### Tutorials of Composer and Spectre





#### Get started

Create a new library just like what you did in Laker.Choose "Don't need a techfile unless you want to draw layout by Virtuoso

🔀 icfb - Log: /home/m	98/m9863511/CDS.log		
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#### Get started

Back to the main window, create a new cellview in the library you made. Choose Composer-Schematic.

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#### Composer schematic window

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# Library File

Key "tt" in section(change to ff fs sf ss for five corner simulation).Cick Add.

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A	dd	Delete	Change	Edit File		Browse

Press "i" in composer main window. Click Browse. Choose analogLib  $\rightarrow$ nmos4  $\rightarrow$ symbol (You can find most components you need including resistors, capacitors, inductors.....in analogLib)

Library	I			Browse
Cell				
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Specify device parameters similar to HSPICE.Only need to specify device name,Model name,Multiplier,Width,Length.

Click "Hide", add your device in main window

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Add analogLib  $\rightarrow$  cap, gnd ,Vsource.Press "W" to make wire connection. (Vsource is used as signal source for transient and pss pac analysis. Use Vdc instead when doing ac analysis.)



Click on Vsource.Press "Q" to edit its properties.Create two non-overlapping clock signals as in the right figure.Press "X" to check and save.





CDF Parameter	Value	Display
DC voltage	<u> </u>	off 💷
Source type	pulse	off 💷
Frequency name 1	1	off 💷
Delay time	<u> </u>	off 💷
Type of rising & falling edge		off 💷
Zero value	QÎ V	off 💷
One value	3∎ ⊽	off 💷
Period of waveform	lm s	off 💷
Rise time	1.000u 💐	off 💷
Fall time	1.000u 🧃	off 💷
Pulse width	450.00u s	off 💷

To simulate frequency response of the switched capacitor filter, add analogLib  $\rightarrow$  Vdc as input. Choose PAC magnititude =1.



CDF Parameter	Value	Display
AC magnitude		off 😑
AC phase		off 🖃
DC voltage	1.5 V	off 🖃
Noise file name	<u>.</u>	off 🖃
Number of noise/freq pairs	đ	off 🗆
XF magnitude	1	off 🗆
PAC magnitude	1 V	off 🖃
PAC phase		off 🖃
Temperature coefficient 1	<u>.</u>	off 🖃
Temperature coefficient 2	<u>.</u>	off 😑
Nominal temperature	Ĭ	Off 🖃

Click Tools  $\rightarrow$  Analog Environment.Click Analysis  $\rightarrow$  Choose.

ToolsDesignWindowAMSOpts.AnalogEnvironmentDesignSynthesisDivaFloorplan/SchematicsHierarchyEditorMixedSignalOpts.ParasiticsSchematicsSimulation

🔀 Virtuoso?	Analo?	g Design E	nvironme	nt (3)				
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								8
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Use pss and pac analysis. Set Beat Frequency = your clock frequency. Output harmonics = 0.Accuracy = moderate.Set your interested frequency range in pac analysis and maximum sidebands=0.Click "OK" when all settings are done.

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Back to ADE window.Click Simulation  $\rightarrow$  Netlist and Run.Click OK.

🔀 Virtuoso?Analog Design E	nvironment (3)		
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Session Setup Analyses	Variables Outputs	Simulation Results Tools	Help
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×	Welc	ome to S	Spectre	×
0	ĸ	Cancel		Help
Bef of	Fore imp	runnin ortant	ng a simulation with the Spectre interface, ther facts that you must know.	e are
1.	You men	need t u on th	to prepare any existing libraries with the Tools he CIW. The commands are "Spectre siminfo from S	->Cont pectre
2.	You Spe The mod ext	can co ctre in comman els int ension	onvert any models you used with the SpectreS int nterface through the Tools->Conversion Tools men nd is "Spectre Models from SpectreS". This will to a single file with a ".scs" extension. Files will be read in Spectre native format.	erface u on t— place with
3.	Spe Art nod on	ctre su ist pro es to i the CIW	upports inherited connections. It does not suppo ogrammable node progn(). You must therefore conv inherited connections with the Tools->Conversion W. The command is "Analog Bulk Node Conversion".	rt the ert pr Tools

Click Results  $\rightarrow$  Direct Plot  $\rightarrow$  Main Form.Choose pac  $\rightarrow$  spectrum  $\rightarrow$ dB20.

Status: Starting simulat	ion		T=27 C Simulator: spec	tre 8
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Add To Outputs 🗌 Replot	
freqaxis = in	
> Select Net on schematic	

Click on the output node, and you'll see the frequency response.





To do transient simulation, replace Vdc by Vsource as input signal

— Library —	Cell	View
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AIC_SWC	vdda	ams
US_8ths	vddd	auCdl
ahdlLib	vee	auLvs
analoqLib	veea	cdsSpice
basic	veed	hspiceS
odaDefTechLib	vevh	spectre
functional	vnpn	spectreS
rfExamples	vpnp	symbol
rfLib	vpulse	
test	vpwl	
	vpwlf	
	vsffm	
	vsin	
	vsource	

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Simulation results when clock frequency=1KHZ and input is a 100HZ Sinusoidal wave.

Transient analysis and AC analysis are the same as HSPICE.Just keep in mind that use Vdc for AC and Vsource for transient.

OK Cancel Defaults Apply Help   Analysis tran dc ac noise   * xf sens dcmatch stb   * pz sp envlp pss   * qpsp envlp   * qpsp <	Choosing Analyses Virtuoso?Analog Design Environment (	D 🔀			
Analysis tran dc ac noise xf sens dcmatch stb pz sp envlp pss pac pnoise pxf psp qpsp qpac qpnoise qpxf qpsp data dematch stb pac pac proise qpxf qpsp data dematch stb pac pac qpnoise qpxf qpsp data dematch stb pac qpnoise qpxf stop Time 30m Accuracy Defaults (errpreset) conservative moderate liberal	OK Cancel Defaults Apply	Help 2.25			
Transient Analysis       Stop Time       30m       Accuracy Defaults (errpreset)       conservative     moderate       liberal	Analysis $\$ tran $\$ dc $\$ ac $\$ noise $\$ xf $\$ sens $\$ dcmatch $\$ stb $\$ pz $\$ sp $\$ envlp $\$ pss $\$ pac $\$ pnoise $\$ pxf $\$ psp $\$ qpss $\$ qpac $\$ qpnoise $\$ qpxf $\$ qpsp	2.0 1.75- € 1.5		Ouput	
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Use an inverter as example. Press "p" to create pin. Define your pin names. Connect them to the corresponding nodes

🔀 Add Pin			X
Hide Canc	el Defaults		Help
Pin Names	out		
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Click Design  $\rightarrow$  Create Cellview  $\rightarrow$  From Cellview  $\rightarrow$  key in your library and cell name



🔀 Cellview From (	Cellview			X
OK Cancel D	efaults Apply			Help
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From View Name	schematic =	To View Name Tool / Data Type	symbol <u>i</u> Composer	- Symbol 💷
Display Cellview Edit Options	:			

Decide your positions of pins in the symbol(left, right, top, bottom). Check the resulted graph

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You can use this cell repeatedly in other cells just like subcircuits in HSPICE

Library	Cell	View	
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AIC_SWC	RC	symbol	
JS_8ths	inv		
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