

**** mosfets

| | | | | | | |
|---------|------------|------------|------------|------------|------------|------------|
| subckt | x7 | x3 | x5 | x2 | x4 | x6 |
| element | 1:m0 | 2:m0 | 3:m0 | 4:m0 | 5:m0 | 6:m0 |
| model | 1:pmos_int | 2:pmos_int | 3:pmos_int | 4:nmos_int | 5:nmos_int | 6:nmos_int |
| region | Saturati | Saturati | Saturati | Saturati | Saturati | Saturati |
| id | -384.6046u | -192.3023u | -192.3023u | 192.3023u | 192.3023u | 408.5087u |
| ibs | 0. | 1.8741f | 1.8741f | 0. | 0. | 0. |
| ibd | 1.8741f | 10.9804f | 10.9804f | -4.0196f | -4.0196f | -9.3345f |
| vgs | -376.4098m | -362.5871m | -362.5871m | 401.9613m | 401.9613m | 401.9613m |
| vds | -187.4129m | -910.6258m | -910.6258m | 401.9613m | 401.9613m | 933.4493m |
| vbs | 0. | 187.4129m | 187.4129m | 0. | 0. | 0. |
| vth | -300.0000m | -322.5532m | -322.5532m | 300.0000m | 300.0000m | 300.0000m |
| vdsat | -67.8811m | -36.0201m | -36.0201m | 90.6678m | 90.6678m | 90.6678m |
| vod | -76.4098m | -40.0339m | -40.0339m | 101.9613m | 101.9613m | 101.9613m |
| beta | 148.4499m | 266.8115m | 266.8115m | 41.6572m | 41.6572m | 88.4927m |
| gam eff | 200.0000m | 200.0000m | 200.0000m | 200.0000m | 200.0000m | 200.0000m |
| gm | 10.0769m | 9.6106m | 9.6106m | 3.7770m | 3.7770m | 8.0234m |
| gds | 59.3594u | 32.7517u | 32.7517u | 41.8227u | 41.8227u | 87.7737u |
| gmb | 1.2661m | 1.0709m | 1.0709m | 470.4566u | 470.4566u | 999.3933u |
| cdtot | 52.2643f | 74.0037f | 74.0037f | 5.3447f | 5.3447f | 9.4365f |
| cgtot | 119.2690f | 190.4558f | 190.4558f | 12.6673f | 12.6673f | 23.9073f |
| cstot | 116.1417f | 181.7564f | 181.7564f | 12.3389f | 12.3389f | 23.2838f |
| cbtot | 49.1370f | 65.3043f | 65.3043f | 5.0163f | 5.0163f | 8.8129f |
| cgs | 90.4137f | 144.3779f | 144.3779f | 9.6027f | 9.6027f | 18.1233f |
| cgd | 28.8553f | 46.0779f | 46.0779f | 3.0647f | 3.0647f | 5.7840f |

| | | | |
|---------|------------|------------|------------|
| subckt | x9 | xr | x1 |
| element | 7:m0 | 8:m0 | 9:m0 |
| model | 7:pmos_int | 8:nmos_int | 9:pmos_int |
| region | Saturati | Linear | Saturati |
| id | -408.5087u | 0. | -187.2650u |
| ibs | 0. | 0. | 0. |
| ibd | 5.6655f | 3.609e-25 | 3.7641f |
| vgs | -376.4098m | 1.0980 | -376.4098m |
| vds | -566.5507m | -927.1472f | -376.4098m |
| vbs | 0. | 0. | 0. |
| vth | -300.0000m | 300.0000m | -300.0000m |
| vdsat | -67.8811m | 722.9214m | -67.8811m |
| vod | -76.4098m | 798.0387m | -76.4098m |
| beta | 157.6764m | 4.3164m | 72.2807m |
| gam eff | 200.0000m | 200.0000m | 200.0000m |
| gm | 10.7032m | 0. | 4.9065m |
| gds | 66.9674u | 3.4447m | 29.7707u |
| gmb | 1.3448m | 0. | 616.4566u |
| cdtot | 49.0984f | 1.2098f | 23.8729f |
| cgtot | 119.2690f | 1.7956f | 56.3785f |
| cstot | 116.1417f | 1.2098f | 54.9024f |
| cbtot | 45.9711f | 624.0000a | 22.3969f |
| cgs | 90.4137f | 897.8202a | 42.7386f |
| cgd | 28.8553f | 897.8202a | 13.6399f |

**** small-signal transfer characteristics

| | | |
|-------------------------------|---|-----------|
| v(out_2)/vid1 | = | 6.6453k |
| input resistance at vid1 | = | 1.000e+20 |
| output resistance at v(out_2) | = | 6.4624k |

***** job concluded
1***** HSPICE -- C-2009.09 32-BIT (Aug 24 2009) sunos *****

b1;2c** ee140 lab3 : cmos operational amplifier design **

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

***** HSPICE Threads Information *****

Command Line Threads Count : 1
Available CPU Count : 4