Two Transistor Amplifiers

Source follower (Common Drain)

$$I_{th}(\kappa(V_{in} - V_{T0}) - V_{out})/U_T = I_{th}(\kappa(V_{ref} - V_{T0})/U_T$$

$$V_{out} = \kappa(V_{in} - V_{ref})$$

Common source

$$\kappa(V_{dd} - V_{ref}) + \sigma_p V_{dd} = (\sigma_p + \sigma_n)V_{out} + \kappa V_{in}$$

$$V_{out} = \frac{-\kappa}{\sigma_p + \sigma_n} V_{in} + V_{constant}$$

Graphs showing data and simulation for different input voltages $V_{in}$ and output voltages $V_{out}$.
Transconductance Amplifier

OTA = Operational Transconductance Amplifier
≈ Transconductance Amplifier

OTA follower step response

\[
C \frac{dV_{out}}{dt} = I_{bias} \tanh \frac{\kappa(V_{out} - V_{in})}{2U_T}
\]
pFET based Amplifiers to use

pFET based Amplifiers

pFET Source Follower

\[ V_{dd} \]
\[ V_{bias} \]
\[ V_{in} \]

Components in the blocks for Source Follower and Common Source

pFET Common Source

\[ V_{dd} \]
\[ V_{in} \]

FG switch Element

\[ I_{bias} \]

GND
Summary of some Testsetups

Common drain

Input (V_{in})

DC Bias (V_{bias})

Operational Transconductance amplifier

OTA open loop

Input (V_{in})

Bias current is programmed \( I_{bias} \)