



UNIVERSITY OF CALIFORNIA, BERKELEY

## Model Bug Fixes for BSIM3v3.2.3

- ❖ 1/f noise model bug fix
- ❖ Memory pointer bug
- ❖ ACDE check
- ❖ Temperature parameters for parasitic diodes
- ❖ Typo error for CAPMOD=0,40/60 partition



UNIVERSITY OF CALIFORNIA, BERKELEY

# 1/f Noise Model Bug Fix

Requested by David Zweidinger Keith Green Britt Brooks

Texas Instruments

**Problem: negative DelCIm under certain conditions of voltage bias, temperature, L, and W**

$$S_{id,inv}(f) = \frac{k_B T q^2 m_{eff} I_{ds}}{C_{oxe} L_{eff}^2 A_{bulk} f^{ef} \cdot 10^0} \left( NOIA \log \left( \frac{N_0 + N^*}{N_l + N^*} \right) + NOIB (N_0 - N_l) + \frac{NOIC}{2} (N_0^2 - N_l^2) \right)$$

$$+ \frac{k_B T I_{ds}^2 \Delta L}{W_{eff} \cdot L_{eff}^2 f^{ef} \cdot 10^0} \cdot \frac{clm \cdot NOIA + NOIB N_l + NOIC N_l^2}{(N_l + N^*)^2}$$

$$\Delta L_{clm} = Litl \cdot \log \left( \frac{V_{ds} - V_{dseff} + EM}{E_{sat}} \right)$$

$$E_{sat} = \frac{2V_{SAT}}{m_{eff}}$$

**In b3noi.c:**

```
if(model->BSIM3em<=0.0) DelCIm = 0.0; /* flicker noise modified -JX */
else {
    T0 = (((Vds - here->BSIM3Vdseff) / pParam->BSIM3litl)
          + model->BSIM3em) / esat);
    DelCIm = pParam->BSIM3litl * log (MAX(T0, N_MINLOG));
}
```

Jane Xi, October 05,2001



UNIVERSITY OF CALIFORNIA, BERKELEY

# Memory Pointer Bug

Requested by David Zweidinger Keith Green Britt Brooks

Texas Instruments

**Problem: No value assignment to pParam for no-binning approach.**

**In b3temp:**

```
while ((pSizeDependParamKnot != NULL) && Size_Not_Found)
{ if ((here->BSIM3l == pSizeDependParamKnot->Length)
    && (here->BSIM3w == pSizeDependParamKnot->Width)
    && (here->BSIM3nf == pSizeDependParamKnot->NFinger))
{ Size_Not_Found = 0;
  here->pParam = pSizeDependParamKnot;
  pParam = here->pParam; /*bug-fix */
}
}
```

---

Jane Xi, October 05,2001



UNIVERSITY OF CALIFORNIA, BERKELEY

# ACDE (capMod 3) Checking

Requested by David Zweidinger Keith Green Britt Brooks

Texas Instruments

**Problem: warning message for other capacitance models**

**In b3check.c:**

```
if(model->BSIM3capMod ==3) {  
    if (pParam->BSIM3acde < 0.4)  
    { fprintf(fplog, "Warning: Acde = %g is too small.\n", pParam->BSIM3acde);  
      printf("Warning: Acde = %g is too small.\n", pParam->BSIM3acde);  
    }  
    if (pParam->BSIM3acde > 1.6)  
    { fprintf(fplog, "Warning: Acde = %g is too large.\n", pParam->BSIM3acde);  
      printf("Warning: Acde = %g is too large.\n", pParam->BSIM3acde);  
    }  
}
```

---

Jane Xi, October 05,2001



UNIVERSITY OF CALIFORNIA, BERKELEY

# Temperature Parameters for Parasitic Diodes

Requested by Alex Zavorine

Circuit Semantics

Jane Xi

UC Berkeley

**Problems: Model parameters be reassigned with new value for parasitic diode parameters in b3temp.c**

**In bsim3def.h, new Pre-calculated constants added:**

```
double BSIM3unitAreaTempJctCap;
```

```
double BSIM3unitLengthSidewallTempJctCap;
```

```
double BSIM3unitLengthGateSidewallTempJctCap;
```

**Modifications also needed in bsim3def.h, b3temp.c, b3ld.c.**



UNIVERSITY OF CALIFORNIA, BERKELEY

## Typo Error for CapMod0 in BSIM3

Requested by: Alex Zavorine

Circuit Semantics

Jane Xi

UC Berkeley

**Problem: A fundamental bug propagated from BSIM3 for  
CAPMOD=0, 40/60 partition :**

**In b3ld.c:**

```
here->BSIM3cbdb = -(here->BSIM3cgdb + here->BSIM3cddb + T10);
```

```
/* replace from T11 */
```