APPENDIX I

Models

I1. NMOS Monte Carlo

```
* ------------------------------------------------------------------
************************ SIMULATION PARAMETERS ********************
* ------------------------------------------------------------------
* format    : SpectreS
* model     : MOS AMS_model
* process   : CU[BEQWAVP]
* revision  : B;
* extracted : CUE 41667.21; 1998-08; ese(487)
* doc#      : 9933011 REV_B
* ------------------------------------------------------------------
*  MONTE-CARLO SIMULATION
* ------------------------------------------------------------------
*NOTE: Do not use these parameters with standard SPICE MOS2 model!
*      These parameters are only valid for the improved AMS-model.
*
simulator lang=\spice
.model &1 mos15 type=\n capmod=\meyer xqc=0.0 noisemod=2 &
cgso=cgsdo         cgdo=cgsdo         cgbo=cgbo       &
cj=cj60       mj=4.400e-01     cjsw=cjsw60     mjsw=2.500e-01 &
js=2.000e-05 pb=8.400e-01  tlevc=0.000E+00 rsh=3.000e+01+drdiffn  &
tox=GAUSS(1.270e-08+deltgox,05.00e-12,1) xj=1.940e-08 &
trs=6.600e-03  trd=6.600e-03 &
vto=GAUSS(8.960e-01+delvton,0.300e-3,1)     nsub=nsub60  &
nfs=2.007e+12     neff=6.704e+01  &
uo=4.015e+02+deluon  ucrit=3.732e+06 uexp=7.696e-02 utra=2.331e-01
vmax=5.683e+04    delta=1.289e+00  &
kf=6.896e-27            af=1.343e+00  &
rs=rs60       rd=rd60     ldif=2.000e-07     hdif=8.000e-07  &
xl=0.000e+00+dell       xw=0.000e+00+delw  &
ld=GAUSS(1.754e-07,5.700e-09,1)    wd=GAUSS(-1.54e-09,4.500e-09,1) &
ute=-1.90e+00   tlev=1.000E+00    tcv=1.400e-03   minr=1e-3
* ------------------------------------------------------------------
```

I2. NMOS Typical Mean

```
* ------------------------------------------------------------------
************************ SIMULATION PARAMETERS ********************
* ------------------------------------------------------------------
* format    : SpectreS
* model     : MOS AMS_model
* process   : CU[BEQWAVP]
* revision  : B;
* extracted : CUE 41667.21; 1998-08; ese(487)
* doc#      : 9933011 REV_B
* ------------------------------------------------------------------
*    TYPICAL MEAN CONDITION
* ------------------------------------------------------------------
*NOTE: Do not use these parameters with standard SPICE MOS2 model!
```

```
*      These parameters are only valid for the improved AMS-model.
*
simulator lang=\spice
.model &1 mos15 type=\n capmod=\meyer xqc=0.0 noisemod=2 &
cgso=3.400e-10     cgdo=3.400e-10     cgbo=1.300e-10  &
cj=3.800e-04    mj=4.400e-01     cjsw=4.300e-10     mjsw=2.500e-01 &
js=2.000e-05     pb=8.400e-01  tlevc=0.000E+00      rsh=3.000e+01  &
tox=1.270e-08       xj=1.940e-08   trs=6.600e-03  trd=6.600e-03 &
vto=8.960e-01     nsub=9.536e+16  &
nfs=2.007e+12     neff=6.704e+01  &
uo=4.015e+02 ucrit=3.732e+06     uexp=7.696e-02    utra=2.331e-01  &
vmax=5.683e+04    delta=1.289e+00  &
kf=6.896e-27            af=1.343e+00  &
rs=3.312e+03    rd=3.312e+03     ldif=2.000e-07    hdif=8.000e-07  &
xl=0.000e+00       xw=0.000e+00  &
ld=1.754e-07       wd=-1.54e-09  &
ute=-1.90e+00   tlev=1.000E+00    tcv=1.400e-03   minr=1e-3
* ---------------------------------------------------------------------
```

I3.PMOS Monte Carlo

```
* ---------------------------------------------------------------------
************************ SIMULATION PARAMETERS ********************
* ---------------------------------------------------------------------
* format    : SpectreS
* model     : MOS AMS_model
* process   : CU[BEQWAVP]
* revision  : B;
* extracted : CUE 41667; 1998-08; ese(487)
* doc#      : 9933011 REV_B
* ---------------------------------------------------------------------
*  MONTE-CARLO SIMULATION
* ---------------------------------------------------------------------
*NOTE: Do not use these parameters with standard SPICE MOS2 model!
*      These parameters are only valid for the improved AMS-model.
*
simulator lang=\spice
.model &1 mos15 type=\p capmod=\meyer xqc=0.0 noisemod=2 &
cgso=cgsdo         cgdo=cgsdo         cgbo=cgbo       &
cj=cj62       mj=4.400e-01     cjsw=cjsw62     mjsw=2.400e-01 &
js=2.000e-05   pb=8.400e-01  tlevc=0.000E+00 rsh=6.000e+01+drdiffp
tox=GAUSS(1.270e-08+deltgox,05.00e-12,1)       xj=1.000e-09   &
vto=GAUSS(-8.43e-01+delvtop,0.300e-3,1)     nsub=nsub62  &
nfs=2.147e+12     neff=1.098e+01  &
uo=1.124e+02+deluop  ucrit=6.530e+06 uexp=1.786e-01 utra=2.741e-01 &
vmax=4.176e+04    delta=7.660e-01  &
kf=1.126e-26            af=1.772e+00  &
rs=rs62       rd=rd62     ldif=2.000e-07     hdif=8.000e-07  &
xl=0.000e+00+dell       xw=0.000e+00+delw  &
ld=GAUSS(1.401e-07,8.900e-09,1)    wd=GAUSS(5.658e-08,4.700e-09,1) &
ute=-1.40e+00   tlev=1.000E+00    tcv=1.900e-03   minr=1e-3
* ---------------------------------------------------------------------
```

I4. PMOS Typical Mean

```
* ---------------------------------------------------------------------
************************ SIMULATION PARAMETERS ********************
* ---------------------------------------------------------------------
```

```
* format    : SpectreS
* model     : MOS AMS_model
* process   : CU[BEQWAVP]
* revision  : B;
* extracted : CUE 41667; 1998-08; ese(487)
* doc#      : 9933011 REV_B
* ---------------------------------------------------------------------
*    TYPICAL MEAN CONDITION
* ---------------------------------------------------------------------
*NOTE: Do not use these parameters with standard SPICE MOS2 model!
*      These parameters are only valid for the improved AMS-model.
*
simulator lang=\spice
.model &1 mos15 type=\p capmod=\meyer xqc=0.0 noisemod=2 &
cgso=3.400e-10     cgdo=3.400e-10     cgbo=1.300e-10  &
cj=6.000e-04    mj=4.400e-01     cjsw=3.300e-10     mjsw=2.400e-01 &
js=2.000e-05    pb=8.400e-01  tlevc=0.000E+00      rsh=6.000e+01  &
tox=1.270e-08       xj=1.000e-09   &
vto=-8.43e-01     nsub=4.767e+16  &
nfs=2.147e+12     neff=1.098e+01  &
uo=1.124e+02    ucrit=6.530e+06 uexp=1.786e-01     utra=2.741e-01  &
vmax=4.176e+04    delta=7.660e-01  &
kf=1.126e-26            af=1.772e+00  &
rs=9.066e+03  rd=9.066e+03     ldif=2.000e-07     hdif=8.000e-07  &
xl=0.000e+00       xw=0.000e+00  &
ld=1.401e-07       wd=5.658e-08  &
ute=-1.40e+00   tlev=1.000E+00    tcv=1.900e-03   minr=1e-3
* ---------------------------------------------------------------------
```

I5. CPOLY Monte Carlo

```
* ---------------------------------------------------------------------
************************ SIMULATION PARAMETERS ********************
* ---------------------------------------------------------------------
* format    : SpectreS
* model     : CAPACITOR
* process   : CU[BEQWAVP]
* revision  : B;
* extracted : CUE Map; 1998-10; ese(487)
* doc#      : 9933011 REV_B
* ---------------------------------------------------------------------
*  MONTE-CARLO SIMULATION
* ---------------------------------------------------------------------
*
* Syntax: USEM cpoly instance multiplier area perimeter
*1        2          3    4
simulator lang=\spice
.model &1 capacitor c=(&2*(GAUSS(ca132,1.032e-06,1)*GAUSS(&3,2.100e-
12,1)+cp132*&4))
*---------------------------------------------------------------------
```

I6. CPOLY Typical Mean

```
* ---------------------------------------------------------------------
************************ SIMULATION PARAMETERS ********************
* ---------------------------------------------------------------------
```

```
* format    : SpectreS
* model     : CAPACITOR
* process   : CU[BEQWAVP]
* revision  : B;
* extracted : CUE Map; 1998-10; ese(487)
* doc#      : 9933011 REV_B
* ---------------------------------------------------------------------
*    TYPICAL MEAN CONDITION
* ---------------------------------------------------------------------
*
* Syntax: USEM cpoly instance multiplier area perimeter
*1        2          3    4
simulator lang=\spice
.model &1 capacitor c=(&2*(8.600e-04*&3+1.100e-10*&4))
*---------------------------------------------------------------------
```

I7. RPOLY1 Monte Carlo

```
* ---------------------------------------------------------------------
************************ SIMULATION PARAMETERS ********************
* ---------------------------------------------------------------------
* format    : SpectreS
* model     : RESISTOR
* process   : CU[BEQWAVP]
* revision  : B;
* extracted : CUE  1998-08; ese(487)
* doc#      : 9933011 REV_B
* ---------------------------------------------------------------------
*  MONTE-CARLO SIMULATION
* ---------------------------------------------------------------------
*
* Syntax: USEM rpoly1 instance w l
*1        2 3
.model &1 resistor r=((GAUSS(3.300e+01,0.033,1)+drpolyn)*((&3-
0))/(&2-GAUSS(0.000e+00,2e-9,1)-(-dell))) tc1=7.500e-04
* ---------------------------------------------------------------------
```

I8. RPOLY1 Typical Mean

```
* ---------------------------------------------------------------------
************************ SIMULATION PARAMETERS ********************
* ---------------------------------------------------------------------
* format    : SpectreS
* model     : RESISTOR
* process   : CU[BEQWAVP]
* revision  : B;
* extracted : CUE  1998-08; ese(487)
* doc#      : 9933011 REV_B
* ---------------------------------------------------------------------
*    TYPICAL MEAN CONDITION
* ---------------------------------------------------------------------
*
* Syntax: USEM rpoly1 instance w l
*1        2 3
simulator lang=\spice
.model &1 resistor r=(3.300e+01*((&3-(0.0)))/(&2-(0.000e+00)))
tc1=7.500e-04
* ---------------------------------------------------------------------
```