

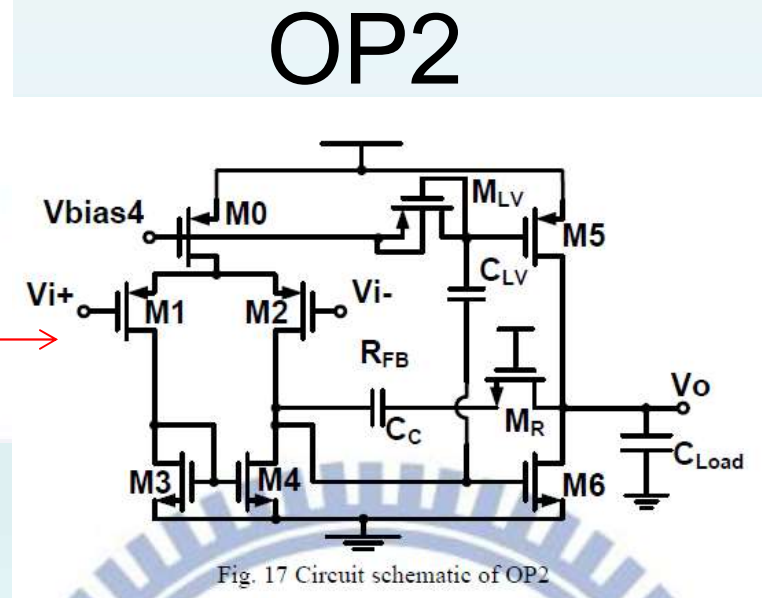
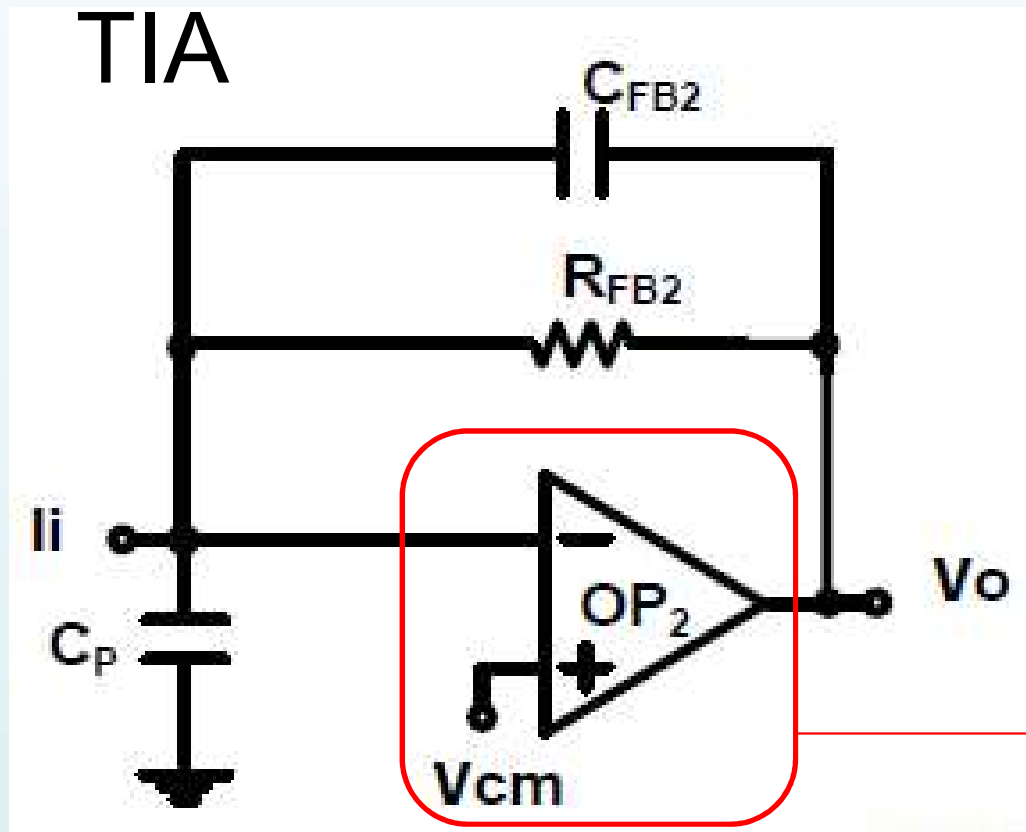
The Modification of TIA in the Design of an 8-Channel CMOS Analog Front-End Acquisition Circuit for Bio-potential Signal Recoding Systems

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Transimpedance Amplifier (TIA) Schematic



Modifications

The original TIA circuit was fabricated in TSMC 0.18um CMOS process, and the process is now changed to UMC 0.18um CMOS process. Moreover, we tried to maintain or even improve the performance of the TIA circuit after the modification of the process. Since the bio-potential signal recoding system is designed to be implanted in human body, we focused especially on improving the power dissipation of the circuit to prevent the tissues from being damaged by the heat due to excessive power consumption.



Simulation Results

Parameter	Value (Original Circuit)	Value (Modified Circuit)
open loop gain (dB)	77.4	73.9
Phase margin (degree)	54.5	55.7
Unit gain frequency (MHz)	11.7	7.51
3-dB bandwidth (Hz)	1.06k	1.9k
CMRR (dB)	78.7	79.8
PSRR_vdd (dB)	42.5	71.8
PSRR_gnd (dB)	77.4	73.9
Slew rate (MV/s)	9.06	5.84
Settling time (us)	0.164	0.222
Power dissipation (uW)	72.1236	31.3733



Conclusion and Future Work

To sum up, most of the simulation results of the modified TIA circuit are acceptable so far. Despite the fact that some of the parameters such as unit gain frequency or slew rate would require a little more improvement, the power dissipation of the TIA circuit has been reduced a lot after the modification.

In the future, we will make more modifications on the TIA circuit to make the performance better. Moreover, we will combine the TIA with the programmable transconductance gain amplifier (PTGA), and do the simulation of the whole circuit afterward.

