1 Part 2 - Analogue

1.1 Passive components

1.1.1 Resistors

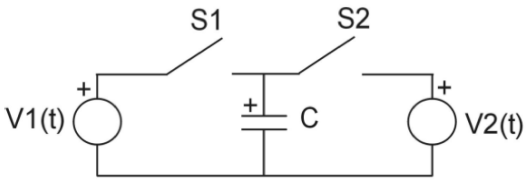
- Poly 20 Ω to 40 Ω per square
- N-well 2 kΩ to 4 kΩ per square

1.1.2 Capacitors

- MOS 2 fF µm^{-2} to 3 fF µm^{-2}. Between the poly and diffusion regions
- Poly 1/Poly 2 cap 0.8 fF µm^{-2} to 1 fF µm^{-2}.

1.1.3 Switched caps

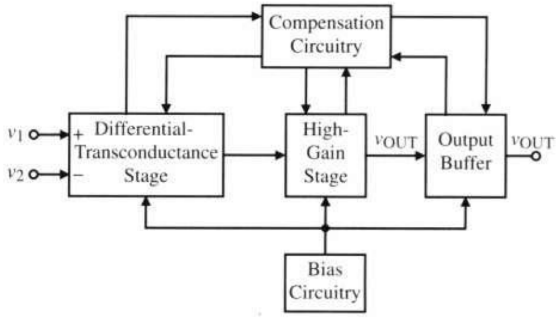
Alternatively, switched caps can be used as resistors.



$$R = \frac{T}{C} \quad (1)$$

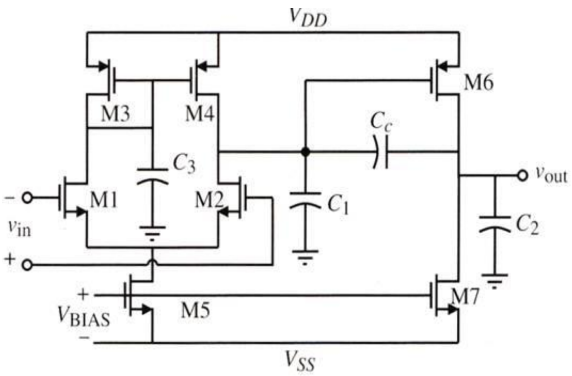
where T is the time period of the clock.

1.2 Opamp



- A differential trans-conductance front-end that converts the difference between the input signals v1 and v2 to a current.
- A high gain stage that amplifies the input signal
- An output buffer stage that is capable of driving a load resistor without reducing the gain
- Compensation circuitry to improve the frequency characteristics of the amplifier
- Bias circuitry to set the DC operating point of the different stages

Miller cap C_c reduces ringing, but should be minimised as it can take a significant proportion of the area.



1.3 Technologies

1.3.1 SOI vs CMOS

Insulated layer below normal CMOS processes

Advantages	Disadvantages
Better isolation	Cost
Faster	Kink effects
Denser	Floating bodies
Higher temp	Self heating
Lower capacitance	Less robust

1.3.2 GaAs

Advantages	Disadvantages
	Cost