UPiS - Uninterruptible Power intelligent Supply

Introduction

The **UPiS** is an Advanced Powering add-on Module for the RaspberryPi® that adds a wealth of additional features to the powering functionality. It is equipped with a LiPO battery (1150 or 2600 mAh) and features a buck/boost switching power converter. There is no need for any additional cabling or power supply, as the **UPiS** is powered by the same power supply of your original RaspberryPi®; you just insert the **UPiS** on the top of the **P1** connector of your RaspberryPi®. The **UPiS** has an embedded measurement system that continuously checks the powering voltage and current consumption, and when the cable power is absent or insufficient, it automatically switches to the battery source. Then, it keeps checking the input voltage on all power sources, and when cable power is available again, it switches to it automatically, turning the battery source off. The **UPiS** uses exactly the same micro USB Power Supply that you are using to supply your RaspberryPi®, however it also has an extended external voltage input[1] for other non-standard powering sources.

Applications

The **UPiS** as an add-on Module is addressed to all users that need a power back-up and/or sensing features for applications running on the RaspberryPi®. All applications running on the RaspberryPi® can take advantage of the *uninterruptible power supply* feature of the **UPiS** (ranging from RaspberryPi®-based fan-less servers to solar-powered applications), but in

[1] The extended external voltage input is available only in the advanced version of the **UPiS**

addition, the **UPiS** provides a wealth of sensors and features, all cumulated in a single all-in-one unit, that can enable writing many innovative applications.

Features

The features of the **UPiS Module** can be categorized as follows:

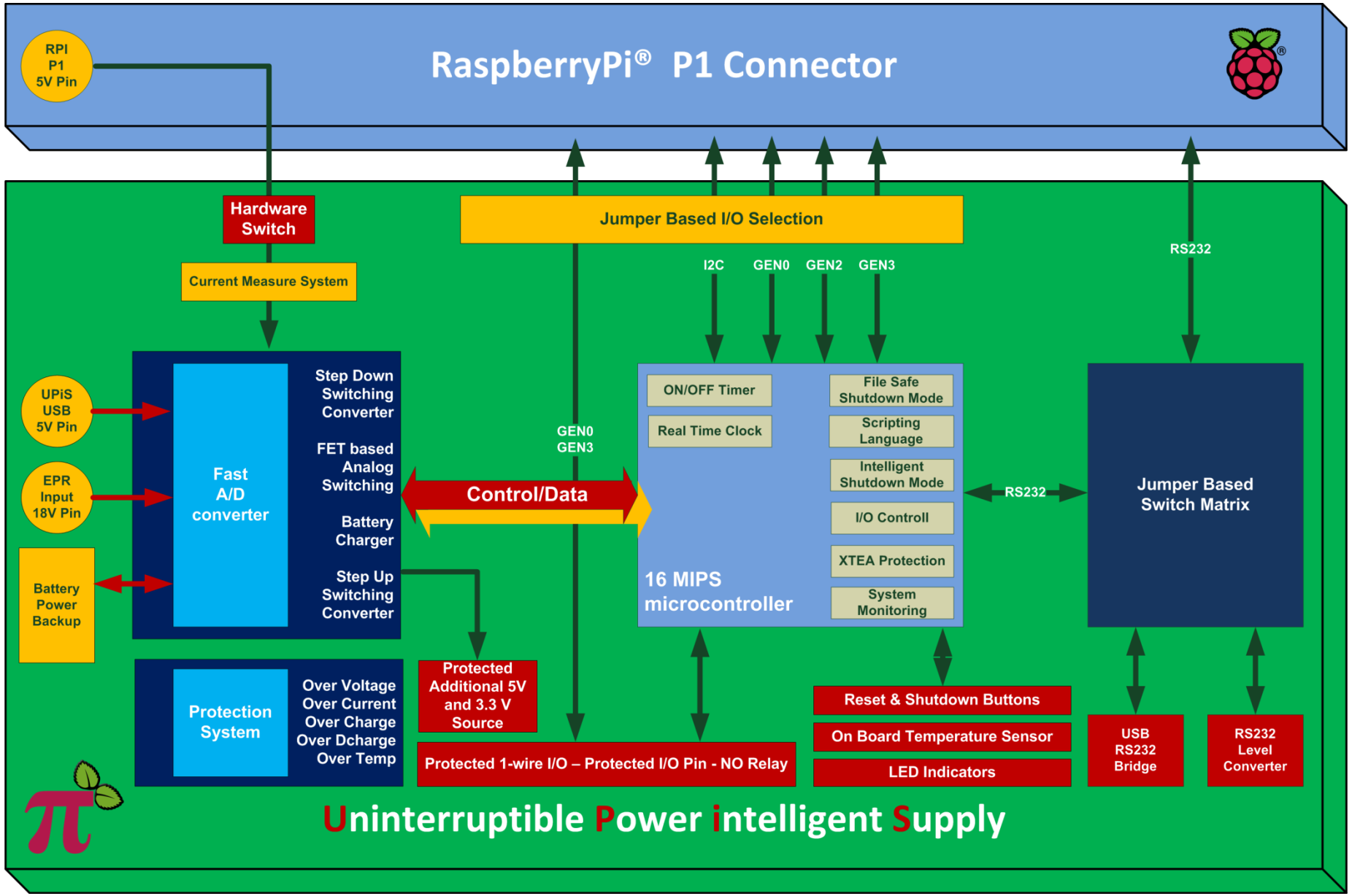
- Powering functionalities
- I/O and control functionalities
- RTC functionalities
- Interfaces functionalities
- Software Protection functionalities
- Environment supervising functionalities

In detail, the list of **UPiS** features is below:

1. Supervised and Protected Powering from all cable sources
    a. RaspberryPi ® micro USB (5 VDC) – available from firmware release V1.20
    b. Additional micro USB (5V DC)
    c. Extended External Powering Input (7V DC – 18V DC) [Advanced version only]
2. Battery Power Backup on each cable powering source (including original RaspberryPi® micro USB – optional after firmware activation) – the UPS feature
3. Onboard Rechargeable LiPO Battery (1150/2600 mAh) – battery working time is from 2 to 5 hours, depending on the version, system load and configuration
4. Onboard enhanced multiple level protection system for the LiPO battery:
    a. Cut-off jumper
    b. PTC fuse
    c. Onboard Thermometer
    d. Over-charge and Over-discharge protection
    e. Over-voltage and Under-voltage protection
5. Onboard Intelligent Automatic LiPO Battery Charger (Charges the battery automatically only if the supply voltage is present and can provide enough current to both feed the RaspberryPi® and charge the battery)
6. RaspberryPi® Hardware ON/OFF Switch
7. Embedded Emulated RTC (Real Time Clock – DS1307) accessible via RaspberryPi® I2C and/or RS232 provided from the System
8. Onboard Analog Thermometer (accessible via RaspberryPi® RS232)
9. Onboard True USB interface (can be used as RS232 – USB Bridge)
10. Programmable Time, RaspberryPi® File Safe Shutdown Button[2]
11. Full monitoring of all UPiS Powering Parameters via RaspberryPi® RS232 port:
    a. Current Consumption
    b. Voltage on each Power source
    c. System Temperature

[2] Requires that the RaspberryPi® be powered from the second micro USB placed on the UPiS board or from Extended External Powering Input

   d. Battery Level
   e. Powering source
12. RTC based programmed Startup/Shutdown
13. Onboard UPiS Reset Button (resets UPiS and RaspberryPi® but not RTC by cutting the powering of the RaspberryPi® for a very short time)
14. Onboard NO RELAY controlled via RS232 or RaspberryPi® Pin (selectable by jumper GPIO_GEN0)
15. Onboard ESD Protected 1-wire interface, controlled via RS232 or RaspberryPi® Pin (selectable by jumper GPIO_GEN3) with separate 3.3V supply pull-up resistor.
16. Onboard ESD Protected I/O pin, controlled via RS232 or RaspberryPi® Pin (selectable by jumper GPIO_GEN3)
17. Onboard True 12 V RS232 interface to the external world (with level converter)
18. Protected (Resettable fuse 140 mA) 5 VDC output for user applications, with battery backup feature
19. Non-protected 3.3 VDC output for user applications (usually used for 1-wire application), separate and independent from the RaspberryPi® 3.3 supply.
20. Extended Tiny Encryption Algorithm (*XTEA*) cryptographic Customer Software Protection System (with custom defined protection keys)
21. Scripting language
22. LED-based Status Information System
23. Bootloader feature for lifetime firmware update.


RPI
P1
5V Pin
RaspberryPi® P1 Connector
Hardware
Switch
Current Measure System
Jumper Based I/O Selection
I2C
GEN0
GEN2
GEN3
RS232
UPiS
USB
5V Pin
EPR
Input
18V Pin
Battery
Power
Backup
Fast
A/D
converter
Step Down
Switching
Converter
FET based
Analog
Switching
Battery
Charger
Step Up
Switching
Converter
GEN0
GEN3
Control/Data
ON/OFF Timer
Real Time Clock
File Safe
Shutdown Mode
Scripting
Language
Intelligent
Shutdown Mode
I/O Controll
XTEA Protection
System
Monitoring
16 MIPS
microcontroller
RS232
Jumper Based
Switch Matrix
Protection
System
Over Voltage
Over Current
Over Charge
Over Dcharge
Over Temp
Protected
Additional 5V
and 3.3 V
Source
Protected 1-wire I/O – Protected I/O Pin - NO Relay
Reset & Shutdown Buttons
On Board Temperature Sensor
LED Indicators
USB
RS232
Bridge
RS232
Level
Converter
Uninterruptible Power intelligent Supply