



Analog CMOS Integrated Circuits

Exercise 1: MOSFET Device

1. Plot the on-resistance R_{on} of an n-channel MOSFET as a function of the gate voltage $V_{GS} < 3 \text{ V}$!

$$\mu_n = 2000 \text{ cm}^2/\text{Vs} \quad C_I = 0.25 \text{ fF}/\mu\text{m}^2 \quad W/l = 10 \quad V_{TH} = 0.7 \text{ V}$$

2. Plot the drain current I_D and transconductance g_m
 - a) versus the gate voltage $V_{GS} < 2 \text{ V}$ at $V_{DS} = 3 \text{ V}$ both in a first diagram,
 - b) versus the drain voltage $V_{DS} < 3 \text{ V}$ at $V_{GS} = 2 \text{ V}$ both in a second diagram !

Use the values given in task 1.1. !

3. Plot the transconductance g_m of a n-channel MOSFET in saturation
 - a) versus the overdrive voltage at $W/l = 10$,
 - b) versus the drain current at $W/l = 10$,
 - c) versus the overdrive voltage at $I_D = 0.2 \text{ mA}$!

Use again the values given in task 1.1. !