UPiS - Uninterruptible Power intelligent Supply

Frequently Asked Questions (version 1.5)

Q: Is the UPiS Module true Plug and Play?

A: Yes, the **UPiS Module** is 100% Plug and Play; you don't need to setup anything. You even don't need to change the micro USB power connection plugged to your **RPi.** You will just plug-in the **UPiS Module** to the **P1** connector on the top of your **RPi** and use it. It will solve all of your possible powering problems and offer battery backup.

Q: What types of UPiS Module plug-in versions are available?

A: There are two versions available: the Basic and Advanced. In addition each of them are manufactured with top-end and stackable **P1** connector. Therefore you can choose the version that best fits to your needs and just plug it in. It is that simple. No extra cables needed!!!

Q: Can I use the UPiS Module with other boards?

A: Yes. Just plug it in on top of them, or use the version of the **UPiS Module** with extended **P1** connector, and then plug-in the other board on top of it. The **UPiS Module** will power also your additional boards and other existing peripherals.

Q: How is it possible that without any external powering connection UPiS Module switches the battery power backup ON and OFF?

A: The **UPiS Module** continuously monitors the **RPi** supply voltage on the **P1** connector and the current consumption, and basing on those measurements with sophisticated algorithm decides automatically when to switch battery power backup ON or OFF.

Q: How many additional powering options do I have with the UPiS Module?

A: You can supply your **RPi** with your standard micro USB connector placed on your mother **RPi** board, you can use an additional micro USB socket placed on the **UPiS Module**, you can use also the Protected Extended Voltage input (up to 18 V DC). Notice that all cable powering sources (including the **RPi** micro USB) are monitored and battery backed up.

Q: Can I use the UPiS Module for solar powering?

A: Yes. Use the Protected Extended Voltage input, just connect it to the solar panel, and that's it. **UPiS Module** will automatically charge the integrated LiPO battery, automatically

switch to battery if solar power is missing, as also check the power and battery level, inform you about the system temperature, switch integrated relay ON if needed, and much, much more.

Q: Are all cable powering sources backup with the battery power?

A: Yes, each cable power source is automatically monitored by integrated 16 MIPS microcontroller that switches to battery power when cable power is missing.

Q: What is the switching time from cable powering to battery powering?

A: Less than 100 μSec. In addition, in order to cover also this extremely short-timed lack of power, a large capacitor is placed on the **PRi** power 5V pin, and cover supply of your unit until battery power will established. The powering voltage drop during this time is less that 180 mV with RPi running load of 350 mA.

Q: Is the integrated battery rechargeable, and how it is recharging?

A: The **UPiS Module** has a built-in smart battery charger, which controls and charges the integrated battery whenever your **RPi** is cable-powered. It is an automatic process and you don't need to do anything.

Q: What is the integrated LIPO battery capacity?

A: 1200 mAh in the Basic Version and **2600 mAh** in Advanced Version.

Q: How long can I run my RPi with these batteries?

A: Assuming that current consumption of the **RPi** Model B is about 350 mA and boost switching converter efficiency is about 90%, the estimation is about 5 Hours for Advanced Version and 2.2 hours for Basic Version.

Q: Is it possible to have batteries with higher capacity, and how long do they last?

A: YES, on special order request. However as the charging current is 350 mA, batteries with capacity higher than 4200 mAh will take more than 12 hours to charge completely, which is out of scope of auto charge. Therefore the maximum runtime with battery power is about 8 hours.

Q: Can I change the battery charging current in order to use more powerful batteries?

A: Yes, but at your own risk. The charging current is set by a simple SMD resistor, at your own risk you can change it to a smaller one (thus increasing the charging current up to 500

mA), however this is not recommended for non advanced users. If you want, we can do it for you at your request. You could also use a higher capacity battery, however we strongly recommend you to use one of the batteries offered by our distributors which have been tested to match UPiS.

Q: I need to have more running time from my battery.

A: For dedicated applications you can increase charging current up to 500 mA as written above. Therefore the maximum battery capacity could be increased up to 6000 mAh, still keeping the full charge time within 12 hours. With such battery of 6000 mAh the total running time of **RPi** will be about 16 hours.

Q: I need more running time on battery. Is there are any other way to extend battery runtime?

A: YES, you can use embedded internal **timed ON** and file safe **timed OFF** and then run your **RPi** only on requested time schedule. All other time it will be switched off. With such approach you can save a lot of energy

Q: Can I use the UPiS Module with all models of the RPi?

A: YES. It is using only the **5 VDC** pin and **GND** for all basic operations. On your request (by setting up appropriate jumpers) you can use also RS232, I2C, GPIO_GEN2, GPIO_GEN3 and GPIO_GEN0.

Q: Is the integrated battery protected for the overcharge and over discharge?

A: Yes, the **UPiS Module** has a built in multiple monitoring and protection systems, and one of them is the overcharge and over discharge battery protection. In addition battery is connected trough resettable fuse in order to avoid the risk of short circuit.

Q: What other protection do I have for the LiPO battery?

A: There is a battery **cut-off jumper** which completely cuts off the battery connection to the system.

Q: What other power protections are implemented in the UPiS Module?

A: Extended Voltage and micro USB cable power inputs are protected with reverse polarity, resettable fuse, and surge protection. In addition live current monitoring systems analyze the power consumption and cut-off the battery or cable power when it exceeds preselected threshold.

Q: Can I change the current consumption thresholds?

A: Yes, it is programmable and can be changed by the user. However we recommend that only experienced users do this.

Q: What happens if I program something wrong (i.e. current threshold)?

A: No problem, you can always return to the factory defaults.

Q: Can I use the UPiS Module with other types of batteries?

A: NO. The **UPiS Module** is designed to be used only with LiPO batteries, approved by our company with charging voltage of 4.2 V DC. Any other battery connected to the **UPiS Module** can destroy your battery or the **UPiS** module itself and can be harmful.

Q: RPi uses 5 VDC for powering, how can a lower voltage LiPO battery supply the system in the UPiS Module?

A: It uses switching step-up/step-down converter able to provide up to 2.4 A with efficiency near to 90%. However for security reasons all protection systems implemented in the **UPiS Module** are set for a maximum 1 A.

Q: Can I switch OFF the UPiS Module?

A: Yes. You can switch completely off the **UPiS Module** by hardware switch which completely isolates the **UPiS Module** from the RPi.

Q: So, now I can switch ON or OFF my RPi with a hardware switch?

A: Yes. If you use cable power connected to the **UPiS Module** (micro USB or Extended Voltage input or battery) then you can completely switch OFF or ON your **RPi**. If you use the **RPi** micro USB placed on the mother board, then you can switch ON or OFF only when battery power is used.

Q: Do I have any indications about the UPiS Module status?

A: Yes. You have LEDs informing you about the powering source and battery status. Also you have embedded scripting commands that inform you via RS232 about **UPiS Module** status.

Q: Can I control my UPiS Module via scripting commands?

A: Yes. There is plenty of commands for full system control. Thanks to the implemented bootloader, the set of commands can be enhanced with new ones, as we release more of

them. We are open to customers suggestions about new commands to implement. Customers can propose new commands by e-mail or on our forum: if we find them generally useful, then we will implement them for free and distributed them via our bootloader system.

Q: What is the bootloader system, why do we need it?

A: Bootloader System is a live updating procedure for the embedded microcontroller in the **UPiS Module.** This system gives you access to any new version of the firmware every time that it becomes available.

Q: How can I upload new firmware to the UPiS Module?

A: Just download the .HEX file from our website, and update the **UPiS** Module directly from the **RPi** or any other PC or MAC. It is very simple.

Q: What other features do I have in the UPiS Module?

A: There are a lot of additional features, and new are coming soon via firmware update.
Here below is the current list:

1. Embedded Real Time Clock controlled via RS232 interface and I2C.
2. Time programmed ON/(file safe) OFF switch for the RPi
3. RPi system Watch-Dog timer
4. Protected 1- wire interface
5. Protected digital I/O pin
6. Embedded on the board analog temperature monitor independent from the 1-wire interface – accessed via RS232
7. NO Relay controlled via RS232 interface or RPi
8. True 12V RS232 interface to the external world
9. Additional USB interface for the RS232 I/O pins (based on FTDI chipset)
10. Additional resettable fuse protected power source of 5 VDC and 200 mA
11. Software controlled file safe shutdown switch
12. Scripting language for timed shutdown or switch on
13. Full monitoring via RS232 for all power sources and battery level

Q: What is the Analog Temperature Sensor?

A: The **Analog Temperature Sensor** is placed near the **P1** connector on the **UPiS Module** and can be read by the user via RS232. The resolution is 1 degree Celsius and can be used to monitor the **RPi** environment temperature. If e.g. the temperature is too high, then the **RPi** can be shutdown (on user request), or fan can be automatically started (via embedded Relay on **UPiS Module**). It is very useful if you are using the **RPi** in the outside environment.

Q: What IC of RTC UPiS Module is using?

A: There is no physical RTC IC. The microcontroller controlling all the **UPiS Module** functionalities is emulating the RTC chip. Currently we have implemented the DS1307. However in the future any other chip can be implemented and upload to your **UPiS** Module via bootloader procedure. The RTC system has its own crystal of 32768 Hz and is powered from the **UPiS Module** embedded LiPO battery.

Q: What about support for the UPiS Module and other modules from your company?

A: We are just at the beginning. Very soon we will release new products and discussion forums for each of them.

Q: Where I can buy this UPiS Module?

A: We are a designing house and manufacturer of electronic devices. We are not selling to end customers. You can find them only via our distributors listed on our website.

Q: How can I become a distributor of your products?

A: Very simple. Just send us an e-mail with your request to info@pimodules.com

Devices Features

Supported Functionality	UPiS Basic	UPiS Advanced
Powering		
ON/OFF Switch	Only if **RPi** is powered from battery	Supports all modes: • External Powering (7 VDC – 18 VDC) • Micro USB Powering (on the **UPiS** module) • Battery Powering
UPS functionality (automatic switch to battery supply when cable power is unavailable)	YES (with all supported cable powering modes)	YES (with all supported cable powering modes)
Internal Battery Capacity	1200 mAh	2600 mAh
Automatic LiPO Battery Charger	YES	YES
LiPO Battery Protection – Over charge	YES	YES
LiPO Battery Protection - Over discharge	YES	YES
LiPO Battery Protection – Over Current and short circuit with Resettable Fuse	YES	YES
LiPO Battery Protection – user emergency Cut-off jumper	YES	YES
Resettable Fuse on each powering input	YES	YES
Overvoltage protection on each powering input	YES	YES
Reverse Polarity protection on the External Voltage Input	YES	YES
Power Monitoring		
Voltage on **RPi** P1 connector	YES	YES
Voltage on Battery	YES	YES
Voltage on External Powering Connector (7 – 18 VDC)	NO	YES
Voltage on additional micro USB socket	YES	YES
RPi Current consumption monitoring	YES On all available Powering Sources: • Micro USB Powering (on the UPiS PCB) • Battery Powering	YES On all Powering Sources: • External Powering (7 VDC – 18 VDC) • Micro USB Powering (on the UPiS PCB) • Battery Powering

Intelligent Modules for the Raspberry Pi

LED on Battery Powering	YES	YES
LED on External Powering	NO	YES
LED on micro USB Powering	YES	YES
LED on Battery Charging	YES	YES
Dual LED System Status	YES	YES
RTC control Power ON - OFF	YES	YES
File Safe shutdown Using on Board Button	YES	YES
File Safe Shutdown on low power on battery	YES	YES
Programmable timeout for power cut-off	YES	YES
Interfaces		
12V RS232 Interface	NO	YES
micro USB <-> RPi RS232 Interface (Virtual Com Port)	YES	YES
Protected 1-wire Interface	NO	YES
Fuse Protected 5 VDC @200mA	NO	YES
Sensors		
Embedded on board Temperature sensor for system temperature monitoring	YES	YES
NO Relay	NO	YES
Scripting Commands		
STATUS	YES	YES
RELAYON	NO	YES
REALYOFF	NO	YES
SHUTDOWN	YES	YES
1WIRE	NO	YES
ANTEMP (Analog Sensor Temperature)	YES	YES
ANTEMPBIN (Analog Sensor Temperature Binary)	YES	YES
READTIME	YES	YES
SETTIME	YES	YES
RPITIMEON	NO	YES
RPITIMEOFF	NO	YES
ANTEMPRPIOFF	NO	YES
RPIVLEVEL	YES	YES
USBVLEVEL	YES	YES
EXTVLEVEL	NO	YES
BATVLELEL	YES	YES
RPICLEVEL	NO	YES

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CUTOFFLEVEL	YES	YES
Real Time Clock	YES	YES