RF Analysis Commands (continued)

.HBXF / .SNXF

Calculates transfer function from the given source in the circuit to the designated output.

```
.HBXF out_var frequency_sweep
.SNXF out_var frequency_sweep
```

.HBNOISE

Runs cyclo-stationary noise analysis on circuits in a large-signal periodic steady state.

```
.HBNOISE output insrc parameter_sweep [N1, N2, ..., NK,+/-1]
+ [LISTFREQ=(freq1 [freq2 ... freqN]|none|all]) [LISTCOUNT=num]
+ [LISTFLOOR=val] [LISTSOURCES=on|off]
```

.HBOSC

Runs analysis on autonomous oscillator circuits.

```
.HBOSC TONE=F1,[F2…,FN] NHARMS=H1,[H2,…,HN]
+ PROBENODE=N1,N2,VP [OSCTONE=N] [FSPTS=NUM,MIN,MAX]
+ [SWEEP parameter_sweep] [SUBHARMS=I]
```

.NOISE

Runs noise analysis in frequency domain.

```
.NOISE v(out) vin [interval|inter=x] [listckt=[1|0]]
+ [listfreq=(freq1 [freq2 ... freqN]|none|all]) [listcount=num]
+ [listfloor=val] [listsources=1|0|yes|no]]
```

.PHASENOISE

Interprets signal / noise quantities as phase variables for accumulated jitter in closed-loop PLL analysis.

```
.PHASENOISE output input [interval] carrier=freq
+ [listfreq=(freq1 [freq2 ... freqN]|none|all)] [listcount=num]
+ [listfloor=val] [listsources=(1|0)]
```

.PTDNOISE

Calculates the noise spectrum and total noise at a point in time.

```
.PTDNOISE output TIME=[val|meas|sweep]
+[TDELTA=time_delta] frequency_sweep
+[listfreq=(freq1 [freq2 ... freqN]|none|all)] [listcount=num]
+[listfloor=val] [listsources=on|off]
```

.SN

Runs periodic steady state analysis using the Shooting Newton algorithm.

```
.SN TRES=Tr PERIOD=T [TRINIT=Ti] [OSCNODE=NAME]
+ [SWEEP parameter_sweep]
.SN TONE=F1 TRINIT=Ti NHARMS=Round(PERIOD/TRES)
+ [OSCNODE=NAME] [SWEEP parameter_sweep]
```

.SNNOISE

Runs periodic AC noise analysis on nonautonomous circuits in a large-signal periodic steady state.

```
.SNNOISE output insrc parameter_sweep [N1+/-1]
+ [LISTFREQ=(freq1 [freq2 ... freqN]|none|all]) [LISTCOUNT=num]
+ [LISTFLOOR=val] [LISTSOURCES=on|off]
```

.SNOSC

Runs analysis on autonomous oscillator circuits.

```
.SNOSC TONE=F1, [F2,…,Fn] NHARMS=H1, [H2,…,Hn]
+ PROBENODE=N1,N2,VP [OSCTONE=N] [FSPTS=NUM,MIN,MAX]
+ [SWEEP parameter_sweep] [SUBHARMS=I]
```

.TRANNOISE

Activates transient noise analysis to compute the additional noise variables over a standard .TRAN analysis.

```
.TRANNOISE output [METHOD=MC] [SEED=val] [SAMPLES=val]
+ [AUTOCORRELATION=0|1|off|on] [FMIN=val] [FMAX=val] [SCALE=val]
+ [PHASENOISE=0|1|2] [JITTER=0|1|2] [REF=srcName]
```

Options

```
.OPTION opt1 [opt2 opt3 …]
```

opt1 opt2 … Specify an input control option.

General Options

`ALTCC=n` Enables reading the input netlist once for multiple .ALTER statements. Default is 0.

`LIS_NEW=x` Enables streamlining improvements to the *.lis file. Default is 0.

`SCALE=x` Sets the element scaling factor. Default is 1.

`POSTTOP=n` Outputs instances up to n levels deep. Default is 0.

`POSTLVL=n` Limits data written to the waveform file to the level of nodes specified by n.

`POST=n` Saves results for viewing by an interactive waveform viewer. Default is 0.

`PROBE=n` Limits post-analysis output to only variables specified in .PROBE and .PRINT statements. Default is 0.

RC Reduction Options

`SIM_LA=name` Starts linear matrix (RC) reduction to the PACT, PI, or LNE algorithm. Default is off.

RF Options

`SIM_ACCURACY=x` Sets and modifies the size of timesteps. The higher the value, the greater accuracy; the lower the value, the faster the simulation runtime. Default is 1.

`TRANFORHB=n` 1 Forces HB analysis to recognize specific V/I sources, 0 (default) ignores.

`HBCONTINUE=n` Specifies whether to use the sweep solution from the previous simulation as the initial guess for the present simulation. 0 restarts, 1 (default) uses the previous sweep solution.

`HBSOLVER=n` Specifies a preconditioner for solving nonlinear circuits. 0 invokes the direct solver. 1 (default) invokes the matrix-free Krylov solver. 2 invokes the two-level hybrid time-frequency domain solver.

`SNACCURACY=n` Sets accuracy. The higher the value, the greater accuracy; the lower the value, the faster the simulation runtime. Default is 10.

`SAVESNINIT="filename"` Saves operating point at the end of SN initialization.

`LOADSNINIT="filename"` Loads operating point saved at end of SN initialization.

Transient Options

`AUTOSTOP=n` Stops transient analysis after calculating all TRIG-TARG, FIND-WHEN, and FROM-TO measure functions. Default is 0.

`METHOD=name` Sets numerical integration method for a transient analysis to GEAR or TRAP (default).

`RUNLVL=n` Controls the speed and accuracy trade-off; where n can be 1 through 6. The higher the value, the greater accuracy; the lower the value, the faster the simulation runtime. Default is 3.

Output Commands

.BIASCHK .MEASURE .PRINT .PROBE

For details about all commands and options, see the *HSPICE® Reference Manual: Commands and Control Options.*

SYNOPSYS®

Synopsys Technical Publications
690 East Middlefield Road
Mountain View, CA 94043
Phone (650) 584-5000 or (800) 541-7737
www.synopsys.com

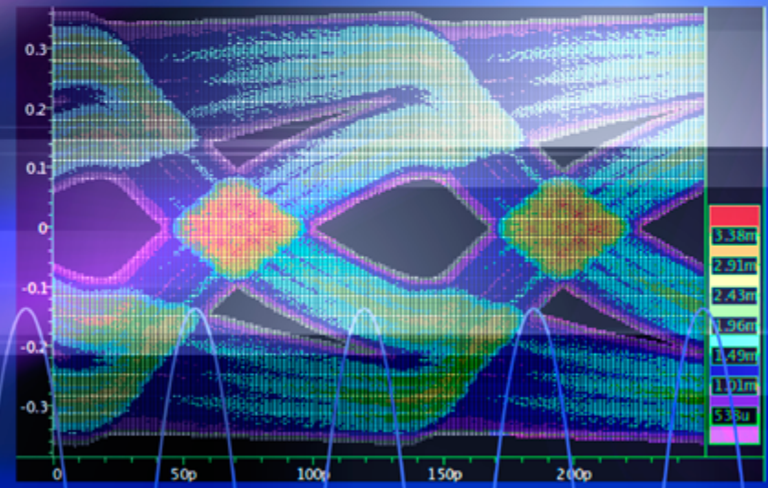
Revision 6.0, June 2015

SYNOPSYS®

HSPICE®

Quick Reference

K-2015.06



Invoking HSPICE

```
hspice [-i path/input_file] [-o path/output_file] [-n number]
[-dp process_count [-dpconfig dpconfig_file] [-merge] [-dpgui]]
[-hpp] [-mt thread_count] [-meas measure_file]
[-restore checkpoint_file.store.gz] [-hdl filename]
[-hdlpath pathname] [-vamodel name ...] [-help] [-doc]
```

Argument Descriptions

`-i path/input_file` Specifies the input netlist file name.

`-o path/output_file` Name of the output file. HSPICE appends the extension .lis.

`-n number` Sets the starting number for numbering output data file revisions.

`-dp process_count [-dpconfig dpconfig_file] [-merge] [-dpgui]` Invokes distributed processing and specifies number of processes and configuration file for DP. Optionally launches the DP manager and merges the output files from HSPICE.DP.

`-hpp` Invokes HSPICE Precision Parallel.

`-mt thread_count` Invokes multithreading and specifies the number of processors. Works best when `-hpp` is used.

`-meas measfile` Calculates new measurements from a previous simulation.

`-restore checkpoint_file.store.gz` Restores the file containing simulation checkpoint data saved using the .STORE command.

`-hdl filename [module_name] [module_alias]` Specifies a Verilog-A file.

`-hdlpath pathname` Specifies the search path for a Verilog-A file.

`-help` Invokes the online help system (requires a Web browser).

`-doc` Opens the PDF documentation set for HSPICE (requires Adobe Acrobat Reader or other PDF document reader).

HSPICE is fully integrated with the Synopsys Galaxy® Custom Designer SAE. See the *Galaxy Custom Designer® Simulation and Analysis Environment User Guide*. To use the HSPICE integration to the Cadence® Virtuoso® Analog Design Environment, go to `/$INSTALLDIR/K-2015.06/interface/` and follow the README instructions.

Analysis Commands

.AC

Performs AC analyses.

Single / Double Sweep

```
.AC type np fstart fstop
.AC type np fstart fstop SWEEP var
+ [START=]start [STOP=]stop [STEP=]incr
.AC type np fstart fstop SWEEP var type np start stop
```

Sweep Using Parameters

```
.AC type np fstart fstop SWEEP DATA=datanm
.AC DATA=datanm
.AC DATA=datanm SWEEP var [START=]start [STOP=]stop [STEP=]incr
.AC DATA=datanm SWEEP var type np start stop
```

Monte Carlo Analysis

```
.AC type np fstart fstop [SWEEP MONTE=MCcommand]
```

.ACMATCH

Calculates effects of variations on AC transfer function, with one or more outputs.

```
.ACMatch Vm(n1) Vp(n1) Vr(n1) Vi(n1) Vm(n1,n2) Im(Vmeas)
```

.ALTER

Reruns a simulation using different parameters and data from a specified sequence or block. The .ALTER block can contain element commands and .AC, .ALIAS, .DATA, .DC, .DEL LIB, .HDL, .IC (initial condition), .INCLUDE, .LIB, .MODEL, .NODESET, .OP, .OPTION, .PARAM, .TEMP, .TF, .TRAN, and .VARIATION commands.

```
.ALTER title_string
```

.DC

Performs DC analyses.

```
.DC var1 START=start1 STOP=stop1 STEP=incr1
```

Parameterized Sweep

```
.DC var1 start1 stop1 incr1 SWEEP var2 type np start2 stop2
.DC var1 start1 stop1 incr1 var2 start2 stop2 incr2
```

Data-Driven Sweep

```
.DC var1 type np start1 stop1 SWEEP DATA=datanm
.DC DATA=datanm [SWEEP var2 start2 stop2 incr2]
.DC DATA=datanm
```

Monte Carlo Analysis

```
.DC var1 type np start1 stop1 [SWEEP MONTE=MCcommand]
.DC MONTE=MCcommand
```

.DCMATCH

Calculates the effects of variations on DC operating point, with one or more outputs.

```
.DCMatch V(n1) V(n1,n2) I(Vmeas)
```

.LSTB

Invokes loop stability analysis.

```
.LSTB mode=[single|diff|comm] vsource=[vlstb|vlstbp,vlstbn]
```

.MODULE

Enables multi-technology simulation for 3D-IC and Silicon Interposer.

```
.MODULE label
```

.OP

Calculates the operating point of the circuit.

```
.OP format_time format_time... [interpolation]
```

.PARAM

Define parameters. Parameters are names that have associated numeric values or functions.

```
.PARAM ParamName=[ RealNumber | 'AlgebraicExpression'
  | DistributionFunction(Arguments) | str('string')
  | OPTxxx (initial_guess, low_limit, upper_limit)
```

Monte Carlo Analysis

```
.PARAM mc_var=[ UNIF(nominal_val, rel_variation [, multiplier])
  | AUNIF(nominal_val, abs_variation [, multiplier])
  | GAUSS(nominal_val, rel_variation, num_sigmas [, multiplier])
  | AGAUSS(nominal_val, abs_variation, num_sigmas [, multiplier])
  | LIMIT(nominal_val, abs_variation) ]
```

.STORE

Starts creation of checkpoint files describing a running process during .TRAN analysis.

```
.STORE [file=checkpoint_file] [time=time1]
+ [repeat=checkpoint_interval]
```

.TEMP

Performs temperature analysis at specified temperatures.

```
.TEMP t1 [t2 t3 ...]
```

.TRAN

Performs a transient analysis.

Single-Point Analysis

```
.TRAN tstep1 tstop1 [START=val] [UIC]
```

Multipoint Analysis

```
.TRAN tstep1 tstop1 [tstep2 tstop2 ... tstepN tstopN]
+ [START=val] [UIC] [SWEEP var type np pstart pstop]
```

Data-Driven Sweep

```
.TRAN DATA=datanm
.TRAN DATA=datanm SWEEP var type np pstart pstop
.TRAN tstep1 tstop1 [tstep2 tstop2 ... tstepN tstopN]
+ [START=val] [UIC] SWEEP DATA=datanm
```

Monte Carlo Analysis

```
.TRAN tstep1 tstop1 [tstep2 tstop2 ... tstepN tstopN]
+ [START=val] [UIC] [SWEEP MONTE=MCcommand]
```

Interval-based RUNLVL

```
.TRAN tstep tstop [RUNLVL=(time1 runlvl1...timeN runlvlN)]
```

Interval-based Subcircuit/Instance RUNLVL

```
.TRAN tstep tstop
+ [INST=inst_exp1 RUNLVL=(time11 runlvl11...time1N runlvl1N)]
+ [SUBCKT=subckt_exp2 RUNLVL=(time21 runlvl21...time2N runlvl2N)]
```

Interval-based Temperature Sweep

```
.TRAN tstep tstop [tempvec=(t1 Temp1 t2 Temp2 t3 Temp3...)
+[tempstep=val]]
```

Signal Integrity Commands

.LIN

Calculates linear transfer and noise parameters for a general multi-port network.

```
.LIN [sparcalc=[1|0] [modelname=modelname] [filename=filename]
+ [format=[selem|citi|touchstone]] [noisecalc=[1|0]
+ [gdcalc=[1|0]] [dataformat=[ri|ma|db]]
+ [listfreq=(freq1 [freq2 ... freqN]|none|all)] [listcount=num]
+ [listfloor=val] [listsources=1|0|on|off]
```

.STATEYE

Performs Statistical Eye Diagram analysis.

```
.STATEYE T=time_interval Trf=rise_fall_time [Tr=rise_time]
+ [Tf=fall_time] Incident_port=idx1, [idx2, … idxN]
+ Probe_port=idx1, [idx2, … idxN] [Tran_init=n_periods]
+ [V_low=val] [V_high=val] [TD_In=val] [TD_PROBE=val]
+ [T_resolution=n] [V_resolution=n] [VD_range=val]
+ [EDGE=1|2|4|8] [MAX_PATTERN=n] [PATTERN_REPEAT=n]
+ [SAVE_TR=ascii] [LOAD_TR=ascii] [SAVE_DIR=string]
+ [IGNORE_Bits=n] [Tran_Bit_Seg=n]
+ [MODE=EDGE|CONV|TRAN] [XTALK_TYPE = SYNC|ASYNC|DDP|NO]
```

RF Analysis Commands

.ACPHASENOISE

Helps interpret signal and noise quantities as phase variables for accumulated jitter for closed-loop PLL analysis.

```
.ACPHASENOISE output input [interval] carrier=freq
+ [listfreq=(freq1 [freq2 ... freqN]|none|all)][listcount=num]
+ [listfloor=val] [listsources=(1|0)]
```

.HB

Runs periodic steady state analysis with single / multitone Harmonic Balance algorithm.

```
.HB TONES=F1 [F2,…,FN] NHARMS=H1,[H2,…,HN]
+ [INTMODMAX=n] [SWEEP parameter_sweep]
```

.HBAC / .SNAC

Runs periodic AC analysis on circuits operating in a large-signal periodic steady state.

```
.HBAC frequency_sweep
.SNAC frequency_sweep
```