FMR Experiment Log File

Date: 23-02-2022, Tuesday

**Experiment 1:**

**Aim:** Check whether the waveguide has input impedance of 50 or is it having any reflection

Circuit 1:

[Signal Generator] [SMA cable] [Oscilloscope]

Circuit 2:

[Signal Generator] [SMA cable] [Waveguide] [Oscilloscope]

The Frequency and Level is set in the Signal Generator, and the , , and is measured in the Oscilloscope

Circuit 1:

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  |  |
| 100k Hz | 0 | 663 mV | 338 mV | -325 mV | 100.04k Hz | Perfect Sine wave |
| 1M Hz | 0 | 650 mV | 333 mV | -316 mV | 1.0001M Hz | Perfect Sine wave |
| 10M Hz | 0 | 630 mV | 327 mV | -305 mV | 9.976M Hz | Perfect Sine wave |
| 100M Hz | 0 | 565 mV | 290 mV | 290 mV | 99.71M Hz | Perfect Sine wave |

Circuit 2:

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  |  |
| 100k Hz | 0 | 660 mV | 335 mV | -322 mV | 100.039k Hz | No reflection seen |
| 1M Hz | 0 | 649 mV | 330 mV | -317 mV | 999.9k Hz | No reflection seen |
| 10M Hz | 0 | 627 mV | 325 mV | -305 mV | 9.96M Hz | No reflection seen |
| 100M Hz | 0 | 550 mV | 280 mV | -270 mV | 99.7M Hz | No reflection seen |

**Observation**:

As we increase the frequency the decreases, therefore at higher frequency (at GHz), we may expect further noticeable decrease of . But until now we have not seen any reflection, so it is hoped that we will not see reflection at GHz frequencies, but finger crossed, cannot be stated for sure.

**Conclusion:**

**Experiment 2:**

**Aim:** Check and calibrate the power loss in Spectrum analyser

Circuit 1:

[Signal Generator] [SMA cable] [Spectrum Analyzer]

Circuit 2:

[Signal Generator] [SMA cable] [Waveguide][Spectrum Analyzer]

The Frequency and the Signal Generator Level is given as input, Spectrum Analyzer level is measured as output

Circuit 1:

|  |  |  |  |
| --- | --- | --- | --- |
|  |  |  |  |
| 5G Hz | 0 | -2.1 | 2.1 |
| 6G Hz | 0 | -2.4 | 2.4 |
| 7G Hz | 0 | -3.7 | 3.7 |
| 8G Hz | 0 | -4.0 | 4.0 |
| 9G Hz | 0 | -6.8 | 6.8 |
| 10G Hz | 0 | -11.4 | 11.4 |

Circuit 2:

|  |  |  |  |
| --- | --- | --- | --- |
|  |  |  |  |
| 5G Hz | 0 | -6.4 | 6.4 |
| 6G Hz | 0 | -24.8 | 24.8 |
| 7G Hz | 0 | -9.7 | 9.7 |
| 8G Hz | 0 | -11.3 | 11.3 |
| 9G Hz | 0 | -16.7 | 16.7 |
| 10G Hz | 0 | -29.2 | 29.2 |

**Observation:**

As we increase the frequency, the dBm loss increases. On adding the waveguide, the dBm loss increases is more than the without waveguide circuit. Particularly at 6 GHz there is sharp decrease in the dBm loss.

**Conclusion:**

**Experiment 3:**

**Aim:** Re-calibrate the Magnetic field vs PWM

Connection:

[Electromagnet] [Lab laptop],

[Electromagnet coil 1] <Electromagnet Gauss Probe > [Electromagnet coil 2]

At first adjust the pole gap to fit the waveguide, then proceed for calibration

Find the offset between the EM Gauss Probe and the Lab Gauss probe

Place the probes hall sensor near to each other, and manually measure

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  |  |  |  |  |
| 200 |  |  |  |  |
| 250 |  |  |  |  |
| 300 |  |  |  |  |
| 350 |  |  |  |  |
| 400 |  |  |  |  |
| 450 |  |  |  |  |
| 500 |  |  |  |  |
| 550 |  |  |  |  |
| 600 |  |  |  |  |
| 650 |  |  |  |  |

Use the offset in the PWM vs Magnetic Field calibration LabView program.

Equation of PWM vs Magnetic Field: