

## NGSPICE

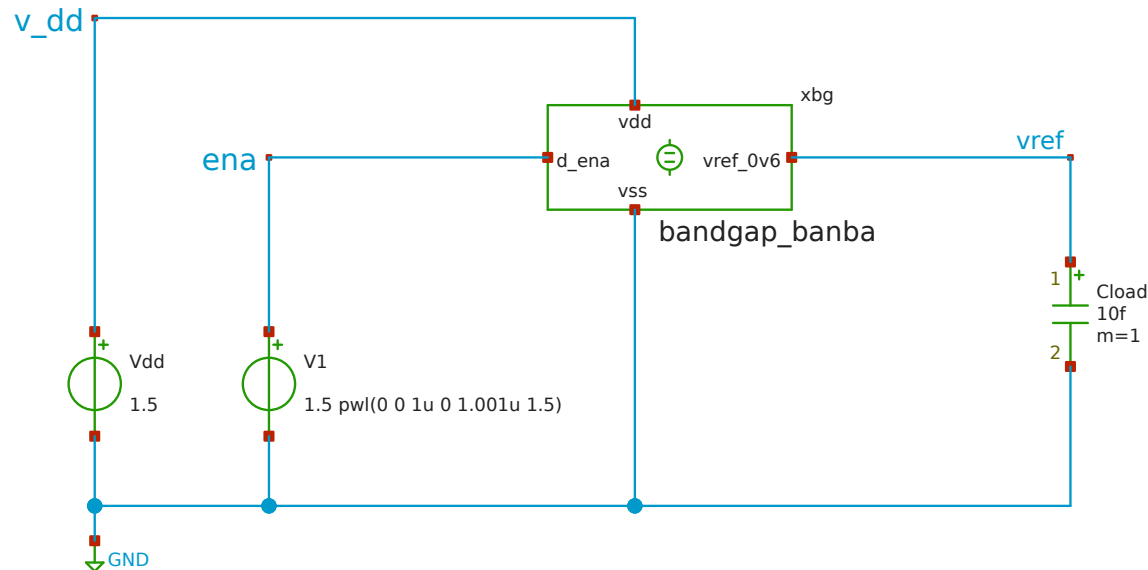
```
.include bandgap_banba_tb.save
.control
option klu
option method=gear
option noacct
option noinit
save v(vref)
save all

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
wrrdata bandgap_banba.txt vref_vec vs temp_vec

.endc
```



## MODEL

```
.lib cornerMOSlv.lib mos_tt
.lib cornerHBT.lib hbt_tyt
.lib cornerRES.lib res_tyt
```

 simulate

→ annotate OP