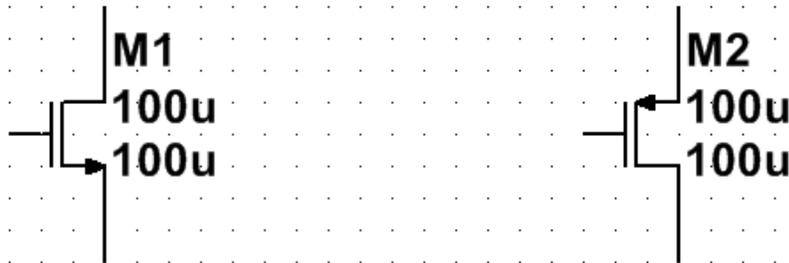


## ECEN 326

### MOSFET Custom Models

Instructor: Sam Palermo

The custom MOSFET models allow the flexibility to edit key device parameters ( $V_{TN/P}$ ,  $KP_{N/P}$ ,  $\lambda$ ,  $W$ ,  $L$  etc...) and also provides a more standard symbol. These use of these models may also help your matching between simulation and measurements. **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.

[https://people.engr.tamu.edu/spalermo/ecen325/UsrComp\\_S\\_ECEN.usr](https://people.engr.tamu.edu/spalermo/ecen325/UsrComp_S_ECEN.usr)

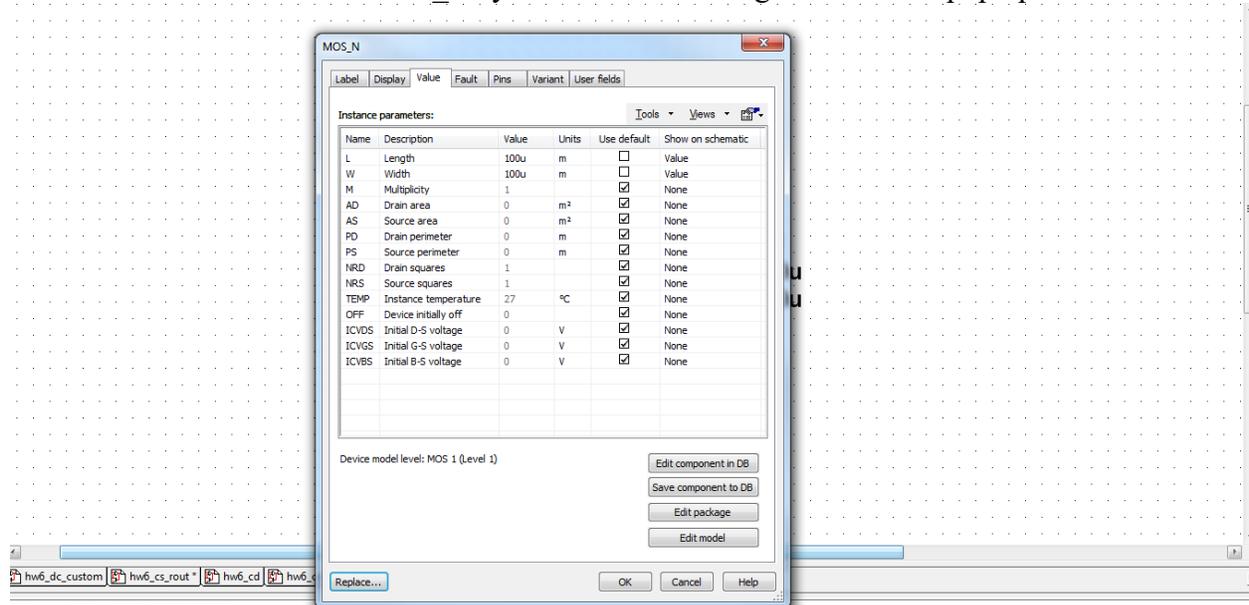
In order to use the custom models, follow the procedure outlined on Page 3 of the MultiSim and Analog Discovery 2 Manual.

<https://people.engr.tamu.edu/spalermo/ecen325/MultiSim-AnalogDiscovery2-Keysight-Manual.pdf>

## Using Custom NMOS to Mimic 2N7000 Example

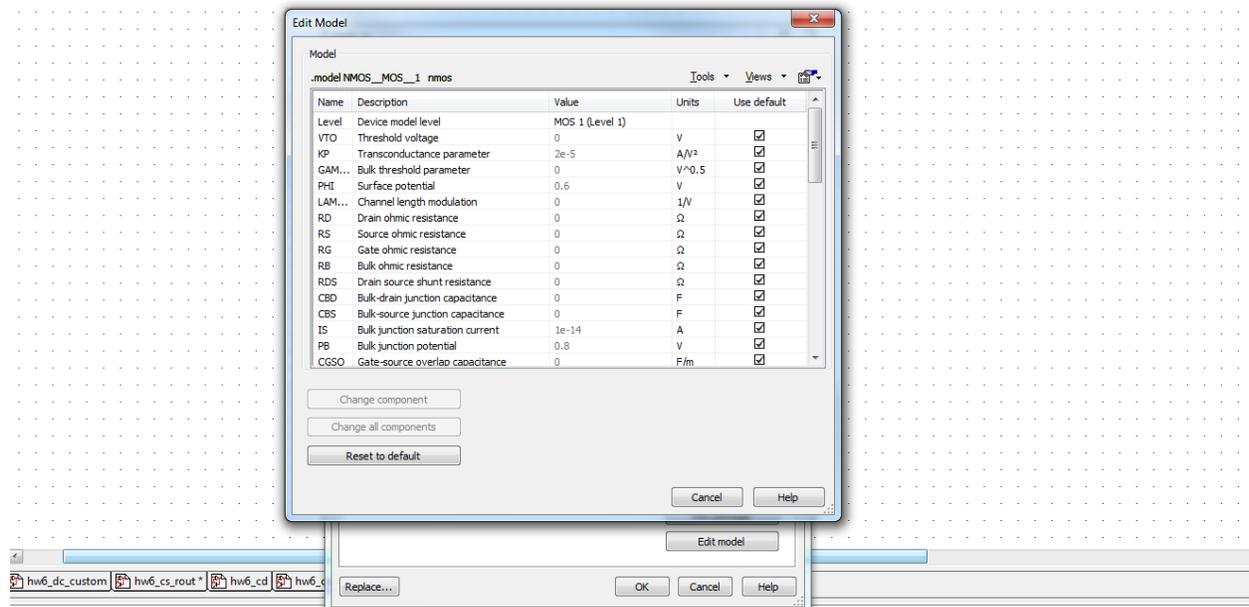
The default 2N7000 NMOS transistor model has a  $\beta=102\text{mA/V}^2$  and  $V_{TN}=2.0\text{V}$ . This can be emulated with the custom "MOS\_N" model with the following steps.

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



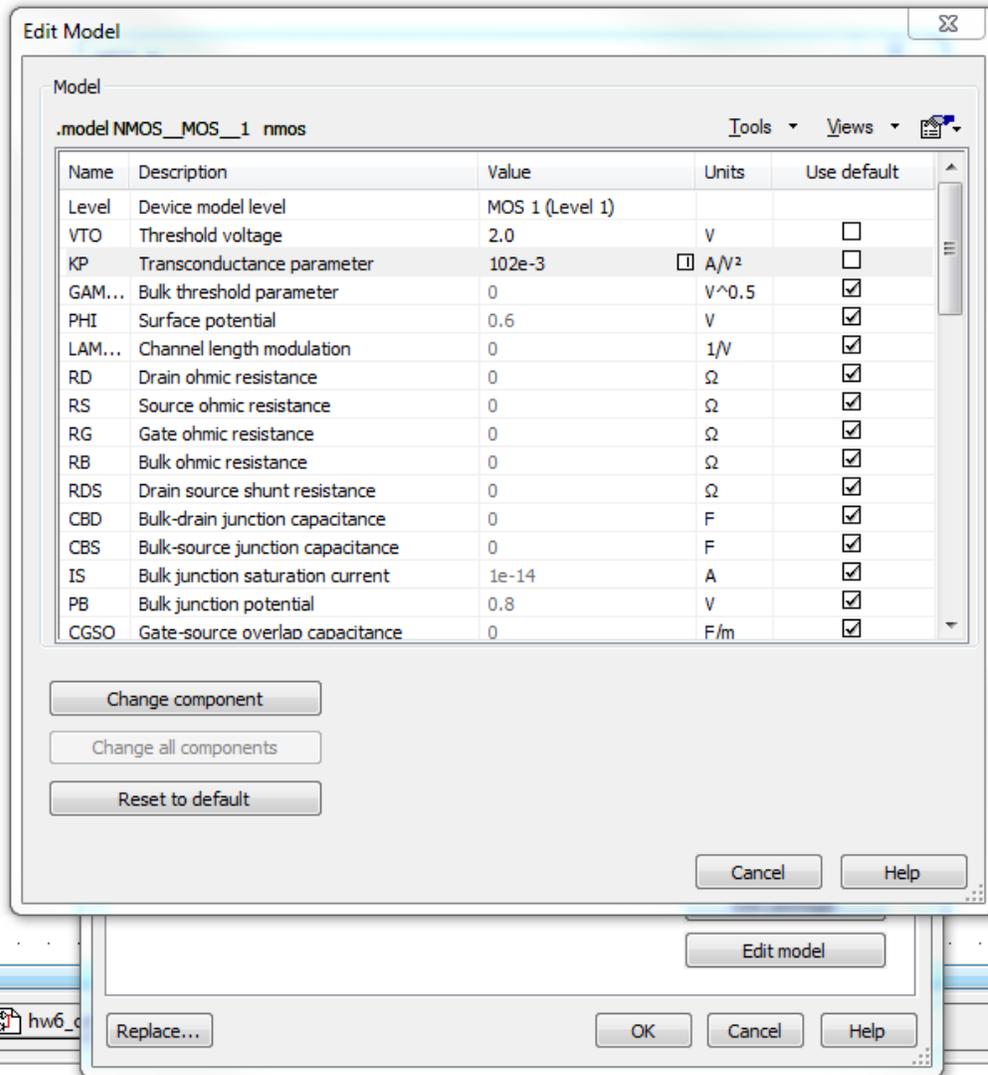
hw6\_cg\_rout - Friday, July 20, 2018, 6:13:25 PM -----  
mpleted, 0 error(s), 0 warning(s) =====

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.