# Process Parameters for Homework Problems

ECE 5411 – CMOS Analog IC Design (Spring 2014)

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**Table 1:** Long-channel MOSFET general design parameters.

| **Parameter** | **NMOS** | **PMOS** |
|---|---|---|
| Scale factor ($L_{min}$) | $1\,\mu m$ | |
| $V_{DD}$ | 5 V | |
| $V_{THN}$ and $V_{THP}$ | 0.8 | 0.9 |
| $KP_n$ and $KP_p$ | 120 $\frac{\mu A}{V^2}$ | 40 $\frac{\mu A}{V^2}$ |
| $C'_{ox} = \frac{\epsilon_{ox}}{t_{ox}}$ | 1.75 $\frac{fF}{\mu m^2}$ | |
| Bias Current, $I_D$ | $20\,\mu A$ | $20\,\mu A$ |
| $W/L$ | 10/2 | 30/2 |
| $V_{GS}$ and $V_{SG}$ | 1.05 V | 1.15 V |
| $V_{DS,sat}$ and $V_{SD,sat}$ | 250 mV | 250 mV |
| $g_{mn}$ and $g_{mp}$ | 150 $\frac{\mu A}{V}$ | 150 $\frac{\mu A}{V}$ |
| $r_{on}$ and $r_{op}$ | $5\,M\Omega$ | $4\,M\Omega$ |
| $g_{mn}.r_{on}$ and $g_{mp}.r_{op}$ | 750 $\frac{V}{V}$ | 600 $\frac{V}{V}$ |
| $\lambda_n$ and $\lambda_p$ | $0.01\,V^{-1}$ | $0.0125\,V^{-1}$ |
| $C_{oxn}$ and $C_{oxp}$ | 35 fF | 105 fF |
| $C_{gsn}$ and $C_{sgp}$ | 23.3 fF | 70 fF |
| $C_{gdn}$ and $C_{dgp}$ | 2 fF | 6 fF |
| $f_{Tn}$ and $f_{Tp}$ | 900 MHz | 300 MHz |

The corresponding $1\,\mu m$ CMOS models are available at the following file ocation on the AMS servers:

`/home/pdks/Cadence_IC61_CMOSedu/models/cmosedu_models.txt`

## References


[1] R. J. Baker, "CMOS: Circuit Design, Layout and Simulation," 3rd ed., Wiley-IEEE, 2010: Sections 9.1&2, Tables 9.1 and 9.2.