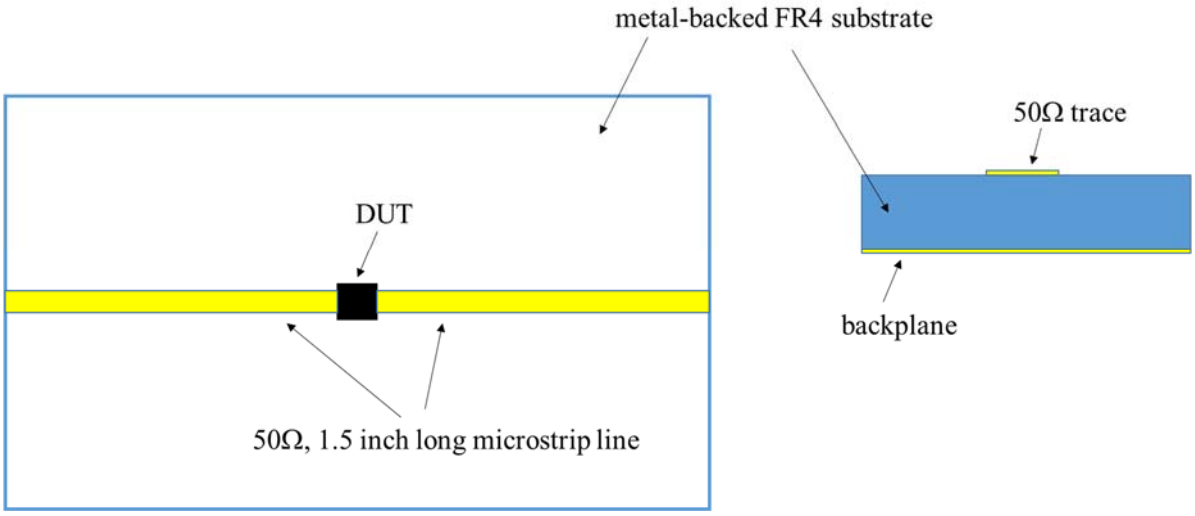
ECE 451 **Homework 4** **Due Wednesday, March 15, 2017**

TRL design problem

You will measure a device-under-test (DUT) in later experiments in the lab. The DUT is a two-port device, implemented on an FR-4 substrate, extended to the edges by two 50Ω traces. The top and cross-sectional view of the device you would measure in the lab are shown in the following figures.



It is known that the TRL calibration method provides more accurate 2-port measurement results than the traditional SOLT method. However, TRL standards are valid only in a limited frequency range. In this problem, you will design a standard TRL calibration kit to enable characterization of the aforementioned device.

The frequency range of interest is from 1 to 6 GHz. Your final TRL set should look like the one depicted below. Board dimensions should be reasonable, i.e. within 4”x4”. Put all 3 standards on the same board, with enough separation between them to neglect coupling effects. Center them in a manner that will facilitate the board-cutting process. For more information about PCB fabrication capability of E-shop, go here.

You will work in this problem with your lab partner and your team is to submit one design only. However, you are required to submit individual design procedure reports. Your report should include your reasoning and calculations for your design.

Use Keysight ADS for your design and file export. Simulate each of your TRL standards; you will collect measurement data of them later for comparison. Simulation results, schematic snapshots etc. are also a part of your individual report.

For students who are not familiar with ADS, there will be tutorials on the website. Check for updates regularly.

Due date: Design file (in gerber, `.gbr` format) and report will have to be submitted on Compass by midnight **Wednesday, March 15,** 2017. You do **not** need to submit your ADS workspace. Name your design file properly so that it can be distinguished from others.

You will received your design back from your lab TA before the lab. You will mount SMA connectors on your design in the lab.