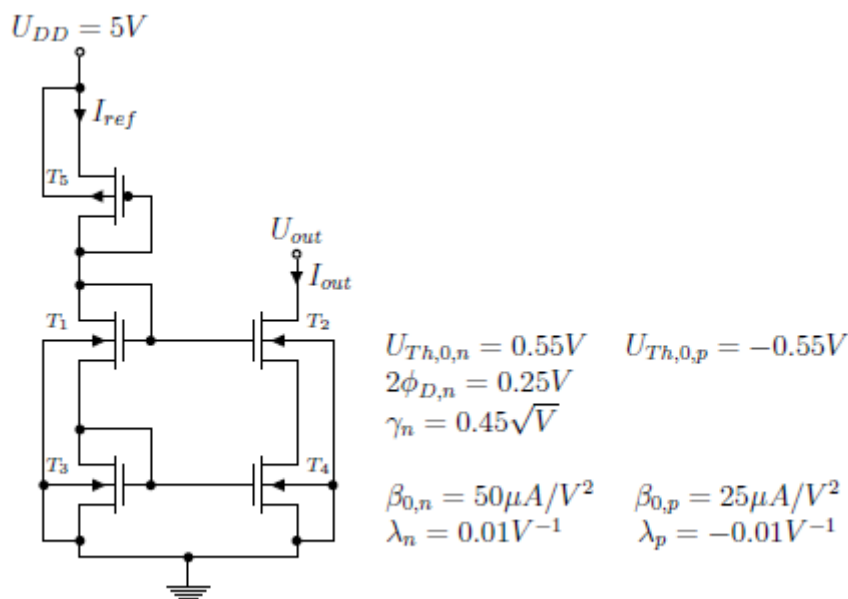


WS 2019/2020

Tutorial for Microelectronics III

3. Cascode Current Sources

The following Cascode Circuit is given:



The transistors T_1 and T_3 have a W/L -dimension of $5\mu m/5\mu m$, the minimum width of the transistors is $2\mu m$.

1. Dimension the remaining transistors. Neglect the channel length modulation, while the body effect should be considered!

- In which operation range are the transistors T_1 , T_3 and T_5 operated?
- Dimension the transistor T_5 so that a reference current of $1\mu A$ is flowing.
- Dimension the transistor T_5 for $1\mu A$, if the gate of T_5 is tied to ground. What are the advantage and the disadvantage of such a circuitry?
- This current source should deliver a current of $10\mu A$. Please dimension the transistors T_2 and T_4 .

2. Determine now the most important characteristics of the current source.

- Determine the minimum working voltage for the output of the current source.
- What is the value of the small signal output resistance of the current source?