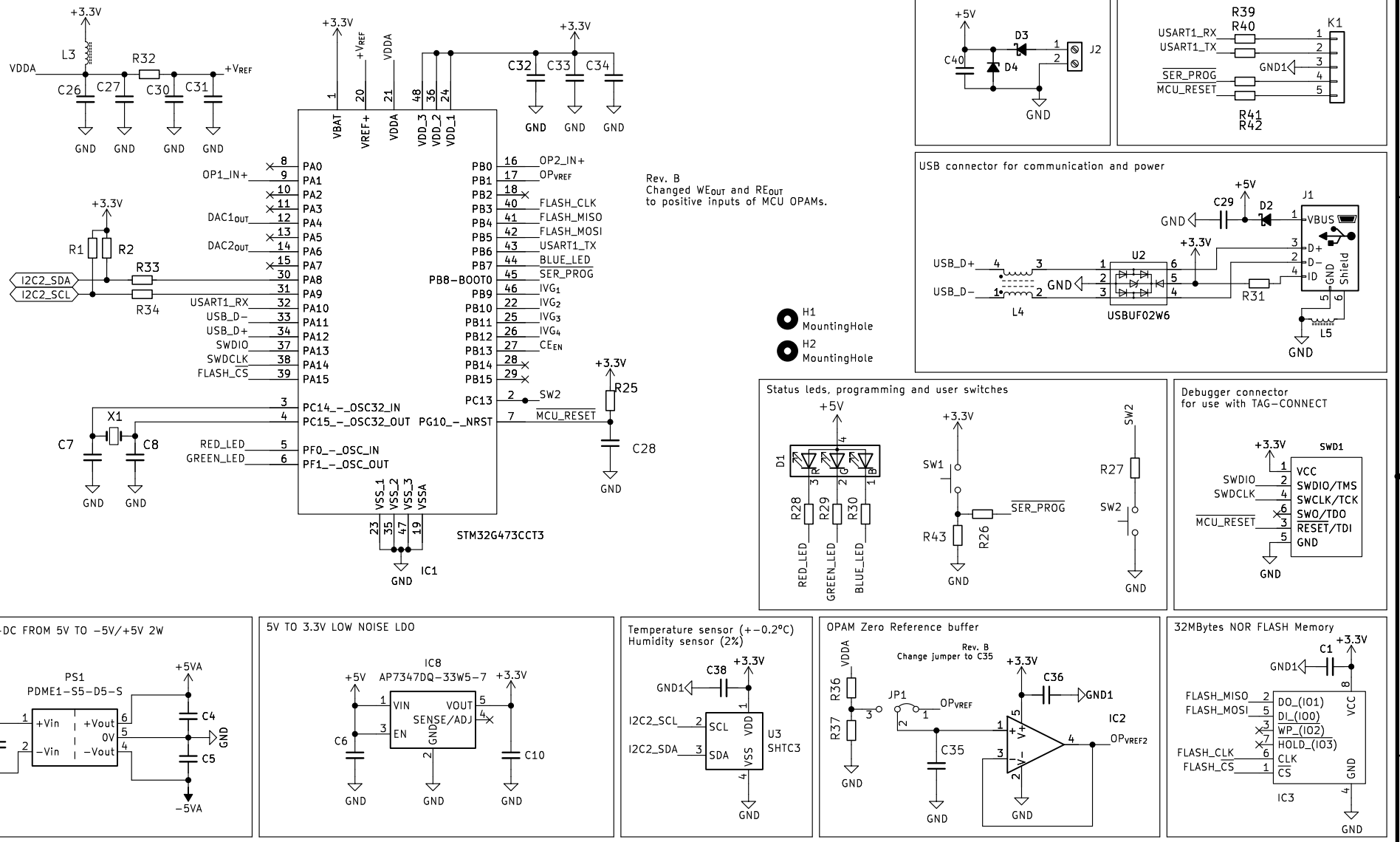
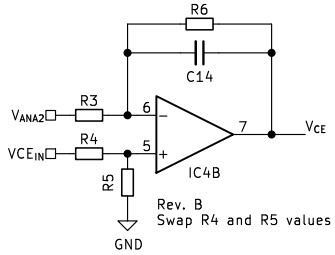


Responsible dept.	Technical reference	Document type: Schema	Document status: Prototipo 2
	Created by	Title, Supplementary title: Potentiostat	
	Approved by		Rev. B · Date of issue 2023-05-29 · Lang. EN · Sheet 1/2

A4

Voltage translator for potentiostat bias.



Voltage input range 0V to 3.3V, output range −5V to +5V.

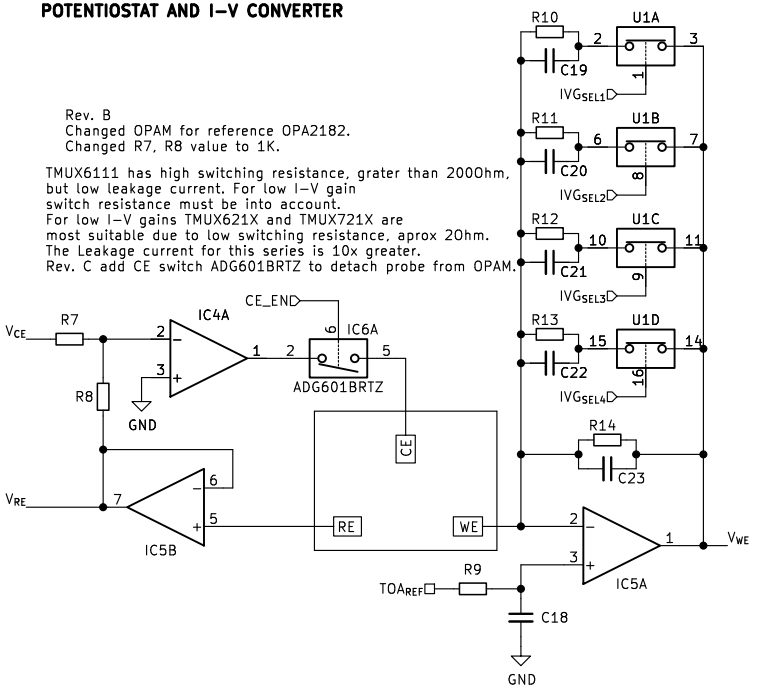
G = R5 / R4 = R6 / R3 = 3
V_{ANA2} = 1.65V
$V_{CE} = G * (VCE_{IN} - V_{ANA2}) = 3 * (VCE_{REF} - 1.65)$

C14 is for low pass 10KHz filter.

POTENTIOSTAT AND I–V CONVERTER

Rev. B
Changed OPAM for reference OPA2182.
Changed R7, R8 value to 1K.

TMUX6111 has high switching resistance, grater than 200Ohm, but low leakage current. For low I–V gain switch resistance must be into account.
For low I–V gains TMUX621X and TMUX721X are most suitable due to low switching resistance, aprox 20hm.
The Leakage current for this series is 10x greater.
Rev. C add CE switch ADG601BRTZ to detach probe from OPAM.



I–V converter with fracctional scale:
Lower range from −5 to 5uA

Every scale is made of a RC cell, R set current gain and C gives stability.

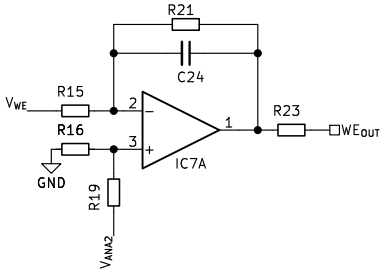
Current gain steps are R14 || (R10 , R11, R12, R13) combination.

R14 = 1MOhm, it gives a gain 1 mV/nA. ADC resolution is : 3.3 / (2^{12}) − 1) = 0.80567uV
C23 = 1 / (2 * pi * Rg * Frq); For Frq = 10KHz lowpass filter C = 16pF
The OPAM minimum GBW > (Ci * C23) / (2 * pi * R14 * $C23^2$) = 13667KHz
Ci is OPAM input impedance.

The calculus before is made for each I–V switch´s RC cell.

$TAMP_{REF}$ output voltage set for zero current.

Voltage translator for I–V output.

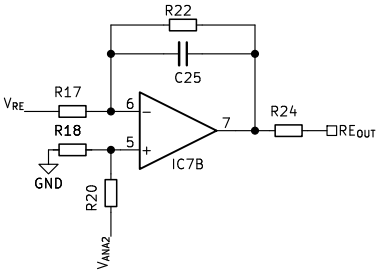


Voltage input range −5V to 5V, output 0V to +3.3V.

G = R21 / R15 = R19 / R16 = 1/3
V_{ANA2} = 1.65V
$V_{WEout} = V_{ANA2} - G * V_{WE} = 1.65 - (V_{WE} / 3)$

C24 is for low pass 10KHz filter.

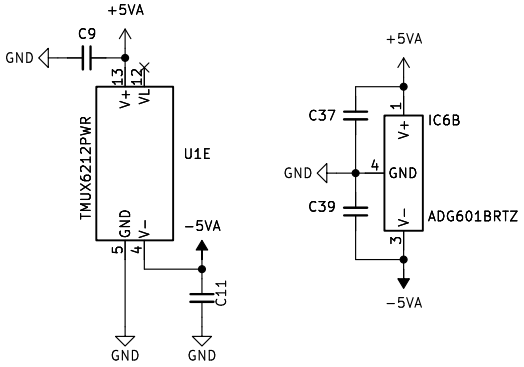
Voltage translator for V_{RE} output.

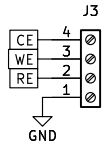


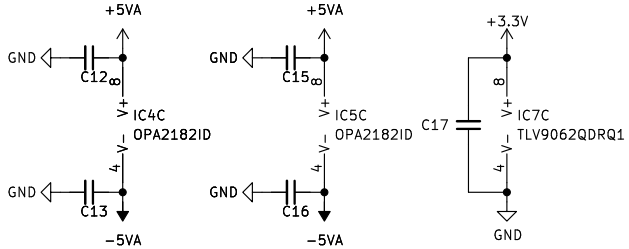
Voltage input range −5V to 5V, output 0V to +3.3V.

G = R22 / R17 = R20 / R18 = 1/3
V_{ANA2} = 1.65V
$V_{WEout} = V_{ANA2} - G * V_{WE} = 1.65 - (V_{WE} / 3)$

C25 is for low pass 10KHz filter.







Responsible dept.	Technical reference	Document type: Schema	Document status: Provisional
	Created by	Title, Supplementary title: Potentiostat	
	Approved by		Rev. A · Date of issue 2023−01−13 · Lang. EN · Sheet 2/2

A4