



TLC-549

**Convertitore analogico-digitale
Trasmissione dati seriale al Raspberry**



Hardware

**Assembly
Project**














Trasmissione Seriale

La trasmissione seriale è una modalità di comunicazione tra dispositivi digitali nella quale i bit sono comunicati uno di seguito all'altro e giungono sequenzialmente al ricevente nello stesso ordine in cui li ha trasmessi il mittente.

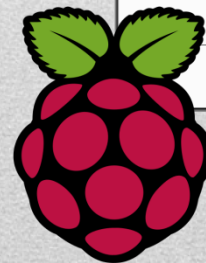
Clock

Abbiamo generato il Clock con un programma dal Raspberry e sincronizzato al TLC-549 tenendo conto dei suoi valori limite e della frequenza a cui lavora.

Raspberry Pinout

Raspberry Pi P1 Header					
PIN #	NAME			NAME	PIN #
	3.3 VDC Power	1		5.0 VDC Power	2
8	SDA0 (I2C)	3		DNC	4
9	SCL0 (I2C)	5		0V (Ground)	6
7	GPIO 7	7		TxD	15
	DNC	9		RxD	16
0	GPIO 0	11		GPIO1	1
2	GPIO2	13		DNC	
3	GPIO3	15		GPIO4	4
	DNC	17		GPIO5	5
12	MOSI	19		DNC	
13	MISO	21		GPIO6	6
14	SCLK	23		CE0	10
	DNC	25		CE1	11

<http://www.pi4j.com>

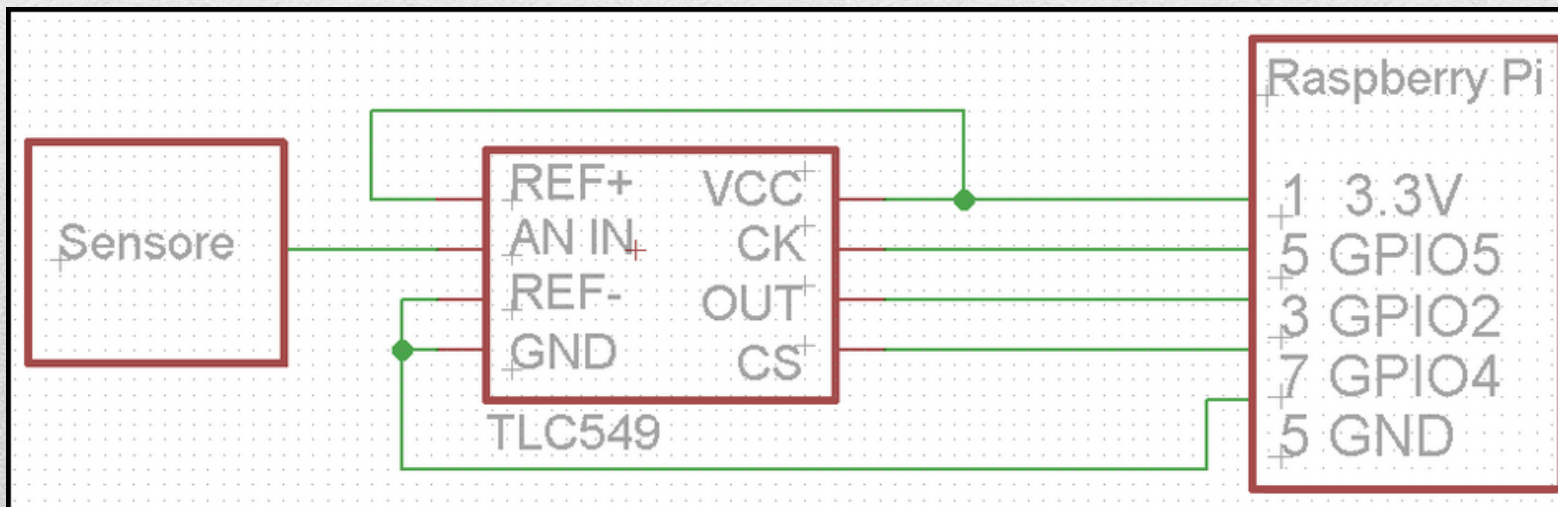


Accorgimenti

Recommended Operating Conditions

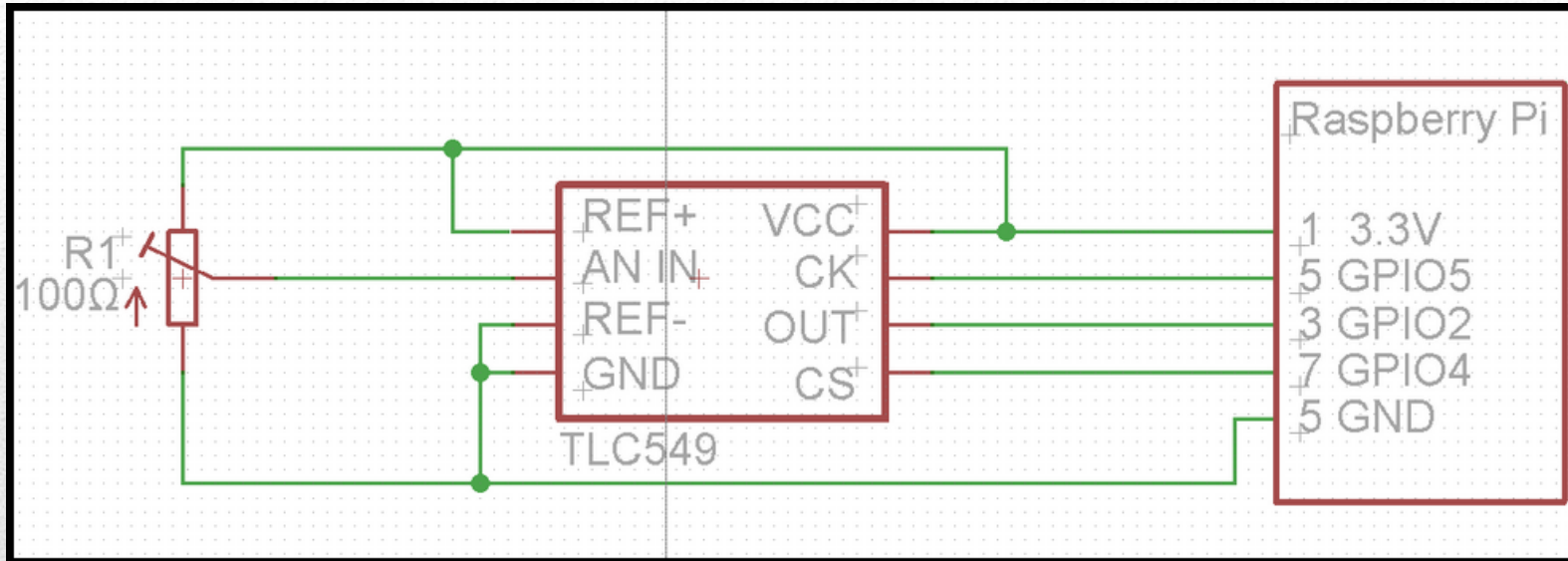
	TLC548			TLC549			UNIT
	MIN	NOM	MAX	MIN	NOM	MAX	
Supply voltage, V_{CC}	3	5	6	3	5	6	V
Positive reference voltage, V_{ref+}	2.5	V_{CC}	$V_{CC}+0.1$	2.5	V_{CC}	$V_{CC}+0.1$	V
Negative reference voltage, V_{ref-}	-0.1	0	2.5	-0.1	0	2.5	V
Differential reference voltage, V_{ref+}, V_{ref-}	1	V_{CC}	$V_{CC}+0.2$	1	V_{CC}	$V_{CC}+0.2$	V
Analog input voltage	0		V_{CC}	0		V_{CC}	V
Input/output clock frequency, $f_{clock(I/O)}$ (for $V_{CC} = 4.75\text{ V to }5.5\text{ V}$)	0		2.048	0		1.1	MHz

Electrical Network



Circuit Assembly

Electrical Network (Trimmer)



Circuit Assembly

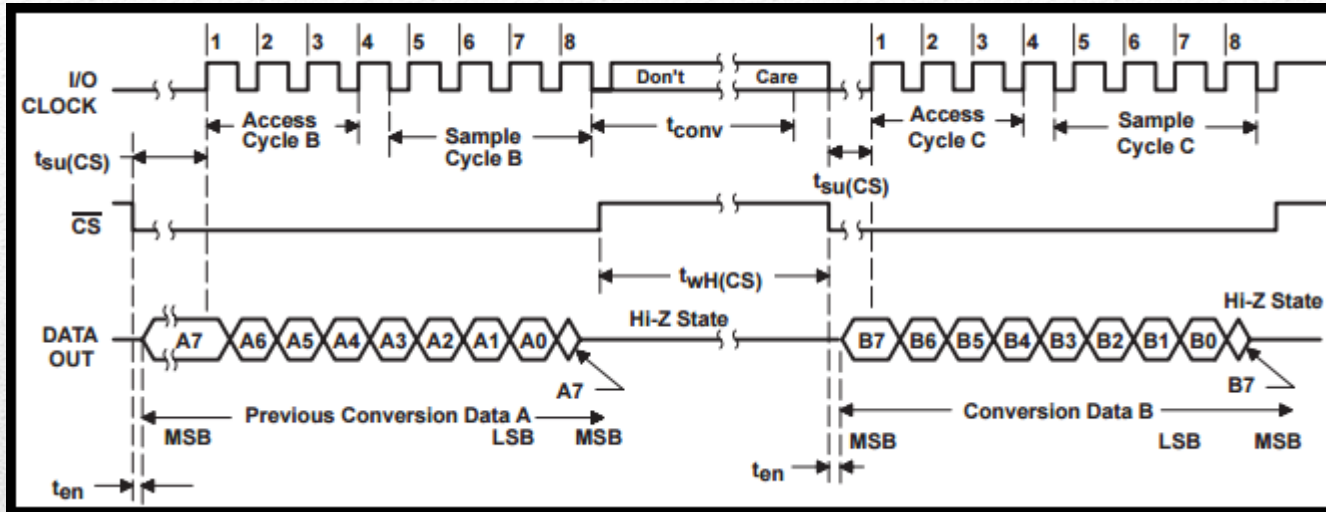


Software

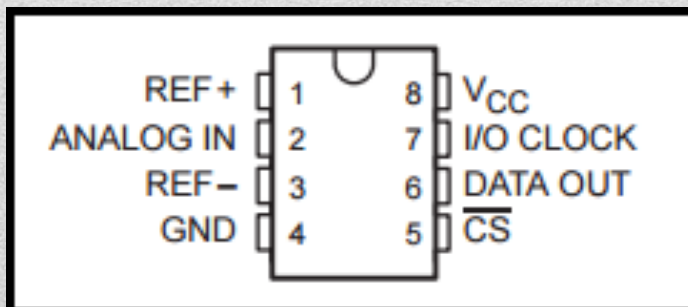
C language program

QT Application

Operating Sequence



Pinout



[Data Sheet](#)

```

#include <stdio.h>
#include <stdlib.h>
#include <unistd.h>
#include <string.h>
#include <time.h>
#include <string.h>
#include <sys/types.h>
#include <sys/stat.h>
#include <fcntl.h>
#include <math.h>

void initPin(char number[])
{
int fd;
int retCode;
fd = open("/sys/class/gpio/export", O_WRONLY);
retCode = write(fd, number, strlen(number));
retCode = close(fd);
}

void dirPin(char number[], char dir[])
{
int fd;
int retCode;
char pin[50];
sprintf(pin, "/sys/class/gpio/gpio%s/direction", number);
fd = open(pin, O_WRONLY);
retCode = write(fd, dir, strlen(dir));
retCode = close(fd);
}

```

```

void closePin(char number[])
{
int fd;
int retCode;
fd = open("/sys/class/gpio/unexport", O_WRONLY);
retCode = write(fd, number, strlen(number));
retCode = close(fd);
}

char readPin(char number[])
{
int fd;
int retCode;
char bit;
char pin[50];
sprintf(pin, "/sys/class/gpio/gpio%s/value", number);
fd = open(pin, O_RDONLY);
retCode = read(fd, &bit, 1);
retCode = close(fd);
return bit;
}

void writePin(char number[], char bit)
{
int fd;
int retCode;
char pin[50];
sprintf(pin, "/sys/class/gpio/gpio%s/value", number);
fd = open(pin, O_WRONLY);
retCode = write(fd, &bit, 1);
retCode = close(fd);
}

```

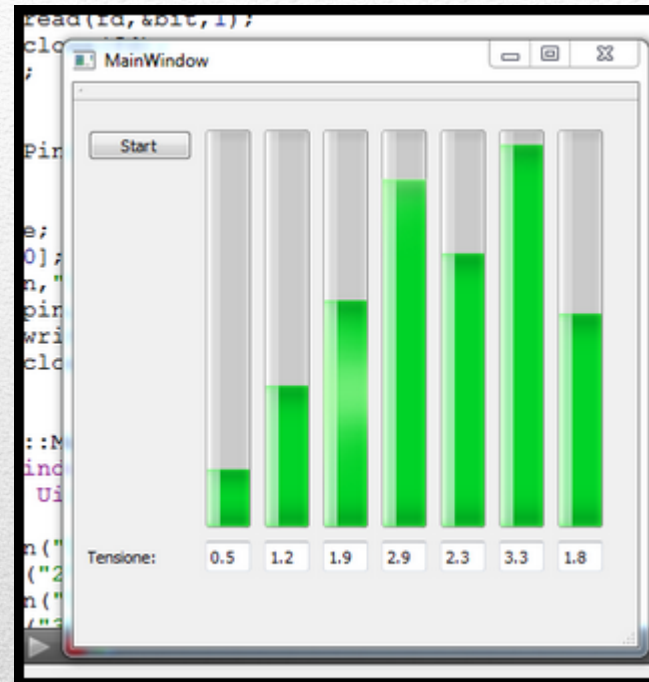
Functions

Code

```
int main(void) // inizializzazione
{
float valore = 0;
initPin("2");//dati
dirPin("2","in");
initPin("3");//Clock
dirPin("3","out");
initPin("4");
dirPin("4","out");//CS
writePin("4",'1');
}

void MainWindow::on_pushButton_clicked()
{
char st[10];
int i = 0;
int j=0;
writePin("4",'0');
valore=0;
for(i = 0; i<8;i++) //ciclo conversione
{
char bit;
writePin("3",'1');
usleep(2);
writePin("3",'0');
bit = readPin("2");
if(bit == '1'
valore = valore + pow(2,i);
}
writePin("4",'1');
valore = valore * 0.0129;
sprintf(st,"valeur %f",valore);
ui->editTensione->setText(QString::number(valore));
ui->progressBar->setValue(valore);
}
```

Application



QT Creator Application

Development Phase

Fase 1:
Lettura e comprensione Data Sheet

Fase 2:
Montaggio circuito

Fase 3:
Programmazione su text editor,
compilazione ed esecuzione da terminale

Fase 4:
Applicazione Qt Creator con interfaccia
grafica, utilizzo delle librerie dell'ambiente
di sviluppo.

Fase 5:
Utilizzo di sensore di temperatura LM335

Project