

ENV setup:

For mixed signal designs - use this env setup:

<https://github.com/propy/conda-eda/releases/tag/v0.0-1406-ga734ede>

Original release: <https://github.com/propy/conda-eda/releases/tag/v0.0-1399-g9288596>

```
curl -L -O
https://github.com/propy/conda-eda/releases/download/v0.0-1399-g9288596/mi
xed-signal.gf180mcuc-0-Linux-x86_64.sh
bash mixed-signal.gf180mcuc-0-Linux-x86_64.sh -p silicon-env -b
source silicon-env/bin/activate
```

Latest:

<https://github.com/propy/conda-eda/releases/tag/v0.0-1435-g5285797>

curl -L -o /tmp/silicon-installer.sh

https://github.com/propy/conda-eda/releases/tag/v0.0-1435-g5285797/mixed-signal.gf180mcuc-0-Linux-x86_64.sh

curl -L -o /tmp/silicon-installer.sh

https://github.com/propy/conda-eda/releases/download/v0.0-1424-g1e0ce17/mixed-signal.gf180mcuc-0-Linux-x86_64.sh

bash /tmp/silicon-installer.sh -p silicon-env -b

curl -L -O

https://github.com/propy/conda-eda/releases/download/v0.0-1406-ga734ede/mixed-signal.gf180mcuc-0-Linux-x86_64.sh

bash mixed-signal.gf180mcuc-0-Linux-x86_64.sh -p silicon-env -b
source silicon-env/bin/activate

Fix to xschemrc:

```
sed -i -e 's/ngspice\models/gf180mcuC\libs.tech\ngspice/'
~/silicon-env/share/pdk/gf180mcuC/libs.tech/xschem/xschemrc
```

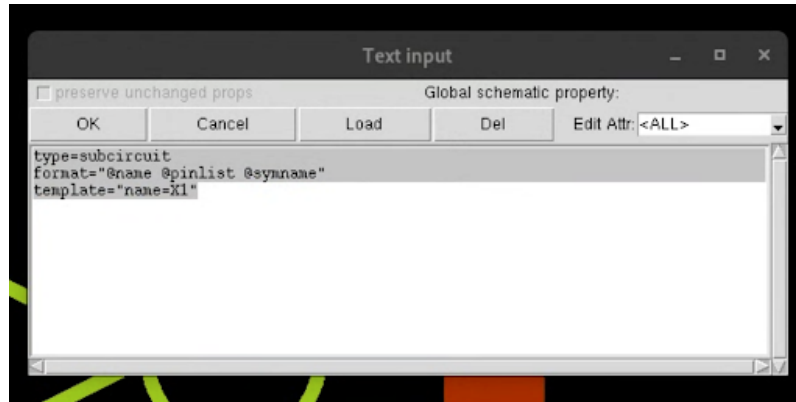
Open mixed signal env: `source silicon-env/bin/activate`

Xschem hierarchy designs

While making symbol to set all the pin attributes -

Ref: [Creating a Hierarchical Schematic in Xschem](#)

1. Save the schematic in the same folder as the symbol. With **Same name**
2. Click outside design in empty space press q and write:



To traverse thru hierarchy - enter - E, exit out is ctrl E

components-> devices/ **Labpin** - is used to connects nets with same name at top level

Post layout extraction

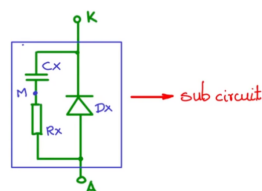
[Ngspice Tutorial: Extracting spice from Magic VLSI and running analog simulation](#)

extract all

Exttospice - creates spice netlist from layout

Subcircuit is created with extraction netlist

Example:

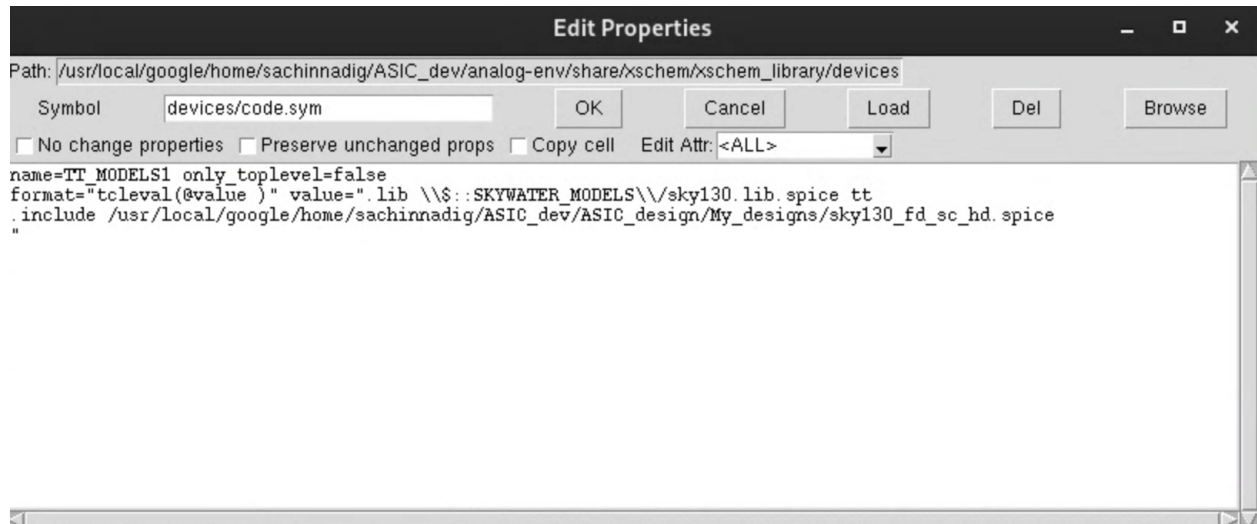


```
.SUBCKT pwrdiode A K
DX A K dmod
RX A M 10K
CX M K 0.01uF
.model dmod D(Rs=0.01,CJO=100pF)
.ENDS
```

Calling a subckt: xInstance net1 net2 subckt name

Example: xD1 in out pwrdiode

Ngspice simulation env setup: tt model



Later, this is fixed in .sch to reflect directly in netlist file from proppey's commit:
https://github.com/spnadig/GF180_GAFE_1/pull/1

Git notes

Git diff -> to check changes

Git checkout -b <branch name>

 If pulling from main -> git checkout

Git branch -a -> shows all branch

Git status -> shows all the modified files

Git add <> -> files to commit

Git commit -m 'xxx'

git push origin <branch name> -> now I have main and a new branch on remote called origin

Note: git does not allow for push on remote if its http

Fix: git remote set-url origin [git@github.com:spnadig/GF180_GAFE_1.git](https://github.com/spnadig/GF180_GAFE_1.git)

Now gnubby to push and pull

Git fetch -> grabs reference locally but wont update

Git log origin/main -> shows all commits and changes

Git pull origin main -> to get changes into local

To undo local changes -> git stash -> git pull

Incase of detached head:


git checkout -b temp

Switched to a new branch 'temp'

```
git checkout -B main temp
Switched to and reset branch 'main'
Your branch is up to date with 'origin/main'.
git branch -d temp
Deleted branch temp (was 90db6be).
git push origin main
Everything up-to-date
git status
```

Klayout updates in env

Klayout -e to run in layout editor mode

 [gf180mcu tutorial part8 klayout layout](#)

```
conda install -c litex-hub klayout
```

Fix path issue:

```
cd silicon-env/share/pdk/gf180mcuC/libs.tech/klayout/
cp -r pymacros/ drc/ lvs/ tech/
mv tech/pymacros tech/cells
klayout -d 31 -e -rm
silicon-env/share/pdk/gf180mcuC/libs.tech/klayout/tech/gf180mcu.lym
```

To run DRC

```
echo ~/silicon-env/share/pdk/gf180mcuC/libs.tech/klayout/tech/drc/*.drc >
/tmp/merged.drc && mv /tmp/merged.drc
~/silicon-env/share/pdk/gf180mcuC/libs.tech/klayout/tech/drc/
```

Alternative LVS DRC fix:

Cd into share/pdk/gf/libs.tech/klayout

```
rm -fR drc lvs cells
ln -s ../drc drc
ln -s ../lvs lvs
mkdir pymacros
ln -s ../../pymacros pymacros/cells
ln -s ../gf180mcu.lym pymacros/gf180mcu.lym
cat ../drc/*.drc > /tmp/gf180mcu.drc && mv /tmp/gf180mcu.drc ../drc
cat rules_decks/*.drc > gf180mcu.drc
cat rule_decks/*.drc > gf180mcu.drc
```

Ngspice cheat sheet

<https://ngspice.sourceforge.io/ngspice-control-language-tutorial.html>

GF180 Caravel User Project:

for final integration of all IPs in openLane

https://github.com/propy/caravel_user_project

Guideline for caravel and openlane - <https://developers.google.com/silicon/notebooks>

LEF file from MAGIC

the abstract view for an analog block (LEF) can be extracted using magic's `lef` TCL command

https://open-source-silicon.slack.com/archives/C016HUV935L/p1675916162398259?thread_ts=1675916162.398259&cid=C016HUV935L

Running tcl script in MAGIC ex: `magic -dnull -noconsole < TOP_ext2spice.tcl`

Ongoing designs:

https://github.com/spnadig/GF180_GAFE_1