```
Using: /usr/bin/time -p /afs/ir.stanford.edu/class/archive/ee/ee/synopsys.2002/B-2008.09-SP1/hspice/
linux/hspice currentFile.sp
 ****** HSPICE -- B-2008.09-SP1 32-BIT (Nov 24 2008) linux ******
  Copyright (C) 2008 Synopsys, Inc. All Rights Reserved.
  Unpublished-rights reserved under US copyright laws.
  This program is protected by law and is subject to the
  terms and conditions of the license agreement from Synopsys.
  Use of this program is your acceptance to be bound by the
  license agreement. HSPICE is the trademark of Synopsys, Inc.
  Input File: currentFile.sp
 lic:
 lic: FLEXlm: v8.5b
 lic: USER:   samfok               HOSTNAME: corn05.stanford.edu
 lic: HOSTID: 001b213a6879         PID:      10127
 lic: Using FLEXlm license file:
 lic: 27000@cadlic0
 lic: Checkout 1 hspice
 lic: License/Maintenance for hspice will expire on 09-dec-2012/2011.09
 lic: FLOATING license(s) on SERVER cadlic0
 lic:
 Init: read install configuration file: /afs/ir.stanford.edu/class/archive/ee/ee/synopsys.2002/
B-2008.09-SP1/hspice/meta.cfg
 Init: hspice initialization file: /afs/ir.stanford.edu/class/archive/ee/ee/synopsys.2002/B-2008.09-
SP1/hspice/hspice.ini
 .option runlvl
 * please fill in the specification achieved by your circuit
 * before your submit the netlist.
 **************************************************************
 * the specifications that this script achieves are:
 * sunetid = rohitpid, samfok
 * power  = 2.4242 mw
 * gain   = 20.631 k
 * bandwidth = 90.965  mhz
 ***************************************************************


 ** including the model file
 .include /usr/class/ee114/hspice/ee114_hspice.sp
 * device models for ee114  rev.1.2 (10/04/08)
 * fall 2008 - by b. murmann
 * include this file in your hspice deck using .inc usr/class/ee114/hspice/ee114_hspice.sp

 *** nmos device parameters
 .param n_vto=0.5 n_cox=2.3m n_kp=50u n_gamma=0.6 n_phi=0.8 n_lambda=0.1u
 .param n_cgdo=0.5n n_cgso=0.5n n_cj=0.1m n_cjsw=0.5n n_pb=0.95 n_mj=0.5 n_mjsw=0.33 n_hdif=1.5u

 *** pmos device parameters
 .param p_vto=-0.5 p_cox=2.3m p_kp=25u p_gamma=0.6 p_phi=0.8 p_lambda=0.1u
 .param p_cgdo=0.5n p_cgso=0.5n p_cj=0.3m p_cjsw=0.35n p_pb=0.95 p_mj=0.5 p_mjsw=0.33 p_hdif=1.5u

 *** channel lengths supported in this file (add additional values or edit if needed)
 *** minimum length is 1um, minimum increment is 0.2um
 .param wmin=2u l1=1u l2=1.2u l3=1.4u l4=1.6u l5=1.8u l6=2.0u l7=2.2u l8=2.4u l9=2.6u l10=2.8u l11=3u
l12=5u l13=10u l14=20u l15=50u


 ***********************************************  idealized n-channel
*******************************************************
 **** no channel length modulation, no extrinsic capacitances
 **** example instantiation: m1 nmos114_ideal d g s b w=10u l=1u
 ****
 .model nmos114_ideal nmos level=1 capop=1 vto=n_vto cox=n_cox kp=n_kp gamma=n_gamma phi=n_phi lmin=l1
lmax=1m wmin=wmin wmax=10m


 ***********************************************  idealized p-channel
*******************************************************
 **** no channel length modulation, no extrinsic capacitances
 **** example instantiation: m1 pmos114_ideal d g s b w=10u l=1u
 ****
 .model pmos114_ideal pmos level=1 capop=1 vto=p_vto cox=p_cox kp=p_kp gamma=p_gamma phi=p_phi lmin=l1
lmax=1m wmin=wmin wmax=10m
```

```
 ***************************************************** n-channels
***************************************************************
 **** lambda is computed based on channel length; as, ads, ps, pd are automatically calculated based
on hdif, acm=3
 **** example instantiation: m1 nmos114 d g s b w=10u l=1u
 ****
 .model nmos114.1 nmos level=1 capop=1 acm=3 cjgate=0 hdif=n_hdif vto=n_vto cox=n_cox kp=n_kp
gamma=n_gamma phi=n_phi lambda='n_lambda/l1'
 + lmin=l1 lmax='l1+0.01u' wmin=wmin wmax=10m cgdo=n_cgso cgso=n_cgso cj=n_cj cjsw=n_cjsw pb=n_pb
mj=n_mj mjsw=n_mjsw
 .model nmos114.2 nmos level=1 capop=1 acm=3 cjgate=0 hdif=n_hdif vto=n_vto cox=n_cox kp=n_kp
gamma=n_gamma phi=n_phi lambda='n_lambda/l2'
 + lmin=l2 lmax='l2+0.01u' wmin=wmin wmax=10m cgdo=n_cgso cgso=n_cgso cj=n_cj cjsw=n_cjsw pb=n_pb
mj=n_mj mjsw=n_mjsw
 .model nmos114.3 nmos level=1 capop=1 acm=3 cjgate=0 hdif=n_hdif vto=n_vto cox=n_cox kp=n_kp
gamma=n_gamma phi=n_phi lambda='n_lambda/l3'
 + lmin=l3 lmax='l3+0.01u' wmin=wmin wmax=10m cgdo=n_cgso cgso=n_cgso cj=n_cj cjsw=n_cjsw pb=n_pb
mj=n_mj mjsw=n_mjsw
 .model nmos114.4 nmos level=1 capop=1 acm=3 cjgate=0 hdif=n_hdif vto=n_vto cox=n_cox kp=n_kp
gamma=n_gamma phi=n_phi lambda='n_lambda/l4'
 + lmin=l4 lmax='l4+0.01u' wmin=wmin wmax=10m cgdo=n_cgso cgso=n_cgso cj=n_cj cjsw=n_cjsw pb=n_pb
mj=n_mj mjsw=n_mjsw
 .model nmos114.5 nmos level=1 capop=1 acm=3 cjgate=0 hdif=n_hdif vto=n_vto cox=n_cox kp=n_kp
gamma=n_gamma phi=n_phi lambda='n_lambda/l5'
 + lmin=l5 lmax='l5+0.01u' wmin=wmin wmax=10m cgdo=n_cgso cgso=n_cgso cj=n_cj cjsw=n_cjsw pb=n_pb
mj=n_mj mjsw=n_mjsw
 .model nmos114.6 nmos level=1 capop=1 acm=3 cjgate=0 hdif=n_hdif vto=n_vto cox=n_cox kp=n_kp
gamma=n_gamma phi=n_phi lambda='n_lambda/l6'
 + lmin=l6 lmax='l6+0.01u' wmin=wmin wmax=10m cgdo=n_cgso cgso=n_cgso cj=n_cj cjsw=n_cjsw pb=n_pb
mj=n_mj mjsw=n_mjsw
 .model nmos114.7 nmos level=1 capop=1 acm=3 cjgate=0 hdif=n_hdif vto=n_vto cox=n_cox kp=n_kp
gamma=n_gamma phi=n_phi lambda='n_lambda/l7'
 + lmin=l7 lmax='l7+0.01u' wmin=wmin wmax=10m cgdo=n_cgso cgso=n_cgso cj=n_cj cjsw=n_cjsw pb=n_pb
mj=n_mj mjsw=n_mjsw
 .model nmos114.8 nmos level=1 capop=1 acm=3 cjgate=0 hdif=n_hdif vto=n_vto cox=n_cox kp=n_kp
gamma=n_gamma phi=n_phi lambda='n_lambda/l8'
 + lmin=l8 lmax='l8+0.01u' wmin=wmin wmax=10m cgdo=n_cgso cgso=n_cgso cj=n_cj cjsw=n_cjsw pb=n_pb
mj=n_mj mjsw=n_mjsw
 .model nmos114.9 nmos level=1 capop=1 acm=3 cjgate=0 hdif=n_hdif vto=n_vto cox=n_cox kp=n_kp
gamma=n_gamma phi=n_phi lambda='n_lambda/l9'
 + lmin=l9 lmax='l9+0.01u' wmin=wmin wmax=10m cgdo=n_cgso cgso=n_cgso cj=n_cj cjsw=n_cjsw pb=n_pb
mj=n_mj mjsw=n_mjsw
 .model nmos114.10 nmos level=1 capop=1 acm=3 cjgate=0 hdif=n_hdif vto=n_vto cox=n_cox kp=n_kp
gamma=n_gamma phi=n_phi lambda='n_lambda/l10'
 + lmin=l10 lmax='l10+0.01u' wmin=wmin wmax=10m cgdo=n_cgso cgso=n_cgso cj=n_cj cjsw=n_cjsw pb=n_pb
mj=n_mj mjsw=n_mjsw
 .model nmos114.11 nmos level=1 capop=1 acm=3 cjgate=0 hdif=n_hdif vto=n_vto cox=n_cox kp=n_kp
gamma=n_gamma phi=n_phi lambda='n_lambda/l11'
 + lmin=l11 lmax='l11+0.01u' wmin=wmin wmax=10m cgdo=n_cgso cgso=n_cgso cj=n_cj cjsw=n_cjsw pb=n_pb
mj=n_mj mjsw=n_mjsw
 .model nmos114.12 nmos level=1 capop=1 acm=3 cjgate=0 hdif=n_hdif vto=n_vto cox=n_cox kp=n_kp
gamma=n_gamma phi=n_phi lambda='n_lambda/l12'
 + lmin=l12 lmax='l12+0.01u' wmin=wmin wmax=10m cgdo=n_cgso cgso=n_cgso cj=n_cj cjsw=n_cjsw pb=n_pb
mj=n_mj mjsw=n_mjsw
 .model nmos114.13 nmos level=1 capop=1 acm=3 cjgate=0 hdif=n_hdif vto=n_vto cox=n_cox kp=n_kp
gamma=n_gamma phi=n_phi lambda='n_lambda/l13'
 + lmin=l13 lmax='l13+0.01u' wmin=wmin wmax=10m cgdo=n_cgso cgso=n_cgso cj=n_cj cjsw=n_cjsw pb=n_pb
mj=n_mj mjsw=n_mjsw
 .model nmos114.14 nmos level=1 capop=1 acm=3 cjgate=0 hdif=n_hdif vto=n_vto cox=n_cox kp=n_kp
gamma=n_gamma phi=n_phi lambda='n_lambda/l14'
 + lmin=l14 lmax='l14+0.01u' wmin=wmin wmax=10m cgdo=n_cgso cgso=n_cgso cj=n_cj cjsw=n_cjsw pb=n_pb
mj=n_mj mjsw=n_mjsw
 .model nmos114.15 nmos level=1 capop=1 acm=3 cjgate=0 hdif=n_hdif vto=n_vto cox=n_cox kp=n_kp
gamma=n_gamma phi=n_phi lambda='n_lambda/l15'
 + lmin=l15 lmax='l15+0.01u' wmin=wmin wmax=10m cgdo=n_cgso cgso=n_cgso cj=n_cj cjsw=n_cjsw pb=n_pb
mj=n_mj mjsw=n_mjsw


 ***************************************************** p-channels
***************************************************************
```

```
 **** lambda is computed based on channel length; as, ads, ps, pd are automatically calculated based
on hdif, acm=3
 **** example instantiation: m1 pmos114 d g s b w=10u l=1u
 ****
 .model pmos114.1 pmos level=1 capop=1 acm=3 cjgate=0 hdif=p_hdif vto=p_vto cox=p_cox kp=p_kp
gamma=p_gamma phi=p_phi lambda='p_lambda/l1'
 + lmin=l1 lmax='l1+0.01u' wmin=wmin wmax=10m cgdo=p_cgso cgso=p_cgso cj=p_cj cjsw=p_cjsw pb=p_pb
mj=p_mj mjsw=p_mjsw
 .model pmos114.2 pmos level=1 capop=1 acm=3 cjgate=0 hdif=p_hdif vto=p_vto cox=p_cox kp=p_kp
gamma=p_gamma phi=p_phi lambda='p_lambda/l2'
 + lmin=l2 lmax='l2+0.01u' wmin=wmin wmax=10m cgdo=p_cgso cgso=p_cgso cj=p_cj cjsw=p_cjsw pb=p_pb
mj=p_mj mjsw=p_mjsw
 .model pmos114.3 pmos level=1 capop=1 acm=3 cjgate=0 hdif=p_hdif vto=p_vto cox=p_cox kp=p_kp
gamma=p_gamma phi=p_phi lambda='p_lambda/l3'
 + lmin=l3 lmax='l3+0.01u' wmin=wmin wmax=10m cgdo=p_cgso cgso=p_cgso cj=p_cj cjsw=p_cjsw pb=p_pb
mj=p_mj mjsw=p_mjsw
 .model pmos114.4 pmos level=1 capop=1 acm=3 cjgate=0 hdif=p_hdif vto=p_vto cox=p_cox kp=p_kp
gamma=p_gamma phi=p_phi lambda='p_lambda/l4'
 + lmin=l4 lmax='l4+0.01u' wmin=wmin wmax=10m cgdo=p_cgso cgso=p_cgso cj=p_cj cjsw=p_cjsw pb=p_pb
mj=p_mj mjsw=p_mjsw
 .model pmos114.5 pmos level=1 capop=1 acm=3 cjgate=0 hdif=p_hdif vto=p_vto cox=p_cox kp=p_kp
gamma=p_gamma phi=p_phi lambda='p_lambda/l5'
 + lmin=l5 lmax='l5+0.01u' wmin=wmin wmax=10m cgdo=p_cgso cgso=p_cgso cj=p_cj cjsw=p_cjsw pb=p_pb
mj=p_mj mjsw=p_mjsw
 .model pmos114.6 pmos level=1 capop=1 acm=3 cjgate=0 hdif=p_hdif vto=p_vto cox=p_cox kp=p_kp
gamma=p_gamma phi=p_phi lambda='p_lambda/l6'
 + lmin=l6 lmax='l6+0.01u' wmin=wmin wmax=10m cgdo=p_cgso cgso=p_cgso cj=p_cj cjsw=p_cjsw pb=p_pb
mj=p_mj mjsw=p_mjsw
 .model pmos114.7 pmos level=1 capop=1 acm=3 cjgate=0 hdif=p_hdif vto=p_vto cox=p_cox kp=p_kp
gamma=p_gamma phi=p_phi lambda='p_lambda/l7'
 + lmin=l7 lmax='l7+0.01u' wmin=wmin wmax=10m cgdo=p_cgso cgso=p_cgso cj=p_cj cjsw=p_cjsw pb=p_pb
mj=p_mj mjsw=p_mjsw
 .model pmos114.8 pmos level=1 capop=1 acm=3 cjgate=0 hdif=p_hdif vto=p_vto cox=p_cox kp=p_kp
gamma=p_gamma phi=p_phi lambda='p_lambda/l8'
 + lmin=l8 lmax='l8+0.01u' wmin=wmin wmax=10m cgdo=p_cgso cgso=p_cgso cj=p_cj cjsw=p_cjsw pb=p_pb
mj=p_mj mjsw=p_mjsw
 .model pmos114.9 pmos level=1 capop=1 acm=3 cjgate=0 hdif=p_hdif vto=p_vto cox=p_cox kp=p_kp
gamma=p_gamma phi=p_phi lambda='p_lambda/l9'
 + lmin=l9 lmax='l9+0.01u' wmin=wmin wmax=10m cgdo=p_cgso cgso=p_cgso cj=p_cj cjsw=p_cjsw pb=p_pb
mj=p_mj mjsw=p_mjsw
 .model pmos114.10 pmos level=1 capop=1 acm=3 cjgate=0 hdif=p_hdif vto=p_vto cox=p_cox kp=p_kp
gamma=p_gamma phi=p_phi lambda='p_lambda/l10'
 + lmin=l10 lmax='l10+0.01u' wmin=wmin wmax=10m cgdo=p_cgso cgso=p_cgso cj=p_cj cjsw=p_cjsw pb=p_pb
mj=p_mj mjsw=p_mjsw
 .model pmos114.11 pmos level=1 capop=1 acm=3 cjgate=0 hdif=p_hdif vto=p_vto cox=p_cox kp=p_kp
gamma=p_gamma phi=p_phi lambda='p_lambda/l11'
 + lmin=l11 lmax='l11+0.01u' wmin=wmin wmax=10m cgdo=p_cgso cgso=p_cgso cj=p_cj cjsw=p_cjsw pb=p_pb
mj=p_mj mjsw=p_mjsw
 .model pmos114.12 pmos level=1 capop=1 acm=3 cjgate=0 hdif=p_hdif vto=p_vto cox=p_cox kp=p_kp
gamma=p_gamma phi=p_phi lambda='p_lambda/l12'
 + lmin=l12 lmax='l12+0.01u' wmin=wmin wmax=10m cgdo=p_cgso cgso=p_cgso cj=p_cj cjsw=p_cjsw pb=p_pb
mj=p_mj mjsw=p_mjsw
 .model pmos114.13 pmos level=1 capop=1 acm=3 cjgate=0 hdif=p_hdif vto=p_vto cox=p_cox kp=p_kp
gamma=p_gamma phi=p_phi lambda='p_lambda/l13'
 + lmin=l13 lmax='l13+0.01u' wmin=wmin wmax=10m cgdo=p_cgso cgso=p_cgso cj=p_cj cjsw=p_cjsw pb=p_pb
mj=p_mj mjsw=p_mjsw
 .model pmos114.14 pmos level=1 capop=1 acm=3 cjgate=0 hdif=p_hdif vto=p_vto cox=p_cox kp=p_kp
gamma=p_gamma phi=p_phi lambda='p_lambda/l14'
 + lmin=l14 lmax='l14+0.01u' wmin=wmin wmax=10m cgdo=p_cgso cgso=p_cgso cj=p_cj cjsw=p_cjsw pb=p_pb
mj=p_mj mjsw=p_mjsw
 .model pmos114.15 pmos level=1 capop=1 acm=3 cjgate=0 hdif=p_hdif vto=p_vto cox=p_cox kp=p_kp
gamma=p_gamma phi=p_phi lambda='p_lambda/l15'
 + lmin=l15 lmax='l15+0.01u' wmin=wmin wmax=10m cgdo=p_cgso cgso=p_cgso cj=p_cj cjsw=p_cjsw pb=p_pb
mj=p_mj mjsw=p_mjsw


 ********************************** bjts **********************************
 * note that these models are for elementary devices having is=1fa
 * for other device sizes use a multiplier m=... in your netlist
 .model npn npn is=1f bf=100 va=100 tf=20p
```

```
.model pnp pnp is=1f bf=50  va=50  tf=80p

*********************** well-to-substrate diode (for pmos) **************
* example instantiation (area = 10um*10um = 100pm^2)
*    (anode)  (cathode) (model) (area)
* d1 sub_node well_node  dwell   100p
.model dwell d cj0=1e-4 m=0.5


* defining top level circuit parameters
.param cin = 100f
.param cl  = 500f
.param rl  = 10k

* defining the supply voltages

vdd vdd 0 2.5
vss vss 0 -2.5

* defining the input current source

** for ac simulation uncomment the following 2 lines**
 iina          iina    vdd     ac      0.5
 iinb          vdd     iinb    ac      0.5

** for transient simulation uncomment the following 2 lines**
*iina          iina    vdd     sin(0 0.5u 1e6)
*iinb          vdd     iinb    sin(0 0.5u 1e6)

* defining input capacitance

cina   vdd     iina 'cin'
cinb   vdd     iinb 'cin'

* defining the differential load

rl     vouta           voutb           'rl'
cl     vouta           voutb           'cl'

*** your trans-impedance amplifier here ***
**nmos***
*name drain gate source bulk type parameters*
m1a  node_1a 0 iina vss nmos114 w=14.2u l=1u
m1b  node_1b 0 iinb vss nmos114 w=14.2u l=1u
m2a  node_2a node_1a ibias2 vss nmos114 w=6.8u l=1u
m2b  node_2b node_1b ibias2 vss nmos114 w=6.8u l=1u
m3a  vdd node_2a vouta vss nmos114 w=40.2u l=1u
m3b  vdd node_2b voutb vss nmos114 w=40.2u l=1u

**pmos***
*name drain gate source bulk type parameters*
ml1a node_1a node_1a vdd vdd pmos114 w=2.4u l=1u
ml1b node_1b node_1b vdd vdd pmos114 w=2.4u l=1u
ml2a node_2a node_2a vdd vdd pmos114 w=2.8u l=1u
ml2b node_2b node_2b vdd vdd pmos114 w=2.8u l=1u

*** your bias circuitry here ***
**nmos***
*name drain gate source bulk type parameters*
mbias1a iina nbias vss vss nmos114 w=2.2u l=2u
mbias1b iinb nbias vss vss nmos114 w=2.2u l=2u
mbias2a ibias2 nbias vss vss nmos114 w=2.2u l=2u
mbias2b ibias2 nbias vss vss nmos114 w=2.2u l=2u
mbias3a vouta nbias vss vss nmos114 w=5.6u l=2u
mbias3b voutb nbias vss vss nmos114 w=5.6u l=2u

** for students enrolled in ee114, you can use the given ideal voltage source
*vbias_n nbias vss 1.5   *replace --- by your value

*** drain gate source bulk mostype w_value l_value
*m1 vb vb vdd vdd pmos114 w=2u l=20u
```

```
 *** nmos
 *** drain gate source bulk mostype w_value l_value
 mu nbias nbias vx vss nmos114 w=2u l=1u
 ml vx nbias vss vss nmos114 w=2u l=1u

 *resistors
 r vdd nbias 140k

 ** for students enrolled in ee214a, you need to design your bias ciruit. you cannpt use vbias_n as
ideal voltage source.



 * defining the analysis

 .op
 .option post brief nomod


 ****** HSPICE -- B-2008.09-SP1 32-BIT (Nov 24 2008) linux ******
 ******
 * design problem, ee114/214a- 2012

  ******  operating point information tnom=  25.000 temp=  25.000 *****
 ***** operating point status is all       simulation time is     0.
    node    =voltage      node    =voltage      node    =voltage

 +0:ibias2  =-345.1616m 0:iina    =  -1.1166  0:iinb    =  -1.1166
 +0:nbias   =-977.6485m 0:node_1a =   1.0540  0:node_1b =   1.0540
 +0:node_2a =   1.1064  0:node_2b =   1.1064  0:vdd     =   2.5000
 +0:vouta   =-171.4282m 0:voutb   =-171.4282m 0:vss     =  -2.5000
 +0:vx      =  -2.2270


 ****  voltage sources

 subckt
 element  0:vdd      0:vss
  volts      2.5000    -2.5000
  current -313.3478u  313.3478u
  power    783.3695u  783.3695u

     total voltage source power dissipation=    1.5667m       watts



 ***** current sources

 subckt
 element  0:iina     0:iinb
  volts     -3.6166     3.6166
  current    0.         0.
  power      0.         0.


     total current source power dissipation=   0.            watts

 **** resistors

 subckt
 element  0:rl       0:r
  r value   10.0000k  140.0000k
  v drop   832.6673a    3.4776
  current  8.327e-20   24.8403u
  power      0.        86.3860u



 **** mosfets


 subckt
```

element	0:m1a	0:m1b	0:m2a	0:m2b	0:m3a	0:m3b
model	0:nmos114.	0:nmos114.	0:nmos114.	0:nmos114.	0:nmos114.	0:nmos114.
region	Saturati	Saturati	Saturati	Saturati	Saturati	Saturati
id	30.7312u	30.7312u	31.8399u	31.8399u	81.6826u	81.6826u
ibs	-13.8338f	-13.8338f	-21.5484f	-21.5484f	-23.2857f	-23.2857f
ibd	-35.5398f	-35.5398f	-36.0644f	-36.0644f	-50.0000f	-50.0000f
vgs	1.1166	1.1166	1.3991	1.3991	1.2779	1.2779
vds	2.1706	2.1706	1.4516	1.4516	2.6714	2.6714
vbs	-1.3834	-1.3834	-2.1548	-2.1548	-2.3286	-2.3286
vth	849.9200m	849.9200m	994.7223m	994.7223m	1.0246	1.0246
vdsat	266.6980m	266.6980m	404.4160m	404.4160m	253.2614m	253.2614m
vod	266.6980m	266.6980m	404.4160m	404.4160m	253.2614m	253.2614m
beta	864.1122u	864.1122u	389.3546u	389.3546u	2.5470m	2.5470m
gam eff	600.0000m	600.0000m	600.0000m	600.0000m	600.0000m	600.0000m
gm	230.4570u	230.4570u	157.4612u	157.4612u	645.0458u	645.0458u
gds	2.5250u	2.5250u	2.7804u	2.7804u	6.4462u	6.4462u
gmb	46.7893u	46.7893u	27.4807u	27.4807u	109.4054u	109.4054u
cdtot	15.1944f	15.1944f	8.1767f	8.1767f	37.8570f	37.8570f
cgtot	36.4525f	36.4525f	17.3665f	17.3665f	103.1510f	103.1510f
cstot	39.0998f	39.0998f	19.2848f	19.2848f	103.5813f	103.5813f
cbtot	18.6108f	18.6108f	10.3140f	10.3140f	40.2499f	40.2499f
cgs	28.8734f	28.8734f	13.8267f	13.8267f	81.7403f	81.7403f
cgd	7.1945f	7.1945f	3.4303f	3.4303f	20.4293f	20.4293f

subckt

element	0:ml1a	0:ml1b	0:ml2a	0:ml2b	0:mbias1a	0:mbias1b
model	0:pmos114.	0:pmos114.	0:pmos114.	0:pmos114.	0:nmos114.	0:nmos114.
region	Saturati	Saturati	Saturati	Saturati	Saturati	Saturati
id	-30.7312u	-30.7312u	-31.8399u	-31.8399u	30.7312u	30.7312u
ibs	0.	0.	0.	0.	0.	0.
ibd	14.4602f	14.4602f	13.9356f	13.9356f	-13.8338f	-13.8338f
vgs	-1.4460	-1.4460	-1.3936	-1.3936	1.5224	1.5224
vds	-1.4460	-1.4460	-1.3936	-1.3936	1.3834	1.3834
vbs	0.	0.	0.	0.	0.	0.
vth	-500.0000m	-500.0000m	-500.0000m	-500.0000m	500.0000m	500.0000m
vdsat	-946.0234m	-946.0234m	-893.5570m	-893.5570m	1.0224	1.0224
vod	-946.0234m	-946.0234m	-893.5570m	-893.5570m	1.0224	1.0224
beta	68.6761u	68.6761u	79.7549u	79.7549u	58.8043u	58.8043u
gam eff	600.0000m	600.0000m	600.0000m	600.0000m	600.0000m	600.0000m
gm	64.9692u	64.9692u	71.2655u	71.2655u	60.1187u	60.1187u
gds	2.6849u	2.6849u	2.7946u	2.7946u	1.4372u	1.4372u
gmb	21.7913u	21.7913u	23.9032u	23.9032u	20.1644u	20.1644u
cdtot	4.7373f	4.7373f	5.3027f	5.3027f	4.5877f	4.5877f
cgtot	6.1194f	6.1194f	7.1407f	7.1407f	9.0141f	9.0141f
cstot	9.9800f	9.9800f	11.2934f	11.2934f	12.6067f	12.6067f
cbtot	8.6553f	8.6553f	9.5262f	9.5262f	8.2778f	8.2778f
cgs	4.8800f	4.8800f	5.6934f	5.6934f	7.8467f	7.8467f
cgd	1.2106f	1.2106f	1.4120f	1.4120f	1.1187f	1.1187f

subckt

element	0:mbias2a	0:mbias2b	0:mbias3a	0:mbias3b	0:mu	0:ml
model	0:nmos114.	0:nmos114.	0:nmos114.	0:nmos114.	0:nmos114.	0:nmos114.
region	Saturati	Saturati	Saturati	Saturati	Saturati	Linear
id	31.8399u	31.8399u	81.6826u	81.6826u	24.8403u	24.8403u
ibs	0.	0.	0.	0.	-2.7295f	0.
ibd	-21.5484f	-21.5484f	-23.2857f	-23.2857f	-15.2235f	-2.7295f
vgs	1.5224	1.5224	1.5224	1.5224	1.2494	1.5224
vds	2.1548	2.1548	2.3286	2.3286	1.2494	272.9544m
vbs	0.	0.	0.	0.	-272.9544m	0.
vth	500.0000m	500.0000m	500.0000m	500.0000m	584.8448m	500.0000m
vdsat	1.0224	1.0224	1.0224	1.0224	664.5523m	272.9544m
vod	1.0224	1.0224	1.0224	1.0224	664.5523m	1.0224
beta	60.9258u	60.9258u	156.3000u	156.3000u	112.4940u	102.7295u
gam eff	600.0000m	600.0000m	600.0000m	600.0000m	600.0000m	600.0000m
gm	62.2876u	62.2876u	159.7935u	159.7935u	74.7581u	28.0405u
gds	1.4372u	1.4372u	3.6582u	3.6582u	2.2081u	79.4033u
gmb	20.8919u	20.8919u	53.5964u	53.5964u	21.6516u	9.4051u
cdtot	4.2679f	4.2679f	7.6382f	7.6382f	4.2969f	7.2545f

```
 cgtot      9.0245f    9.0245f   22.9775f   22.9775f    5.1045f    6.5858f
 cstot     12.6067f   12.6067f   27.4534f   27.4534f    8.2756f    8.1180f
 cbtot      7.9476f    7.9476f   12.3624f   12.3624f    7.5284f    8.8311f
 cgs        7.8467f    7.8467f   19.9734f   19.9734f    4.0667f    3.5180f
 cgd        1.1291f    1.1291f    2.8800f    2.8800f    1.0077f    3.0456f



******
* design problem, ee114/214a- 2012

 ******  ac analysis tnom=  25.000 temp=  25.000 *****
  gainmax=  8.0064E+01    at=  1.2882E+04
              from=  1.0000E+02    to=  1.0000E+10
  f3db=  9.0041E+07

         ***** job concluded
****** HSPICE -- B-2008.09-SP1 32-BIT (Nov 24 2008) linux ******
******
* design problem, ee114/214a- 2012

 ******  job statistics summary tnom=  25.000 temp=  25.000 *****

 ******  HSPICE Threads Information  ******
 Command Line Threads Count:                      0
 Available CPU Count:                             8
 Actual Model Evaluation(Load) Threads Count:     1
 Actual Solver Threads Count:                     1


 ******  Circuit Statistics  ******
 # nodes       =      14  # elements   =      27
 # resistors   =       2  # capacitors =       3  # inductors   =       0
 # mutual_inds =       0  # vccs       =       0  # vcvs        =       0
 # cccs        =       0  # ccvs       =       0  # volt_srcs   =       2
 # curr_srcs   =       2  # diodes     =       0  # bjts        =       0
 # jfets       =       0  # mosfets    =      18  # U elements  =       0
 # T elements  =       0  # W elements =       0  # B elements  =       0
 # S elements  =       0  # P elements =       0  # va device   =       0


 ******  Runtime Statistics (seconds)  ******

 analysis           time    # points   tot. iter  conv.iter
 op point           0.00           1           7
 ac analysis        0.02         801         801
 readin             0.00
 errchk             0.00
 setup              0.00
 output             0.00


          total memory used          184  kbytes
          total cpu time            0.02 seconds
          total elapsed time        0.09 seconds
          job started at     01:51:59 11/26/2012
          job ended   at     01:51:59 11/26/2012


 Init: hspice initialization file: /afs/ir.stanford.edu/class/archive/ee/ee/synopsys.2002/B-2008.09-
SP1/hspice/hspice.ini
 lic: Release hspice token(s)
```