

# Lopy4

## Prise en main

Jacques Chambon

<https://github.com/jacquesChambon/Lopy4>



# Atelier Lopy4

- Rappel sur les ateliers SoFab « IOT »
- Présentation Lopy4
  - Description, architecture, caractéristiques
  - Préparation Hardware/Software
  - TP

# Prochains ateliers SoFab « IOT » (à confirmer)

- Jeudi 11/04 : Lopy4 (Jacques Chambon)
- mardi 23/04 : Lora/Sigfox sur Lopy4 (Rémi Jolin)
- mercredi 24/04 : The Things Network (TTN) (Fabien Ferrero)
- Jeudi 25/04 : Présentation Busit (Guillaume Meriel)
- vendredi 26/04 : Propriété Intellectuelle (Benjamin Delsol)

The browser window shows the Pycom website with the URL <https://pycom.io/product/lopy4/>. The navigation bar includes links for Home, Solutions, Shop, Support, Community, Latest, My account, Pybytes, and Pylife. The main content area features a large image of the LoPy4 development board, which is a quadruple bearer MicroPython enabled development board (LoRa, Sigfox, WiFi, Bluetooth). The price is listed as €34.95. Below the main image, there are four smaller images showing different expansion boards: Expansion Board 2.0, Pysense, and Pytrack. The text describes the LoPy4 as a perfect enterprise grade IoT platform for your connected Things, offering a perfect combination of power, friendliness and flexibility. It also mentions that if you are purchasing the LoPy4 and wish to connect via USB to your computer, you will also need to purchase either the Expansion Board 2.0, Pysense or Pytrack.

**LoPy4**

€34.95

**1 YEAR OF SIGFOX CONNECTIVITY INCLUDED**

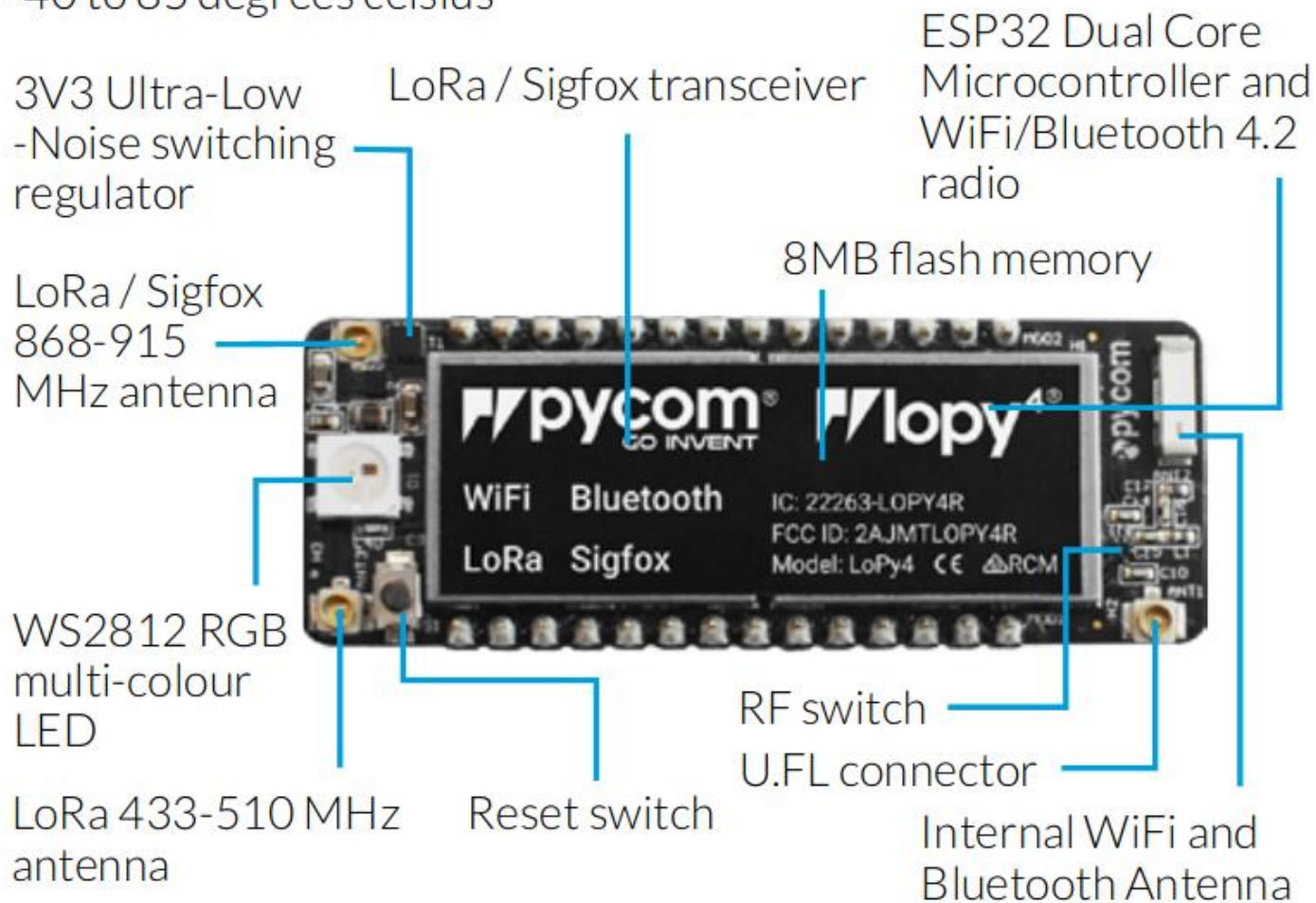
The LoPy4 is a quadruple bearer MicroPython enabled development board (LoRa, Sigfox, WiFi, Bluetooth) perfect enterprise grade IoT platform for your connected Things. With the latest Espressif chipset the LoPy4 offers a perfect combination of power, friendliness and flexibility.

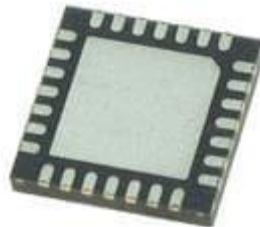
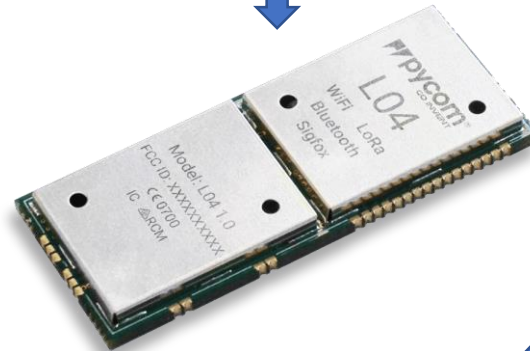
Create and connect you things everywhere.  
Fast.

If you are purchasing the LoPy4 and wish to connect via USB to your computer, you will also need to purchase either the Expansion Board 2.0, Pysense or Pytrack.

Size: 55mm x 20mm x 3.5mm

Operating temperature:  
-40 to 85 degrees celsius

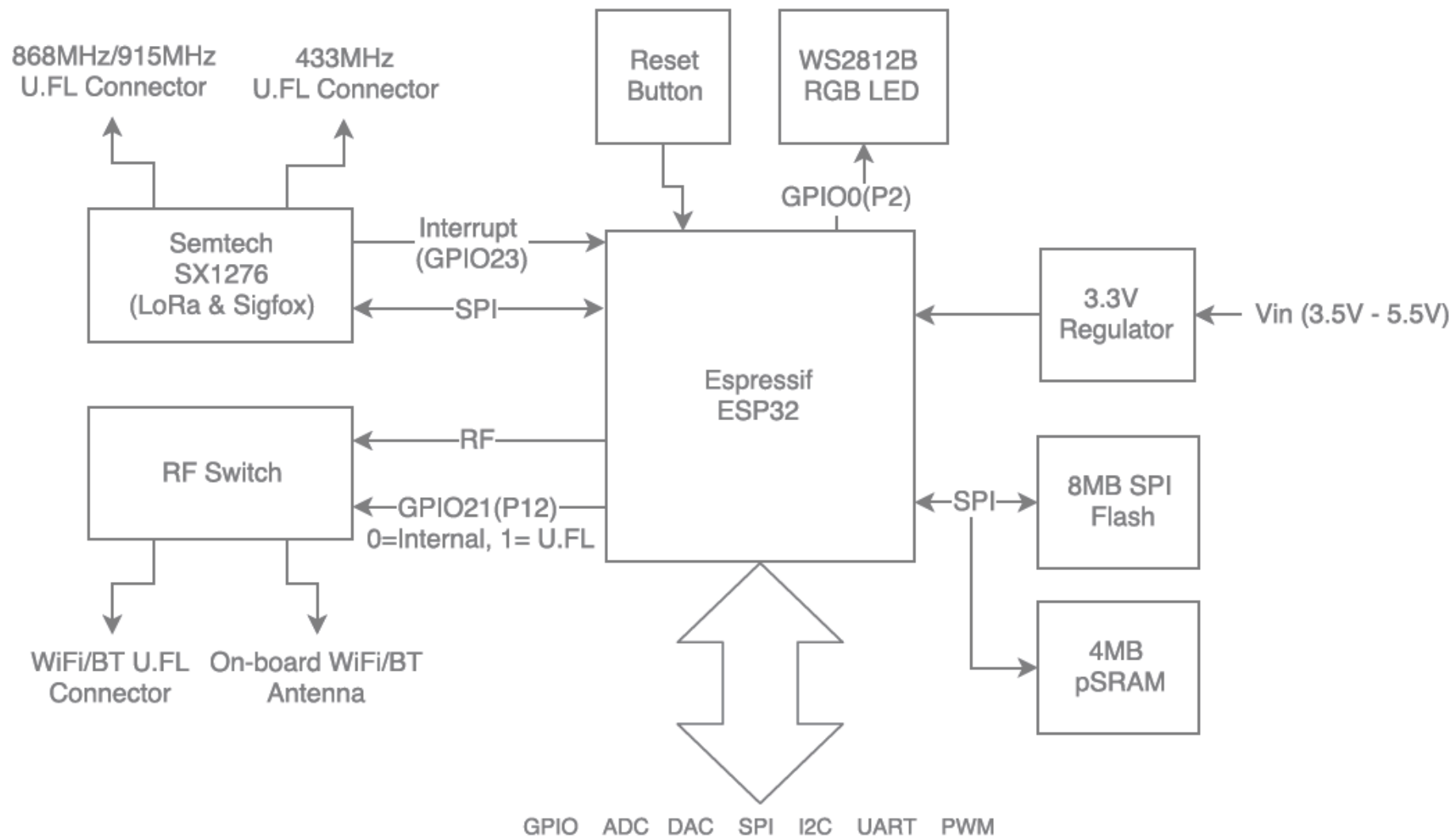




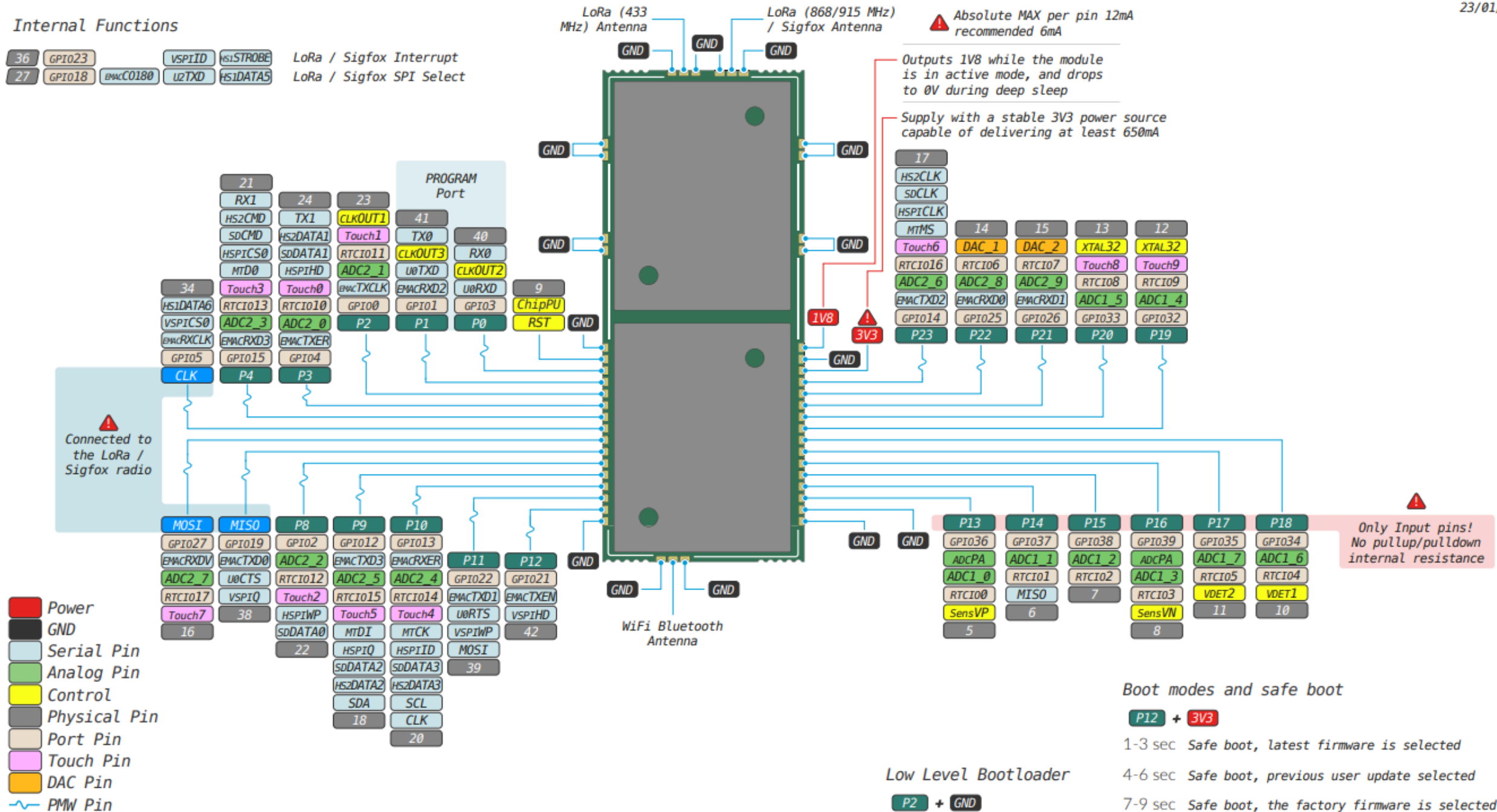
Semtech SX 1276



Espressif ESP32









## 3.0 Specifications

### 3.1 CPU

- Xtensa® dual-core 32-bit LX6 microprocessor(s), up to 600 DMIPS
- Hardware floating point acceleration
- Python multi-threading
- An extra ULP-coprocessor that can monitor GPIOs, the ADC channels and control most of the internal peripherals during deep-sleep mode while only consuming ~25uA.

### 3.2 Memory

- RAM: 520KB + 4MB
- External flash: 8MB

### 3.3 WiFi

- 802.11b/g/n 16mbps

### 3.4 Bluetooth

- Low energy and classic

### 3.5 RTC

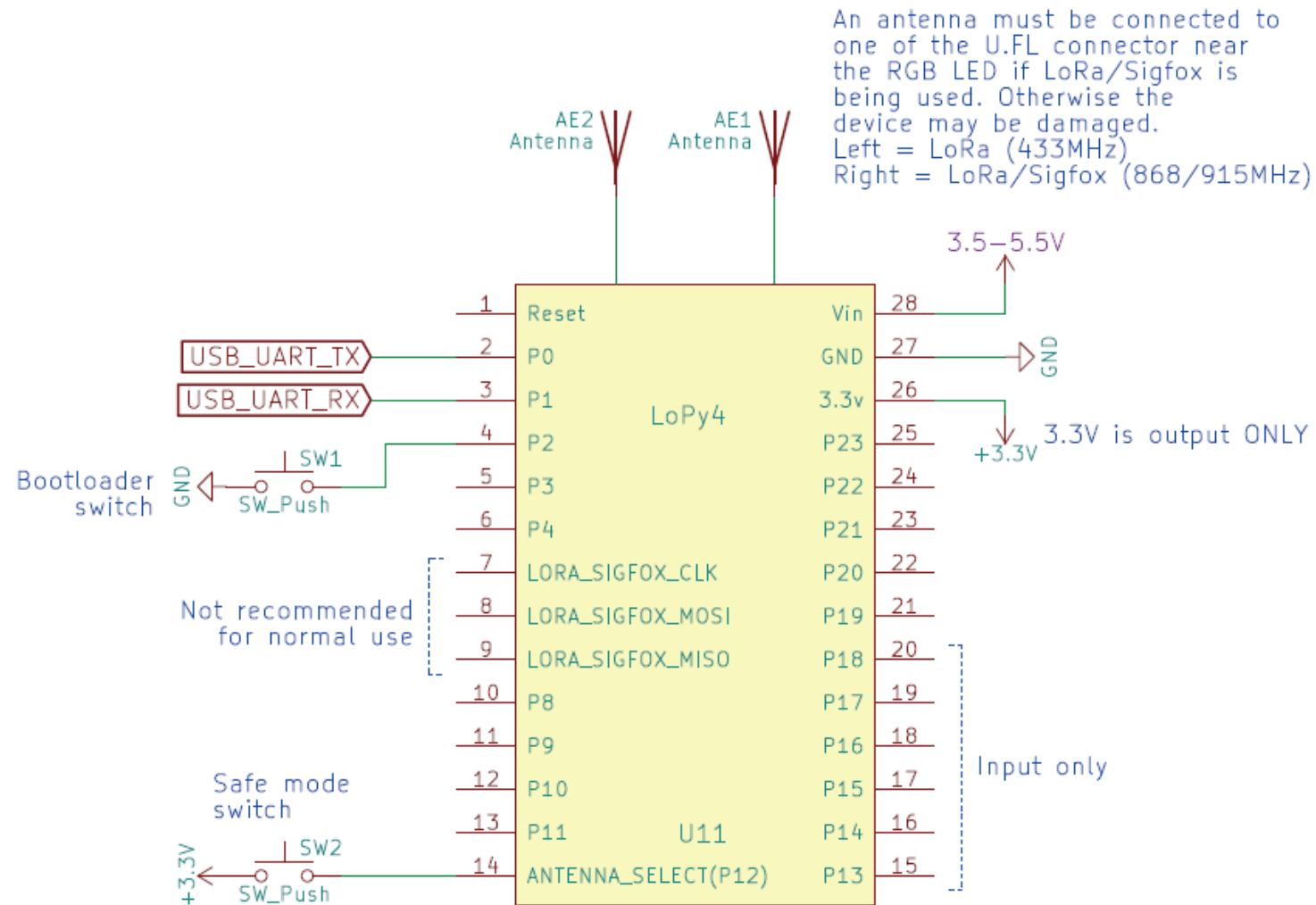
- Running at 150kHz

### 3.6 Security

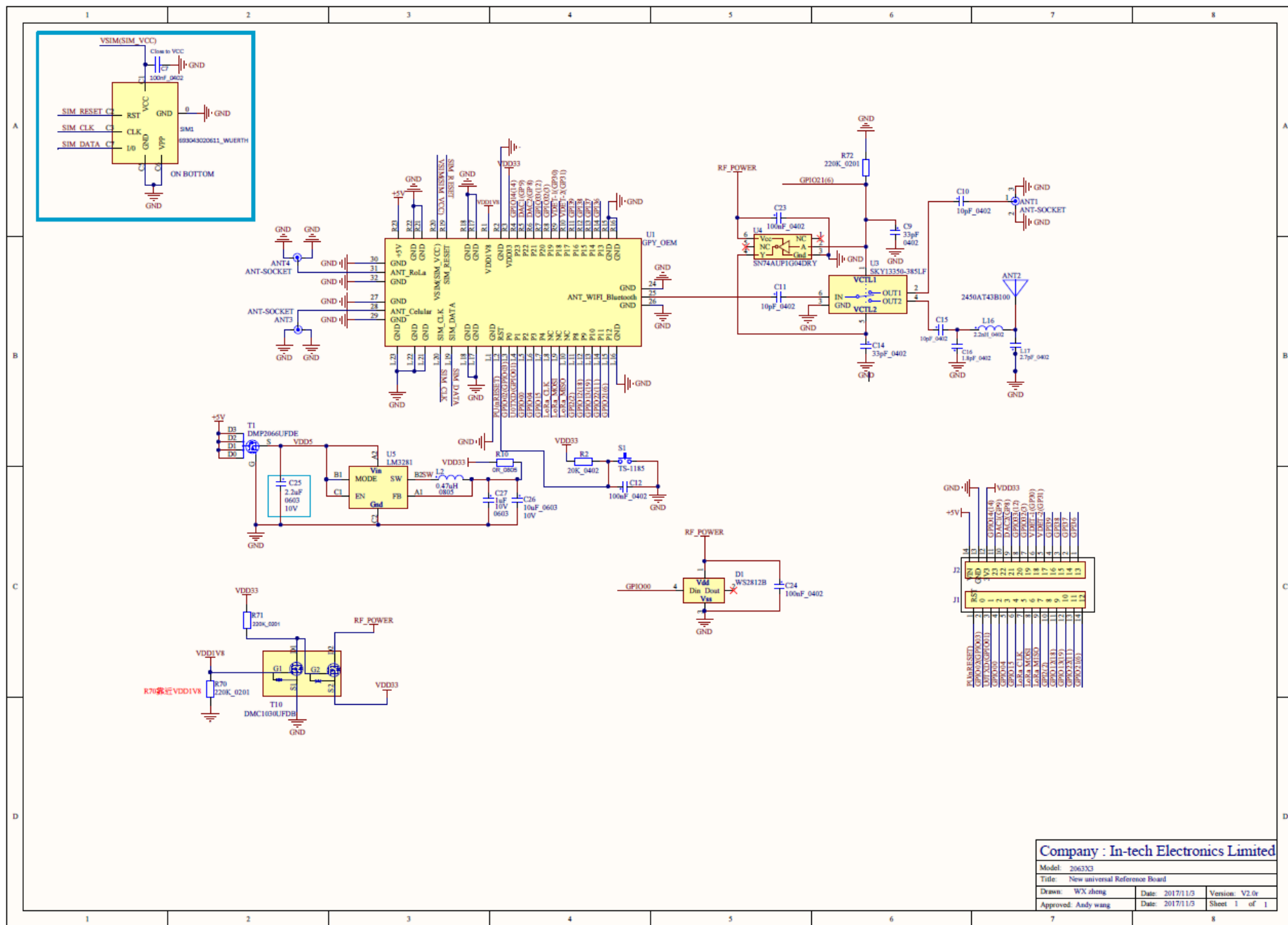
- SSL/TLS support
- WPA Enterprise security

### 3.7 Hash / encryption

- SHA
- MD5
- DES
- AES



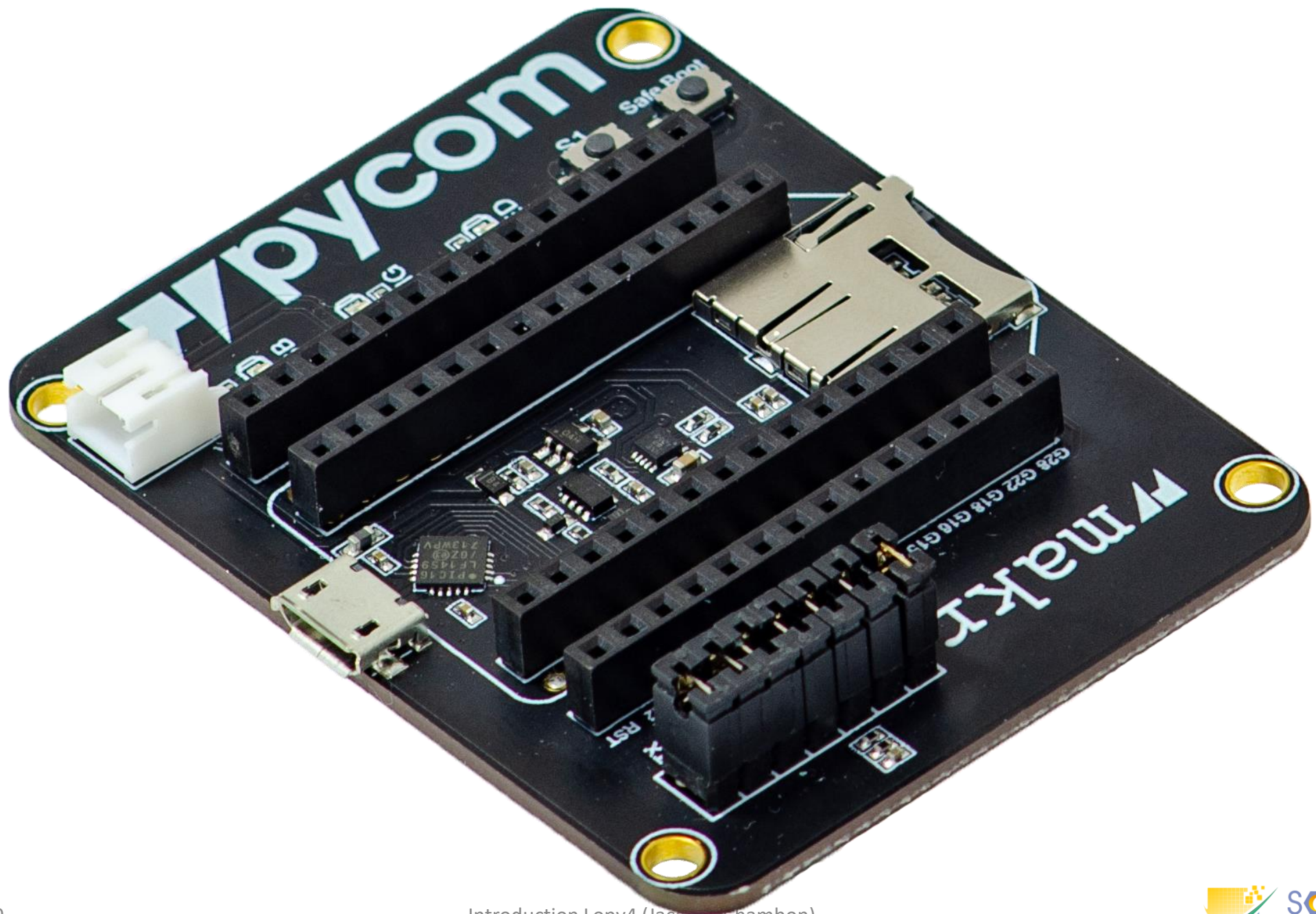
This pin also switches between the on-board antenna and the U.FL connector. For this reason it is not recommended for normal use.



Company : In-tech Electronics Limited		
Model:	2063X3	
Title:	New universal Reference Board	
Drawn:	WX zheng	Date: 2017/11/2
Approved:	Andy wang	Date: 2017/11/2
Version:	V2.0	Sheet: 1 of 1







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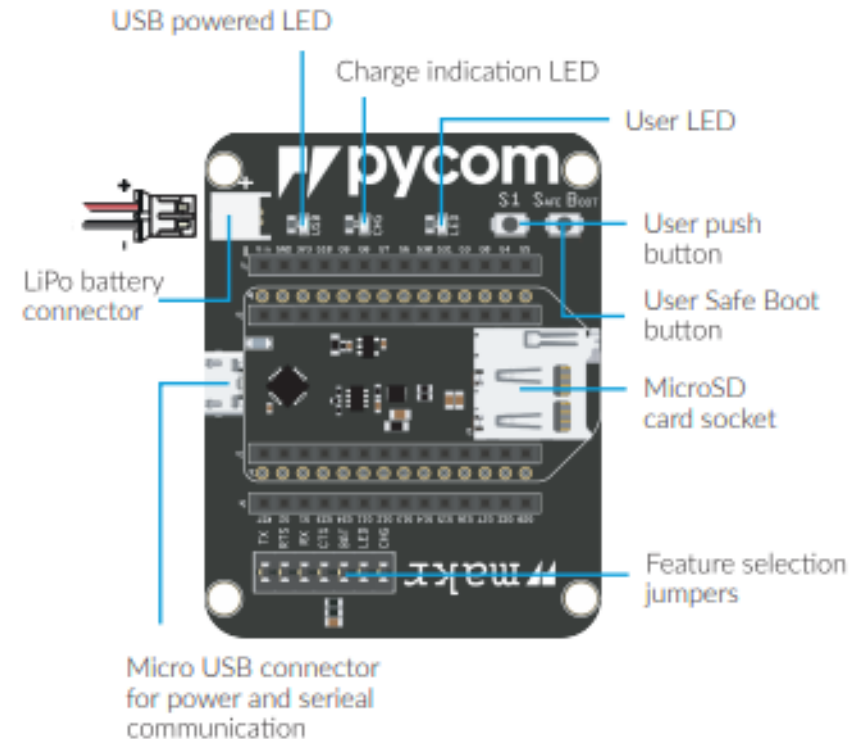
## Expansion Board 3v.0 Features

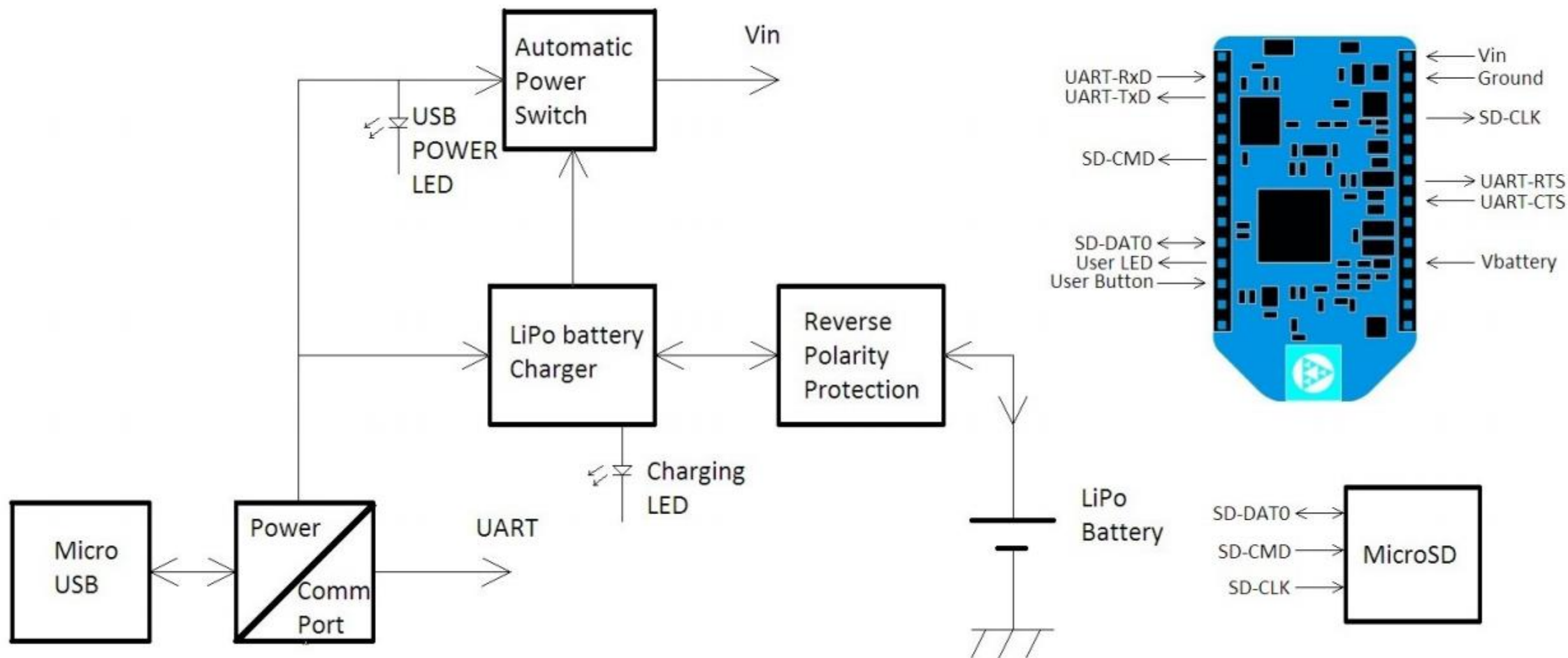
- USB and LiPo battery powered
  - Custom PIC USB to serial converter with automatic bootloader mode
  - LiPo battery charger (BQ24040), with options for two different charging currents (100mA and 450mA)
  - TPS2115A with reverse voltage protection
  - MicroSD card slot
  - JST style battery connector
  - Power LED and charge status LED
  - One user LED and one user switch
  - Button to enter into "safe mode" easily
  - Battery voltage monitoring via the WiPy ADC
  - Lots of jumpers to enable/disable features
- 

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## Mechanical

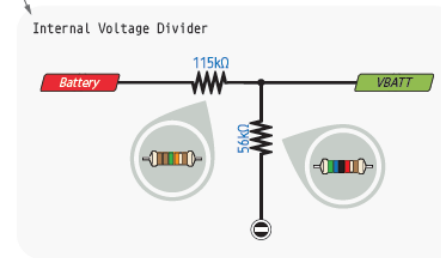
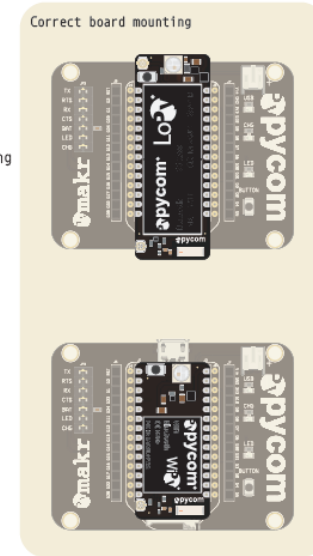
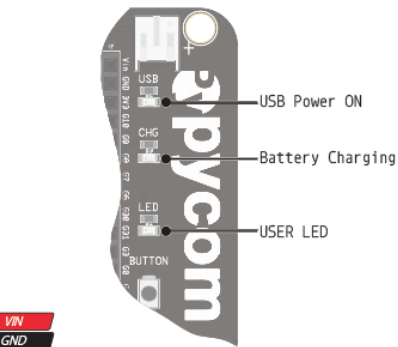
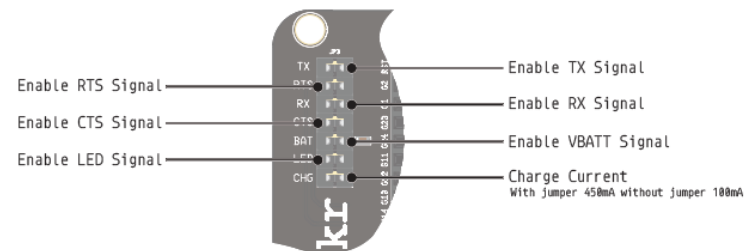
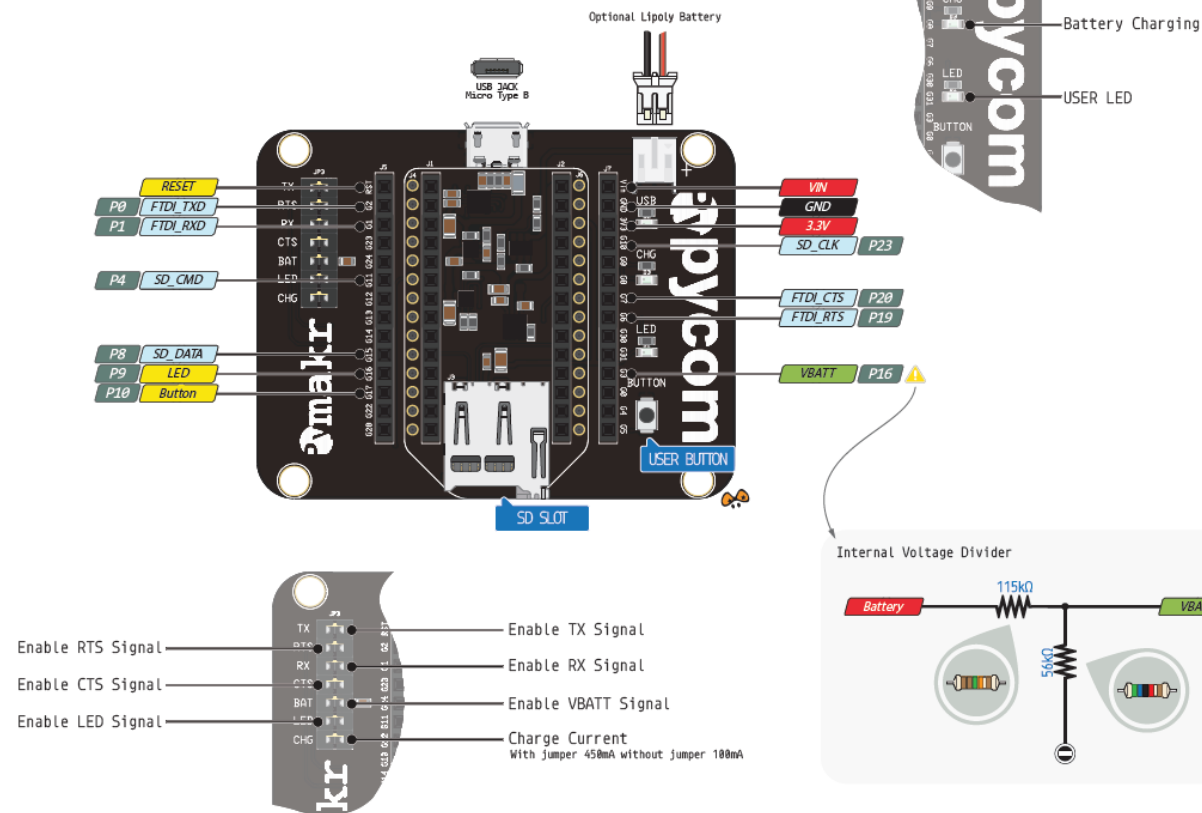
Size: 65 x 50 x 8mm

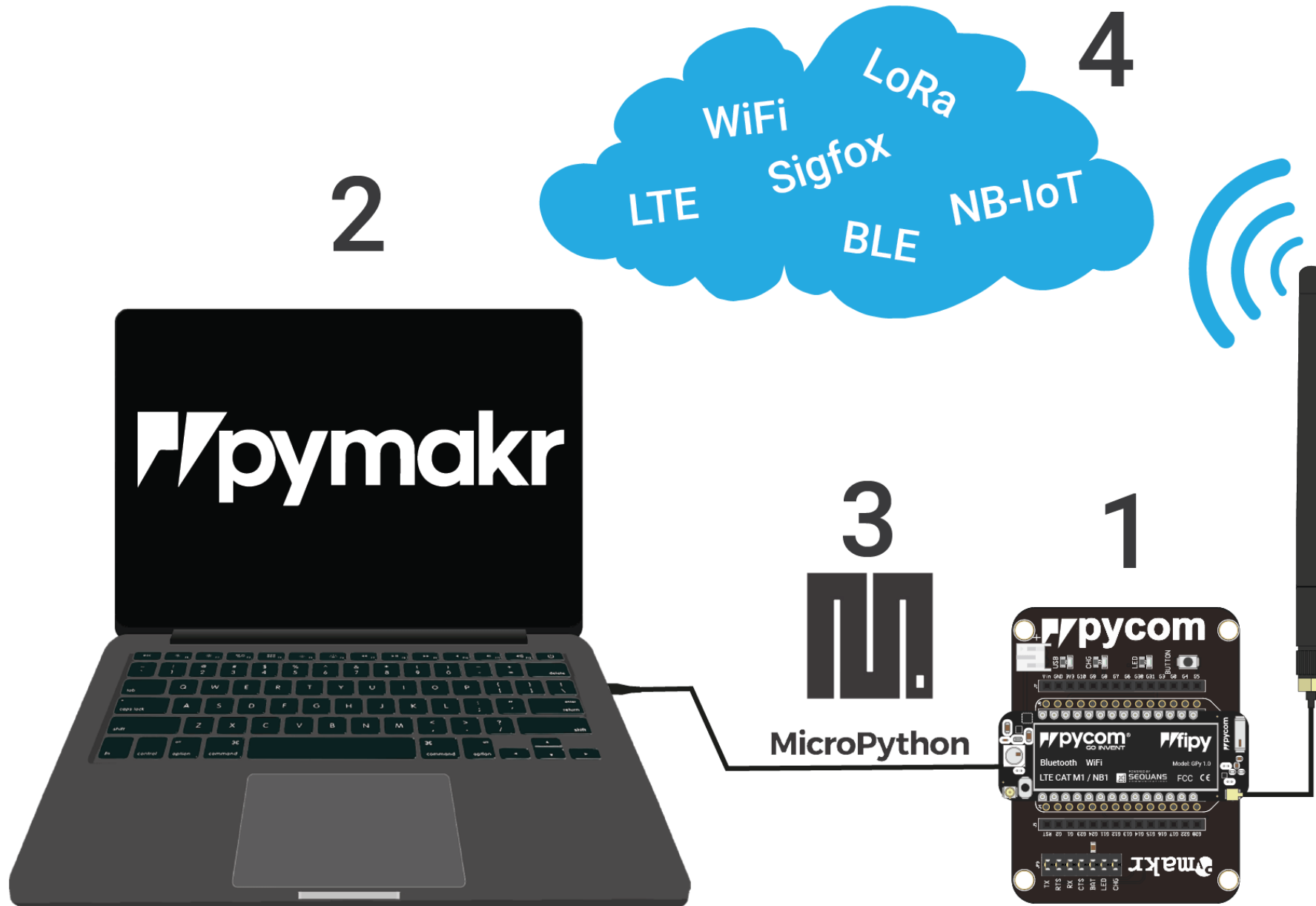


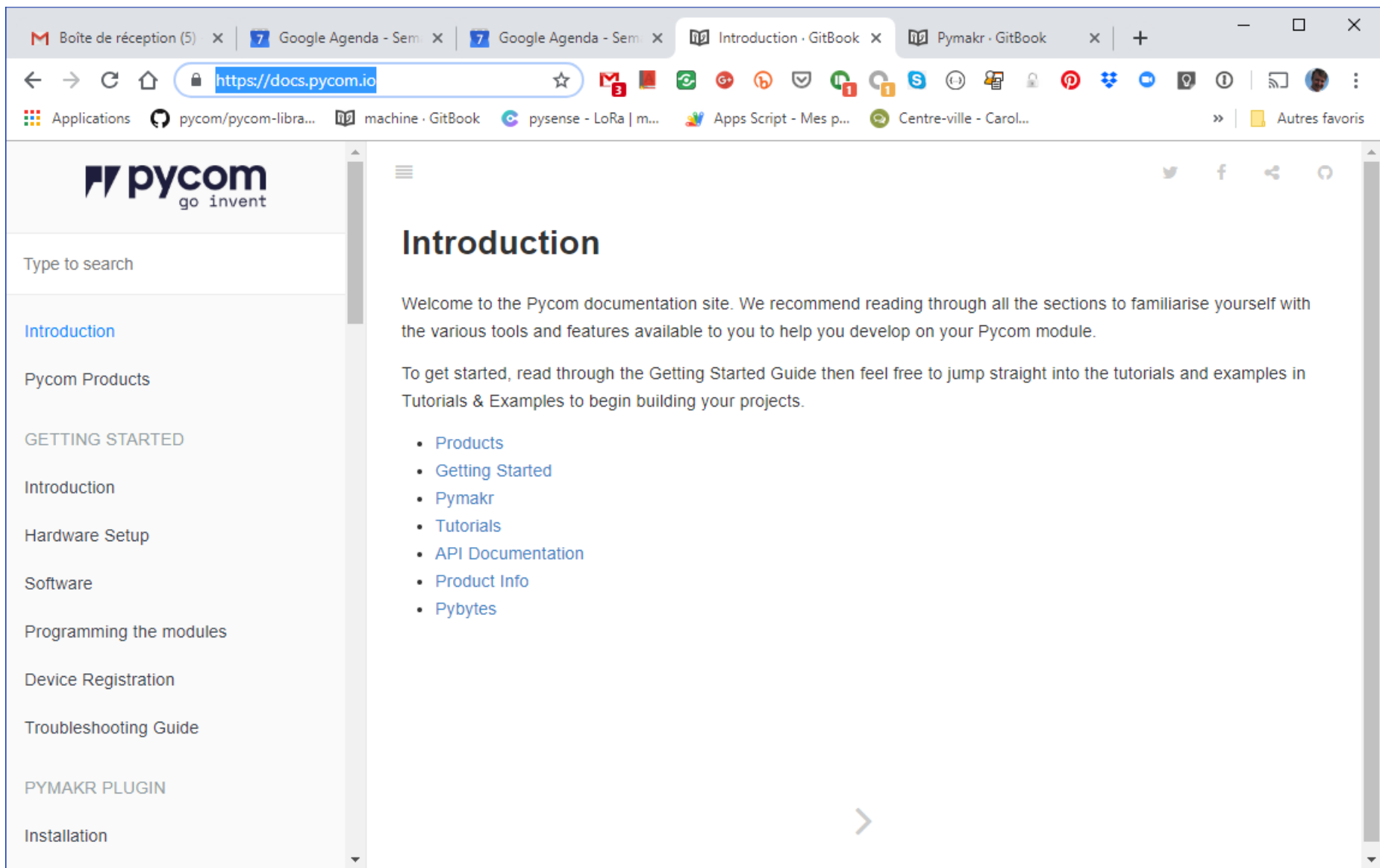




# Expansion Board PINOUT







<https://docs.pycom.io/>

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<p><b>PyLife</b> Discuss our new product here</p>	14 TOPICS	45 POSTS	<p>Dec 3, 2018, 7:46 AM</p> <p>Thank you for the information provided, this is very helpful to</p>
<p><b>Pybytes IoT platform</b> Pybytes IoT platform for all Pycom devices</p> <ul style="list-style-type: none"> <li>Announcements &amp; News</li> <li>Ideas</li> <li>Support &amp; Troubleshooting</li> </ul>	72 TOPICS	246 POSTS	<p>a day ago</p> <p>Obviously you didn't look hard enough:</p>
<p><b>Getting Started</b> Post in here for any discussion, questions or support you need with your projects!</p> <ul style="list-style-type: none"> <li>Discussion</li> <li>WiPy 2&amp;3</li> <li>LoPy</li> <li>SiPy</li> <li>GPY</li> <li>FiPy</li> <li>Pymakr</li> <li>Pymate</li> <li>Expansion Board</li> <li>MicroPython</li> </ul>	3.1k TOPICS	17.6k POSTS	<p>28 minutes ago</p> <p>Hello I am following a tutorial online and trying to import LTE</p>
<p><b>Tutorials</b> Tutorials for your Pycom stuff</p>	81 TOPICS	390 POSTS	<p>6 days ago</p> <p>I'm struggling to get this to work. After following the</p>

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How'd you get your idea into a #factory and rolling out the other side as a finished product?

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JOIN US [#LPWAN](https://eventbrite.co.uk/e/berlin-pycom...#LPWAN) #LoRa #SigFox #NBloT #Berlin

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Mar 30, 2019

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<https://forum.pycom.io/>



## PWR\_EN pin as GPIO (output)



theshade 21 days ago

Dear support team,

Since pins with output capabilities (which don't have SD or other usefull use) come in short supply I wanted to use the P3/PWR\_EN/G24 pin with a lopy4/pysense combination as an output.

Searching the docs for what the PWR\_EN does, is still useless, and looking at the forum only yields unclear 2 years old discussion which don't really talk about the possibility to use it as a simple GPO.

Obviously a schematic would have helped but using a multimeter I was able to figure out it was connected through 2x 9k resistors to the PIC.... but that raises more questions than it answers...

So what does PWR\_EN mean? is that a reserved function which chip does it enable pwr to? does the function work currently?

Where is the information to be found? I tried it with a fipy/pyscan combinaison and apparently it seems to work as an output... but the pyscan datasheet is just as obscure and I have no idea what is the effect of it on the PIC functionality.

It's been months people have been asking proper pin / function documentation and it is progressing somehow... but at a very slow speed... and makes it very difficult to plan any circuits around your boards. I know making proper docs is boring but honestly it is "not an option" when you have customers..

So thanks for that.

Reply Quote ^ 1 v

1  
POSTS

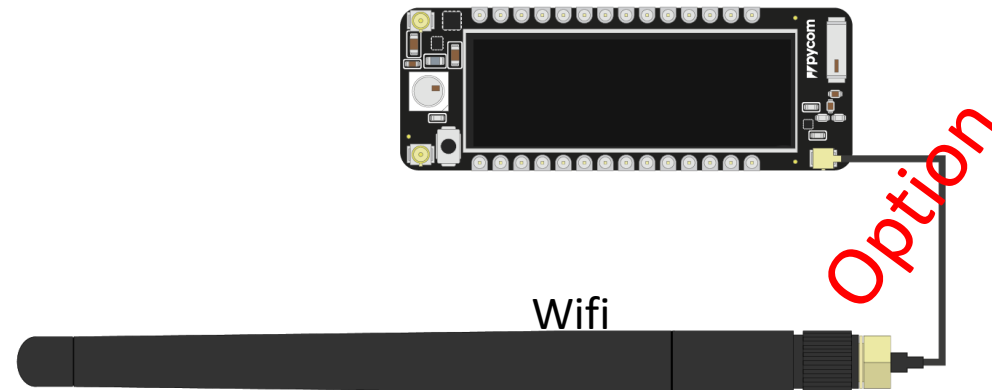
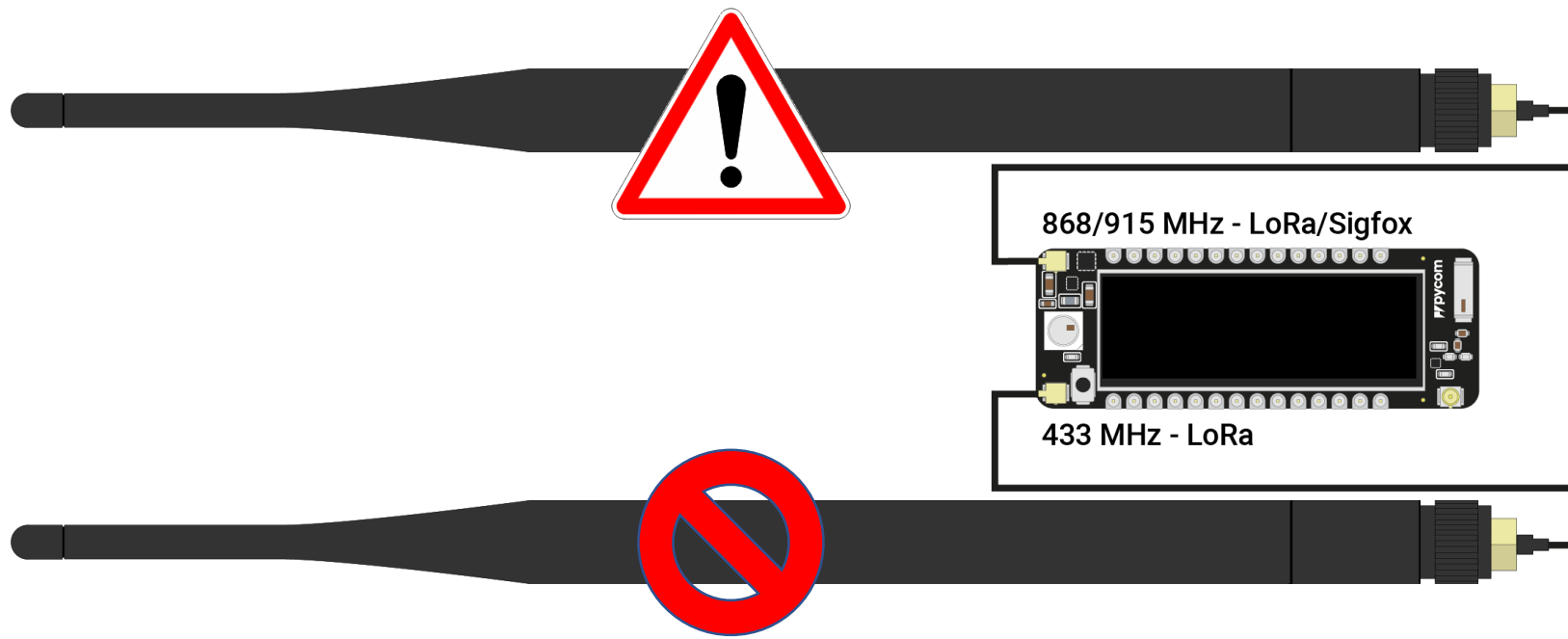
67  
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← → ↻ 🏠 <https://docs.pycom.io/pytrackpysense/installation/firmware.html> ☆

Applications pycom/pycom-libra... machine - GitBook pysense - LoRa | m... Apps Script - Mes p... Centre-ville - Carol... Camping l'Orée d'A... Virtualmin — Web... » | Autres favoris

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go invent

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Introduction

Pycom Products

GETTING STARTED

Introduction

Hardware Setup

Software

Programming the modules

Device Registration

Troubleshooting Guide

PYMAKR PLUGIN

Installation

Tools/Features

## Updating Firmware


To update the firmware on the Pysense/Pytrack/Pyscan/Expansion Board v3, please see the following instructions. The firmware of Pysense/Pytrack/Pyscan/Expansion Board v3 can be updated via the USB port using the terminal tool, `dfu-util`.

The latest firmware DFU file can be downloaded from the links below:

- [Pytrack DFU](#)
- [Pysense DFU](#)
- [Expansion Board DFU v3.0](#)
- [Expansion Board DFU v3.1](#)

⚠

ⓘ Make sure to choose the correct firmware version for your expansion board. both 3.0 and 3.1 versions have version numbers on the silkscreen on the back of the board. See the image below for examples highlighted in Red



While in the normal, application mode, the Pysense/Pytrack/Pyscan/Expansion Board v3 require a Serial USB CDC driver. In DFU mode, the DFU driver is required. Below the USB Product ID is designated for each app...

<https://docs.pycom.io/pytrackpysense/installation/firmware.html>



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Pycom Pysense & Pytrack: How to Update Firmware

By Chris, updated on 14 March 2019

UPDATE: This documentation now also applies to **Pyscan** and **Expansion Board 3.0**

**Pysense** and **Pytrack** boards have a "firmware update mode". Unlike the Pycom microcontrollers you don't add a jumper to the board to access this mode, you hold down the on-board button when you plug it in. The board appears to Windows as two completely different devices. In "normal" mode the board looks like a serial port and is automatically installed by Windows under Ports (COM & LPT) in Device Manager. In "firmware update" mode the device can't be automatically installed, so we have a manual process to get a device driver installed so we can push the firmware update onto the board. Not complicated enough? What if there was a time limit? There is: 7 seconds. Thankfully you can restart the time limit as many times as you need to complete the process.

The Pysense and Pytrack firmware update process is documented in **4.2.1 Updating Firmware** under 4. Pysense and Pytrack. I have written this procedure as a slower, more deliberate, walk-through of the update process after making many mistakes following the Pycom documentation. I'll assume all downloaded files are in your Downloads folder. All the below is done with the Pysense/Pytrack board alone; no Pycom microcontroller board should be mounted on it.

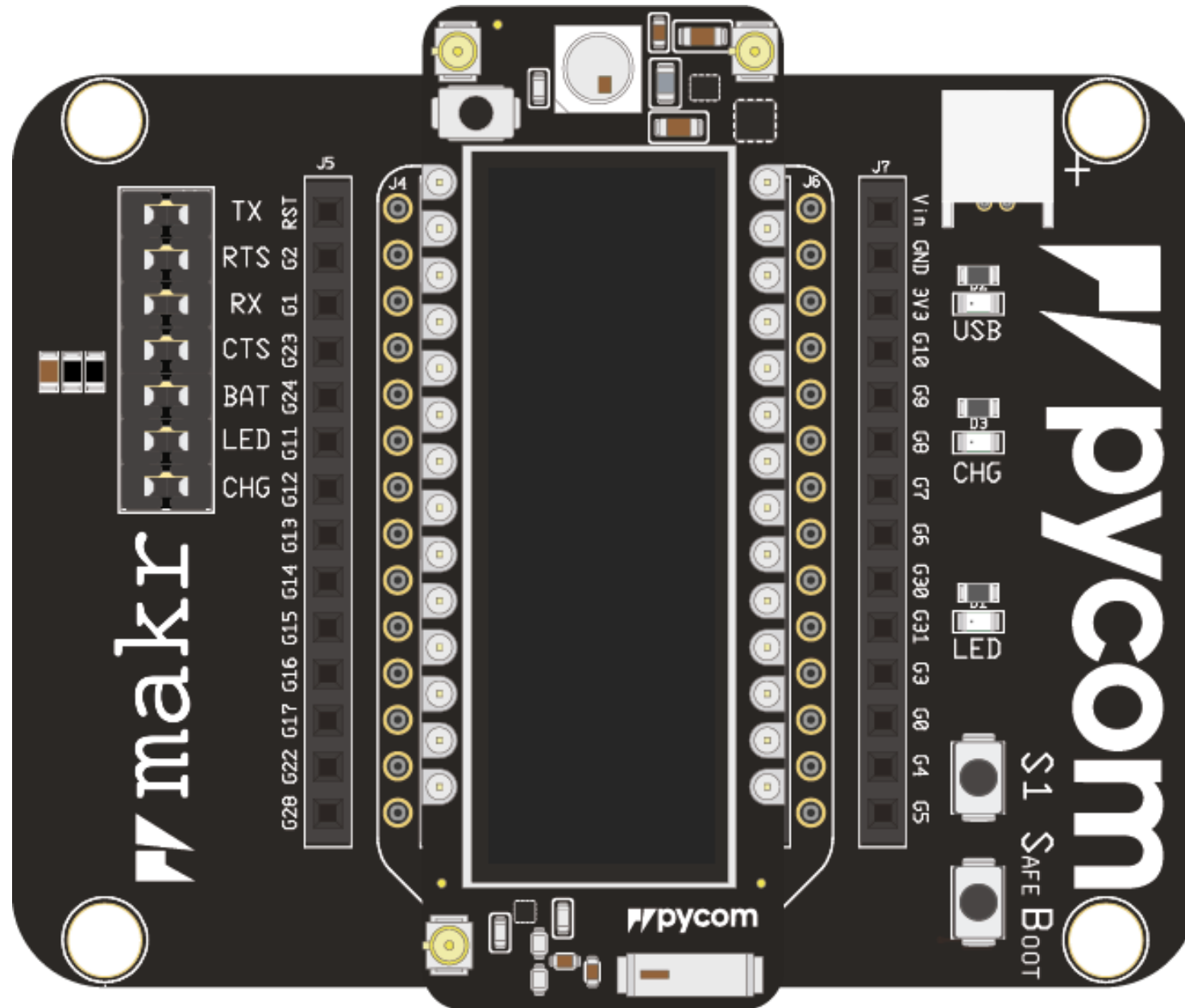
From now on I'll refer to Pysense or Pytrack boards as just "the board".

Aide

Have a question? Ask the Author of this guide today!



<https://core-electronics.com.au/tutorials/pycom-pysense-pytrack-firmware-update.html>



The screenshot shows a web browser window with multiple tabs. The active tab is titled 'Updating Firmware - Git' and displays the URL <https://docs.pycom.io/gettingstarted/installation/firmwaretool.html#second>. The page header features the 'pycom go invent' logo. A left sidebar contains a navigation menu with items: 'Type to search', 'Introduction', 'Pycom Products', 'GETTING STARTED', 'Introduction', 'Hardware Setup', 'Software', 'Drivers', 'Updating Firmware' (highlighted in blue), 'Pymakr', 'Programming the modules', 'Device Registration', and 'Troubleshooting Guide'. The main content area is titled 'Updating Firmware' and includes the following text: 'We strongly recommend you to upgrade your firmware to the latest version as we are constantly making improvements and adding new features to the devices.' and 'Here are the download links to the update tool. Please download the appropriate one for your OS and follow the instructions on the screen.' Below this is a bulleted list: 'Windows', 'macOS (10.11 or Higher)', and 'Linux (requires `dialog` and `python-serial` package)'. A light blue information box states: 'Previous versions of firmware are available for download [here](#).' The next section is titled 'Updating Device Firmware' and contains the text: 'The basic firmware upgrade procedure can be found below, please follow these steps carefully:' and 'After you're done with upgrading, you can use the Pymakr Plugins to upload and run programs in your device.' Below this text are two tabs: 'Exp Board 2.0' (selected) and 'Exp Board 3.0'. The final paragraph states: 'When using a Pysense/Pytrack/Pyscan/Expansion Board 3.0 to update your module you are not required to make a connection between "G23" and "GND", the Pysense/Pytrack/Pyscan/Expansion Board 3.0 will do this automatically.'

<https://docs.pycom.io/gettingstarted/installation/firmwaretool.html#second>

Pycom Upgrade

### Communication

Please select the serial port to use:

Port: COM5

☒ High speed transfer

☐ Erase flash file system

☐ Force update LoRa region

☐ Flash from local file

Type: stable

Please visit our new [Pybytes](#) platform!

Rescan Ports Go Back Continue

<https://atom.io/>

<https://github.com/pycom/pymakr-atom/>



**pymakr**  
plugins

# Micropython

- <http://docs.micropython.org/en/latest/>
  - Micropython is a lean and efficient implementation of the Python 3 programming language that includes a small subset of the Python standard library and is optimized to run on microcontrollers and in constrained environments.
  - Micropython is packed full of advanced features such as an interactive prompt, arbitrary precision integers, closures, list comprehension, generators, exception handling and more. Yet it is compact enough to fit and run within just 256k of code space and 16k of RAM.
  - Micropython aims to be as compatible with normal Python as possible to allow you to transfer code with ease from the desktop to a microcontroller or embedded system.
- Micropython differences from CPython:
  - <http://docs.micropython.org/en/latest/genrst/index.html>



GitHub, Inc. [US] | <https://github.com/pycom/pycom-libraries>

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MicroPython libraries and examples that work out of the box on Pycom's IoT modules

190 commits 2 branches 2 releases 15 contributors

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File/Folder	Description	Latest commit	Time ago
Xykon Update pycoproc.py		681302a	13 days ago
.github	Repo templates (#86)		5 months ago
deepsleep	deepsleep.py, pycoproc.py: Improve calibration functions.		a year ago
examples	Nanogateway: Updated datarate for the US region		4 months ago
img	General clean up of Pycom Libraries - Preparing for Pysense & Pytrack		2 years ago
lib	Update pycoproc.py		13 days ago
license	Moved License PDFs to a separate dir		2 years ago
pybytes	- [Pytrack] Added listen for GPGLL signals as well		6 months ago
pycom-docker-fw-build	remove sdkconfig feature not needed		a month ago
pyscan	Update pycoproc.py		13 days ago
pysense	Fixed typo, fixed #73		7 months ago
pytrack	- [Pytrack] Added listen for GPGLL signals as well		6 months ago
.gitignore	added INT pin as wakeup reason in pytrack		a year ago

<https://github.com/pycom/pycom-libraries>








# MicroPython

## Booting into MicroPython

When booting, two files are executed automatically: first `boot.py` and then `main.py`. These are placed in the `/flash` folder on the board. Any other files or libraries can be placed here as well, and can be included or used from `boot.py` or `main.py`.

The folder structure in `/flash` looks like the picture below. The files can be managed either using FTP or using the Pymakr Plugin.

	cert		Directory
	lib		Directory
	sys		Directory
	boot.py	1734	Python
	main.py	14	Python

# REPL

REPL stands for Read Evaluate Print Loop, and is the name given to the interactive MicroPython prompt that is accessible on the Pycom devices. Using the REPL is by far the easiest way to test out Python code and run commands. You can use the REPL in addition to writing scripts in `main.py`.

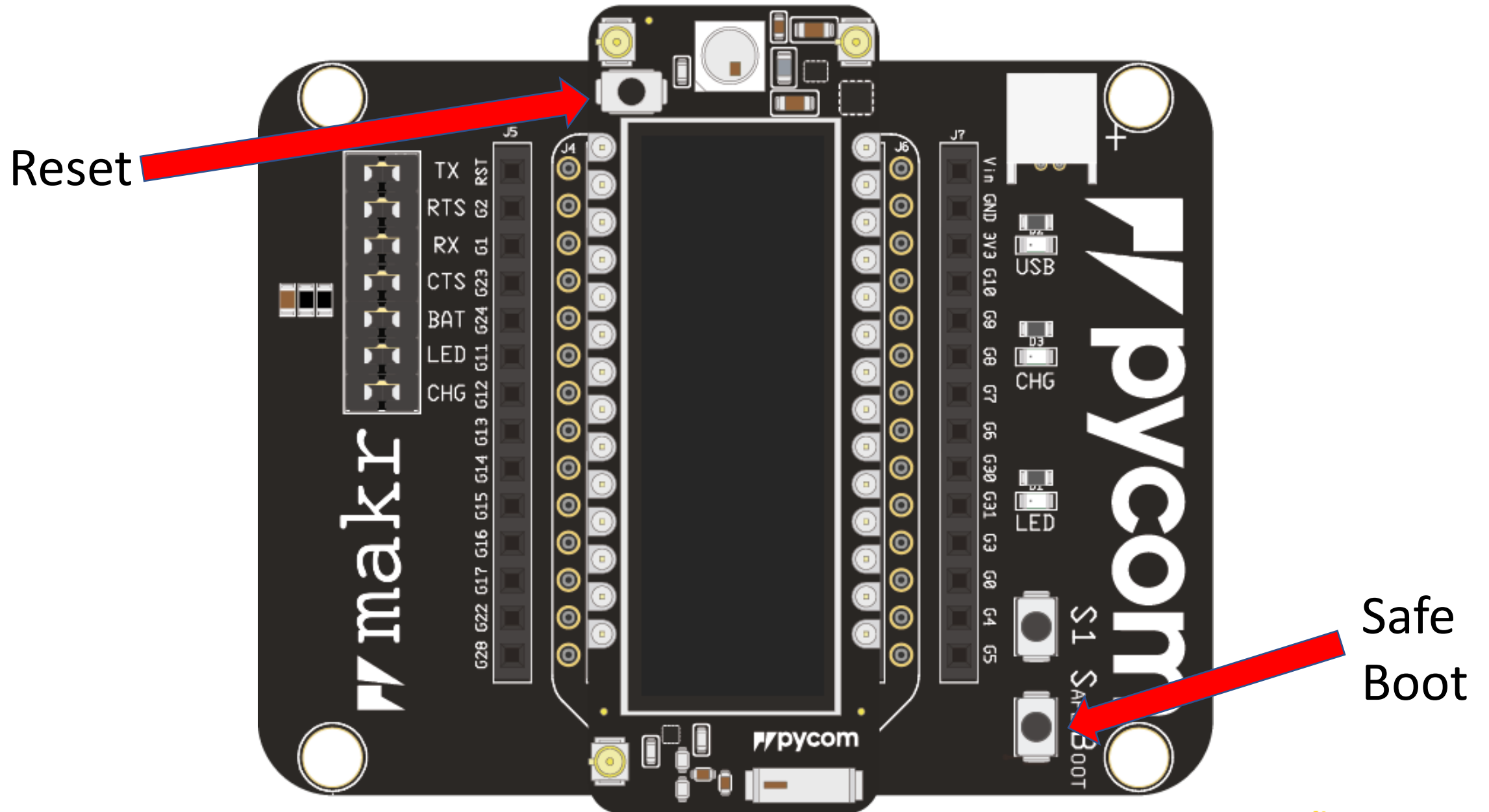
The following pages will explain how to use the REPL with both Serial USB and Telnet connections.

The REPL includes the following features:

- Input history: use arrow up and arrow down to scroll through the history
- Tab completion: press tab to auto-complete variables or module names
- Halt any executing code: with `Ctrl-C`
- Copy/paste code or output: `Ctrl-C` and `Ctrl-V`

**i** There are a number of useful shortcuts for interacting with the MicroPython REPL. See below for the key combinations;

- `Ctrl-A` on a blank line will enter raw REPL mode. This is similar to permanent paste mode, except that characters are not echoed back.
- `Ctrl-B` on a blank line goes to normal REPL mode.
- `Ctrl-C` cancels any input, or interrupts the currently running code.
- `Ctrl-D` on a blank line will do a soft reset.
- `Ctrl-E` enters 'paste mode' that allows you to copy and paste chunks of text. Exit this mode using `Ctrl-D`.
- `Ctrl-F` performs a "safe-boot" of the device that prevents `boot.py` and `main.py` from executing



General Advanced Transfer Settings Charset

Host: 192.168.4.1 Port:

Protocol: FTP - File Transfer Protocol

Encryption: Only use plain FTP (insecure)

---

Logon Type: Normal

User: micro

Password: .....

General Advanced Transfer Settings Charset

Transfer mode:

☐ Default ☐ Active ☒ Passive

☒ Limit number of simultaneous connections

Maximum number of connections: 1

Project — D:\Pycom\Projects\TOCS\Lopy4\ADC-DAC — Atom

Project: ADC-DAC, BLEC, BLES, Deepsleep, Interrupt, WifiSTA (cert, lib, sys, boot.py, main.py)

main.py — ...

```

1  """ TOCS example usage """
2
3  from machine import SD, RTC
4  import os
5  import pycom
6  import time
7
8  rtc = RTC()
9  sd = SD()
10
11 os.mount(sd, '/sd')
12 print("SD card files :")
13 print(os.listdir('/sd'))
14
15 print("Network config :")
16 print(wlan.ifconfig())
17
18 def pled():
19     pycom.heartbeat(False)
20     pycom.rgbled(0xff00)
21
22 print('Syncing time with "pool.ntp.org"')
23 rtc.ntp_sync("pool.ntp.org")
24 while not rtc.synced():
25     time.sleep(0.05)

```

Connected No project More Upload Download Run Disconnect Settings

Control commands:

- CTRL-A -- on a blank line, enter raw REPL mode
- CTRL-B -- on a blank line, enter normal REPL mode
- CTRL-C -- interrupt a running program
- CTRL-D -- on a blank line, do a soft reset of the board
- CTRL-E -- on a blank line, enter paste mode
- CTRL-F -- on a blank line, do a hard reset of the board and enter safe boot

For further help on a specific object, type help(obj)

>>>

main.py 24:24 LF UTF-8 Python master Fetch GitHub Git (2)

