Supplemental Part for Lab 3

Find the parasitic capacitance in our metal runner

1. Use signal generator to insert a 1Vp-p, 1KHz sinusoidal waveform into PIN#13 of Lab Chip 1. Use oscilloscope to observe the waveforms at PIN#13 (input) and PIN#15 (output). Please note that the references of the oscilloscope probes and the signal generator should all be connected to PIN#14 (VSS). Write down the magnitudes of the input and output waveforms and the phase shift (if any) under this frequency.

2. Keep increasing the input frequency and observe the waveforms. When dose the magnitude of output become 0.707 times that of the input? What is the phase shift under this frequency? Why do we choose the value "0.707" here?

3. Keep increasing the input frequency till you reach the maximum frequency the generator could generate. Carefully record the values of magnitude and phase shift around the "break frequency". Sketch the Bode plot by using the values of magnitude and phase shift you just recorded.

4. By using the information in your Bode plot and the resistance value you measured from the metal runner, draw a simple RC circuit and use this circuit to calculate the parasitic capacitance of the metal runner. Comment on the result of your calculation. Is it very accurate to find parasitic capacitance by using this method?

5. To make the value more accurate, we should subtract the parasitic capacitance caused by the breadboard. Use a 1K resistor to construct a simple RC circuit with the parasitic capacitor in the breadboard. Use the same method you just used for metal runner to find the parasitic capacitance in the breadboard.

6. Compare the values of parasitic capacitance you found for metal runner and breadboard. In your lab report, include both Bode plots for metal runner and breadboard and explain this experiment with a simple RC circuit model.