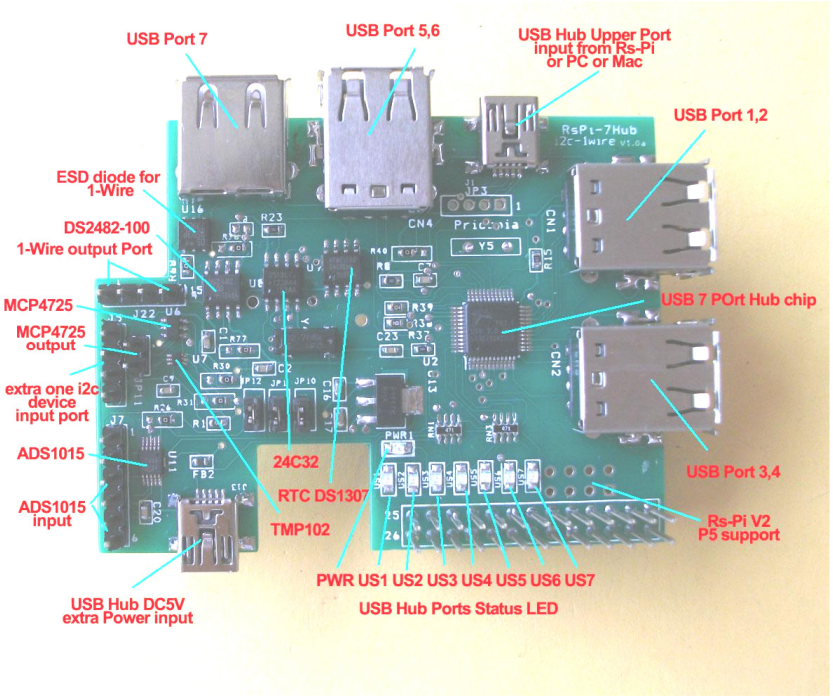
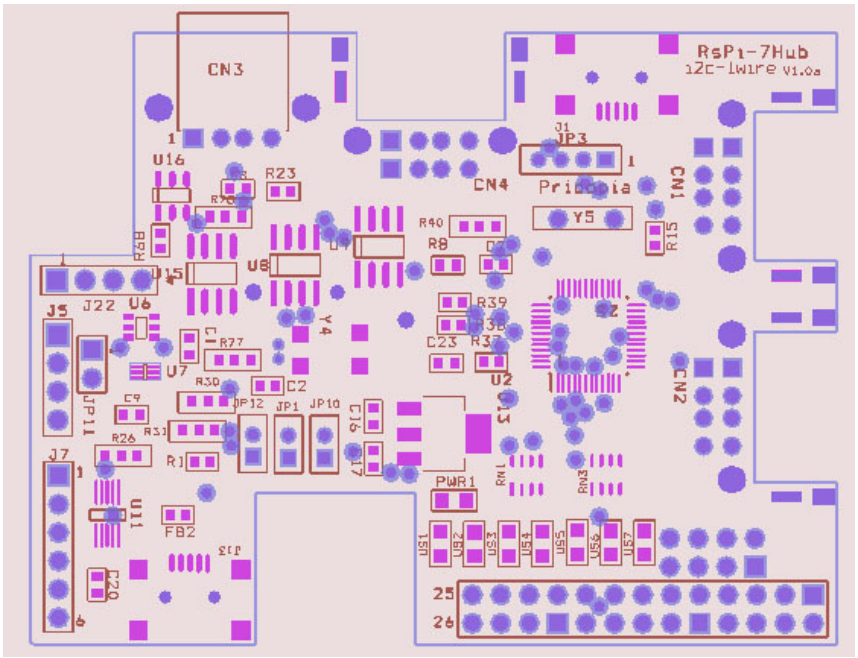
Rs-Pi 7 USB- Hub & I2C 1-Wire User Manual

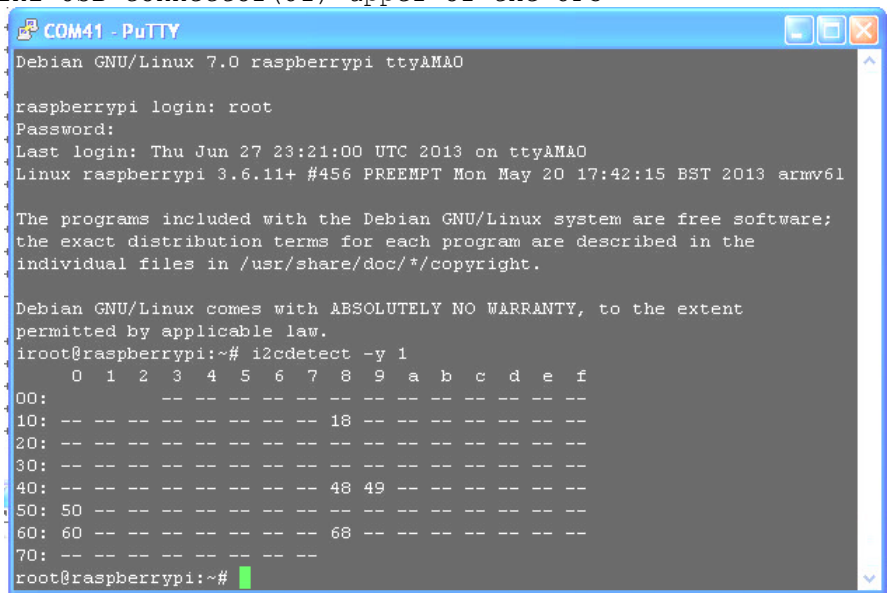




1. U8 RTC **DS1307** with CR2032 Battery
2. U7 **TMP102** Temperature Sensor
3. U9 **24C32** 32Kbit EEPROM **JP10** Disable Jumper
4. U6 **MCP4725** 12bit Digital-to-Analog Converter , JP11 (AOUT, GND) **JP1** Disable Jumper
5. U11 **ADS1015** 12bit Analog-to-Digital Converter , J7 INPUT (AIN0, AIN1,AIN2,AIN3,GND,3V3) **JP12** Disable Jumper
6. J5 (5V, GND,SCL,SDL) J6(3v3,GND,SCL,SDL) I2C output
7. U2 - USB 7 Ports HUB chipset
   J1 (JP3) USB HUB upper port signal input from Rs-Pi
8. J13 Mini USB 5V input for USB HUB, you don't need plug 5V , the HUB already use 5V from Raspberry Pi, if your use USB device need more power, then you can plug-in 5V in this port.
9. J11 for RS-Pi V2 GPIO connector (got 4 more GPIO pin)

Enable 7 Port USB hub function.

* use the Mini USB to USB cable we provide plug in one of the Raspberry Pi USB port to this 7 Port USB hub board Mini USB connector(J1) upper of the JP3



i2c bus device detect status

18> DS2482-100 48 -> tmp102 50 -> 24c32 60 -> MCP4725

68 -> RTC DS1307 49 -> ADS1015

First Install battery for RTC , " + " mark on top

RTC DS1307 - 68 in i2cdetect –y 0 or i2cdetect –y 1

for Rs-Pi V2 you will see 68 in the screen 68 ->

RTC DS1307 48 -> tmp102

This requires a Raspberry Pi running a kernel with the RTC module and DS1307 module included. This is not true of the "Wheezy" distros

or Occidentalis v0.1. This is for use with Occidentalis v0.2 or greater

then, load up the RTC module by running

sudo modprobe rtc-ds1307

Then, as root (type in **sudo bash**) run

echo ds1307 0x68 > /sys/class/i2c-adapter/i2c-0/new_device (if you have a rev 1 Pi)

echo ds1307 0x68 > /sys/class/i2c-adapter/i2c-1/new_device (if you have a rev 2 Pi)

hwclock –r **read time**

hwclock –w **write time in RTC**

*TMP102 information

modprobe tmp102

echo tmp102 0x48 > /sys/class/i2c-adapter/i2c-0/new_device
(if you have a rev 1 Pi)

echo tmp102 0x48 > /sys/class/i2c-adapter/i2c-1/new_device
(if you have a rev 2 Pi)

sensors **show the temp**

- **if your kernel without tmp102 module**

The '-y' option disables interactive mode for the command and the '0' is the I2C bus to scan. You can also run this command on the Pi's second I2C bus by specifying '1' instead.

We can see that it has found our TMP102 device at address 0x48.

To read the temperature from our temperature sensor, we use the i2cget command to read a single byte (Byte 1 - full degrees) from the temperature register (0x00) of the device.

pi@raspberrypi ~ $ i2cget -y 0 0x48 0x00 b

0x16

Converting this hexadecimal value to decimal, we get our temperature of 22°C.

If you want a more precision on the temperature, you can read both the full and fractional bytes from register 0 as follows:

pi@raspberrypi ~ $ i2cget -y 0 0x48 0x00 w

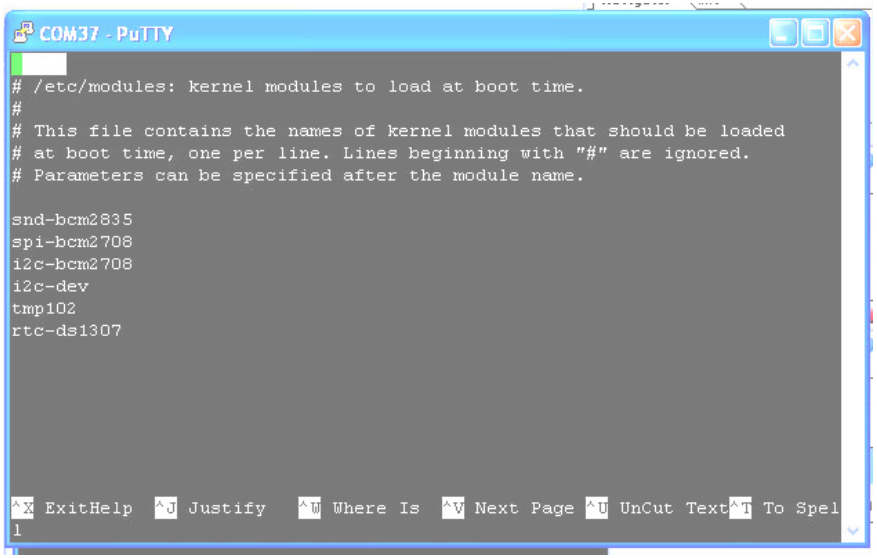
0xa015

This gives us byte 2 (0xa0) and byte 1 (0x15), but as a 16bit hexadecimal number and in the wrong order. To convert to °C, swap around the bytes, shift right by 4, convert to decimal and multiply by 0.0625.

E.g.

dec(0x15a0>>4) * 0.0625 = 21.625°C

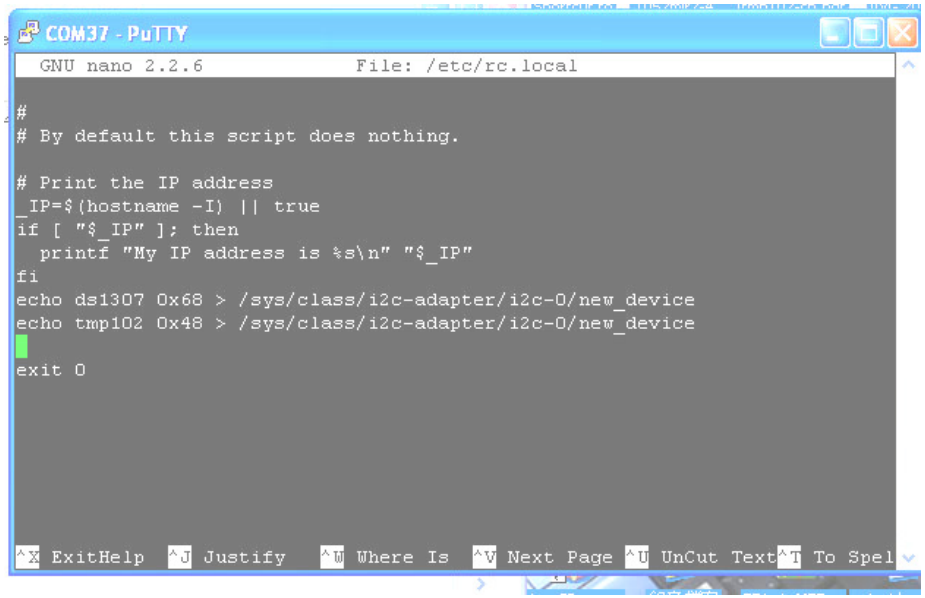
you'll want to add the RTC kernel module & temp tmp102 to the /etc/modules list, so its loaded when the machine boots. Run **sudo nano /etc/modules** and add **rtc-ds1307 & tmp102** at the end of the file



Then you'll want to create the DS1307 device creation at boot, edit /etc/rc.local by running

sudo nano /etc/rc.local

and add **echo ds1307 0x68 > /sys/class/i2c-adapter/i2c-0/new_device** before **exit 0**



* Adafruit **Occidentalis v0.2** image support the TMP102 and RTC DS1307 if you need this driver, you can choose this.

The image can be download from
http://learn.adafruit.com/adafruit-raspberry-pi-educational-linux-distro/occidentalis-v0-dot-2

tmp102 information

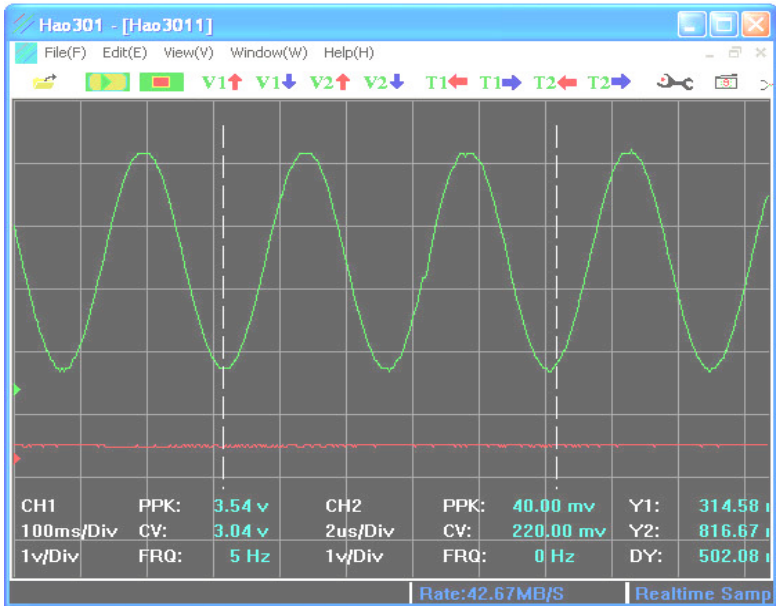
http://www.element14.com/community/groups/raspberry-pi/blog/2012/07/26/is-it-done-yet-temperature-sensing-with-the-raspberry-pi#comment-16249

http://www.agilart.com/blog/tmp102-raspberry-pi

* MCP4725 Digital to Analog Converter but our address are “60” all the sample can Download from our web site.

http://learn.adafruit.com/mcp4725-12-bit-dac-with-raspberry-pi

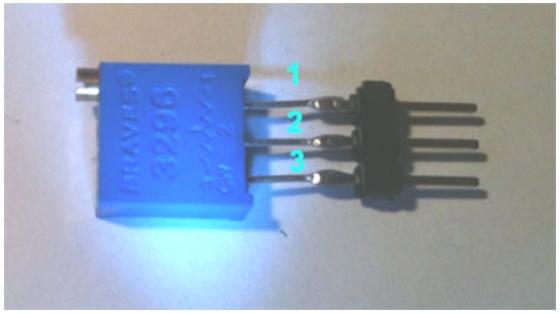
JP11 for analog output JP11 pin 1,2 (AOUT, GND)



* **ADS1015 12bit Analog-to-Digital Converter demo 12 bit 4 channel input ads1015-49.py at address "49"**

J7 INPUT (AIN0, AIN1,AIN2,AIN3,GND,3V3)

AIN0, AIN1, AIN2, AIN3 connect to **trimpot 10K OHM pin 2 pin1 3v3 pin3 GND**



COM21 - PuTTY

```
root@raspberrypi:/home/pi/ads1015# i2cdetect -y 0
     0  1  2  3  4  5  6  7  8  9  a  b  c  d  e  f
00:          -- -- -- -- -- -- -- -- -- -- -- -- --
10: -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- --
20: 20 -- -- -- -- -- -- -- -- -- -- -- -- -- -- --
30: -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- --
40: -- -- -- -- -- -- -- -- 48 49 -- -- -- -- -- --
50: 50 -- -- -- -- -- -- -- -- -- -- -- -- -- -- --
60: 60 -- -- -- -- -- -- -- 68 -- -- -- -- -- -- --
70: -- -- -- -- -- -- -- --
root@raspberrypi:/home/pi/ads1015# dir
Adafruit_ADS1x15.py   Adafruit_I2C.pyc  ads1015_example.py
Adafruit_ADS1x15.pyc  ads1015-49.py     ads1015.py
root@raspberrypi:/home/pi/ads1015# ./ads1015-49.py
Reading ADS1015 Channel 0, 1, 2, 3  Total  4 Channel

Channel 0 = 1.485 V
Channel 1 = 1.869 V
Channel 2 = 0.981 V
Channel 3 = 1.371 V
root@raspberrypi:/home/pi/ads1015#
root@raspberrypi:/home/pi/ads1015#
```

- **24c32 EEPROM**

COM12 - PuTTY

```
root@raspberrypi:/home/pi/eeprog# dir
24c01.c  24cXX.o    data2   eeprog.c  eeprom_1.c  i2c-dev.h  WARNING
24cXX.c  ChangeLog  data4   eeprog.o  eeprom_2    Makefile
24cXX.h  data       eeprog  eeprom_1  eeprom_2.c  README
root@raspberrypi:/home/pi/eeprog# ./eeprog /dev/i2c-0 0x50 -r 0:100 -f -x -16
eeprog 0.7.6, a 24Cxx EEPROM reader/writer
Copyright (c) 2003-2004 by Stefano Barbato - All rights reserved.
  Bus: /dev/i2c-0, Address: 0x50, Mode: 16bit
  Reading 100 bytes from 0x0

 0000|  50 72 69 64 6f 70 69 61   20 ff ff ff ff ff ff ff
 0010|  ff ff ff ff ff ff ff ff   ff ff ff ff ff ff ff ff
 0020|  ff ff ff ff ff ff ff ff   ff ff ff ff ff ff ff ff
 0030|  ff ff ff ff ff ff ff ff   ff ff ff ff ff ff ff ff
 0040|  ff ff ff ff ff ff ff ff   ff ff ff ff ff ff ff ff
 0050|  ff ff ff ff ff ff ff ff   ff ff ff ff ff ff ff ff
 0060|  ff ff ff ff

root@raspberrypi:/home/pi/eeprog# ./eeprog /dev/i2c-0 0x50 -r 0:100 -f -16
eeprog 0.7.6, a 24Cxx EEPROM reader/writer
Copyright (c) 2003-2004 by Stefano Barbato - All rights reserved.
  Bus: /dev/i2c-0, Address: 0x50, Mode: 16bit
  Reading 100 bytes from 0x0
Pridopia ÿÿÿÿÿÿÿÿÿÿÿÿÿÿÿÿÿÿÿÿÿÿÿÿÿÿÿÿÿÿÿÿÿÿÿÿÿÿÿÿÿÿÿÿÿÿÿÿÿÿÿÿÿÿÿÿÿÿÿÿÿÿÿÿÿÿÿÿÿÿÿÿÿÿÿ
ÿÿÿÿÿÿÿÿÿÿÿÿÿÿÿÿÿroot@raspberrypi:/home/pi/eeprog#
root@raspberrypi:/home/pi/eeprog# ./eeprog /dev/i2c-0 0x50 -r 0 -f -x -16
eeprog 0.7.6, a 24Cxx EEPROM reader/writer
Copyright (c) 2003-2004 by Stefano Barbato - All rights reserved.
  Bus: /dev/i2c-0, Address: 0x50, Mode: 16bit
  Reading 1 bytes from 0x0

 0000|  50
```

use eeprog 0.7.6 can read/write for 24c32 or 24cxx

The Program can be download from

http://www.codesink.org/eeprog.html

** DS2482-100 1-Wire system

*. U15 DS2482-100 I2C to 1-Wire bridge device
   J22 1-wire Port pin 1 - pin4
   (5V,GND, OW (1-Wire Data, ESD Protected). RT (1-Wire Return/Ground ,ESC protected)

*. U16 DS9503P ESD protection diode

COM53 - PuTTY

```
i2croot@raspberrypi:~# i2cdetect -y 1
     0  1  2  3  4  5  6  7  8  9  a  b  c  d  e  f
00:          -- -- -- -- -- -- -- -- -- -- -- -- --
10: -- -- -- -- -- -- -- -- 18 -- -- -- -- -- -- --
20: -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- --
30: -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- --
40: -- -- -- -- -- -- -- -- 48 49 -- -- -- -- -- --
50: 50 -- -- -- -- -- -- -- -- -- -- -- -- -- -- --
60: 60 -- -- -- -- -- -- -- 68 -- -- -- -- -- -- --
70: -- -- -- -- -- -- -- --
root@raspberrypi:~# /opt/owfs/bin/owserver --i2c=/dev/i2c-1:all
root@raspberrypi:~# /opt/owfs/bin/owdir
/28.80D6EA040000
/bus.0
/uncached
/settings
/system
/statistics
/structure
/simultaneous
/alarm
root@raspberrypi:~# /opt/owfs/bin/owread /bus.0/interface/settings/name
DS2482-100root@raspberrypi:~#
```

18 -> DS2482-100   I2C 1-Wire bridge chip

/28.7E1CC8030000   - Connect & Detect DALLAS 18B20P   TEMP Sensor

```
root@berry:~# /opt/owfs/bin/owserver --i2c=/dev/i2c-0:ALL
root@berry:~# /opt/owfs/bin/owdir
```

It appears that OWServer has found 1 1-wire busses, exactly what we're expecting to happen.
Lets see if we can get some more details.
Which chip on the breakout board is bus.0

```
root@berry:~# /opt/owfs/bin/owread /bus.0/interface/settings/name
DS2482-100
```

How about the i2c addresses of each bus entry. bus.0

```
root@berry:~# /opt/owfs/bin/owread /bus.0/interface/settings/address
/dev/i2c-0:18
```

Installation of the OWFS (One Wire File System)

First you need to install the following packages:

sudo apt-get update

sudo apt-get install automake autoconf autotools-dev gcc-4.7 libtool libusb-dev libfuse-dev swig python2.6-dev tcl8.4-dev php5-dev i2c-tools

If promoted answer Yes on any questions during the install.

Download the latest version of OWFS to your usr/src directory

cd /usr/src

sudo wget -O owfs-latest.tgz http://sourceforge.net/projects/owfs/files/latest/download

Unpack with the following command:

sudo tar xzvf owfs-latest.tgz

Next you must configure OWFS: (replace X.XXXX with the version number you downloaded)

cd owfs-X.XXXX

sudo ./configure

If everything is correct, you should get a result like this:

Current configuration:

Deployment location: /opt/owfs

Compile-time options:

Caching is enabled

USB is DISABLED

etc.

Next you need to compile OWFS which will take approx. 30 minutes with the following command:

sudo make

Next install OWFS which will take a few minutes

sudo make install

Once the installation has completed you need to create a mountpoint for the 1wire folder:

sudo mkdir /mnt/1wire

In order to use the 1wire devices without root privileges you have to change the FUSE settings, edit the fuse configuration file with:

sudo nano /etc/fuse.conf

Update this line: #user_allow_other and remove the # from the start, then save your changes

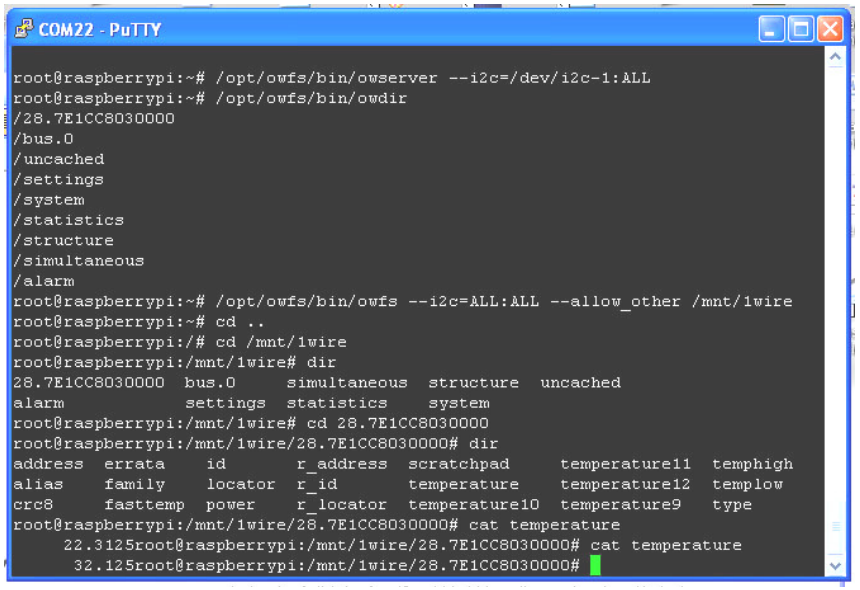
You can now start using OWFS to access your i2c devices and any connected sensors:

sudo /opt/owfs/bin/owfs --i2c=ALL:ALL --allow_other /mnt/1wire/

Using a terminal window navigate to the /mnt/1wire/ directory and use the ls command to list all connected devices.

If you have a temperature sensor connected you should have a folder starting with 28.xxxxxx

cd into this folder and then enter cat temperature to read the temperature of the sensor.



cat Temperature -- 22.312 & 32.125

To keep Rs-Pi USB Hub board working properly, you need make sure the Vcc input for Rs-Pi above 4.75V, JP3 pin 1 Vcc, pin4 GND

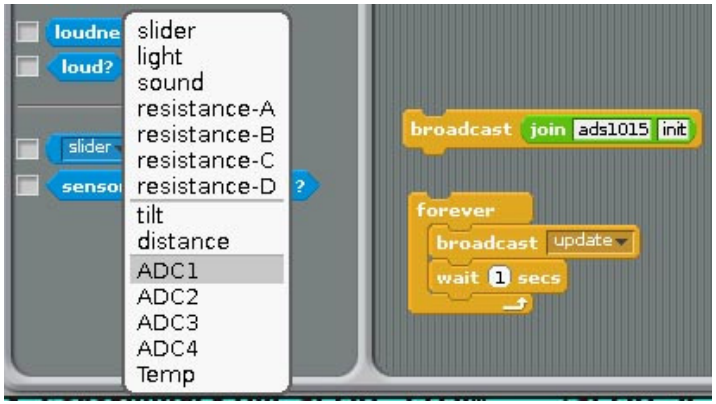
Package Content

1x Rs-Pi 7 USB Hub & I2C AD/DA &1-wire board
1x USB to MINI USB hub input cable (for USB Hub input & Power input)
1x CR1220 3V Battery
1x Manual

New Pridopia scratch interface software you can download from our web site
http://www.pridopia.co.uk/rs-pi-set-scratch.html

(1) i2c address 49 adc ads1015 4 channel input test

i2c adc ads1015 12bit Analog-to-Digital Converter



1. command "ads1015init" initial ADS1015
2.after broadcast "Update" in Sensing --> Slider , you will see the ADC1, ADC2,ADC3, ADC4 in the list

(2) EEPROM i2c address 50 24c32 read/write

command "EEP" + start address x, start address y + " message"

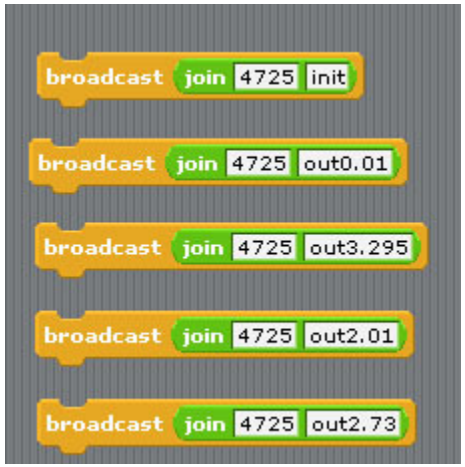
--> EEP 0x00 0x00 pridopia eeprom test

The System will open a new screen for EEPROM editor , need waiting about 10 seconds

(3) DAC MCP4725 12bit Digital-to-Analog Converter

JP11 (AOUT, GND) i2c address 60

demo our 4Hub/7Hub AD/DA board , AD/DA module board



Command "4725init" initial DAC mcp4725
Command "4725out" + "voltage"
voltage range "DC 0.01V to DC 3.29V"
command "4725out2.73" DC output 2.73V