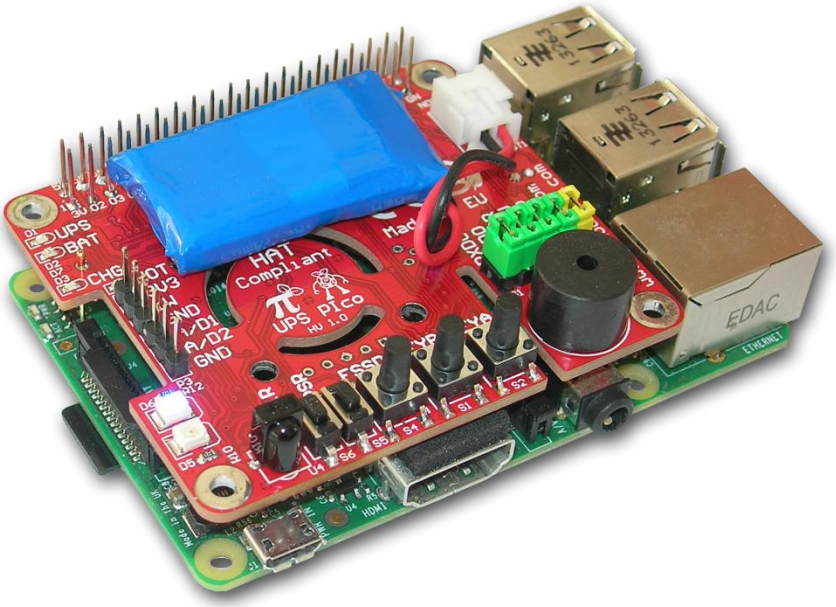
UPS PIco

Uninterruptible Power Supply

with Peripherals and I²C control Interface

for use with

Raspberry Pi® B+, A+, B, and A



HAT Compliant

Gold Plated Reset Pin Assembly

Version 1.0

Intelligent Modules for your Raspberry Pi®

Designed and Manufactured by PiModules and ModMyPi
www.pimodules.com www.modmypi.com

Document Revisions

Version	Date	Modified Pages	Modified Sections	Comments
1.0	19/01/2015	none	none	First Public Document Release

Table of Figures

Credits

Our Company would like to thank the following people that reviewed and, many times, commented and corrected this document before we released it to the public domain.

Marcello Antonucci from Italy

System Overview

Introduction

The **UPS PIco** is an advanced uninterruptible power supply for the Raspberry Pi® that adds a wealth of innovative power back-up functionality and development features to the innovative microcomputer!

The standard **UPS PIco** is equipped with a 300mAh LiPO battery specially designed to enable safe shutdown during a power cut. Additionally, this can be easily upgraded to the extended 3000mAh version, which enables prolonged use of a Raspberry Pi for **up to 8 hours** without a power supply connected!

The **UPS PIco** features an embedded measurement system that continuously checks the powering voltage of the Raspberry Pi®. When the cable power on the Raspberry Pi® is absent, insufficient, or the device detects a power failure, the **UPS Pico** automatically switches to the unit's battery source. The module then continues to check the voltage on the Pi and switches automatically back to the regular cable supply when power is once again available.

The **UPS PIco** is powered and the battery pack intelligently charged via the GPIO pins on the Raspberry Pi®, so no additional cabling or power supply is required.

The **UPS PIco** is designed to be 100% compliant with HAT standards for the Raspberry Pi® B+ and A+, and is mechanically compatible with the original Raspberry Pi® models A and B when an extension header is used. In addition to this, because the **UPS PIco** requires no external powering and fits within the footprint of the Raspberry Pi®, it is compatible with most cases.

The **UPS PIco** can also be equipped with an optional **Infra-Red Receiver** which is routed directly to GPIO18 via the PCB. This opens the door for remote operation of the Raspberry Pi®and **UPS Pico**!

Finally, the **UPS Pico** features an implemented Automatic Temperature Control **PWM fan controller**, and can be equipped with a micro fan kit, which enables the use of the Raspberry Pi® in extreme conditions including very high temperature environments.

Applications

UPS PIco is equipped with plenty of features which make it an extremely useful tool for Raspberry Pi® project development. It not only provides powering continuity, but also offers extra user programmable LEDs, sensors, buttons and I/O's. The unit also features a dedicated **10-bit analogue to digital converter** with two channels making it the perfect board for remote and unmanned sensor deployment. These extra features result in the **UPS PIco** being a superior all-in-one device, perfect for many innovative projects, and embedded applications.

Features

The list of features of the **UPS PIco** is as follows:

- Raspberry Pi B+ **HAT Compliant**
- **Plug and Play**
- **Smart Uninterruptible Power Supply (UPS)**
- **Integrated LiPO Battery** (8-10 Minutes of Power Back-Up)
- **Intelligent Automatic Charger**
- **No Additional External Power Required**
- **Optional 3000 mAh** Battery for 8 Hours Run-Time (Not Included)
- **5V 2A Power Backup (Peak Output 5V 3A)**
- Integrated Software Simulated **Real Time Clock (RTC)** with Battery Back-Up
- **File Safe Shutdown** Functionality
- Raspberry Pi B+ **Activity Pin**
- **PWM fan control** (Fan Not Included)
- **2 User Defined LEDs**
- **2 User Defined Buttons**
- **Integrated Buzzer** for UPS and User Applications
- **Status Monitoring** - Powering Voltage, UPS Battery Voltage and Temperature
- **I2C PICo Interface** for Control and Monitoring
- **RS232 Raspberry Pi** Interface for Control and Monitoring
- **XTEA Based** Cryptography User Software Protection
- 2 Level **Watch-dog Functionality** with **FSSD and Hardware Reset**
- **Raspberry Pi B+ Hardware Reset Button via Spring Test Pin** (Not Included)
- **Jumpers for Raspberry Pi B+ Pin** Functionality Selection
- **Stackable Header** for Add-On Boards
- **Boot Loader** for Live Firmware Update
- Compatible with **Intelligent IR Remote Power ON/OFF (PowerMyPi)**
- **Integrated ESD-Protected 2 Channel A/D 10 Bit Converters 0-5.2V**
- **Integrated ESD-Protected 1-Wire Interface**
- **Labeled J8 Raspberry Pi B+ GPIO Pins** for Easy Plug & Play
- **Infra Red Receiver** Sensor Interface (IR Not Included)
- **Upgradable** with **PIco Add-on Boards**
- **Fits Inside Most Existing Cases**

Gold Plated Hardware Reset Pin

The **Gold Plated Hardware Reset Pin** is used to provide various additional functionalities to the **UPS PIco**. It is not necessary, however strongly recomened as additional functionalities covered by it make the **UPS PIco** system more co-operative. It is used with the following functionalities already implemented in the **UPS PIco**, they are:

1. Button for Hardware Reset of Raspberry Pi®
2. Watch Dog ("Still Alive?") functionality - Automatically Resetting (Restarting) of the Raspberry Pi® when hung-up
3. Resetting (Restarting) of the Raspberry Pi® when cable power returns during shut down procedure.

There is a very simple hand work needed to solder this pin to the Raspberry Pi®

Assembly instructions

Place on your desk the Raspberry Pi® (the B+ or A+), the **UPS PIco** and the **Gold Plated Reset Pin**.

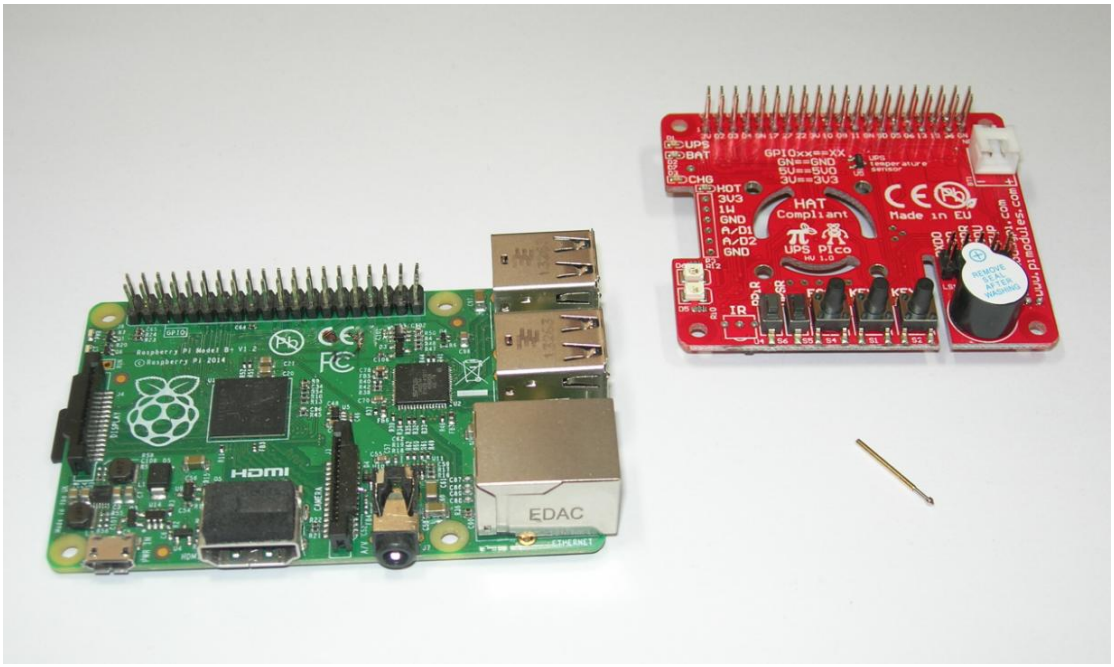


Figure 1 Raspberry Pi B+, UPS PIco and the Gold Plated Reset Pin

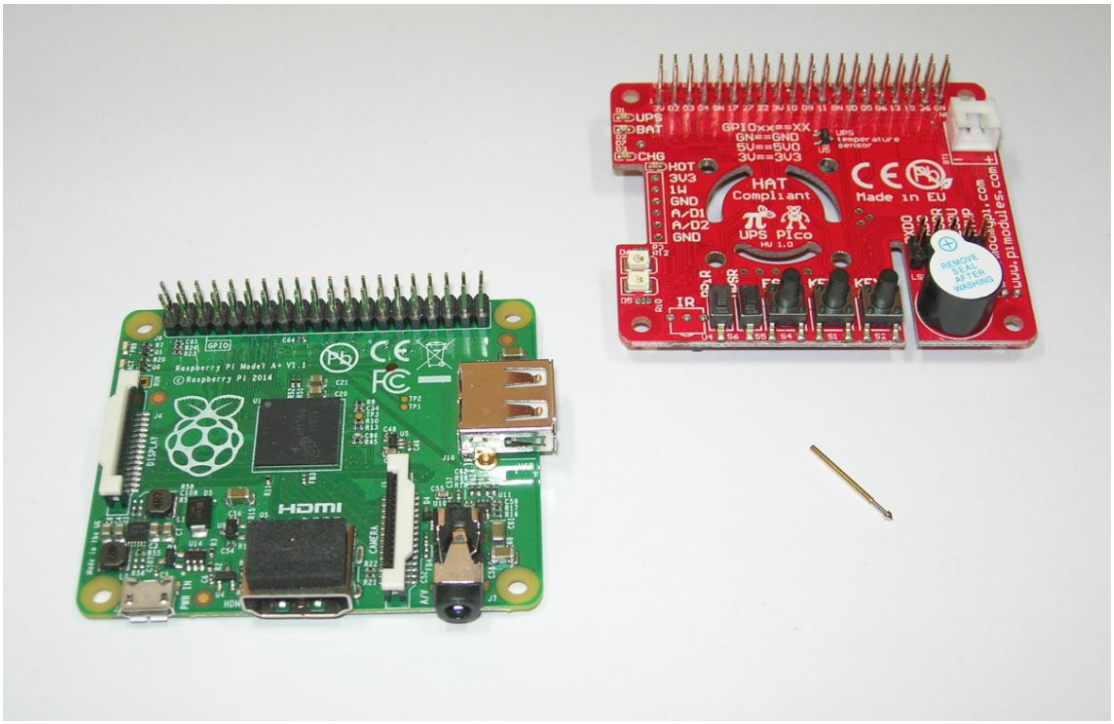


Figure 2 Raspberry Pi A+, UPS PIco and the Gold Plated Reset Pin

Make sure to glue the black rubber spacer on the top of the HDMI connector of the Raspberry Pi® (B+ and A+). This will ensure that the distance between **UPS PIco** and Raspberry Pi® is proper and provide a resistance when **UPS PIco** buttons are pressed.

Figure 3 Black Rubber Spacer glued on the HDMI connector

Drag on the **Gold Plated Reset Pin** through the hole on the **UPS PIco** as shown in the pictures below. Take care to drag on the right direction.

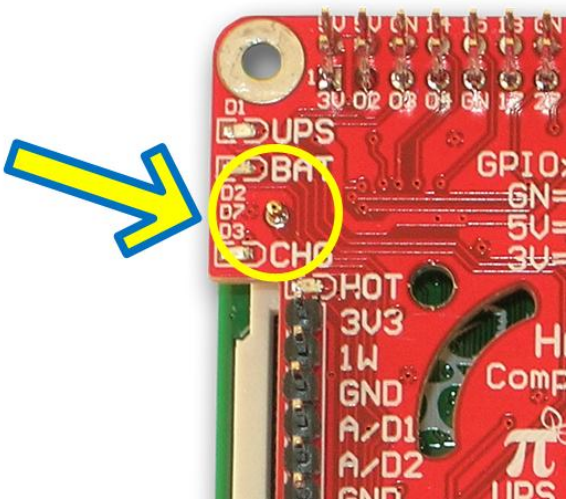


Figure 4 Gold Plated Reset Pin hole

Drag on the **Gold Plated Reset Pin** on the direction as shown on the below picture.

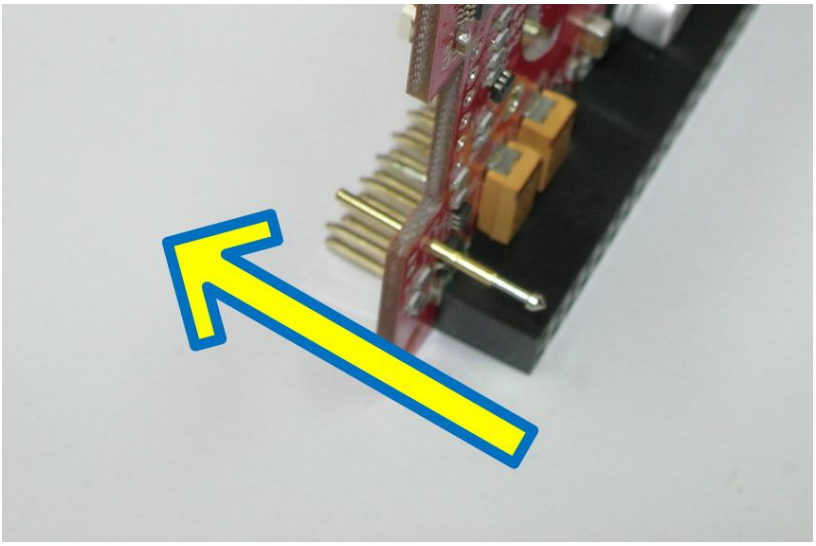


Figure 5 Drag on the Gold Plated Reset Pin through the PCB hole on the direction shown

Put the **UPS PIco** on the Raspberry Pi®, and take care to center the head of the **Gold Plated Reset Pin** to the center of the RUN square pad hole.

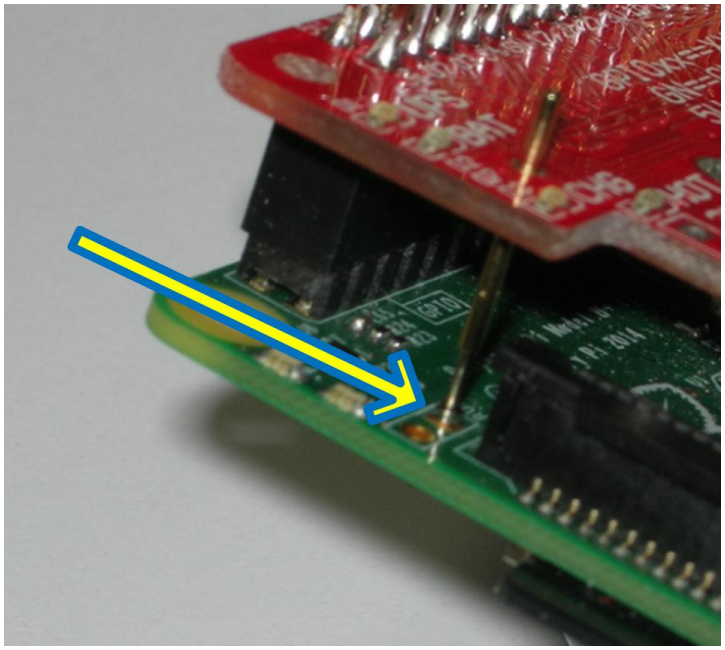


Figure 6 Gold Plated Reset Pin touching the RUN

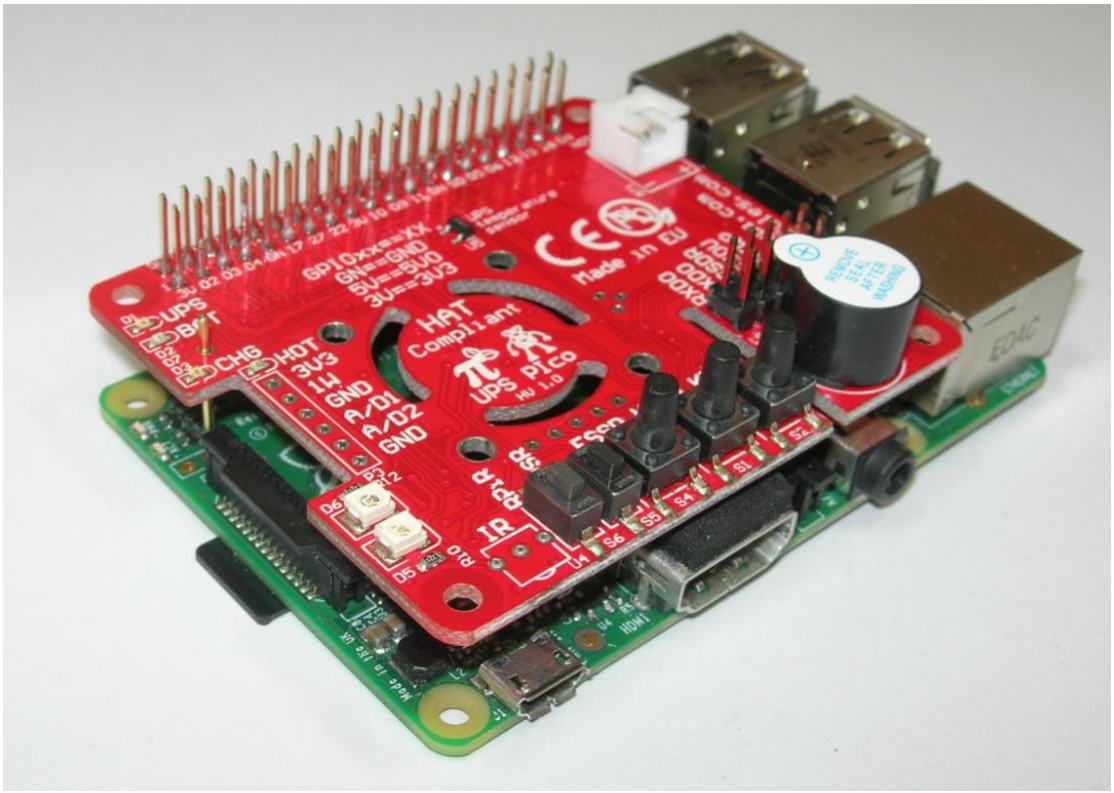


Figure 7 Gold Plated Reset Pin touching the RUN - Top View

Check it, by pressing the pin on the Top. Then, using a soldering tool, solder the **Gold Plated Reset Pin** on the top of the PCB only. Take care to heat up properly the pin before you will add the tin. After soldering it will look like in the picture below. Make sure that the **Gold Plated Reset Pin** after soldering touches properly the RUN on the Raspberry Pi®.

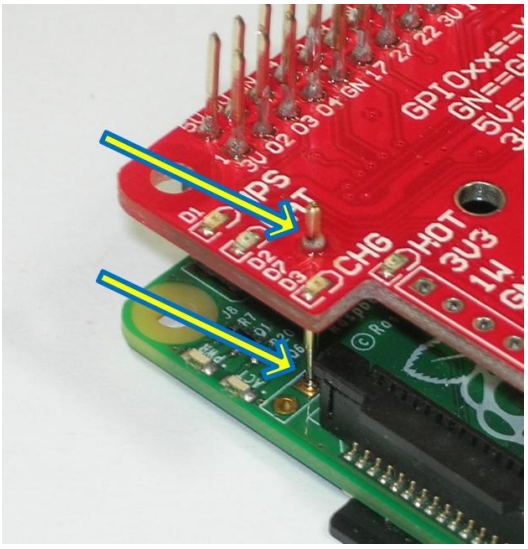


Figure 8 Gold Plater Reset Pin soldered on the UPS PIco

Then in order to make **Gold Plated Reset Pin** internal spring working, you need to re-solder it by pressing down for about 1.5 – 2 mm. Press it down with screw driver and heat up with a soldering tool. Then remove the soldering tool, keeping pressing the pin down. After about 5 seconds, you can put out the screw driver.

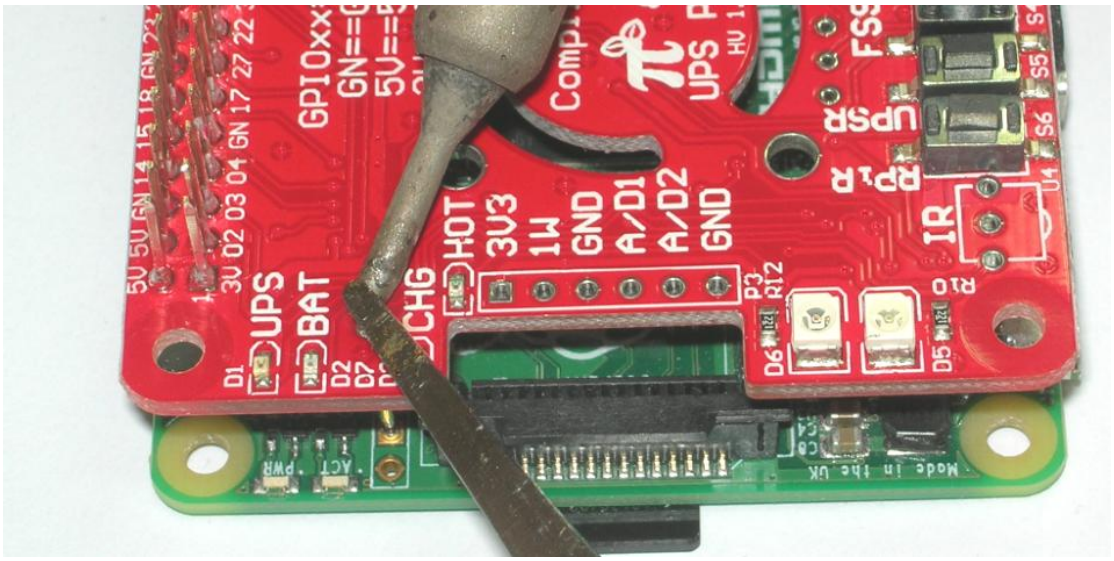


Figure 9 Re-soldering of the Gold Plated Reset Pin while pressing it

You will make the **Gold Plated Reset Pin** ready.

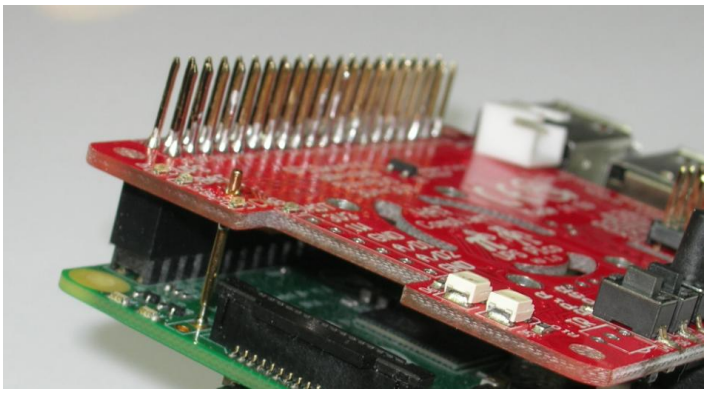


Figure 10 Properly soldered Gold Plated Reset Pin

In order to test it, make Raspberry Pi® working and reset it by pressing the **RPiR** button on the **UPS PIco**.

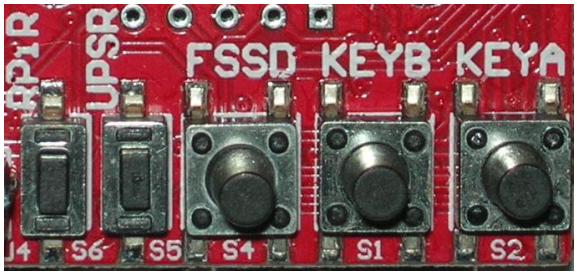


Figure 11 Raspberry Pi® Reset Button on the UPS PIco

More advanced usage of the **Gold Plated Reset Pin** is described in another document where the **PICo** (I^2C) and **@commands** are specified.