

ECEN 325

MOSFET Custom Models

Instructor: Sam Palermo

The custom MOSFET models allow the flexibility to edit key device parameters ($V_{TN/P}$, $KP_{N/P}$, λ , W , L etc...) and also provides a more standard symbol. These use of these models is required in Lab 12 and may also help your matching between simulation and measurements for Labs 10 and 11. **For both the NMOS and PMOS models, the body terminal is shorted to the source.** Thus, it is only a 3-terminal model.



The custom MOSFET models are available for download from the class website in the Lab Section.

http://www.ece.tamu.edu/~spalermo/ecen325/UsrComp_S_ECEN.usr

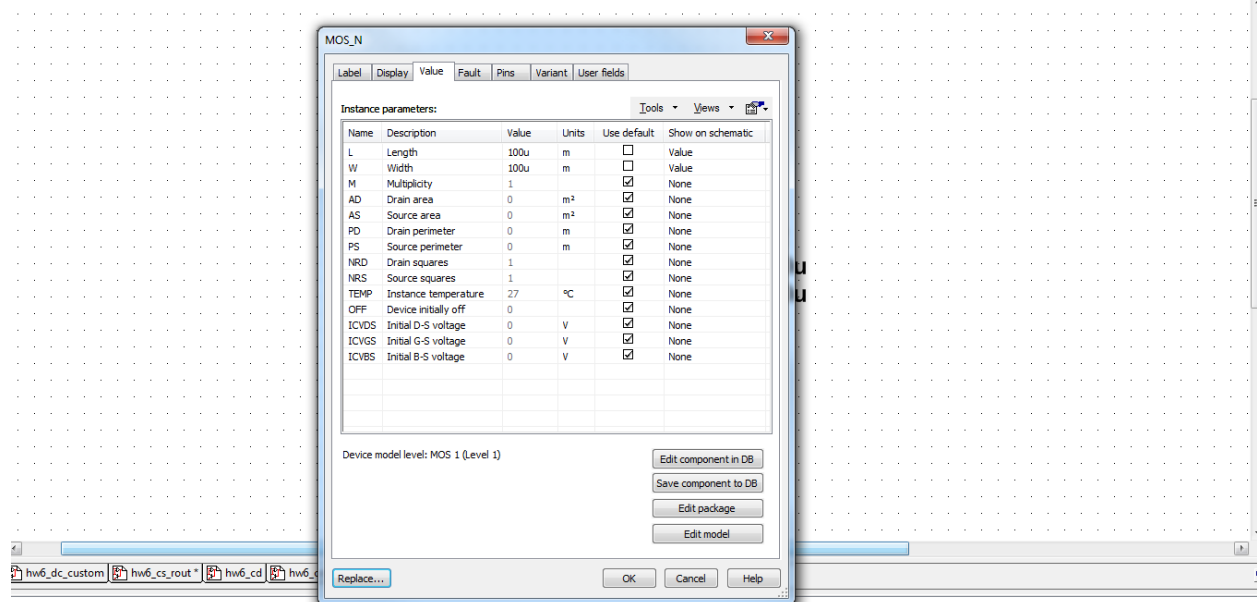
In order to use the custom models, follow the procedure outlined on Page 7 of the MultiSim and Analog Discovery 2 Manual.

<http://www.ece.tamu.edu/~spalermo/ecen325/ms-ad2.pdf>

Using Custom NMOS to Mimic 2N7000 Example

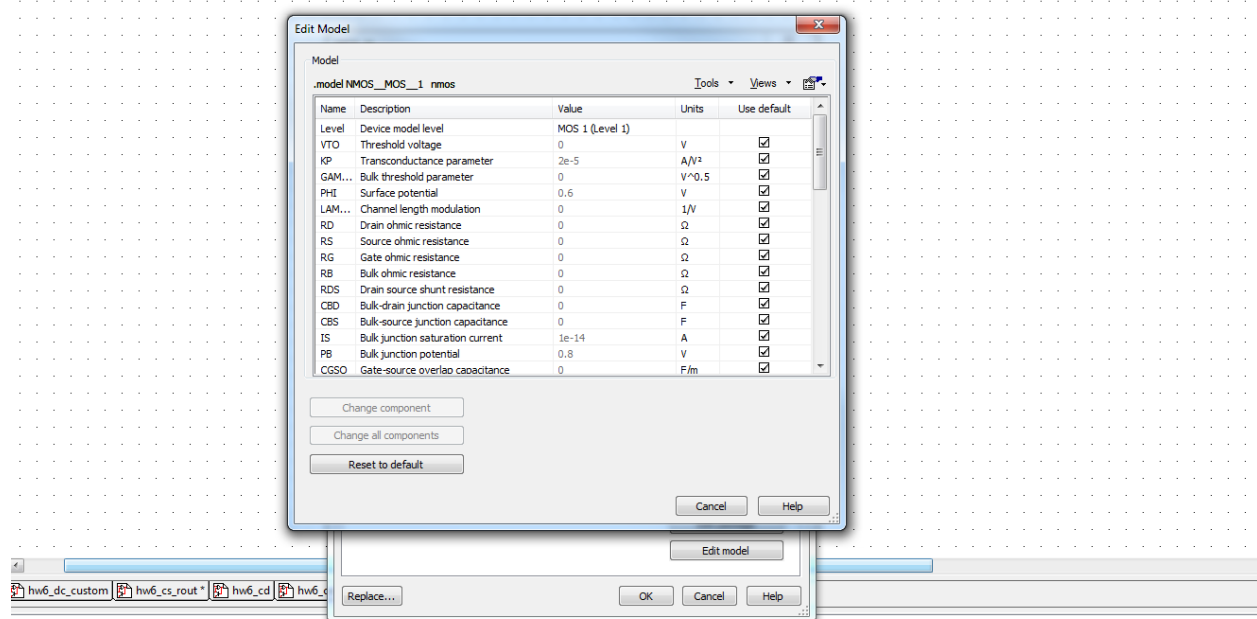
The default 2N7000 NMOS transistor model has a $\beta=102\text{mA/V}^2$ and $V_{TN}=2.0\text{V}$. This can be emulated with the custom "MOS_N" model with the following steps.

1. Place the MOS_N model in your schematic.
2. Double click on the MOS_N symbol. The following window will pop up.



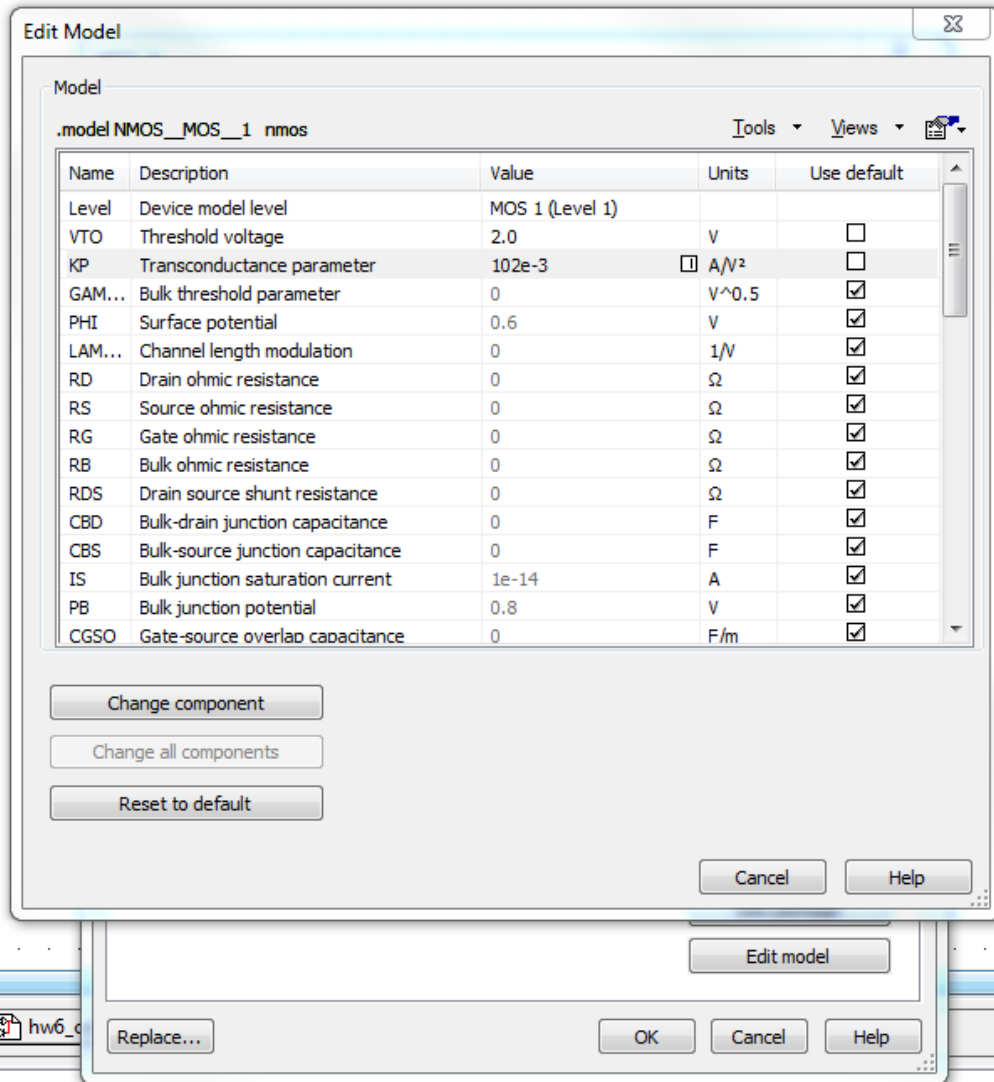
hw6_cg_rout - Friday, July 20, 2018, 6:13:25 PM -----
mpleted, 0 error(s), 0 warning(s) =====

3. Click on Edit model. Another window will pop up.



hw6_cg_rout - Friday, July 20, 2018, 6:13:25 PM -----
mpleted, 0 error(s), 0 warning(s) =====

- To edit the transistor parameters, unclick the “Use default” box and edit the value in the “Value” field. Below is an example to emulate the default 2N7000 NMOS transistor model, with $\beta=102\text{mA/V}^2$ and $V_{\text{TN}}=2.0\text{V}$. As the custom model has a default $W/L=1$, only the KP_N value is edited to give a $\beta=102\text{mA/V}^2$.



- To commit these changes, click on “Change component”. The transistor parameter window will disappear. Then click on “OK” and you will be back in your main schematic.

You can use a similar procedure for the PMOS device and other MOSFET transistors.