

NGSPICE

```
.control
option klu
option method=gear
option noacct
option noinit
save v(vref)
save all

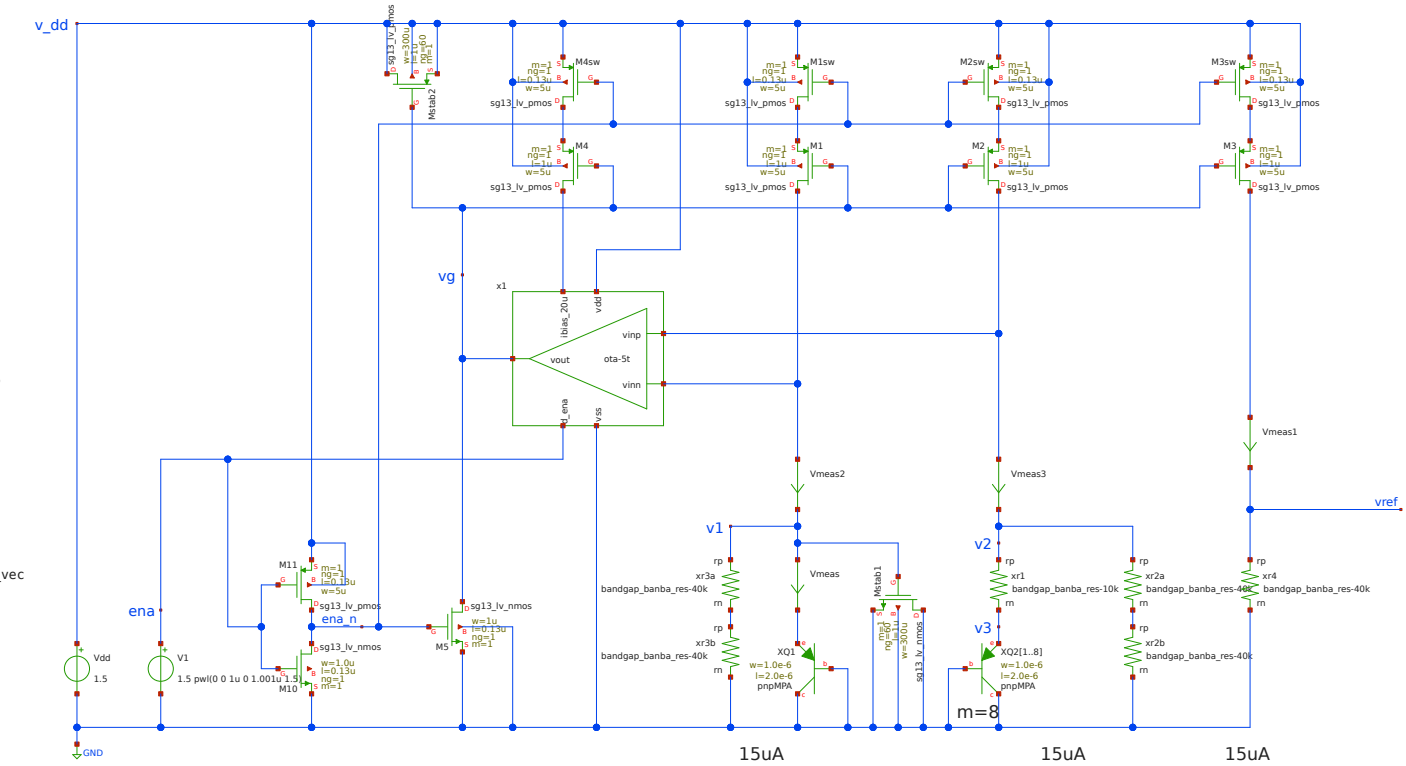
compose temp_vec start=-30 stop=125 step=5
let vref_vec=vector(length(temp_vec))
let idx=0

foreach tmp $temp_vec
option temp=$tmp
tran 0.01u 50u
meas tran vr FIND v(vref) AT=50u
let vref_vec[idx]=vr
let idx=idx+1
end

plot vref_vec vs temp_vec
wdata bandgap_banba.txt vref_vec vs temp_vec
.endc
```

MODEL

```
.lib cornerMOSlv.lib mos_tt
.lib cornerHBT.lib hbt_typ
.lib cornerRES.lib res_typ
```



→ simulate

→ annotate OP