Hints, Tips and Solutions

Mustafa Taner, Applications and Support Engineer

New Binning Routine

The "Binning" routine in *UTMOST III* MOS module has been greatly enhanced. The bin models can be generated much faster and the routine requires less user interface.

The binning methodology is used when a single scaleable model can not fit all geometries. For such cases a single model is extracted for each geometry and binning methodolgy is applied to generate "L", "W" and "P" term parameters. Four single geometry models are used to generate one bin model. The continuity between the bin models are guaranteed by using the parameters LMIN, LMAX, WMIN, WMAX, LREF and WREF.

The user can enter the number of bins and each bin's geometry information (W, L, Wref and Lref) in the new binning routine's "Model Binning Setup Screen" (Figure 1.).
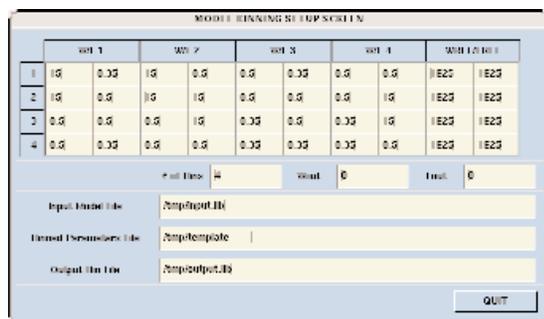

Figure 1. Model Binning Setup Screen.

The input model file should contain all single geometry models. Selecting the correct model from the input model during the binning process is accomplished by comparing the W and L data in the Model Binning Setup Screen and W and L data in the comment line of the input model file. The comment line with W and L data should be present before the ".model" statement of

```
.LIB TT
* DATE: Oct  4/99
* LOT: SILVACO            WAF: 1
* DIE: 1                  DEV: 1
* Temp= 27
* W=   15.0 L=   15.0
.MODEL N15x15 NMOS (                    LEVEL  = 8
+VERSION = 3.1          TNOM   = 27          TOX    = 7.5E-9
+XJ      = 2E-7         NCH    = 2.560743E17 VTH0   = 0.6182272
```

Figure 2. Single Geometry model including W and L information.

each model. *UTMOST III* library generation feature has been modified to add a comment line including the W and L values when there is only a single device selected in the model strategy screen (Figure 2.)

The "Binned Parameters File" contains the name of the parameters with "+" or "-" signs as prefixes. (Figure 3.) The "+" sign indicates that the following parameter will be used for binning. The parameters with "-" prefix are kept constant and "W", "L" and "P" terms are not generated (Parameters such as TOX, XJ, NCH, etc usually have "-" prefixes).

```
-LEVEL
-VERSION
-TNOM
-TOX
-XJ
-NCH
+VTH0
+K1
+K2
-K3
```

Figure 3. Part of a "Binned Parameters File" used for binning

The "Output Bin File" contains all bin models. After the generation of the Output Bin file, parameters LMIN, LMAX, WMIN, WMAX, LREF and WREF are added to each bin model automatically.

A reverse operation of generating a single geometry model from a bin model can be performed too. An input model file which contains bin models should be entered in the "Input Model File" field of the "Model Binning Setup Screen". The values for "Wout" and "Lout" should be entered for the target single geometry model. The "Output Bin File" field is used as the Output Single Model file name for generating a single geometry model.