AC Analysis



Connect the circuit to the left. Note that the circuit is using a 1 volt, 1 khz AC voltage source. While it might be tempting to replace this source with a Virtual Instrument Function Generator from EWB's virtual instrument set, in this case it will not be practical. AC analysis on a circuit requires that the sources be AC Voltage Sources vice the Function Generator. EWB requires that at least one AC voltage source be in the circuit when the AC analysis is being executed



The window to the right will appear. Modify FSTART and FSTOP to 100 hz and 1Mhz respectively. Select Decade, 1000 points, and Decibel. The number of points is important for ensuring that the curves are smooth. If the curves are not smooth you need more points. This is a large area of point loss in labs.

Frequency Parameters 0u	tput 🛛 Analysis Option:	s Summary
Start frequency (FSTART) 100	Hz 🔻
Stop frequency (FSTOP)	1	MHz 💌
Sweep type	Decade	•
Number of points per dec	ade 1000 Î	
Vertical scale	Decibel	•



Next choose the Output window and select the output node. Remove any other nodes in the "selected a variables for analysis" column. Then place node 3 there.

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Click on Simulate to complete the <u>AC Analysis</u>. The results will appear in the Grapher screen shown below. Note that the Grids were added later. In addition there are cursor screens available. The user MUST click inside the graph where the Grid of the cursor is needed in order to add it.



from the pull down menu.



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The 1 hz, 10 Ghz, and Decade Sweep type are default values and should be left as the default to start out with. The number of points per decade defaults at 10 and should normally be set to at least 100 for any kind of measurement accuracy. I have mine set at 1000 to start out at. If you end up having memory problems you might need to go back to 100 points.

The Default for Vertical scale is Logarithmic and SHOULD JUST ABOUT ALWAYS BE CHANGED TO DECIBEL!!

The Output node of the circuit (in this case Vout) should be selected in the Output window.





Note the very level areas in the resulting Magnitude and Phase angle portions of the circuit. Since there is little variation in this area it is best to take note of the values and then shorten the span which the analysis will occur. For this SPECIFIC circuit, I

would change the low end of the analysis to be 10khz. The upper end might be able to be changed to 1Ghz. It wasn't for the Phase angle window I would be tempted to change it to 100Mhz. If your main purpose is to determine the 3db down point and the values 1 decade above and below it in the phase angle curve, that would be fine.

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For now, lets change the values to 10khz and 1G hz.

Lets simulate the circuit again:

Frequency Parameters Output	analysis Options	Summary
0		
Start frequency (FSTART)	1	kHz 💌
Stop frequency (FSTOP)	1	GHz 💌
Sweep type	Decade 💌	
Number of points per decade	1000	
Vertical scale	Decibel 🗾 💌	



Note that the flat band of the Magnitude window is at 6.02 dB. As the cursor moves to the left the value will go slowly down. It is desired to find as reasonable accurate value for the 3dB down point (also called the Half Power point). For this circuit we are looking for a value of around 6.02db-3db=3.02dB. Since we would like to have some accuracy we can click inside the Magnitude window and then select the Left Axis properties. Change the axis scale to rund form -20 to 10.

