Generating Experimental Bode Plots using HP4192A Impedance Analyzer

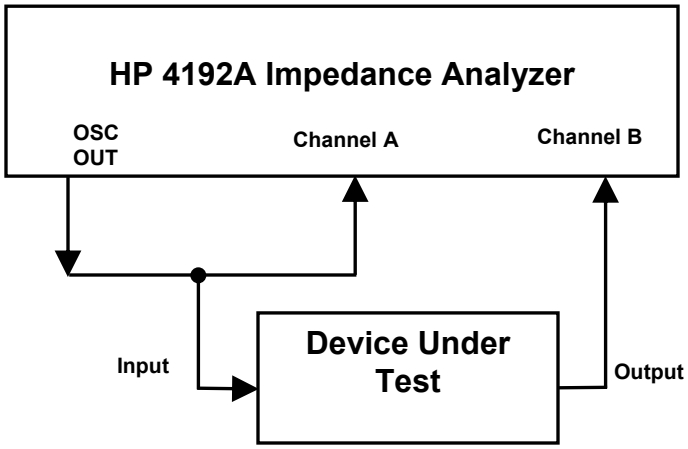
Biranchinath Sahu, *Student Member, IEEE*, and Gabriel A. Rincón-Mora, *Senior Member, IEEE*

Analog Integrated Circuits Laboratory, Georgia Tech Analog Consortium
School of Electrical and Computer Engineering, Georgia Institute of Technology
Email: {bsahu, rincon-mora}@ece.gatech.edu

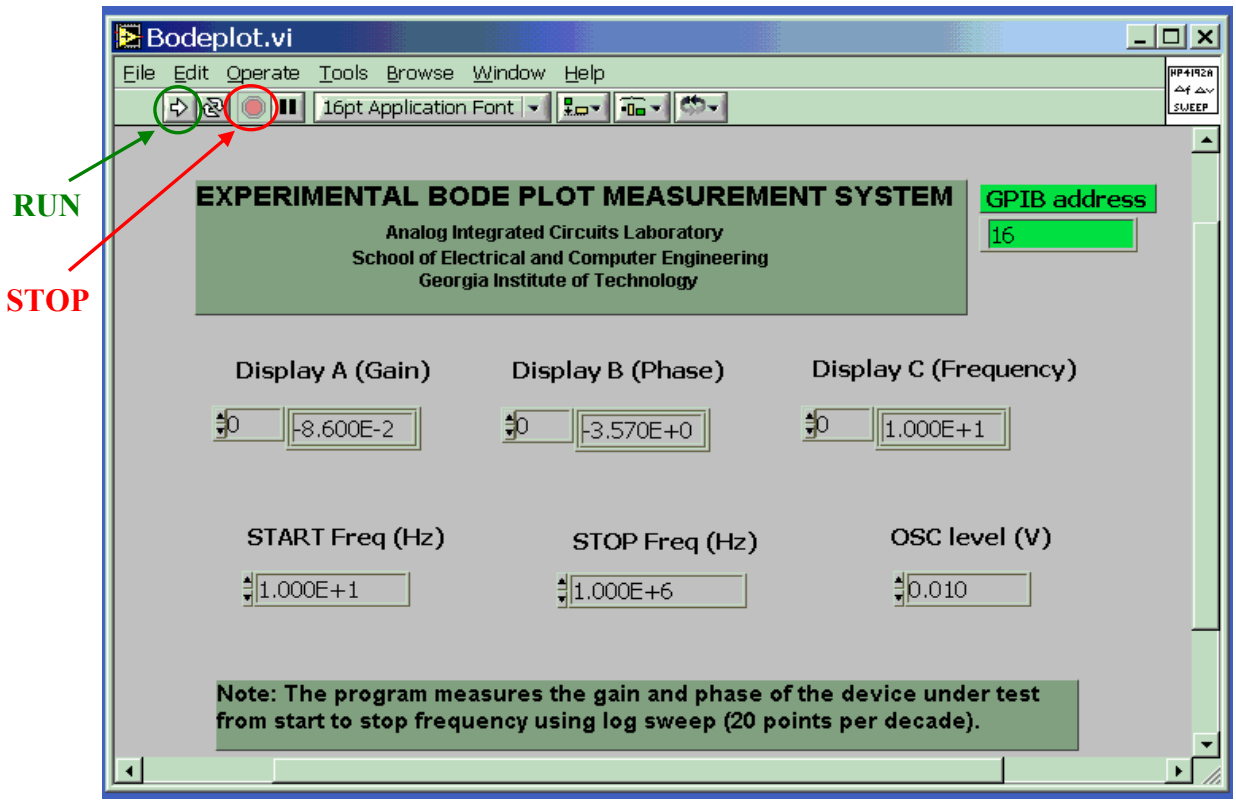
Abstract - Bode plots of transfer functions are widely used to gauge the stability of circuits and systems. To guarantee the stability of circuits and systems used in various applications, their frequency response must be experimentally verified. This application note explains various steps to obtain experimental gain-phase measurement results and plot them using Microsoft Excel.

Measurement Procedure

Step -1: Connect **REFERENCE INPUT (Channel A)** and **TEST INPUT (Channel B)** to the device-under-test (DUT). Note that **OSC** output from the instrument (HP4192A) is connected to the input of the DUT and **Channel A.**



Step-2: All the program files and files generated during the measurement process are (Gain.xls, Phase.xls, and Bode_Plot_Template.xls) are located in the folder **BODE_PLOT** in the desktop. Start the program **Bodeplot.vi.** The program-screen looks as shown in the following page.



Step-3: Enter the values for START Freq, STOP Freq, and the OSC level. The default values are set to be 10 Hz, 10 MHz and 10 mV, respectively. Note that a higher value of OSC output may saturate the amplifiers inside the loop, which yields an incorrect result.

Step-4: Make sure that files **Gain.xls** and **Phase.xls** are closed before the program is started. Otherwise, the program cannot write data into these files causing Direct Memory Access (DMA) error and it stops. Run the program **Bodeplot.vi** by pressing the button as marked in the screen.

Step-5: After the sweep is completed, the program asks the user to confirm overwrites of the following files: **Gain.xls** and **Phase.xls.** Press **Replace** to overwrite the files.

Step-6: Open files **Gain.xls** and **Phase.xls.** Then**,** open the file **Bode_Plot_Template.xls**. The data from Gain.xls and Phase.xls is automatically updated and shown in the standard template plots within **Bode_Plot_Template.xls.** If needed, the data can be copied into another file for further processing or plotting.

Step-7: To repeat the measurement, close files **Gain.xls** and **Phase.xls.** Repeat steps 3 through 6.