Voltus-FI support
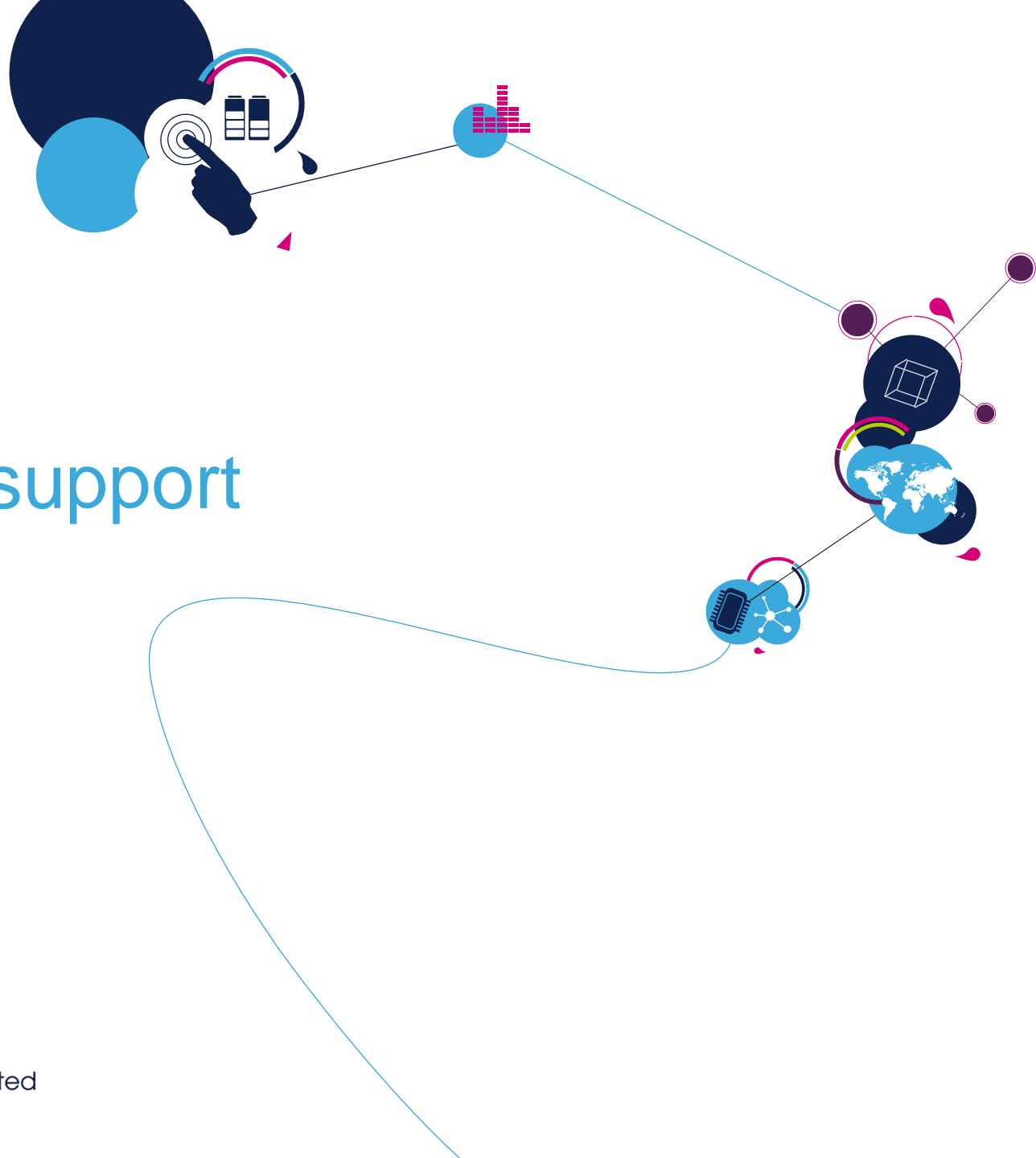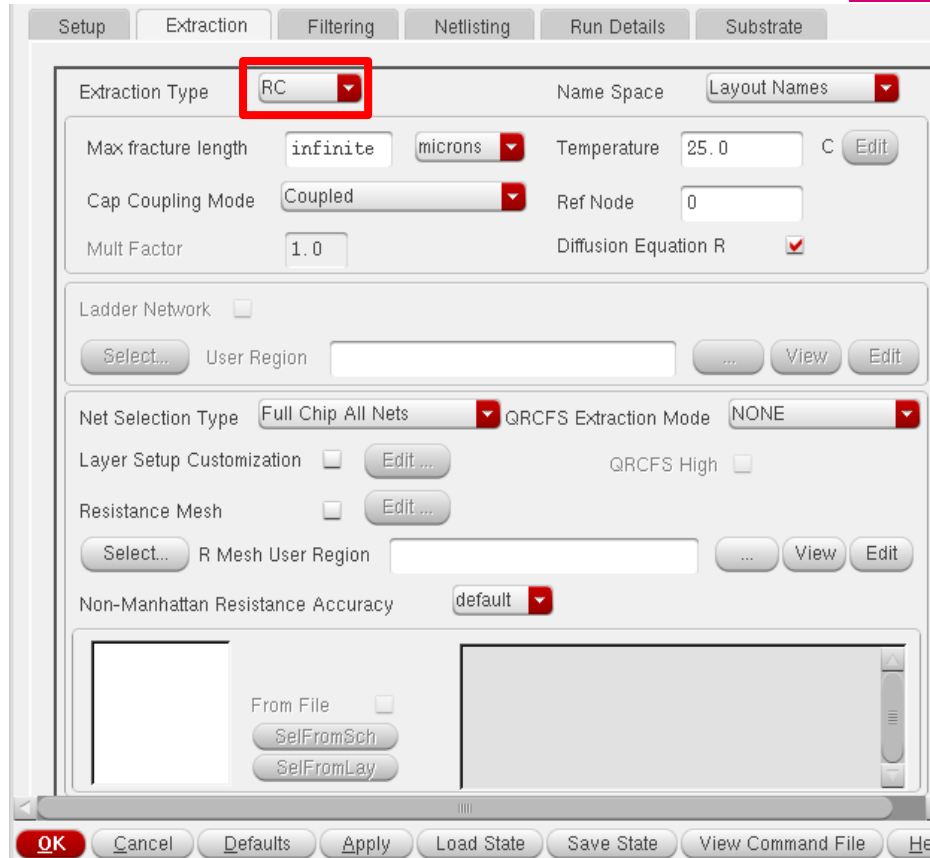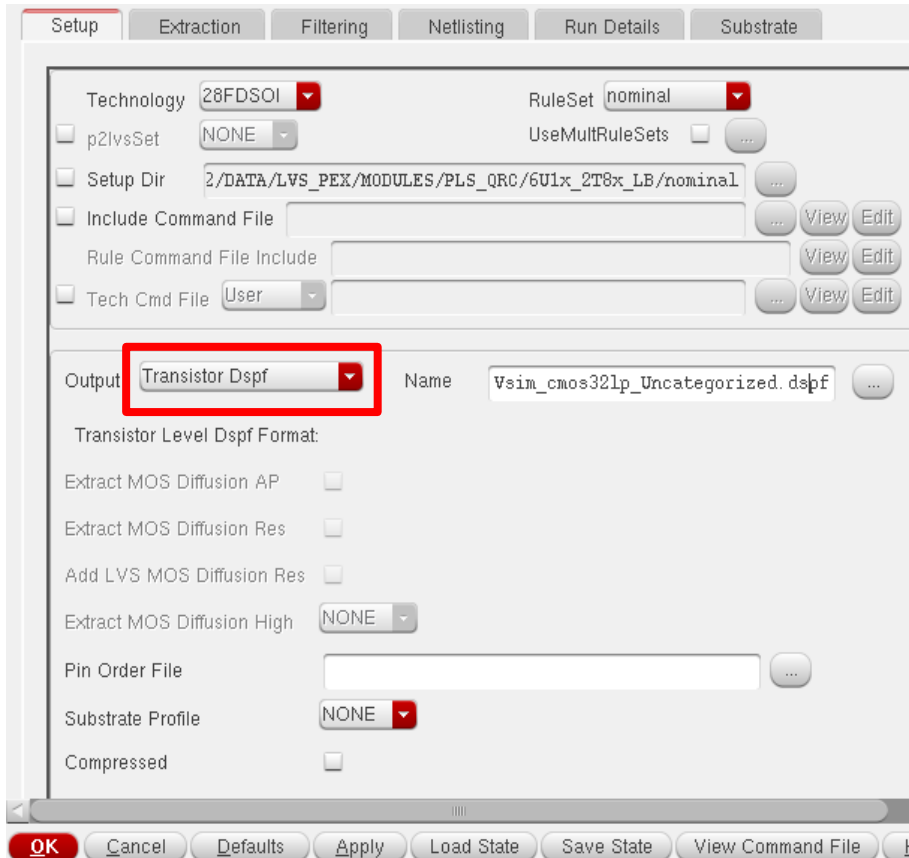
- **QRC configuration**

- Format needed for the DSPF

- Step by step quick kick off using Voltus-Fi
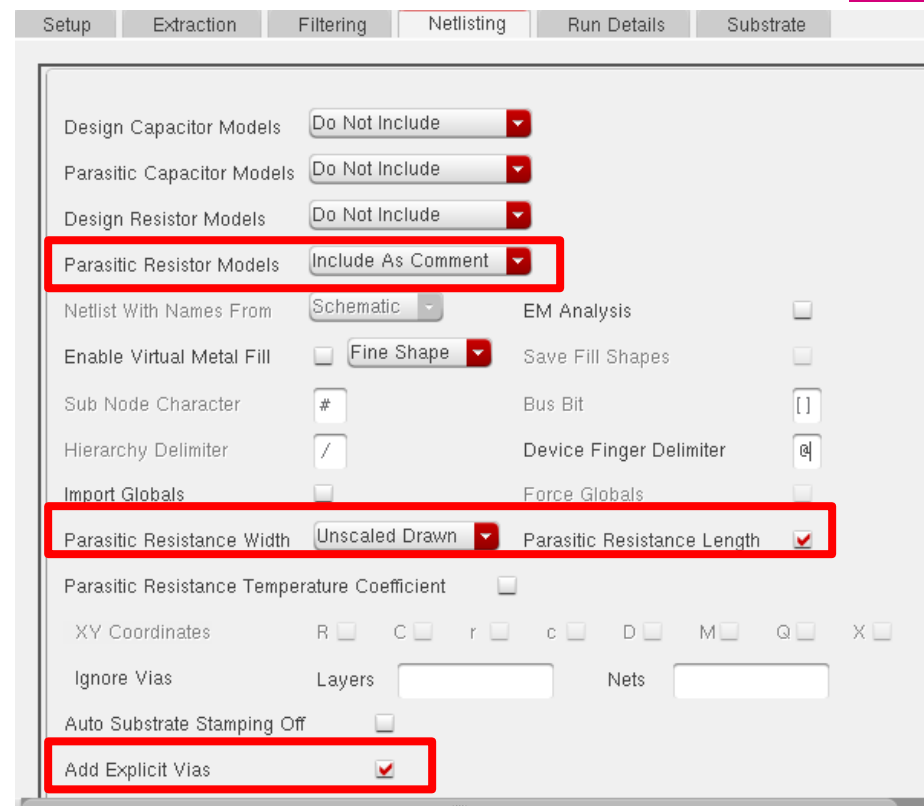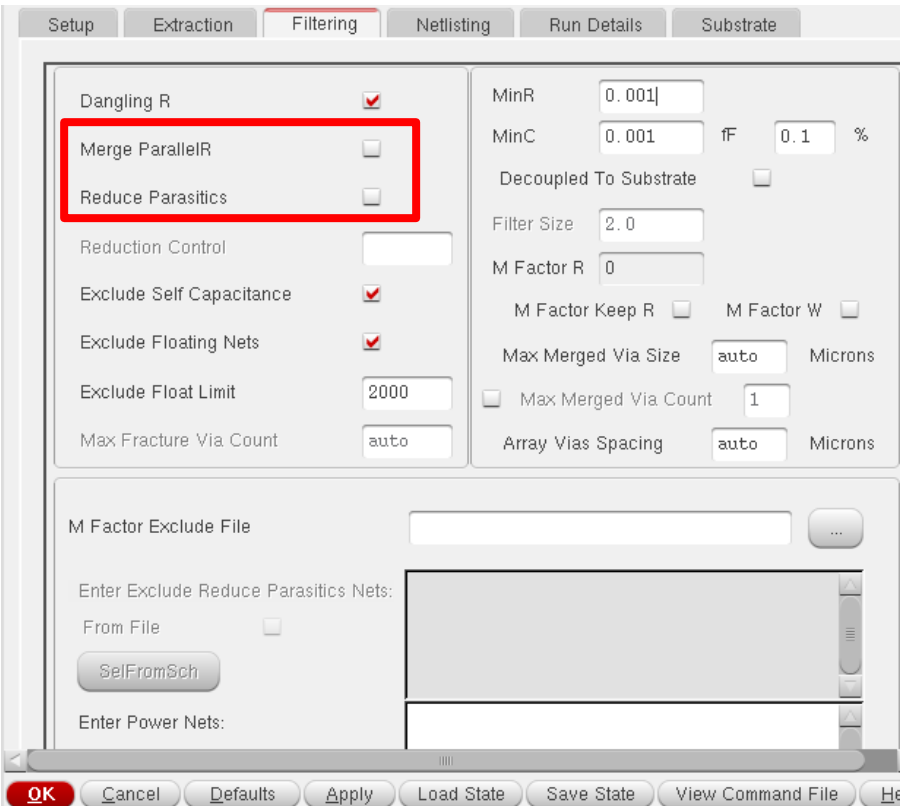
QRC setup for voltus

- Setup tab: Select 'transistor DSPF' output

- Extraction tab: Extraction must be performed at least on 'R' network.

QRC setup for voltus

- Filtering tab: Remove 'Merge parallel R' and 'Reduce parasitics' options

- Netlisting tab:
  - 'Parasitic resistor model' must be included as comment.
  - Parasitic resistance length must be extracted
  - parasitic resistance width must be extracted as 'unscaled drawn'
  - Add explicit vias.

Company Confidential

- QRC configuration

- **Format needed for the DSPF**

- Step by step quick kick off using Voltus-Fi

DSPF format

- Previous QRC options will extract a correct DSPF file for voltus

- You can check that the DSPF includes for each parasitic elements:
    - Layer names (as comment)
    - Width (or Area for vias)
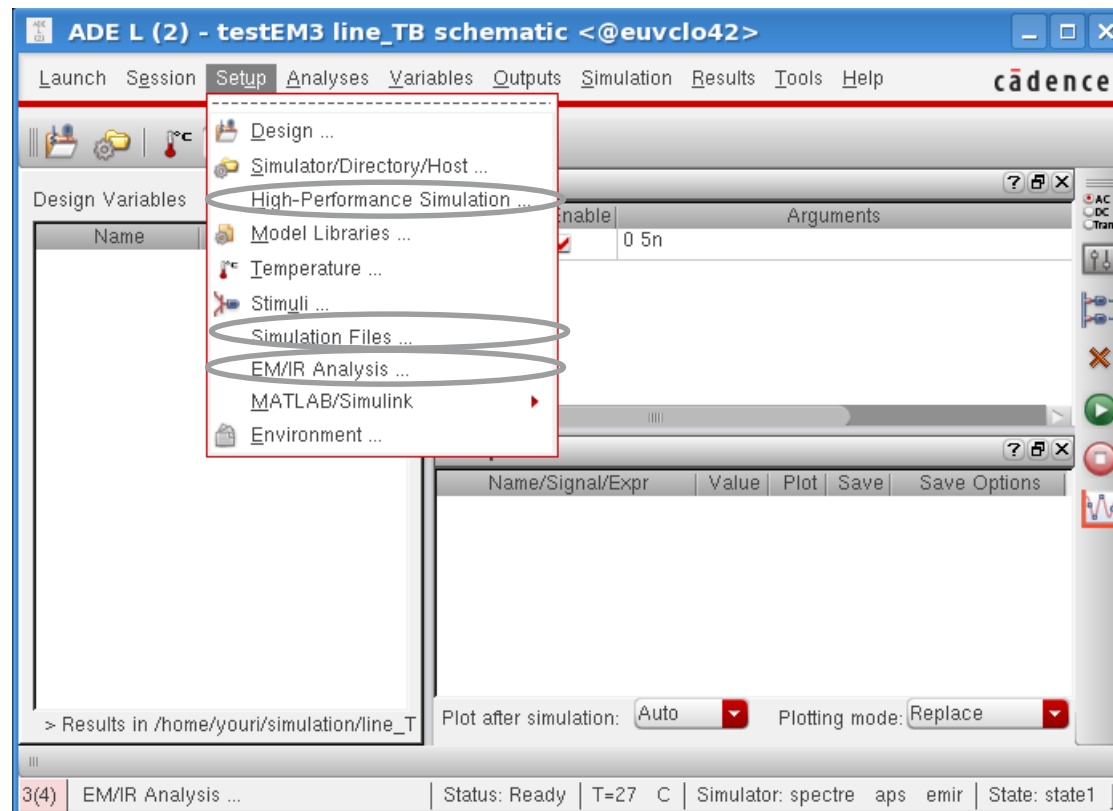   - Length
    - Add explicit via

- QRC configuration

- Format needed for the DSPF
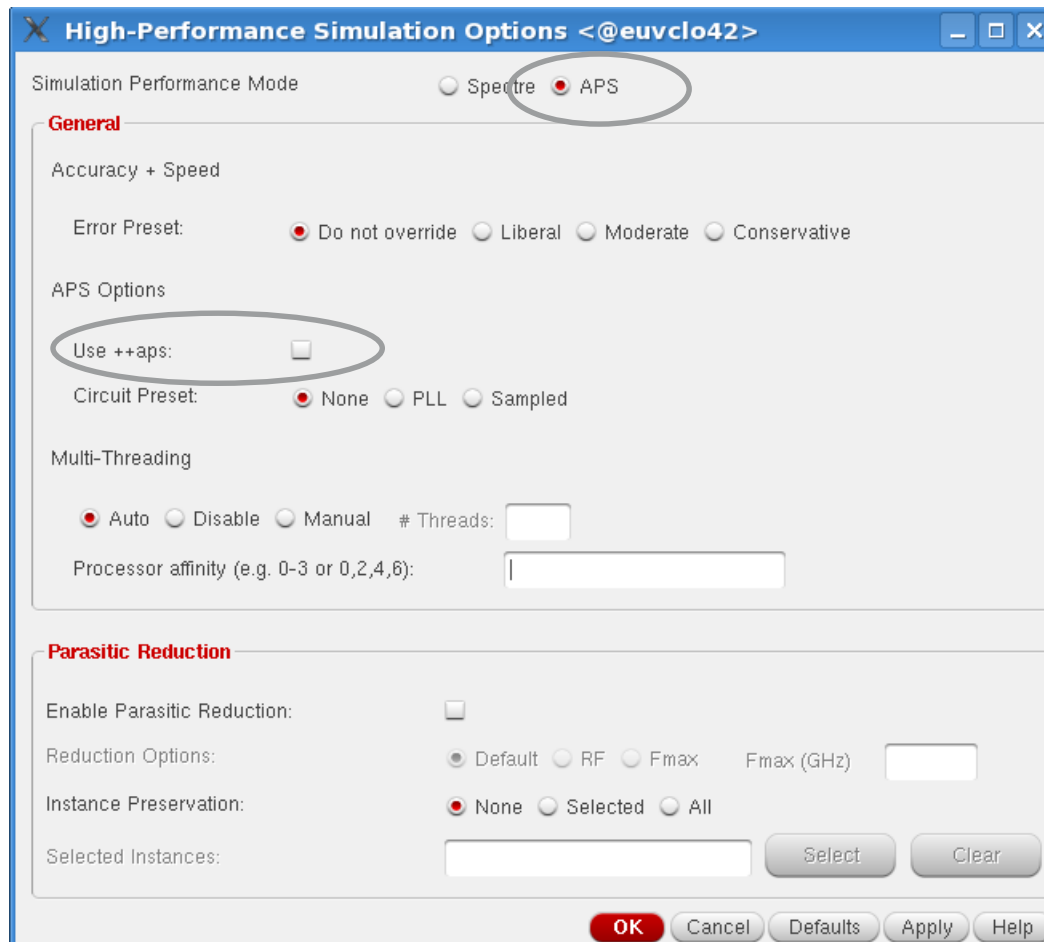
- **Step by step quick kick off using Voltus-Fi**

Simulation Settings

- Set APS to have Spectre faster
- Add DSPF file
- Set EMIR configuration

High Perfomance simulation

- Set APS

Simulation Files setup

- Add DSPF parasitic file
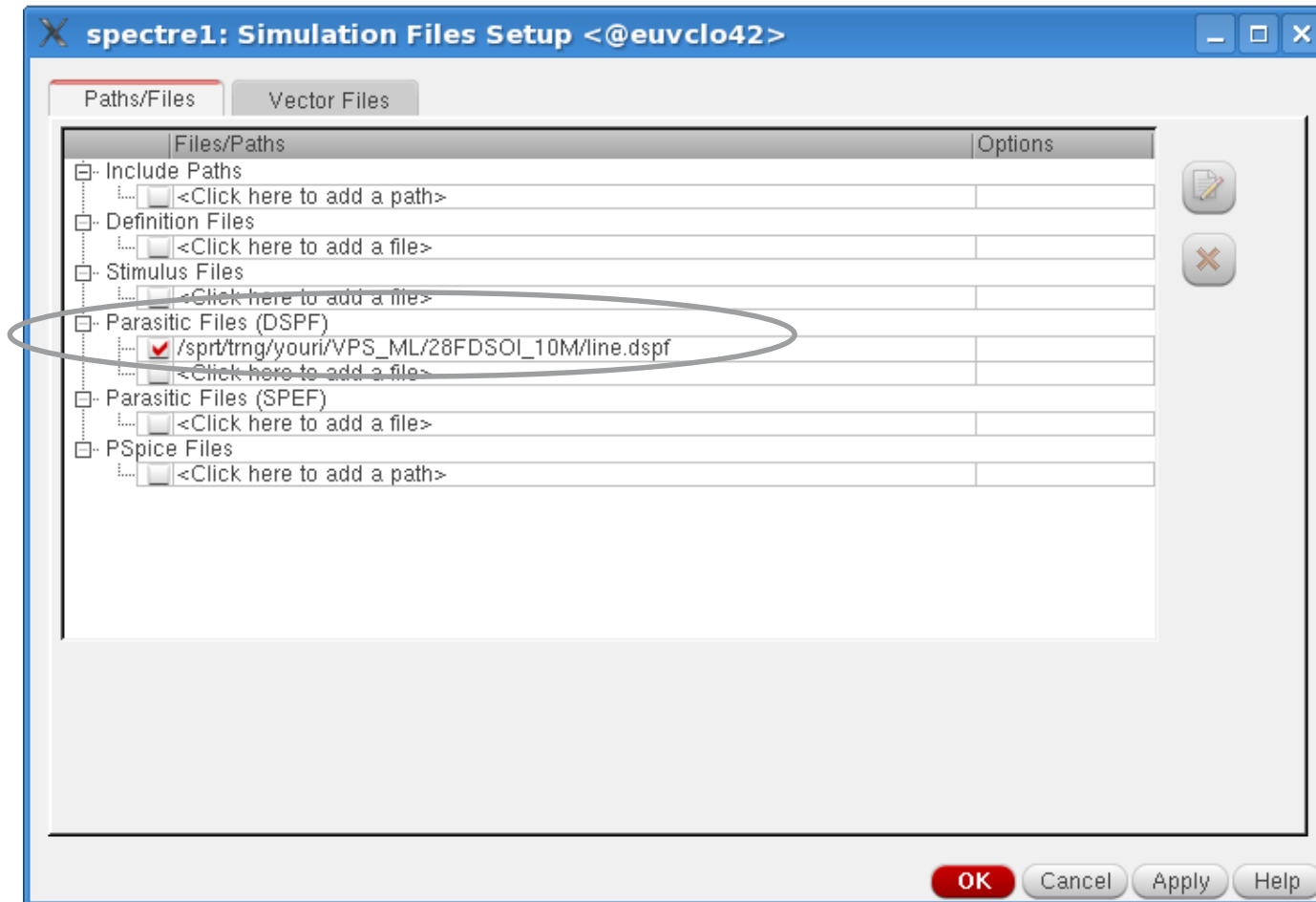
EMIR Analysis setup

- Settings to have the EMIR computation

EMIR setup Analysis tab (1)

- Select the nets on which you want computation of EMIR

- Type or "Select" on the schematic (Select the node of the symbol)

- Select the type analysis (Ixxx for EM analysis; Vxxx for Irdrop analysis)

- Add the selection, it appears in the Summary information section
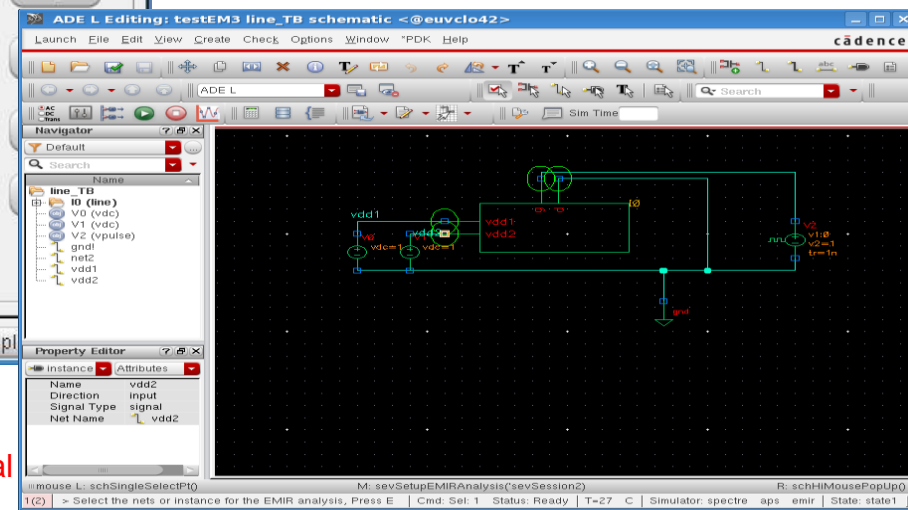
EMIR setup Analysis tab (2)

- Select the EM rules file, either from EMdataFile, either qrcTechfile with EM rules)

- Select the Layer Map File (mapping between layer name in DSPF and layer name in ICT)

- Add to the setup by Apply

EMIR setup Solver tab

- Select the Method of Solving, Direct or Iterated (all in one resolution or resolution in 2 steps)

- Select the time window of analysis calculation (default is the Full transient window)

- Add to the setup

EMIR setup Options tab

- Several options are available here such as the type of report created

- The DSPF checker, checks the validity of the DSPF syntax respect to EMIR analysis. Indeed for EMIR computation, parasitics must contains layer, length and width defnition.

- This checks also the pin order of devices in the dspf

EMIR setup Options tab (2)

- DSPF checker output log

Simulation

- Netlist and Run
- Check logs
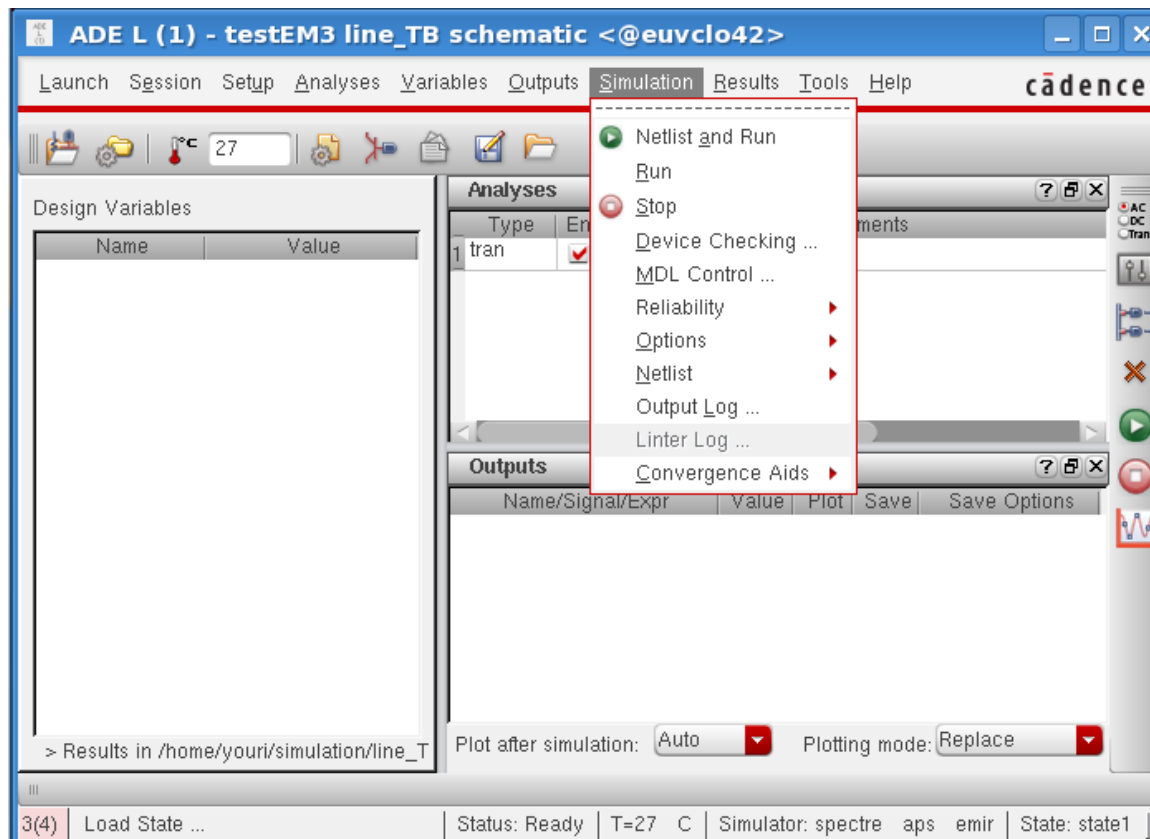
EMIR results

- In Results menu, EMIR Data shows several sub-menu

EMIR results (1)

- EMIR run log
- This log report the EMIR computation and gives information about what wrong or not during computation

- EMIR reports IRdrop

EMIR results (3)

- EMIR reports ElectroMigration


```
/home/youri/simulation/line_TB/spectre/schematic/psf/input.rpt_em <@euvclo42>     cādence

File  Edit  View  Help

ELECTROMIGRATION ANALYSIS RESULTS

VERSION = 1
BINARY FILE          = /home/youri/simulation/line_TB/spectre/schematic/netlist/../psf/input.emir0_bin
RESULTS FILE CREATED = Fri Mar 21 10:54:29 2014
USER SUPPLIED VALUES:
    RESULTS TYPE     = TRANSIENT
    TRANSIENT START  = 0
    TRANSIENT STOP   = 5e-09
    SIM TEMPERATURE  = 27 C
    AVERAGE          = t
    AVERAGE ABS      = t
    AVERAGE POS      = nil
    ACPEAK           = nil
    CUSTOM           = nil
    RMS              = t
    PEAK             = t


---------------------- NET "vdd2" ------------------------------
max

There is no resistor whose current density exceeds the limit.

%failed      resistor layer   current  width  pathLength density       limit          needed width/#vias  X1       Y1       X2       Y2       resistance
                               (A)      (um)   (um)       (A/um,A/via)  (A/um,A/via)   (um/#)              (um)     (um)     (um)     (um)     (ohm)
pass-97.96%  rm93     m1       30.004u  0.067  3.533      447.819u      22.000m        0.001               331.560  -16.000  331.535  -16.000  0.103
pass-97.96%  rm85     m1       30.004u  0.067  18.045     447.819u      22.000m        0.001               12.100   -16.000  12.075   -16.000  0.103
pass-97.96%  rm83     m1       30.004u  0.067  18.045     447.819u      22.000m        0.001               32.125   -16.000  32.100   -16.000  0.103
pass-97.96%  rm81     m1       30.004u  0.067  5.422      447.819u      22.000m        0.001               6.025    -16.000  6.000    -16.000  0.103
pass-98.25%  rm92     m1       30.004u  0.078  3.533      384.665u      22.000m        0.001               334.561  -15.993  331.560  -16.000  10.171
pass-98.25%  rm84     m1       30.004u  0.078  18.045     384.665u      22.000m        0.001               32.100   -16.000  12.100   -16.000  67.779
pass-98.25%  rm82     m1       30.004u  0.078  5.422      384.665u      22.000m        0.001               6.000    -16.000  0        -16.000  20.359
pass-98.26%  rh138    m6       30.004u  0.069  2.767      434.839u      25.000m        0.001               319.335  -16.000  319.310  -16.000  0.107
pass-98.26%  rh137    m6       30.004u  0.069  18.067     434.839u      25.000m        0.001               136.550  -16.000  136.525  -16.000  0.107
pass-98.26%  rh135    m6       30.004u  0.069  5.445      434.839u      25.000m        0.001               110.450  -16.000  110.425  -16.000  0.107
pass-98.26%  rh133    m6       30.004u  0.069  5.445      434.839u      25.000m        0.001               116.475  -16.000  116.450  -16.000  0.107
pass-98.26%  ri132    m5       30.004u  0.069  2.745      434.839u      25.000m        0.001               319.360  -16.000  319.335  -16.000  0.107
pass-98.26%  ri130    m5       30.004u  0.069  2.745      434.839u      25.000m        0.001               322.385  -16.000  322.360  -16.000  0.107
pass-98.26%  ri129    m5       30.004u  0.069  18.045     434.839u      25.000m        0.001               116.500  -16.000  116.475  -16.000  0.107
pass-98.26%  ri127    m5       30.004u  0.069  18.045     434.839u      25.000m        0.001               136.525  -16.000  136.500  -16.000  0.107
pass-98.26%  ri126    m5       30.004u  0.069  5.445      434.839u      25.000m        0.001               104.400  -16.000  104.375  -16.000  0.107
pass-98.26%  ri124    m5       30.004u  0.069  5.445      434.839u      25.000m        0.001               110.425  -16.000  110.400  -16.000  0.107
pass-98.26%  rj123    m4       30.004u  0.069  2.745      434.839u      25.000m        0.001               322.410  -16.000  322.385  -16.000  0.107
pass-98.26%  rj121    m4       30.004u  0.069  2.745      434.839u      25.000m        0.001               325.435  -16.000  325.410  -16.000  0.107
pass-98.26%  rj120    m4       30.004u  0.069  18.045     434.839u      25.000m        0.001               84.350   -16.000  84.325   -16.000  0.107
```
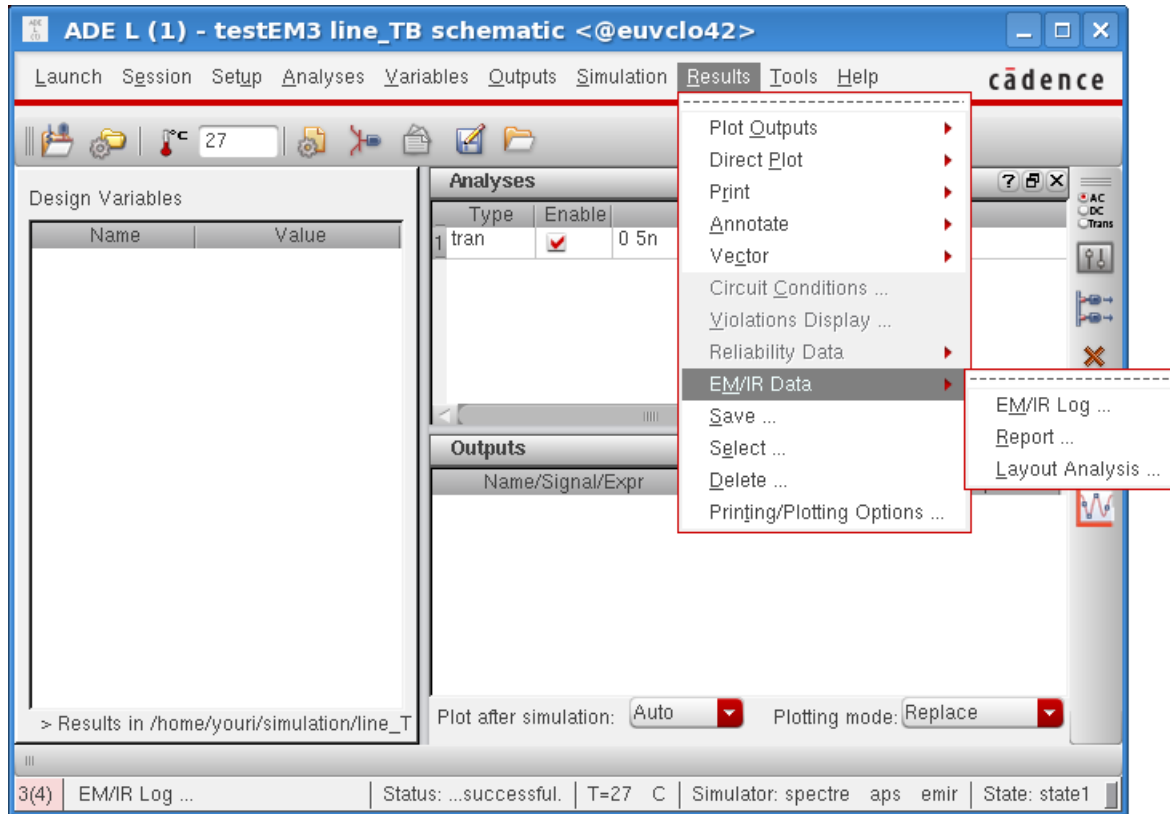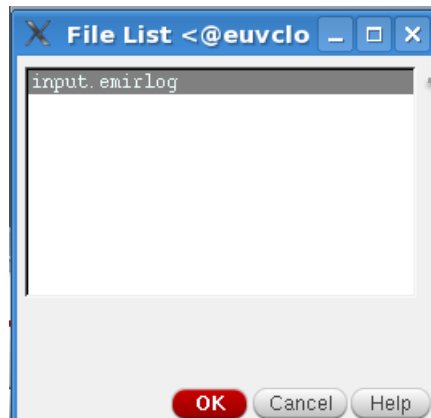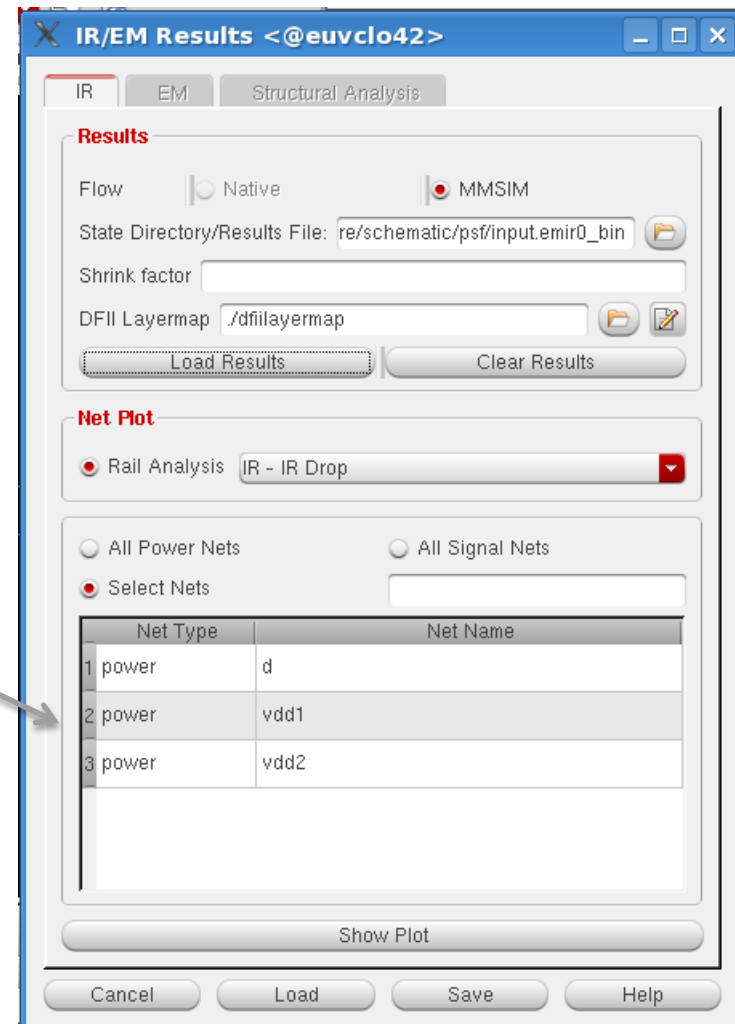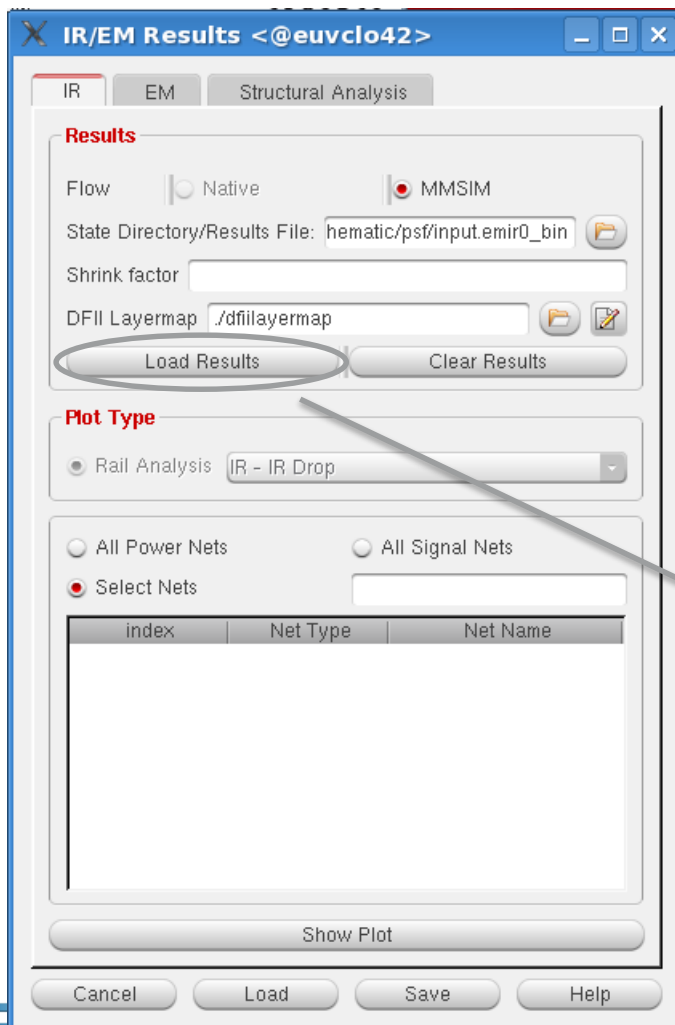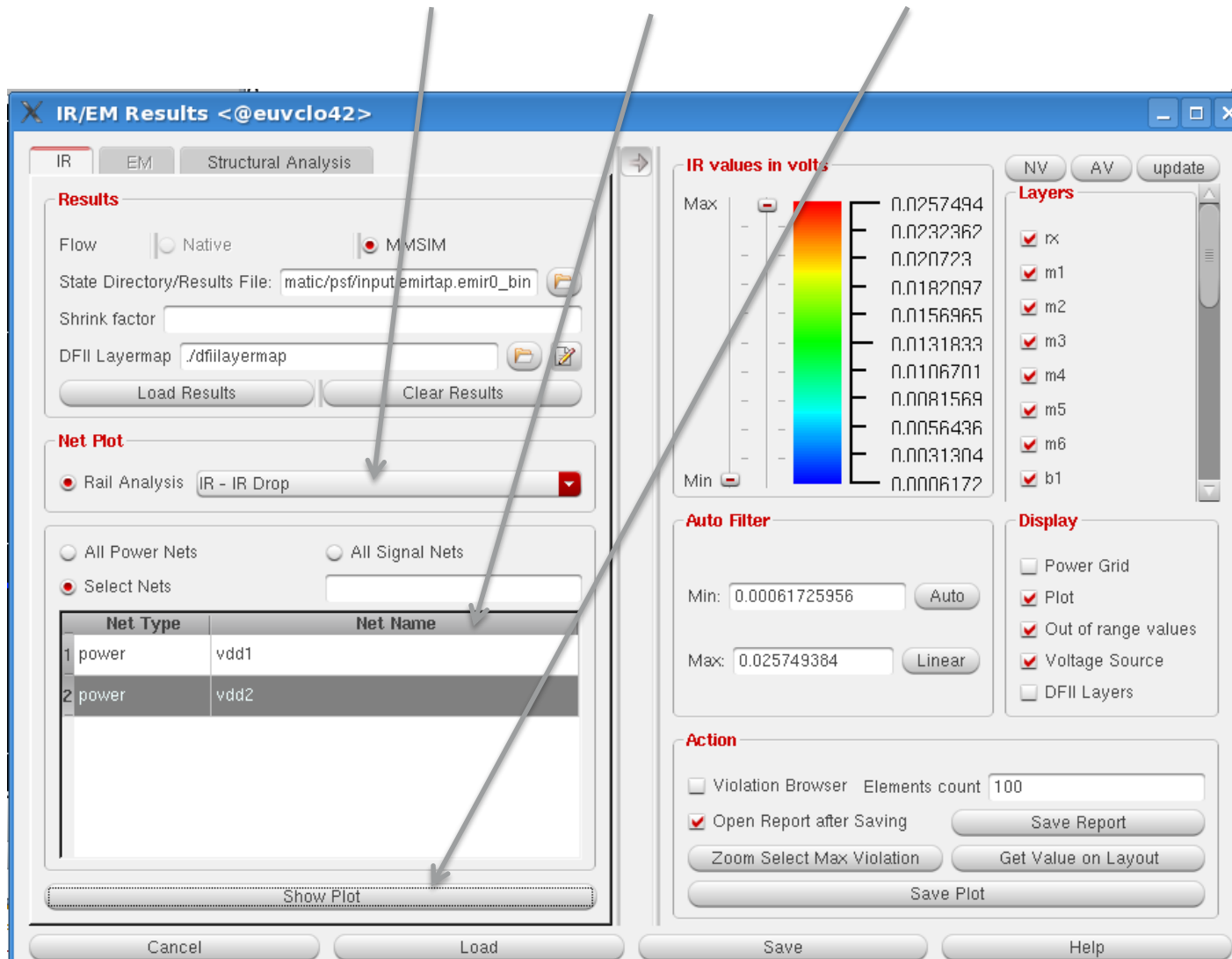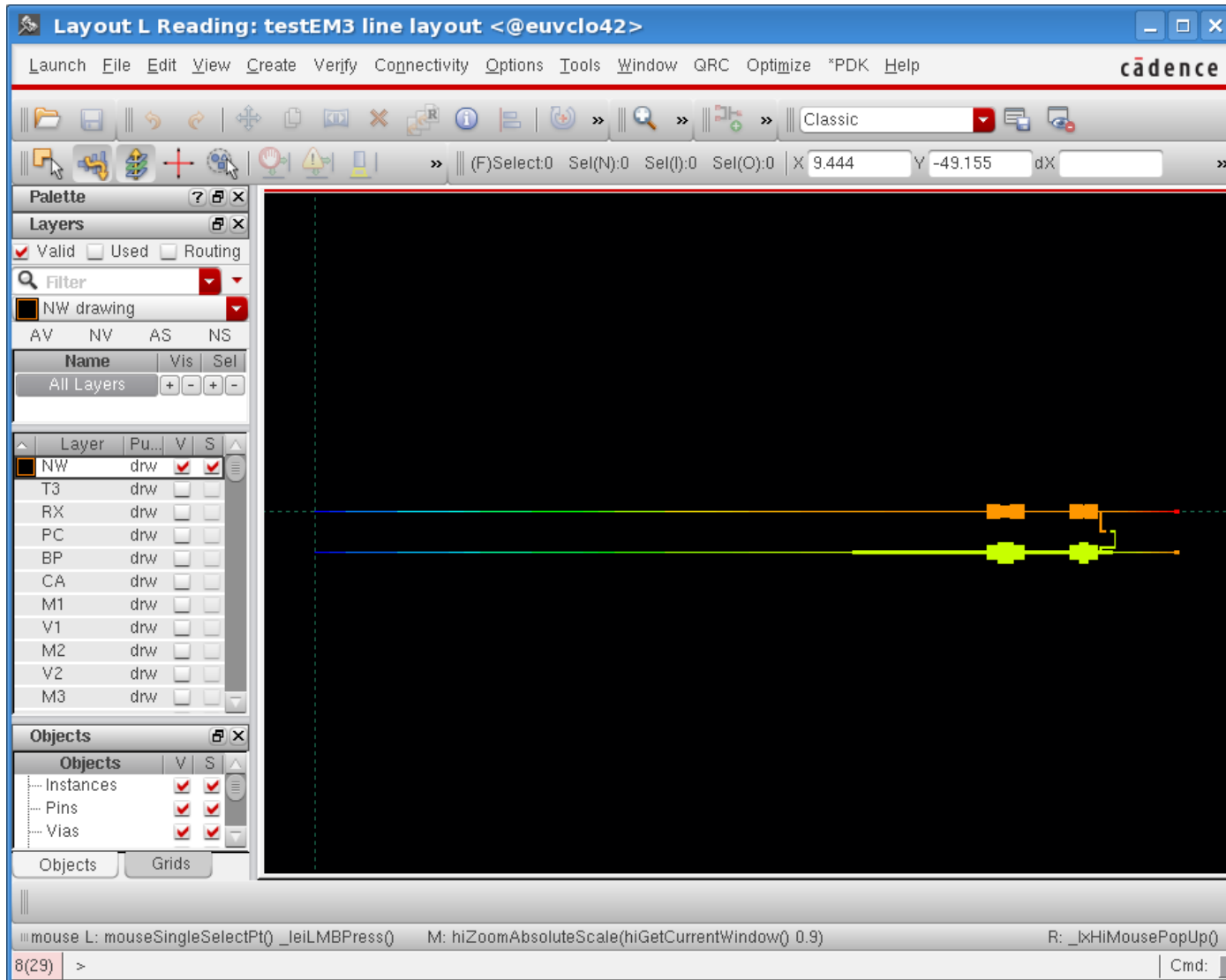
IR results (4)

- Irdrop analysis form empty and loaded

IR results (5)

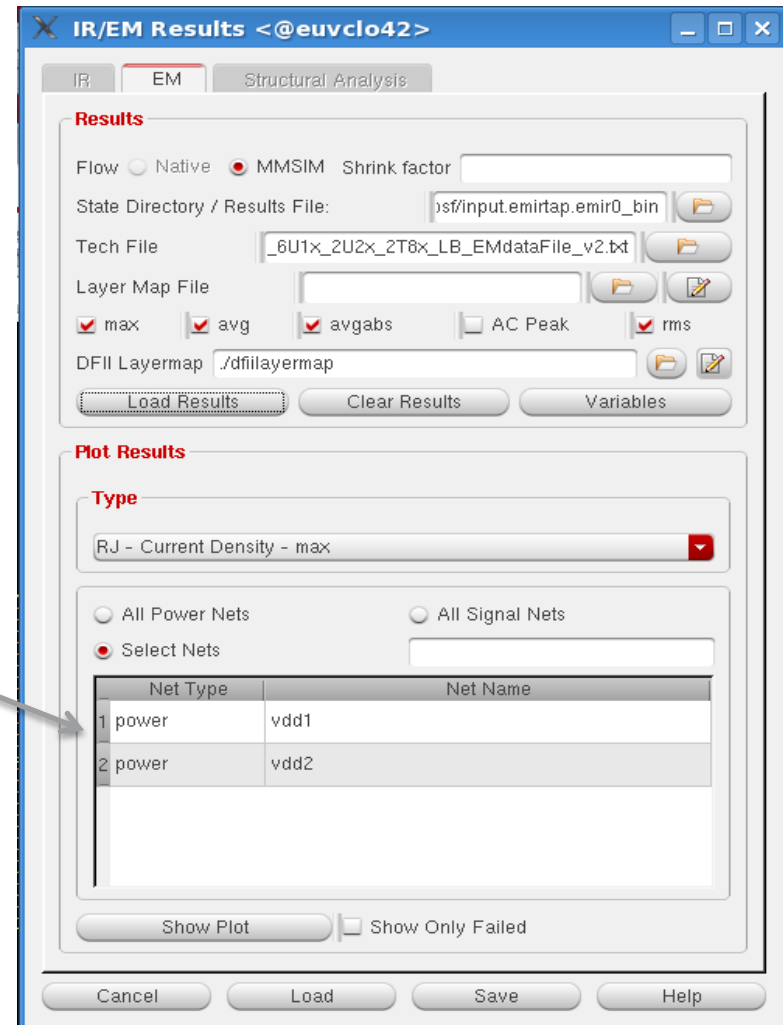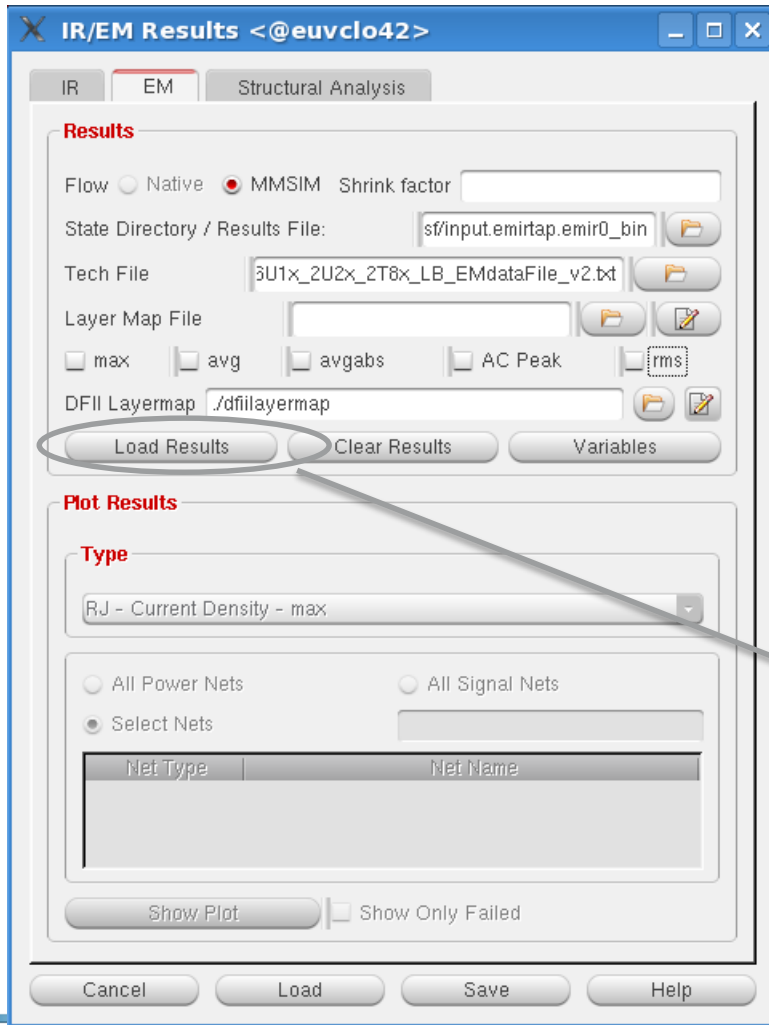- Select analysis type, net(s) and Show plot =>extended form appears

- IRdrop on 2 Power nets
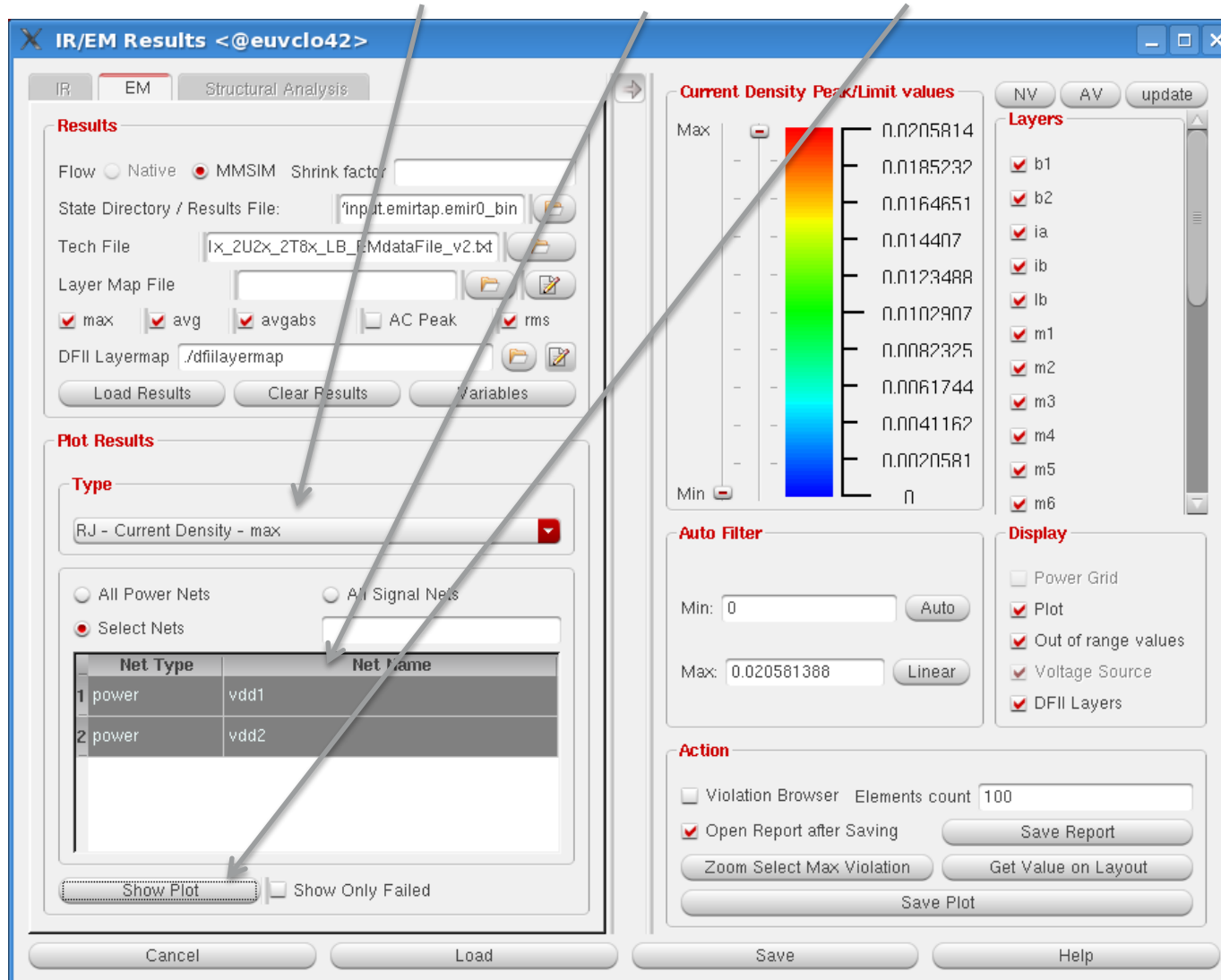
- EM analysis form empty and loaded
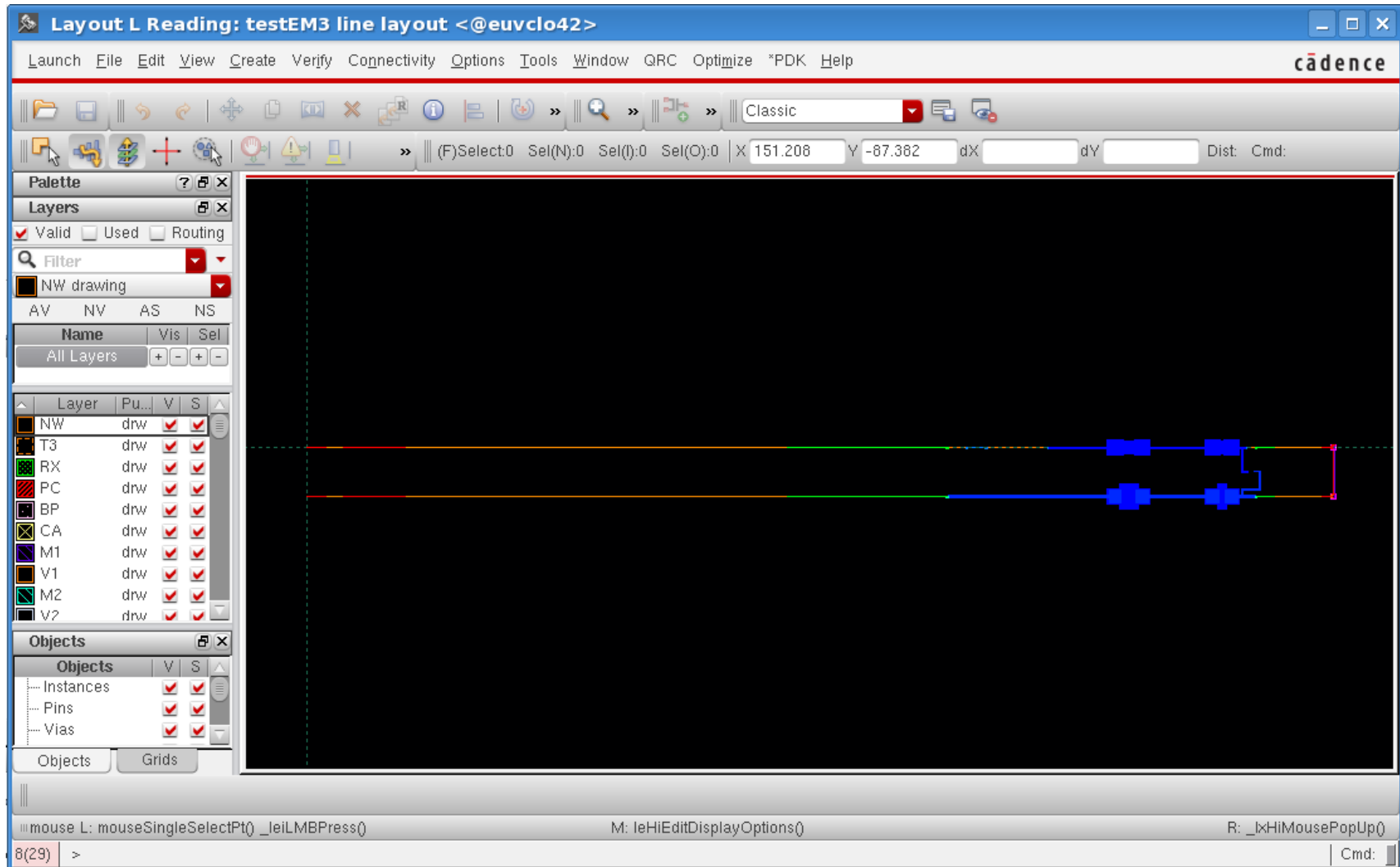
- Select analysis type, net(s) and Show plot =>extended form appears

EM results (7b)

- EM on 2 Power nets

• Getting Value on Layout

- Click on "Get Value"

- Select a region on the layout to get the value in the colormap and selection in the "Annotation browser"

EM results (8b)

- Getting in annotation browser

- Click on "Get Value"

- The "Annotation browser" opens in the layout view, you can select value and zoom on it
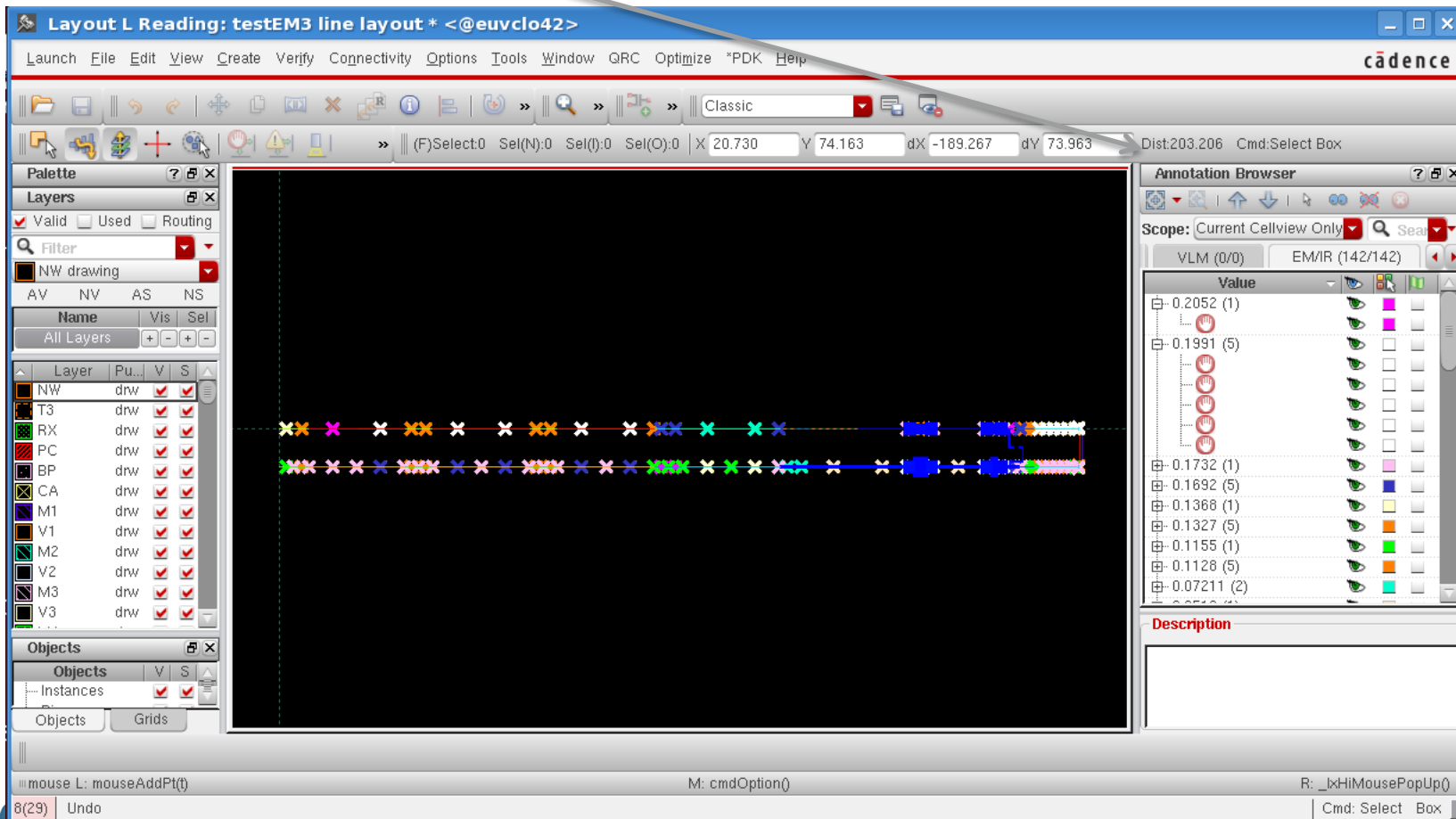
conclusion

- For full details, you can read the documentation voltusFIXL.pdf in the IC doc directory under voltusFIXL/ dir.

- Voltus FI interface and engine are changing with each new mmsim or IC releases

- That's why it is recommended to use them or sooner ones to get
  - all GUI features
  - the best accuracy with a good runtime execution and less convergence issues.

- The snapshots were extracted from IC 06.16.090 and mmsim 14.10.138.