**Lab 3: TRL Calibration**

**Parameter:**

**Deliverables:**

1. Relative Dielectric:

In order to find the relative dielectric the electrical length of the additional line had to found. In the measured data from the lab, it can be seen that at 3GHz the electrical length of the addition was equal to -40.82°. Since the physical and electrical lengths are known, it is possible to find the relative dielectric using equation (1).

1. Propagation Velocity:

Once the dielectric was found the propagation velocity could be calculated. Due to the relative dielectric, the propagation velocity was slower than that of free space propagation.

1. Valid Frequency range for calibration kit:

The TRL calibration kit has its limitations on the range of frequency that it can be accurate for. In order to find that range the phase must lie between 20° and 160°. By rearranging equation (1) and equating λ to ƒ, the lower and upper frequencies can calculated.

1. Attenuation Coefficient:

The attenuation coefficient was found by looking the S21 magnitude at 3GHz. At this frequency, the magnitude was -0.02936164dB with the addition line length still being 6.44mm. Equation (7) was used to find the attenuation coefficient.