

# Raspberry Pi “Sensor” package

- This is a small 20x30mm<sup>2</sup> hand-made board
- it has a temperature readout
- It has a header for an infrared receiver that allows to control things with a remote
- It has two LEDs that can be turned on and off through GPIO pins

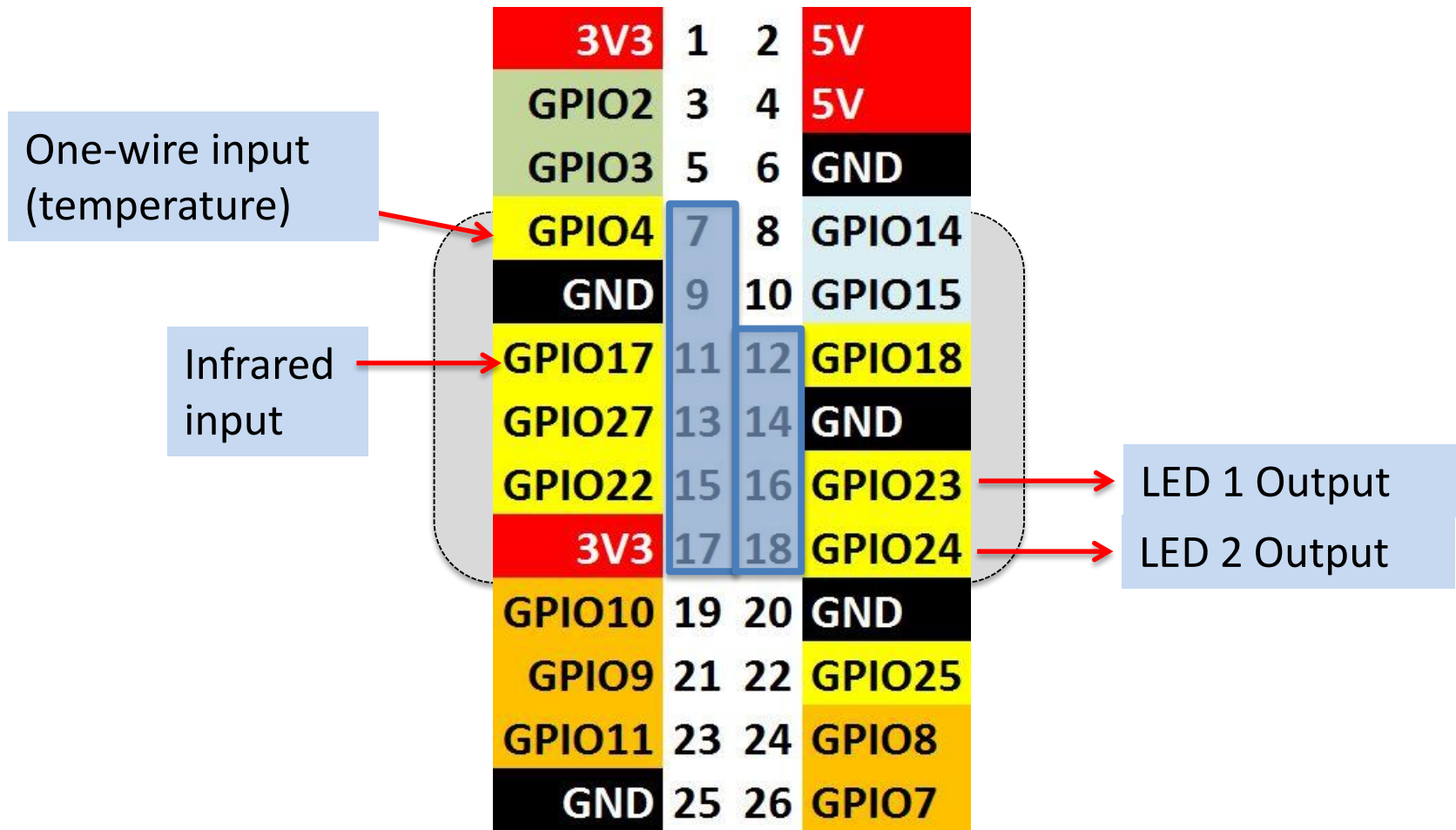
# Sensor Input

- The Pi has software out of the box to read out one-wire “Dallas” protocol sensors
- We use it to read DS18B20 digital thermometers (by default on GPIO pin 4)
- We read a TSOP 312 infrared receiver (on GPIO pin 17 – default input)
- There two LEDs using GPIO pins 23 and 24

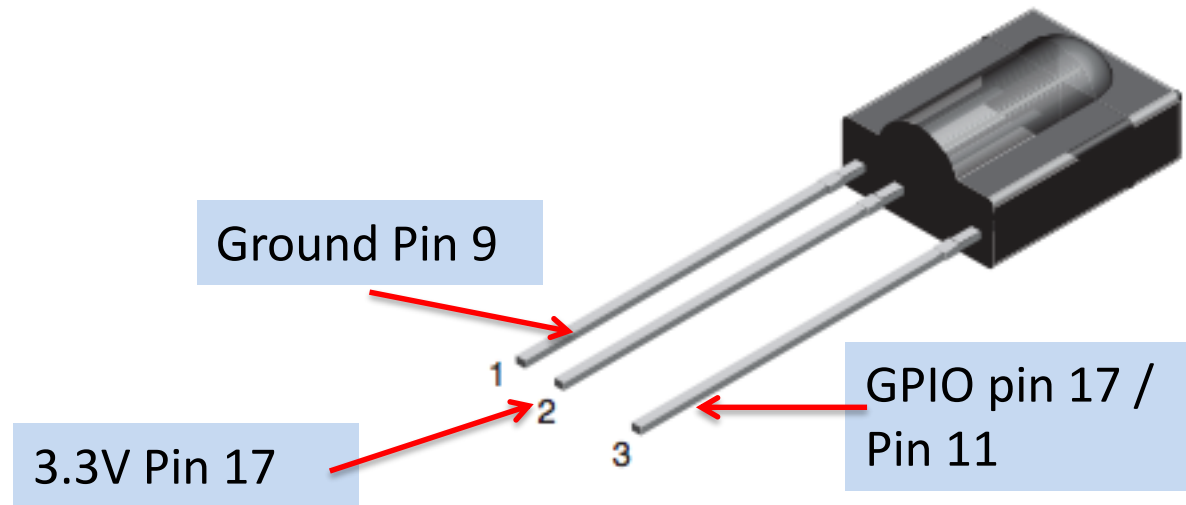


Please distinguish between GPIO pin numbers (on the chip -> function) and the pin number on the header. E.g. GPIO pin 4 is pin 7 on the header.

# Connections



# Infrared Circuit

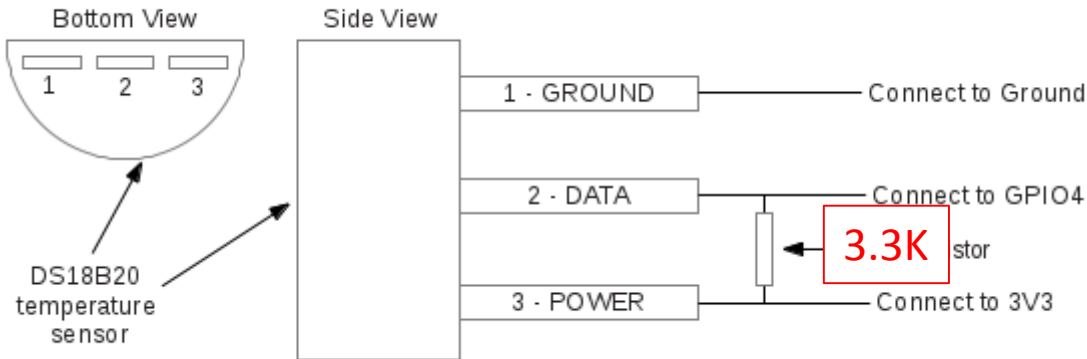
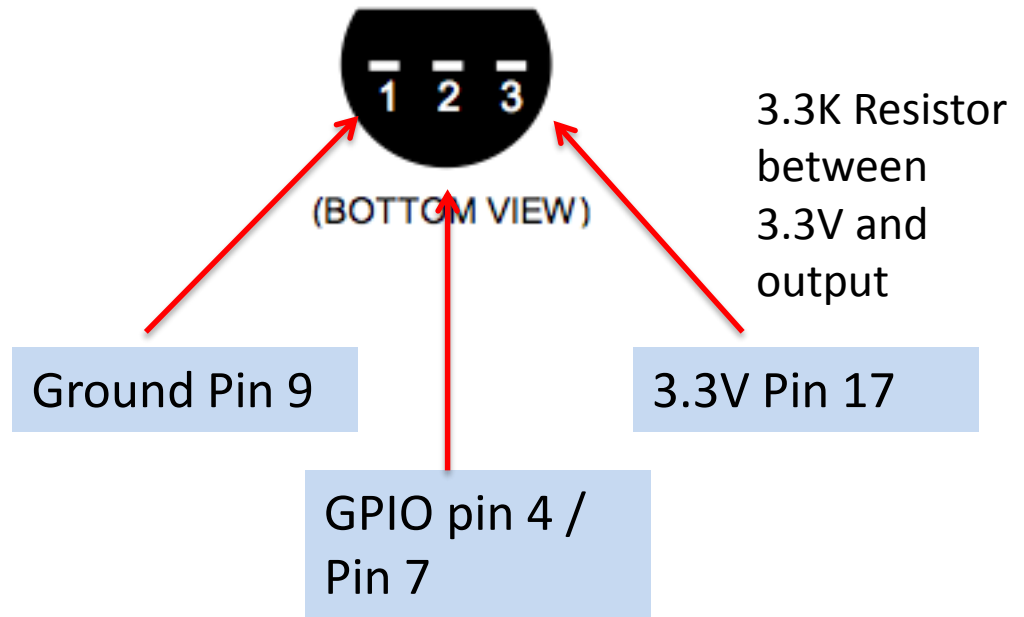


## **MECHANICAL DATA**

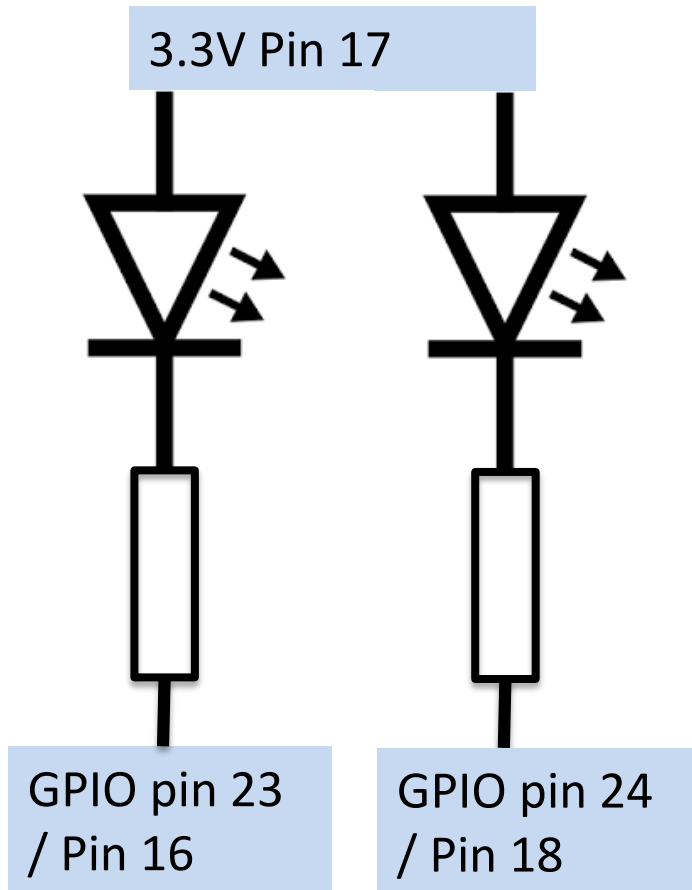
**Pinning:**

1 = GND, 2 =  $V_S$ , 3 = OUT

# Temperature Circuit



# LED 1 and 2



```
echo 23 > /sys/class/gpio/export  
echo out > /sys/class/gpio/gpio23/direction
```

```
echo 1 > /sys/class/gpio/gpio23/value #turn on  
echo 0 > /sys/class/gpio/gpio23/value # turn Off
```

# Software

Edit /boot/config.txt and add

```
dtoverlay=w1-gpio
```

```
dtoverlay=lirc-rpi,gpio_in_pin=17,gpio_in_pull=high,gpio_out_pin=18
```

Then reboot

# Software (DS18B20)

Each DS18B20 sensor has a unique and unchangeable 64bit serial number assigned by the manufacturer.

It shows up as

`/sys/devices/w1_bus_master1/28-xxxxxxxxxxxxxx/`

where 28- is the device type and xxxxxxxxxx is the serial number

```
# cat /sys/devices/w1_bus_master1/28-0000065e5516/w1_slave
31 01 4b 46 7f ff 0f 10 1f : crc=1f YES
31 01 4b 46 7f ff 0f 10 1f t=19062
```



This is the temperature in “milli-Centigrade”  
( e.g. 19062 deg. C = 66.31 F)

```
# grep t= /sys/devices/w1_bus_master1/28-0000065e5516/w1_slave | awk -F= '{print $NF}'
19062
```



# One more shell command

```
# cat /sys/devices/w1_bus_master1/28-0000065e5516/w1_slave  
31 01 4b 46 7f ff 0f 10 1f : crc=1f YES  
31 01 4b 46 7f ff 0f 10 1f t=19062
```

```
grep t= /sys/devices/w1_bus_master1/28-0000065e5516/w1_slave |  
awk -F= '{print $NF}'
```

# Software (Infrared)

- 1) apt-get install lirc (Linux Infrared Controller)
- 2) Edit /etc/lirc/hardware.conf to read

```
#Try to load appropriate kernel modules
LOAD_MODULES=false
# Run "lircd --driver=help" for a list of supported drivers.
DRIVER=""
# usually /dev/lirc0 is the correct setting for systems using udev
DEVICE="/dev/lirc0"
```

“mode2” refers to the infrared protocol which is virtually always used

```
mode2 -d /dev/lirc0
```

Will show you raw pulses from the transmitter

The “Lirc Daemon” lircd interprets the pulses and can issue commands and trigger actions