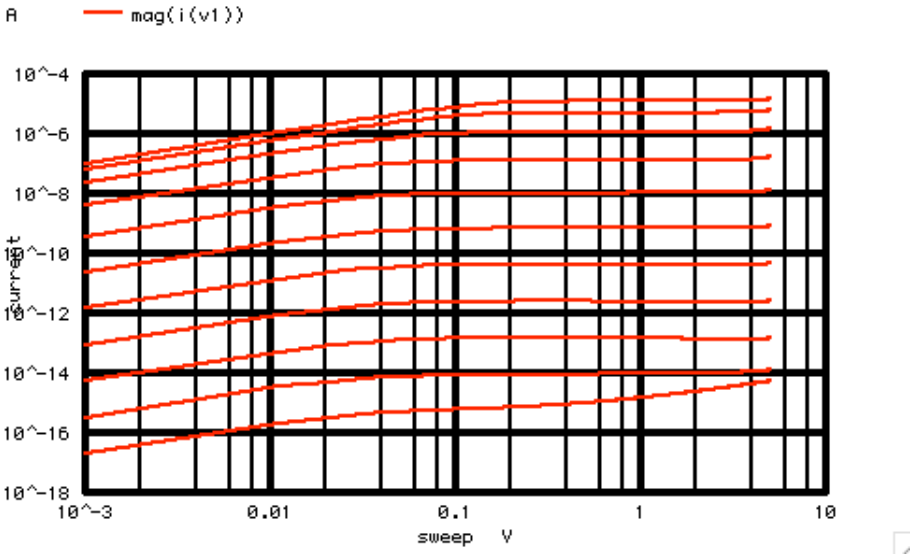
==========NMOS_bsim3_SubSanity==========



NMOS_bsim3_SubSanity

```
Vds   3    0    dc       5v
Vgs   2    0    dc       1.2v
v1    3    1    dc       0v
m1    1    2    0    0    N1    W=3u      L=1u AD=7p AS=7p PD=10u PS=10u

.OPTIONS  GMIN=1e-15 METHOD=gear ABSTOL=1e-15

.dc Vds 1m 5 0.01 vgs 0 1 .1

.control
run
plot  mag(i(v1)) loglog
.endc

**************SILICON_DATA****************************
*         see reference curve below

*Lmin= .35      Lmax= 20         Wmin= .6        Wmax= 20
.model          N1                NMOS
+ Level=  8          Tnom=27.0
*------------------Process-----------------------------------------------
+ tox=160e-10        xj=0.25e-06          nch=0.5e+17
*------------------V_threshold-------------------------------------------
+ vth0=0.72          nlx=0.12e-06
*------------------Bulk--------------------------------------------------
+ k1=1.04            k2=-1.209E-01
+ cdsc=-2.4E-4       cdscd=-1.506E-04     cdscb=-2.219E-04
*------------------mobility----------------------------------------------
+ u0=678             ua=8.964e-10
+ ub=1.472e-18       uc=-4.441E-17        vsat=86000
*------------------Subthresshold-----------------------------------------
+ nfactor=1.8
+ cit=-5.0E-04       voff=-7.862E-02
+ eta0=4.441e-16     etab=-2.E-01         dsub=0.7
*------------------Hot electrons-----------------------------------------
+ alpha0=1.61e-05    beta0=36.68
*------------------VAF---------------------------------------------------
+ lint=.12e-06       pclm=.19             pscbe1=3.79e+08    pscbe2=9.4e-05
+ delta=0.01655      pvag=0.4484
*------------------Bulk_diode--------------------------------------------
+ js=5.858e-08
*------------------Resistance--------------------------------------------
+ rsh=70             rdsw=375
+ wr=0.7586          prwb=0               prwg=-4.441E-17
*------------------Capacitance-------------------------------------------
+ cj=0.0002424       cjsw=2.73e-10        mj=0.3551            mjsw=0.3873
+ cgso=9e-13         cgdo=9e-13           cgbo=7e-10
+ pb=0.5614          pbsw=0.8             xpart=0
```

```
+ dlc=5e-08          dwc=1.5e-07
*------------------BulkChargeEffect-----------------------------------------
+ a0=0.7             a1=0                 a2=1                  ags=0.05583
+ b0=6.305e-08       b1=6.579e-08         keta=-1.531E-02
*------------------ShortChannel--------------------------------------------
+ dvt0=2.2           dvt1=0.53            dvt2=-1.521E-01       drout=0.76
+ pdiblcb=.4         pdiblc1=0.00886      pdiblc2=0.00029
*------------------NarrowChannel-------------------------------------------
+ w0=2.6e-04         wint=0.16e-06
+ ww=-9.525E-14      wwn=1.0
+ dvt0w=0            dvt1w=5.3e6          dvt2w=-1.E-01
+ k3=2.53            k3b=-5               dwg=0                 dwb=0
*------------------Noise---------------------------------------------------
+ af=1               kf=1e-28             ef=0.95
*------------------Temperature---------------------------------------------
+ pvsat=0           ute=-1.258E+00       kt1=-3.85E-01
+ kt1l=0            kt2=-3.098E-02       ua1=5.705e-09
+ ub1=-1.147E-17    uc1=-1.302E-01       at=20380
* prt=-3.287E+02    lk1=0                lk2=0
+ lvsat=0           la0=0                lags=0              lute=0
+ luc=0


*Lmin= .35         Lmax= 20          Wmin= .6         Wmax= 20
.model             N2                 NMOS
+Level=  8         Tnom=27.0
***************Process**********************
+Tox=16e-9         Xj=250E-09        Nch=.5E+17
***************V_thresshold*****************
+Vth0=.72          Nlx=0.12E-06
***************Bulk*************************
+K1=1.04           K2=-1.2e-1        K3=-2.612
***************Mobility*********************
+U0=478            Ua=6.47e-9
+Ub=4.23e-18       Uc=-4.706281E-11 Vsat=86301
***************Subthresshold****************
+NFactor=1.14
+Cit= 1.6E-04      Voff=-6.74E-02
+Eta0=1.03E-02     Etab=-5.04E-03    Dsub= .32
***************VAF**************************
+Lint=.12e-6       Pclm=.19          Pscbe1=4e8       Pscbe2=5E-09
+delta=0.01        Pvag=.44
***************Resistance*******************
+Rdsw=650          Prwg =0           Prwb = -.213     wr=1
***************Capacitance******************
+Cdsc=-2.15E-05    Cdscb=0           Cdscd=0
***************BulkChargeEfffect************
+A0=.35            A1= 2.8E-02       A2= .9           Ags=.1
+B0=0.546          B1=1              Keta=-3.6E-02
***************ShortChannel*****************
+Dvt0=2.812        Dvt1= 0.462       Dvt2=-9.2e-2     Drout= .31871233
+Pdiblcb= -.234    Pdiblc1= 2.5E-03 Pdiblc2=6.4E-03
***************NarrowChannel****************
+W0=1.163e-6       Wint=1.47e-7      Ww=-1.42E-09     Wwn=.2613948
+Wl=0              Wwl=0             Wln=0
+Dvt0w=0           Dvt1w=0           Dvt2w=0
+K3b= 2.233        Dwg=-6.0E-09      Dwb= -3.56E-09
***************Process**********************
+Ll=1.30E-10       Lw=0              Lwl=0
+Lln=.316394       Lwn=0
+Ute=-1.48
***************Temperature******************
+Kt1l=0            kt1=-.3           kt2=-.051
+Ua1= 3.31E-10     Ub1= 2.61E-19     Uc1= -3.42e-10
+At= 22400         Prt=764.3



.model             NMOSC              NMOS
+ Level=  8        Tnom=27.0
*------------------Process-------------------------------------------------
+ tox=160e-10      xj=0.25e-06        nch=0.5e+17
*------------------V_threshold---------------------------------------------
```

```
+ vth0=0.72         nlx=0.12e-06
*------------------Bulk-----------------------------------------------
+ k1=1.04           k2=-1.209E-01
*------------------mobility-------------------------------------------
+ u0=678            ua=8.964e-10
+ ub=1.472e-18      uc=-4.441E-17       vsat=86000
*------------------Subthresshold--------------------------------------
+ nfactor=1.8
+ cit=-5.0E-04      voff=-7.862E-02
+ eta0=4.441e-16    etab=-2.E-01        dsub=0.7
*------------------Hot electrons--------------------------------------
* alpha0=1.61e-05   beta0=36.68
*------------------VAF------------------------------------------------
+ lint=.12e-06      pclm=.19            pscbe1=3.79e+08    pscbe2=9.4e-05
+ delta=0.01655     pvag=0.4484
*------------------Bulk_diode-----------------------------------------
* + js=5.858e-08
*------------------Resistance-----------------------------------------
+ rsh=70            rdsw=375
+ wr=0.7586         prwb=0              prwg=-4.441E-17
*------------------Capacitance----------------------------------------
+ cj=0.0002424      cjsw=2.73e-10       mj=0.3551           mjsw=0.3873
+ cgso=9e-13        cgdo=9e-13          cgbo=7e-10
+ cdsc=-2.4E-4      cdscd=-1.506E-01    cdscb=-2.219E-04
+ pb=0.5614         pbsw=0.8            xpart=0
+ dlc=5e-08         dwc=1.5e-07
*------------------BulkChargeEffect-----------------------------------
* a0=0.7            a1=0                a2=1                ags=0.05583
* b0=6.305e-08      b1=6.579e-08        keta=-1.531E-02
*------------------ShortChannel---------------------------------------
+ dvt0=2.2          dvt1=0.53           dvt2=-1.521E-01     drout=0.76
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*------------------NarrowChannel--------------------------------------
+ w0=2.6e-04        wint=0.16e-06
+ ww=-9.525E-14     wwn=1.0
+ dvt0w=0           dvt1w=5.3e6         dvt2w=-1.E-01
+ k3=2.53           k3b=-5              dwg=0               dwb=0
*------------------Noise----------------------------------------------
* af=1              kf=1e-28            ef=0.95
*------------------Temperature----------------------------------------
* pvsat=0           ute=-1.258E+00      kt1=-3.85E-01
* kt1l=0            kt2=-3.098E-02      ua1=5.705e-09
* ub1=-1.147E-17    uc1=-1.302E-01      at=20380
* prt=-3.287E+02    lk1=0               lk2=0
* lvsat=0           la0=0               lags=0              lute=0
* luc=0


.end
```

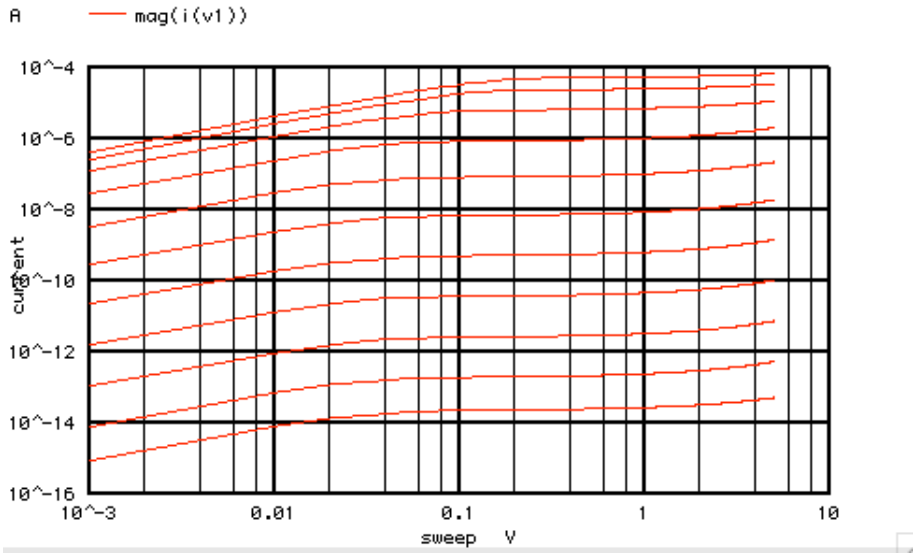
A
mag(i(v1))
10^-4
10^-6
10^-8
10^-10
10^-12
10^-14
10^-16
current
10^-3
0.01
0.1
1
10
sweep V

**********SILICON_DATA**********

NMOS_Subthresshold_Drain_Current and Gate_Voltage