Release Note for HiSIM_HV 2.5.0

Hiroshima University

Revision: HiSIM_HV 2.5.0

Date: 2019.04.26

Deliverable List of HiSIM_HV 2.5.0

Deliverable	File Name or Directory Name	Date
Manual	HiSIM_HV 2.5.0_Users_Manual.pdf	2019.04.26
Release Note	HiSIM_HV 2.5.0_Release_Note.pdf	2019.04.26
Default Model Parameters	HiSIM_HV 2.5.0_Default_Model.txt	2019.04.26
Default Instance Parameters	HiSIM_HV 2.5.0_Default_Instance.txt	2019.04.26
Default Model Parameters (CODEP=3)	HiSIM_HV 2.5.0_Default_Model_CODEP3.txt	2019.04.26
Verilog-A Code	HiSIM_HV 2.5.0_VA-Code	2019.04.26

Update information of HiSIM_HV 2.5.0 from HiSIM_HV 2.4.2

1) Protections against FPE error of some sqrt functions in the overlap capacitance model.
2) Bug-fix of body-bias clamping for the overlap capacitance model.
3) Reactivated the special case near around the gate threshold voltage for the continuity of the intrinsic capacitance.
4) Removed unnecessary top module “hisimhv_dio.va”.
5) Temperature dependence on the diode built-in potentials.
   Added parameters: **TPBBD**=0, **TPBBDSW**=0, **TPBBDSWG**=0, **TPBBS**=0, **TPBBSSW**=0, **TPBBSSWG**=0.
6) Issue of g_m sharpness.
   a. Code improvement on the calculation of the overlap charge to avoid possible numerical difficulties around the flatband condition for the gate overlap region. The overlap charge modulates the conductivity of the drift region, and hence g_m.
   b. Auxiliary adjustment parameters for carrier concentration in the drift region are introduced: **NDRILIM=1**, **NDRIDLT=1**, and **NDRIPW=1**. A g_m roll-off due to drift resistance can be adjusted.

   Additionally, a sensible use of model parameters for saturation velocity and mobility such as **VMAX**, **RDRVMAX**, **RDRCAR** … and to refrain from overusing **NINVD** relax g_m sharpness.
7) Update of model parameter boundary (**RDTEMP1**, **RDTEMP2**, **RDVDTEMP1** and **RDVDTEMP2**).
8) Corrections of model parameter units (**RD**, **RS**, **RDVD**, **RDTEMP1**, **RDTEMP2**, **RDVDTEMP1**, **RDVDTEMP2**, **RTHTEMP1** and **RTHTEMP2**).
9) Code clean up: removal of hidden states and unused variables.
10) Trench overlap capacitance.
    Added parameter: **TOXB = TOX** (7e-9, Default)

11) Improvement of gm and gds in depletion mode. Improvement of Vbs-dependence for both linear and saturation conditions in depletion mode.

Added flag: **COVDSRES=2** (default for **CODEP=3;** valid for **CODEP=3** only)

Added parameters: **DEPVLEAK = 1** (valid for **CODEP=3** only)

DEPPB0 = 0.5 (mobility model for the resistor region compatible with HiSIM2 3.0.0 or later; valid for **CODEP=3** only)

12) Implementation of diode recovery.

Added flag: **CORECOVERY=0** (default)

Added parameters: **NDIBOT=1e16 INJ1=1.0 INJ2=10.0 NQS=5e-9 TAU=2e-7**

WI=5e-6 DEPNQS=0.0 TAUT=0.0 INJT= 0.0

13) Fix on aging model.

Added flag: **COFIXAG = 0** (Default). **COFIXAG** = 1 activates the fixed codes.

14) Short-channel effect (Deep punchthrough current).

Added parameters: **COPT**=0 **COPSPT=0** **XJPT=3E-8**

NJUNC=1e20 **MUPT=0.0** **VFBPT = 0.0** **PSLIMPT=0.0**

15) Additional Vbs dependence in the mobility for the drift region.

Added parameters: **RDRMUEBS1=0.0** **RDRMUEBS2=0.0**