

Cadence (R) Virtuoso (R) Spectre (R) Circuit Simulator  
Version 7.1.1.187.isr11 32bit -- 18 Aug 2009  
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5,610,847; 5,790,436; 5,812,431; 5,859,785; 5,949,992; 5,987,238;  
6,088,523; 6,101,323; 6,151,698; 6,181,754; 6,260,176; 6,278,964;  
6,349,272; 6,374,390; 6,493,849; 6,504,885; 6,618,837; 6,636,839;  
6,778,025; 6,832,358; 6,851,097; 6,928,626; 7,024,652; 7,035,782;  
7,085,700; 7,143,021; 7,493,240.

Includes RSA BSAFE(R) Cryptographic or Security Protocol Software from RSA  
Security, Inc.

User: ramkumar Host: voelligbaf HostID: 53829B1E PID: 4643  
Memory available: 3.0493 GB physical: 8.4122 GB  
CPU(1 of 8): CPU 0 Intel(R) Xeon(R) CPU E5320 @ 1.86GHz  
1869.000MHz

Simulating 'input.scs' on voelligbaf at 9:21:24 PM, Wed Jul 6, 2011 (process  
id: 4643).

Command line:

```
\
/cad/cds03/Cadence_Tools/MMSIM711_2010/tools/spectre/bin/32bit/spectre \
  -env artist5.1.0 +escchars +log ../psf/spectre.out +inter=mpsc \
  +mpsession=spectre3_13629_391 -format sst2 -raw ../psf \
  +lqttimeout 900 -maxw 5 -maxn 5 input.scs
spectre pid = 4643
```

Loading

/cad/cds03/Cadence\_Tools/MMSIM711\_2010/tools.lnx86/cmi/lib/5.0/libinfineon\_s  
h.so ...

Loading

/cad/cds03/Cadence\_Tools/MMSIM711\_2010/tools.lnx86/cmi/lib/5.0/libphilips\_sh  
.so ...

Loading

/cad/cds03/Cadence\_Tools/MMSIM711\_2010/tools.lnx86/cmi/lib/5.0/libsparam\_sh.  
so ...

Loading

/cad/cds03/Cadence\_Tools/MMSIM711\_2010/tools.lnx86/cmi/lib/5.0/libstmodels\_s  
h.so ...

Auto-loading AHDL component.

Finished loading AHDL component in 0 s (elapsed).

Installed AHDL simulation interface.

Opening directory input.ahdlSimDB/ (775)

Opening directory

input.ahdlSimDB/1984\_umc\_90\_printed\_el\_otft\_mod3\_veriloga\_veriloga.va.otft\_m  
od3.ahdlcmi/ (775)

Opening directory

input.ahdlSimDB/1984\_umc\_90\_printed\_el\_otft\_mod3\_veriloga\_veriloga.va.otft\_m  
od3.ahdlcmi/Linux2.6.38.3IES+gcc/ (775)

Compiling ahdlcmi module library.

Finished compilation in 2 s (elapsed).

Installed compiled interface for otft\_mod3.

Circuit inventory:

```
nodes 7
otft_mod3 8
quantity 9
vsource 3
```

Time for parsing: CPU = 344.022 ms, elapsed = 1.85556 s.  
Time accumulated: CPU = 364.022 ms, elapsed = 1.85679 s.  
Peak virtual memory used = 565 Mbytes.

Entering remote command mode using MPSC service (spectre, ipi, v0.0, spectre3\_13629\_391, ).

```
*****
Transient Analysis `tran': time = (0 s -> 100 us)
*****
```

Important parameter values:

```
start = 0 s
outputstart = 0 s
stop = 100 us
step = 100 ns
maxstep = 2 us
ic = all
skipdc = no
reltol = 1e-03
abstol(I) = 1 pA
abstol(V) = 1 uV
temp = 27 C
tnom = 27 C
tempeffects = all
errpreset = moderate
method = traponly
lteratio = 3.5
relref = sigglobal
cmin = 1 fF
gmin = 1 pS
```

Error found by spectre at time = 43.4433 ns during transient analysis `tran'.

ERROR (SPECTRE-16192): No convergence achieved with the minimum time step specified. Last acceptable solution computed at 43.4433 ns.

The values for those nodes that did not converge on the last Newton iteration are given below. The manner in which the convergence criteria were not satisfied is also given.

Failed test: | Value | > RelTol\*Ref + AbsTol

Top 10 Update too large Convergence failure:

```
I(_vvd!p) = -116.639 uA, previously -114.93 uA.
  update too large: | -45.036 MA | > 515.162 nA + 1 pA
I(_vDin:p) = -54.3743 uA, previously -53.9108 uA.
  update too large: | 32.5665 MA | > 452.897 nA + 1 pA
I(_vclk:p) = 242.092 uA, previously 241.686 uA.
  update too large: | -42.4802 MA | > 640.614 nA + 1 pA
V(net1) = -14.573 V, previously -14.573 V.
  update too large: | -7.84241 V | > 24.573 mV + 1 uV
V(clk_1n) = -11.7025 V, previously -11.7025 V.
  update too large: | 2.38733 V | > 21.7025 mV + 1 uV
V(Q) = -3.64405 V, previously -3.64405 V.
  update too large: | -1.36702 V | > 13.644 mV + 1 uV
V(NQ) = -18.0365 V, previously -18.0365 V.
```

```
update too large: | 737.397 mV | > 28.0365 mV + 1 uV
Top 10 Residue too large Convergence failure:
V(net1) = -14.573 V, previously -14.573 V.
residue too large: | -86.2818 MA | > 595.607 kA + 1 pA
V(vdd!) = -20 V, previously -20 V.
residue too large: | 37.2692 MA | > 1.43656 MA + 1 pA
```

The following set of suggestions might help you avoid convergence difficulties.

1. Evaluate and resolve any notice, warning, or error messages.
2. Use realistic device models. Check all component parameters, particularly nonlinear device model parameters, to ensure that they are reasonable.
3. Small floating resistors connected to high impedance nodes might cause convergence difficulties. Avoid very small floating resistors, particularly small parasitic resistors in semiconductors. Instead, use voltage sources or iprobes to measure current.
4. Ensure that a complete set of parasitic capacitors is used on nonlinear devices to avoid jumps in the solution waveforms. On MOS models, specify nonzero source and drain areas.
5. Perform sanity check on the parameter values using the parameter range checker (use ``+param param-limits-file'' as a command line argument) and heed any warnings. Print the minimum and maximum parameter value using the `info' analysis. Ensure that the bounds given for instance, model, output, temperature-dependent, and operating-point (if possible) parameters are reasonable.
6. Check the direction of both independent and dependent current sources. Convergence problems might result if current sources are connected such that they force current backward through diodes.
7. Enable diagnostic messages by setting option `diagnose=yes'.
8. Loosen tolerances, particularly absolute tolerances like `iabstol' (on options statement). If tolerances are set too tight, they might preclude convergence.
9. Try to simplify the nonlinear component models in order to avoid regions in the model that might contribute to convergence problems.

```
Analysis `tran' was terminated prematurely due to an error.
finalTimeOP: writing operating point information to rawfile.
modelParameter: writing model parameter values to rawfile.
element: writing instance parameter values to rawfile.
outputParameter: writing output parameter values to rawfile.
designParamVals: writing netlist parameters to rawfile.
primitives: writing primitives to rawfile.
subckts: writing subcircuits to rawfile.
```