT_IO_1	Input	Input/ouput pin. Pycom Module pin 11 and to PIC pin RC1
12	GP0	Input	Sensor pin for interruption
13	EXT_IO_3	Input	Input/ouput pin. Pycom Module pin 13
14	GP28	Input	Safe boot button

Table 3 – J6 socket to a Pycom module

Module Pin	Pin Name	Type	Description
1	VCC	Power Out (+VCC)	VCC is combined power from three sources, USB, Power-over-Ethernet or Lithium battery. Once USB and PoE power is not available lithium battery will supply the PyGate, else the battery will be charged with charging current 450mA.
2	GND	Power (GND)	Ground
3	3V3_MOD	Power Input (+3.3V)	Power coming from the Pycom module voltage regulator +3.3V
4	SD_CLK	Input	SD card clock line
5	SDA	Input	I2C SDA line
6	SCL	Input	I2C SCL line
7	NC	Floating	Reserved
8	NC	Floating	Reserved
9	NC	Floating	Reserved
10	NC	Floating	Reserved
11	NC	Floating	Reserved
12	NC	Floating	Reserved
13	SWITCH/MCLR	Output	Connected to tactile switch and MCLR of PIC as RESET button
14	INT	Input	Accelerometer interruption

6.3 Module (WiPy, GPy or LoPy) socket

Table 4 – J4 10-pin header

Module Pin	Pin Name	Type	Description
1	GND	Power (GND)	Ground
2	3V3AUX_LP	Power +3V3	Power supplied to SD card
3	3V3AUX	Power +3V3	Output power from Pycom Module
4	3V3	Power +3V3	3V3 generated by LDO
5	EXT_IO_0	IO	Input/ouput pin. Pycom Module pin 4 and to PIC pin RC0
6	EXT_IO_1	IO	Input/ouput pin. Pycom Module pin 11 and to PIC pin RC1
7	EXT_IO_2	IO	Input/ouput pin. Pycom Module pin 12 and to PIC RC3
8	EXT_IO_3	IO	Input/ouput pin. Pycom Module pin 13
9	EXT_IO_4	IO	Input/ouput pin. Pycom Module pin 6 and to SD_CMD
10	EXT_IO_5	IO	Input/ouput pin. Pycom Module pin 10 and to SD_DAT
11	EXT_IO_1	Input	External WiFi/BT antenna switch, Low = on–board, High = U.FL

Plug Jumper in P3 to supply power to GPS_ANT

Figure 6 – Jumper to connect or disconnect the power to the GPS external antenna

6.4   Sensor Header

Table 5 – Sensor Header

Module Pin	Pin Name	Type	Description
1	3V3AUX_SENSE	Power (3V3)	Supplied by Pycom module
2	GND	Power (GND)	Ground
3	SCL	I2C Clock	I2C communication bus, clock pin
4	SDA	I2C Data	I2C communication bus, data pin
5	EXT IO _1	GPIO	Pycom Module Input and output pin
6	GP0	Input pin	Pycom Module Input only pin

7.0   Software overview

For Software and Firmware usage and configuration please check:

http://docs.pycom.io/pytrackpysense/

8.0   Programming the device

8.1   UART

By default, the modules run an interactive python REPL on UART0 which is connected to P0 (RX) and P1 (TX) running at 115200 baud. The easiest way to connect to the WiPy is via our expansion board, but any USB UART adapter will suffice. Code can be run via this interactive REPL or you can use our PyMakr plugin for Atom or Visual Studio Code to upload code to the board.

8.2   Wi–Fi

By default, the WiPy also acts as a Wi–Fi access point.
SSID: wipy–wlan–XXXX
Password: www.pycom.io

Once connected to the WiPy's Wi–Fi network you can access it in two ways.

8.3   Telnet

Running on port 23 is a telnet server. This acts in a very similar way to the UART. It presents you with an interactive REPL and can also be used to upload code via PyMakr.

8.4   FTP

The WiPy also runs a FTP server that allows you to copy files to and from the device, include an SD card if one is connected. To connect to this FTP server, you need to use plain FTP (un–encrypted) with the following credentials:
User: micro
Password: python

9.0   Power

The Pytrack features 2 ways of powering:

1. microUSB connector, that takes 3.5V – 5.5V

2. JST battery connector, that takes 3.6 - 4.2V

9.1   Current consumption

The current consumption is measured when the board

is powered at 3.75V, on the JST battery connector

Table 5 – Power consumption

Mode	Min	Average	Max	Units
Active (GPS + accelerometer)	-	14	-	mA
Sleep*	-	9	-	uA

* Software details how to put Pytrack in Sleep mode are here:

https://docs.pycom.io/pytrackpysense/apireference/sleep/

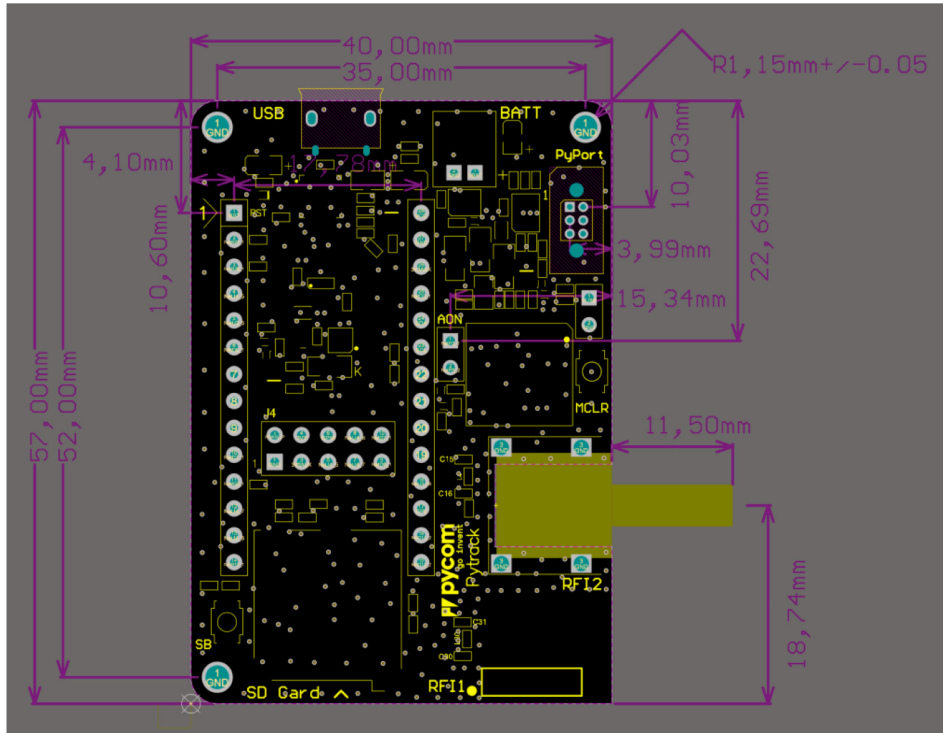## 10.0   Mechanical Specifications

Figure 7 – Mechanical Specifications
PCB thickness 1.6mm. Header height 5mm.

11.0 Ordering Information

Table 6 – Ordering information

Product EAN	Description	Bundle	Contents
604565286017	New Pytrack with GPS (incl. stnd by mode) and Accelerometer 6pin connector and SMA connector for external GPS and power down facility	-	-

For more product accessories like expansion board or cases visit our website: http://www.pycom.io
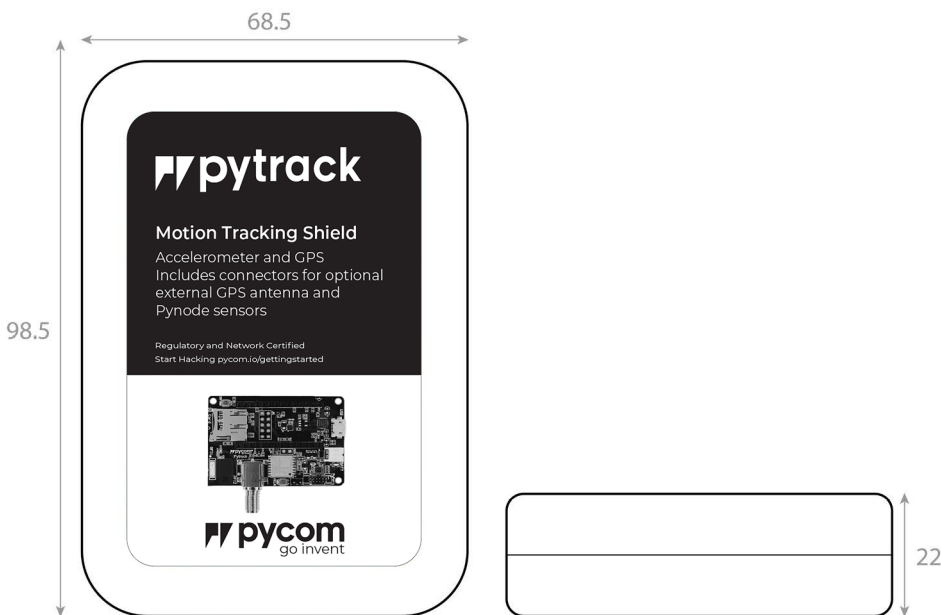
12.0 Packaging

Figure 8 – Mechanical drawing of packaging – Units: mm

The module will come inside a reusable anti–static bag. If the module has headers it will also be inserted into anti–static foam.

Total weight inc. packaging (with headers): 31g

Total weight inc. packaging (without headers): 29g

13.0 Certification

-

14.0 Revision History

Table 7 – Document revision history

Version 1.0	Initial Release
Rev 0.1 / 23.06.2020	First draft