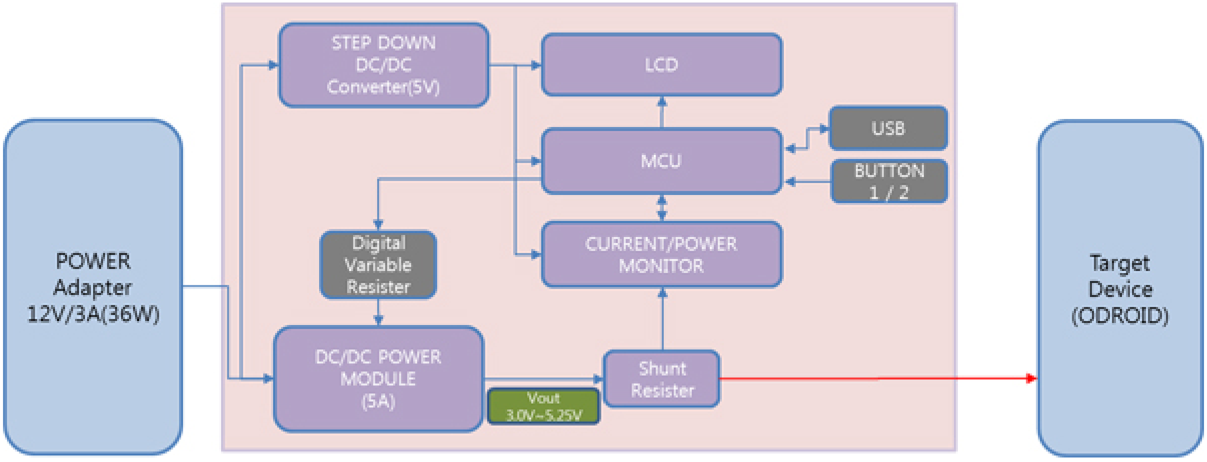
Introduction

The easy way to make a Green platform. The ODROID Smart Power is an easily deployable power supply that collects voltage, current and power of the system load to enable developers to optimize energy consumption. LCD shows voltage, current, watt and watt-hour(Wh) simultaneously. You can also see the graphical energy transient on your PC via USB interface.



Specifications

MCU	PCI18F45K50
Output Voltage	DC 3.00 ~ 5.25Volt
Output Current	DC 5A (Max)
Input Power	DC 12Volt/3A (36Watt)
Measurement	Voltage, Current, Watt, Watt-Hour
Tolerant	2%(Typ.)
LCD	16×2 Character type with LED backlight
USB device port	Data communication with PC (10Hz sampling rate)

Button	Output On/Off, Start/stop measurement of Watt-Hour
Volume	Voltage Adjust
Output	4mm diameter banana jack, USB Host port, Wire connector
ETC	Firmware update via USB

Components

PACKAGE INCLUDES :

- ODROID Smart Power
- Power supply unit (AC-DC Adapter)
- USB cable
- Hook clip cable
- DC plug cable (5.5mm/2.1mm)for ODROID-XU/XU+E
- DC plug cable (2.5mm/0.8mm) for ODROID-X/X2/U2/X2

How to control Smart Power

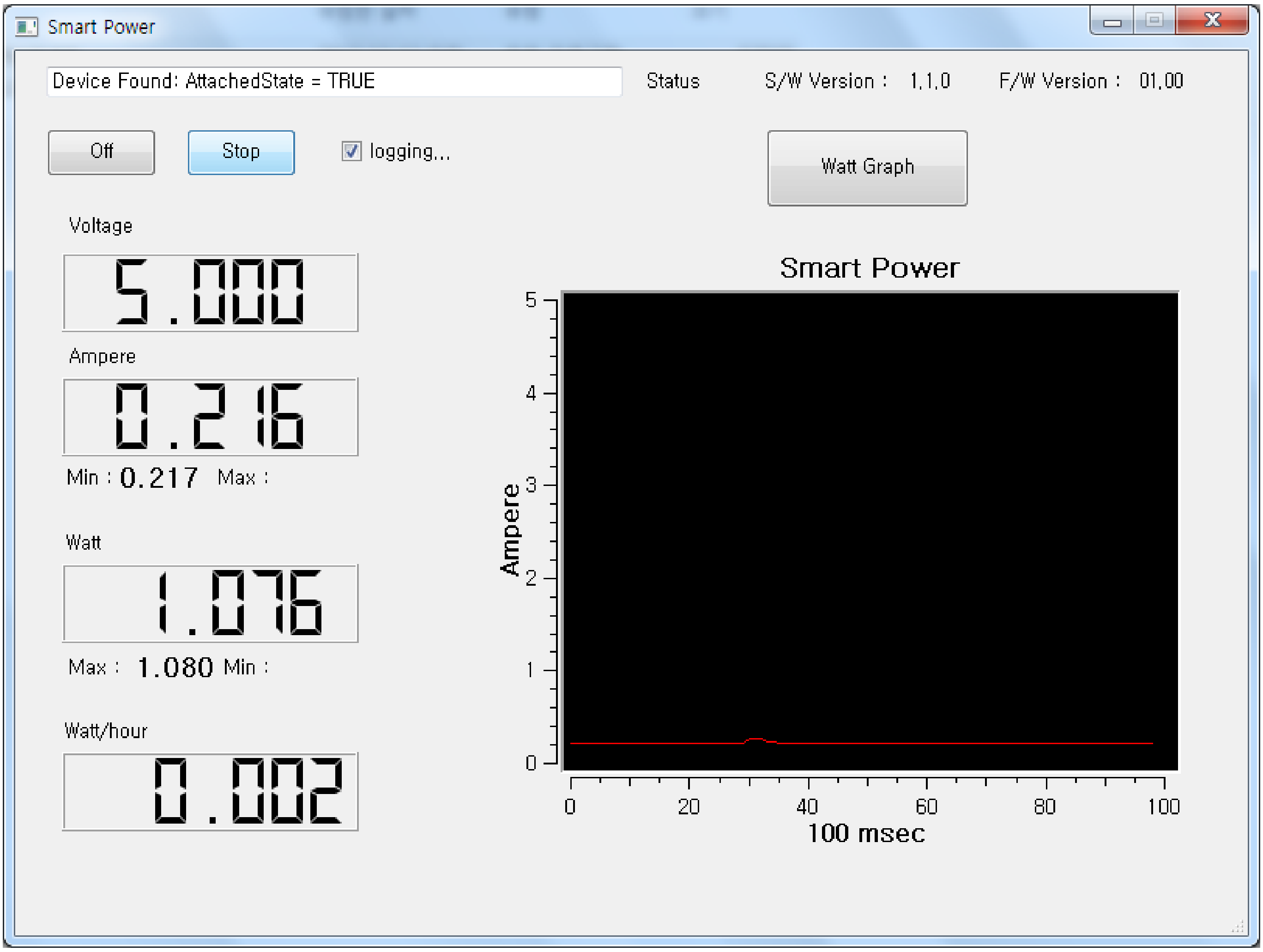
Measure the system load of smartphones. The ODROID Smart Power is an easily deployable power supply that collects voltage, current and power of the system load to enable developers to optimize energy consumption.

Measure the system load of ODROIDs, X / X2 / U2 / XU
LCD shows voltage, current, watt and watt-hour(Wh) simultaneously.

PC Application

You can see the graphical energy transient on your PC via USB interface. You can download it from http://forum.odroid.com/viewforum.php?f=72

The binary source code of PC Application. http://dn.odroid.com/Smart_Power/Smart_Power.zip



Device Found: AttachedState = TRUE

S/W Version : 1.1.0

F/W Version : 01.00

☑ logging...

Voltage 5.000

Ampere 0.216

Min : 0.217 Max :

Watt 1.076

Max : 1.080 Min :

Watt/hour 0.002

How to compile PC Application for Windows

Download and install Qt 4.8.4(MinGW) version

[http://download.qt-project.org/archive/qt/4.8/4.8.4/qt-win-opensource-4.8.4-mingw.exe]

Add C:\Qt\4.8.4\bin to your systems path variable (qmake.exe is located here)

Add C:\MinGW\bin to your systems path variable (mingw32-make.exe. is located here)

Download and extract qwt-6.1.0

[http://sourceforge.net/projects/qwt/files/qwt/6.1.0/qwt-6.1.0.zip]

Copy the qwt-6.1.0 to C:\qwt-6.1.0

build the qwt-6.1.0

Open a command line (cmd) and navigate to “C:\qwt-6.1.0”

```
> cd C:\qwt-6.1.0
> qmake
> make
> make install
> qmake -set QMAKEFEATURES C:\qwt-6.1.0\features
```

Add C:\qwt-6.1.0\lib to your systems path variable (qwtd.dll is located here)

Download the PC Application source code

[http://dn.odroid.com/Smart_Power/smartpower_source.zip]

Extract the smartpower_source.zip

build the smart_power_app

```
> cd smartpower_source\HIDAPI
> qmake
> make -f MakeFile.Release
> cd ..\smartpower_source\smartpower
> qmake
> make -f MakeFile.Release
```

You can get the .exe file to smartpower/windows/SmartPower.exe

How to compile PC Application for Ubuntu

install packages

```
apt-get install qt4-default qt4-designer libqwt-dev libusb-1.0-0-dev
```

build the smart_power_app

```
cd HIDAPI
qmake
make
cd ../smartpower
uic smartpower.ui > ui_smartpower.h
qmake
make
```

create rules file

sudo vi /etc/udev/rules.d/99-hiid.rules

```
# This is a sample udev file for HIDAPI devices which changes the
permissions
# to 0666 (world readable/writable) for a specified device on Linux systems.


# If you are using the libusb implementation of hidapi (hid-libusb.c), then
# use something like the following line, substituting the VID and PID with
# those of your device. Note that for kernels before 2.6.24, you will need
# to substitute "usb" with "usb_device". It shouldn't hurt to use two lines
# (one each way) for compatibility with older systems.

# HIDAPI/libusb
SUBSYSTEM=="usb", ATTRS{idVendor}=="04d8", ATTRS{idProduct}=="003f",
MODE="0666"


# If you are using the hidraw implementation, then do something like the
# following, substituting the VID and PID with your device. Busnum 1 is USB.

# HIDAPI/hidraw
KERNEL=="hidraw*", ATTRS{busnum}=="1", ATTRS{idVendor}=="04d8",
ATTRS{idProduct}=="003f", MODE="0666"

# Once done, optionally rename this file for your device, and drop it into
# /etc/udev/rules.d and unplug and re-plug your device. This is all that is
# necessary to see the new permissions. Udev does not have to be restarted.

# Note that the hexadecimal values for VID and PID are case sensitive and
# must be lower case.
# If you think permissions of 0666 are too loose, then see:
# http://reactivated.net/writing_udev_rules.html for more information on
finer
# grained permission setting. For example, it might be sufficient to just
# set the group or user owner for specific devices (for example the plugdev
# group on some systems).
```

restart system.

./linux/SmartPower

Hardware

This file is the full schematics of ODROID Smart Power. http://dn.odroid.com/Smart_Power/PowerMeter20130624.pdf

PCI18F45K50 MCU data sheet : http://www.microchip.com/wwwproducts/Devices.aspx?dDocName=en558861

Software

Cross Compiler

MPLAB C18 v3.43 or higher (From Microchip homepage : http://www.microchip.com/stellent/idcplg?IdcService=SS_GET_PAGE&nodeId=1406&dDocName=en010014&redirects=c18) In my case, Standard-Eval Version (Free of Charge) was downloaded for my code optimization. It is the trial version and can only be used for 60 days.

IDE

X IDE v1.51 or higher (From Microchip homepage : http://www.microchip.com/pagehandler/en-us/family/mplabx)

How to write firmware

The firmware source code of ODROID Smart Power.
http://dn.odroid.com/Smart_Power/Smart_Power_V30_src.zip

If you unzip the fw source code, there are two major directories.
Microchip : it contains the USB framework for firmware.
USB/Device - HID - Custom Demos/Firmware : it contains main firmware source code of Smart Power.
USB/Device - Bootloaders/HID/Firmware - PIC18 Non-J : it contains bootloader source code for Smart Power.

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http://odroid.com/dokuwiki/ - **Odroid Wiki**

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http://odroid.com/dokuwiki/doku.php?id=en:odroidsmartpower

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