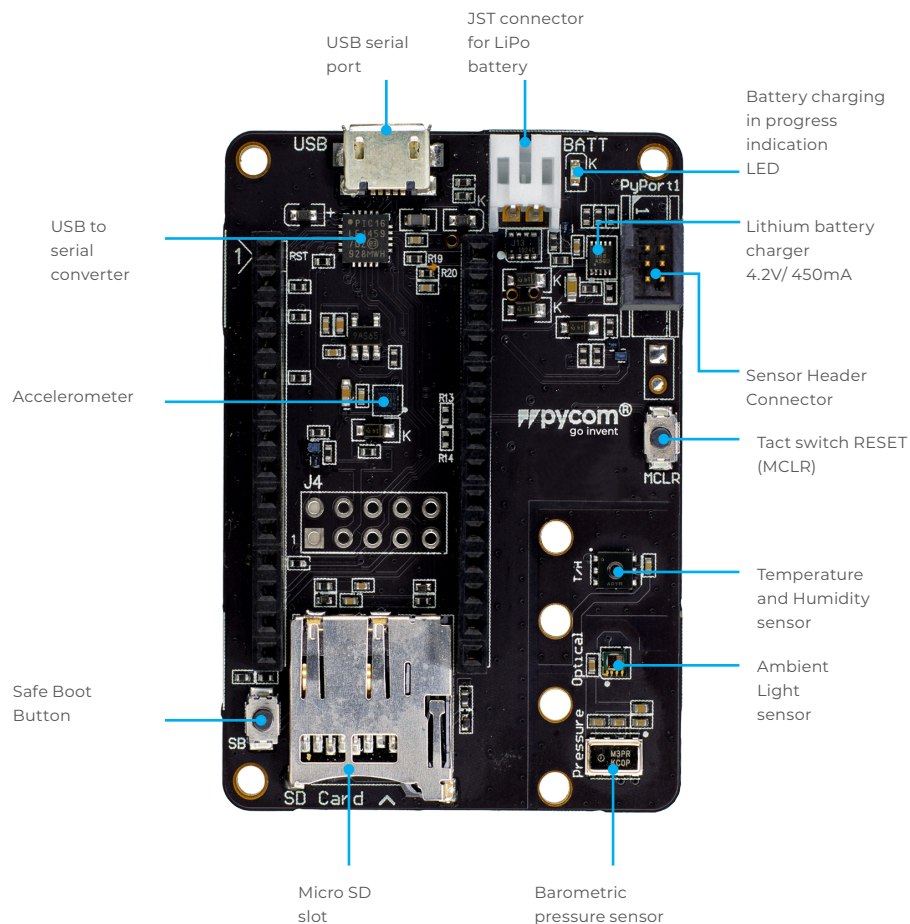


pysense **2.0 X**

Datasheet
Version 1.0

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Size

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

1.0 Overview

The Pysense is a multi sensor 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 a GPy to it. Hook in your Pycom development boards up and you have yourself a nifty little decentralized IoT network in one go. Pysense also fits inside the Universal IP67 Case so you don't have to limit yourself to indoors.

Connect a WiPy, LoPy or a GPy to this shield and you have yourself multiple sensors for your smart application in IoT. You can also update your Pysense with sensors as temperature, motion or fingerprint sensor

2.0 Features

- Sensor header to attach different sensors
- Ambient light sensor
- Barometric pressure sensor
- Humidity
- 3 axis 12-bit accelerometer
- Temperature sensor
- Compatible with development board as WiPy, FiPy, GPy and LoPy
- Ultra-low power standby mode
- Powered via USB or LiPo Battery connector (pin 1 [+], pin 2 [-])
- JST header 2mm pitch for PHR-2 battery
- LiPo battery charging (BQ24040) via the USB port or Ethernet PoE daughter board
- 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

3.0 Specifications

3.1 Hardware configuration

- Temperature and humidity sensor SI7006. Temperature accuracy $\pm 1^\circ\text{C}$ in the range of -10 to 85°C . Humidity 0 to 100% RH operating range
- Optical sensor LTR-329ALS. It provides a linear response over a wide dynamic range from 0.01 lux to 64k lux
- Pressure sensor with altimeter. Calibrated operating range of 20 kPa to 110 kPa absolute pressure. Altitude from -698 to $11,775$ m
- 3-axis linear accelerometer LIS2HH12. Full scales of $\pm 2\text{g}/\pm 4\text{g}/\pm 8\text{g}$ and is capable of measuring accelerations
- Ultra low power standby mode allows backup battery operation
- Same form factor as the Pytrack
- Compatible with WiPy, GPy and LoPy
- USB to serial connection for the Pycom module with auto-programming features
- Micro SD card reader
- 6pin header for sensor connectivity (I2C and +3V3)

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 $+85^\circ\text{C}$

4.0 Block Diagram

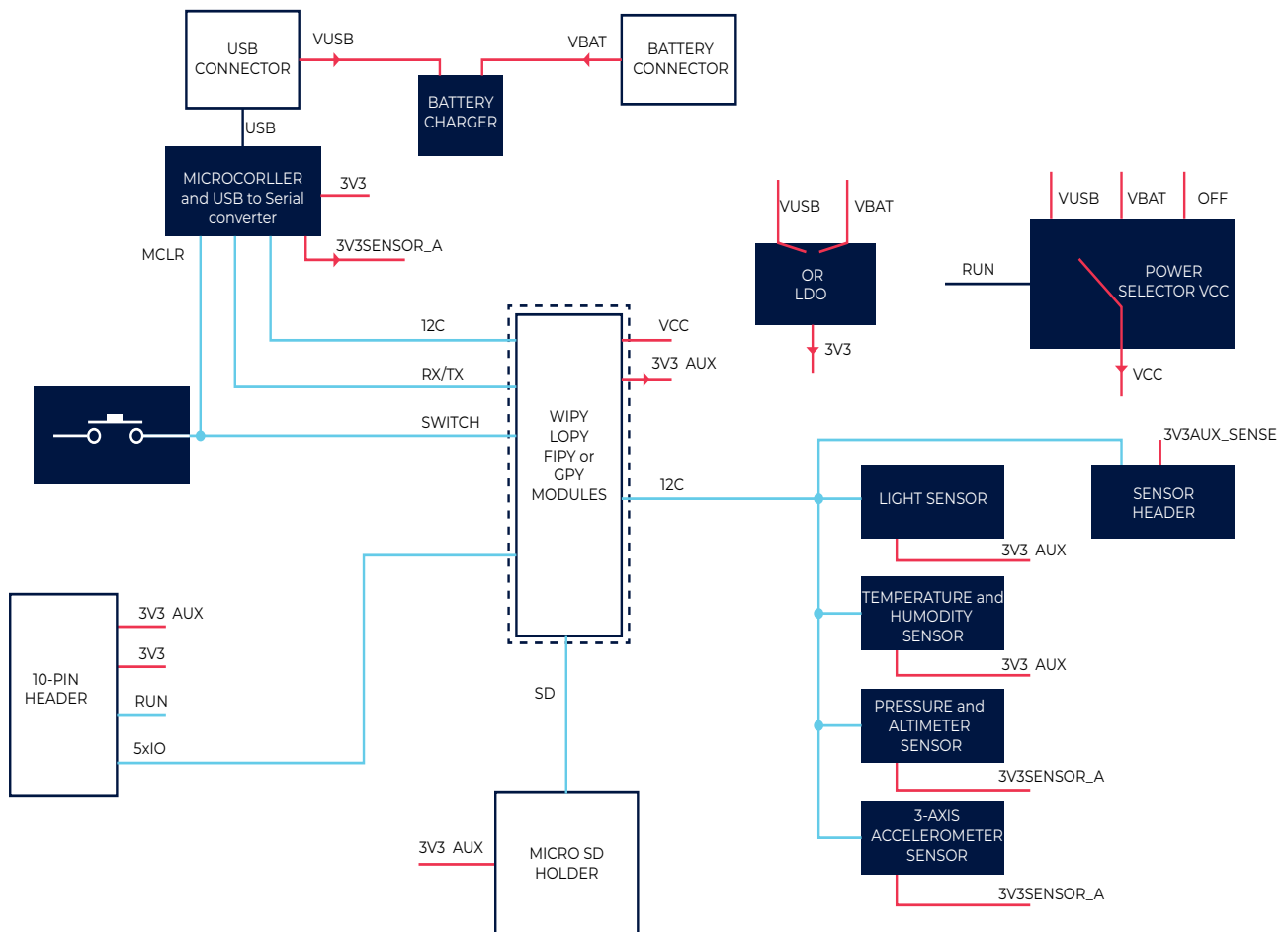
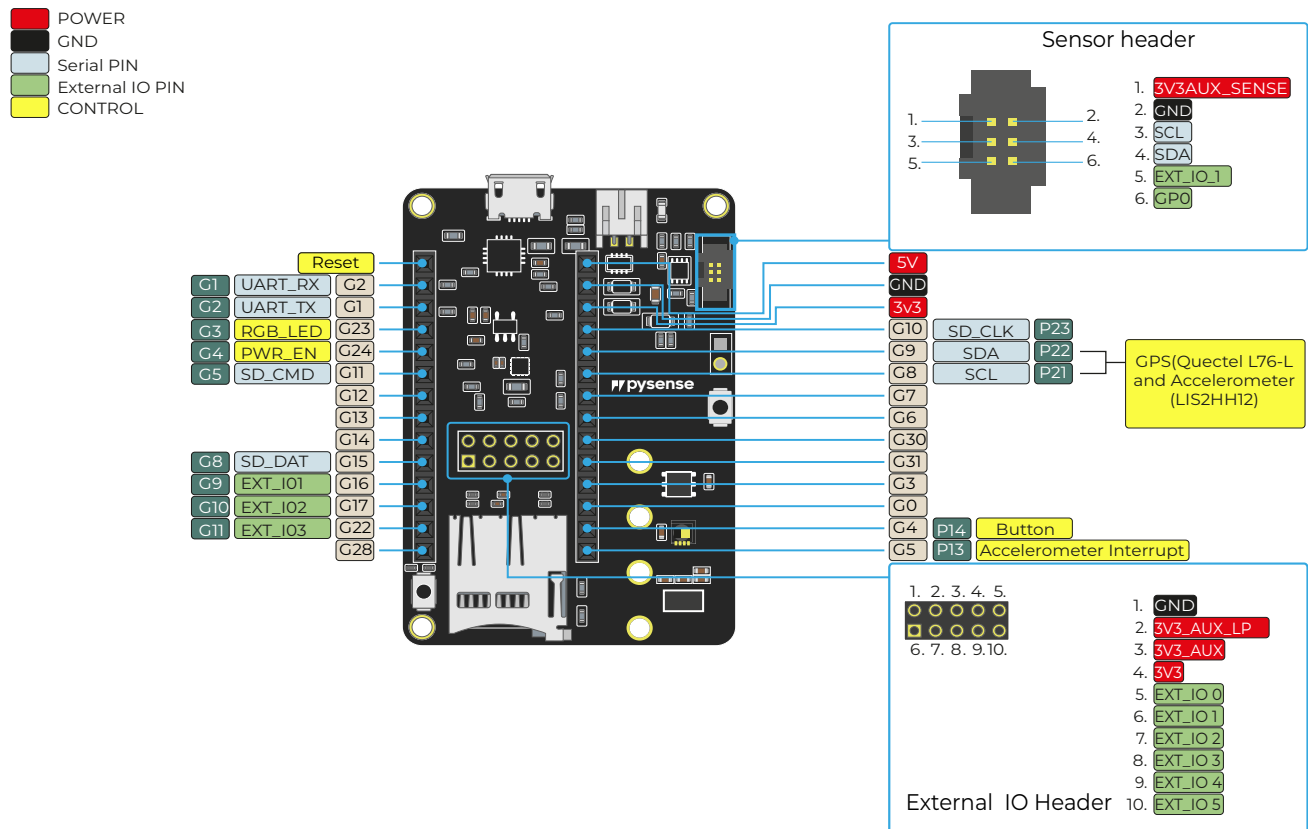


Figure 1 – PySense Block diagram

Note: * in dashed outline shown modules plugged

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

5.0 Pinout



5.1 Lithium battery connector pinout

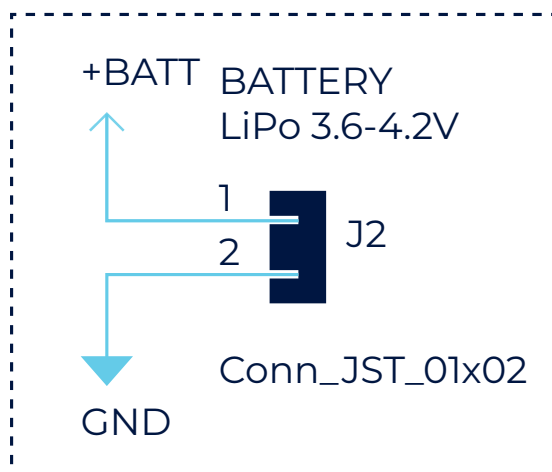


Figure 2 – JST (S2B-PH-K-S) Header to Lithium battery

5.2 Module (WiPy, GPy or LoPy) socket pinout

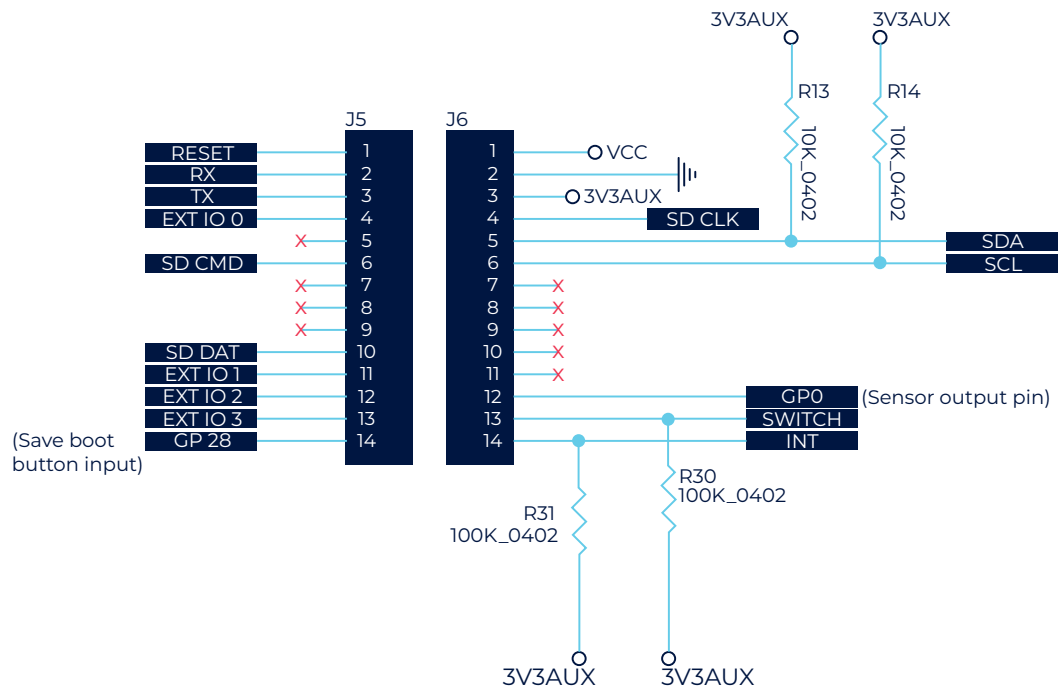


Figure 3 – Socket to Pycom module

5.3 External IO Header pinout



Figure 4 – Header with IO header

5.4 Sensor header connector

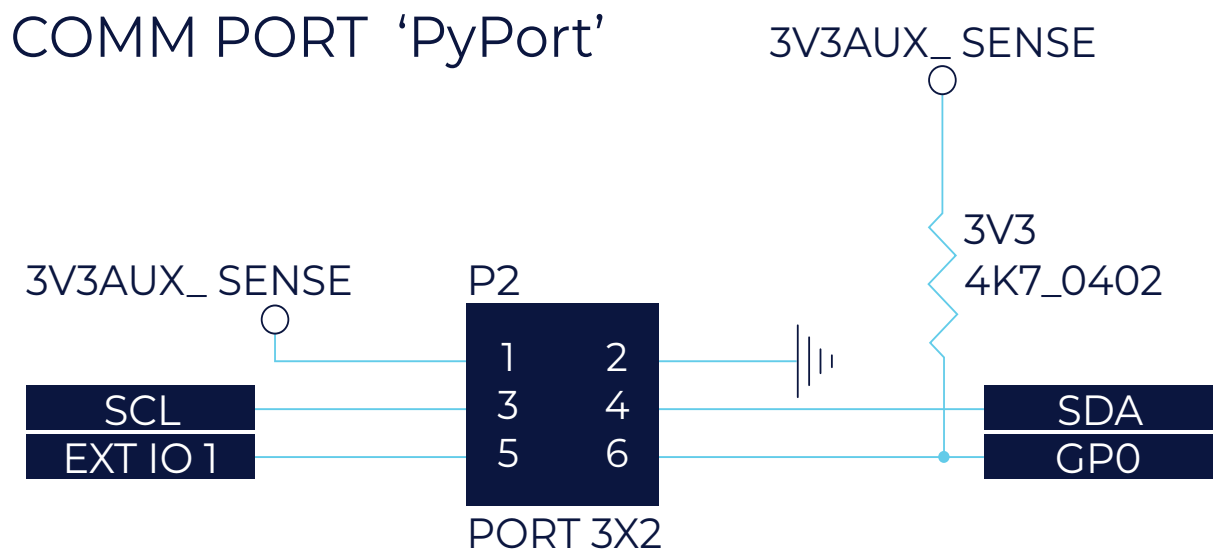


Figure 5 – Header for external sensors

6.0 Pin Details

The tables below provide description of the pins.

Pin direction given from PySense board point of view.

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 coming 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

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 pinout

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/output pin. Pycom Module pin 4 and to PIC pin RC0
6	EXT_IO_1	IO	Input/output pin. Pycom Module pin 11 and to PIC pin RC1
7	EXT_IO_2	IO	Input/output pin. Pycom Module pin 12 and to PIC RC3
8	EXT_IO_3	IO	Input/output pin. Pycom Module pin 13
9	EXT_IO_4	IO	Input/output pin. Pycom Module pin 6 and to SD_CMD
10	EXT_IO_5	IO	Input/output 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
–	–		Sigfox radio interrupt
–	–		Sigfox radio chip select

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 Pysense 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 – Ordering information

Mode	Min	Average	Max	Units
Active (all sensors)	-	7	-	mA
Sleep*	-	9	-	uA

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

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

10.0 Mechanical Specifications

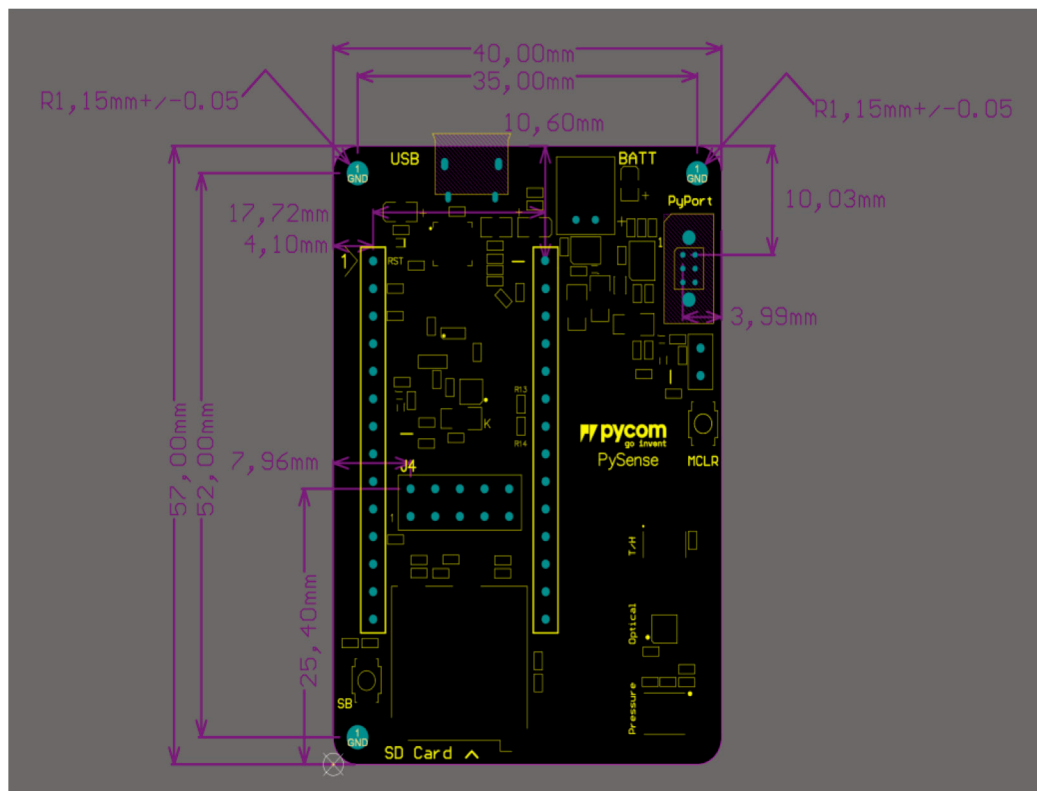


Figure6 – Mechanical Specifications
PCB thickness 1.6mm. Header height 5mm.

11.0 Ordering Information

Table 6 – Ordering information

Product EAN	Description	Bundle	Contents
604565286024	New Pysense with Accelerometer, humidity, pressure, temperature and light sensor incl. 6pin connector and power down facility	-	-

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

12.0 Packaging

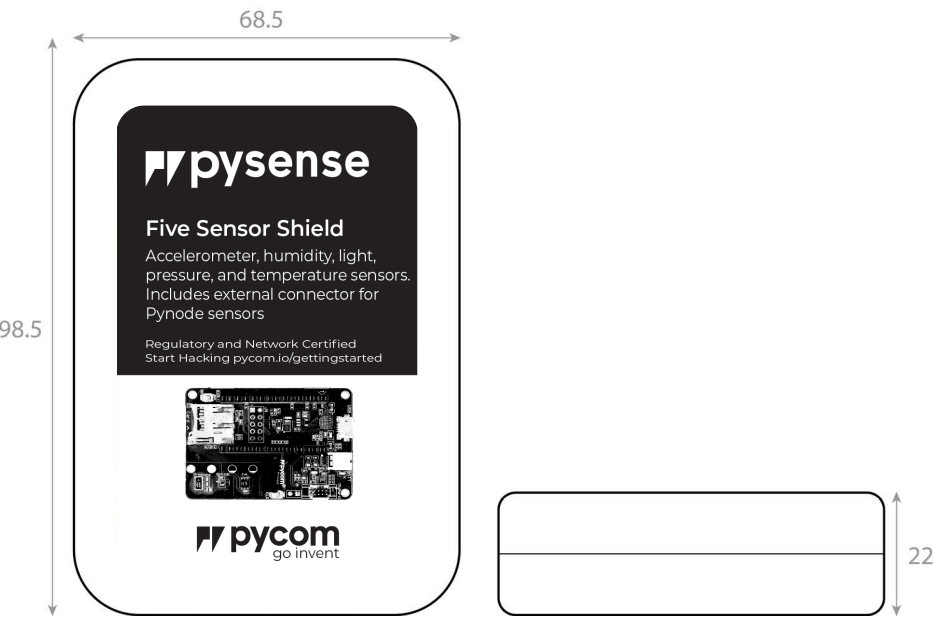


Figure 7 – Mechanical drawing of packaging – Units: mm

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 / 23.06.202	First draft