UNIVERSITY OF WASHINGTON BOTHELL

School of Science, Technology, Engineering, and Mathematics (STEM)

Department of Electrical Engineering

B EE 454

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WiFi antenna Z-Match project

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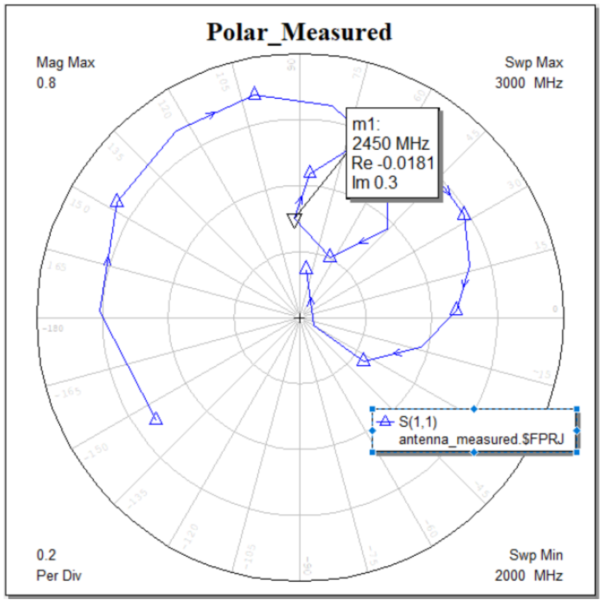
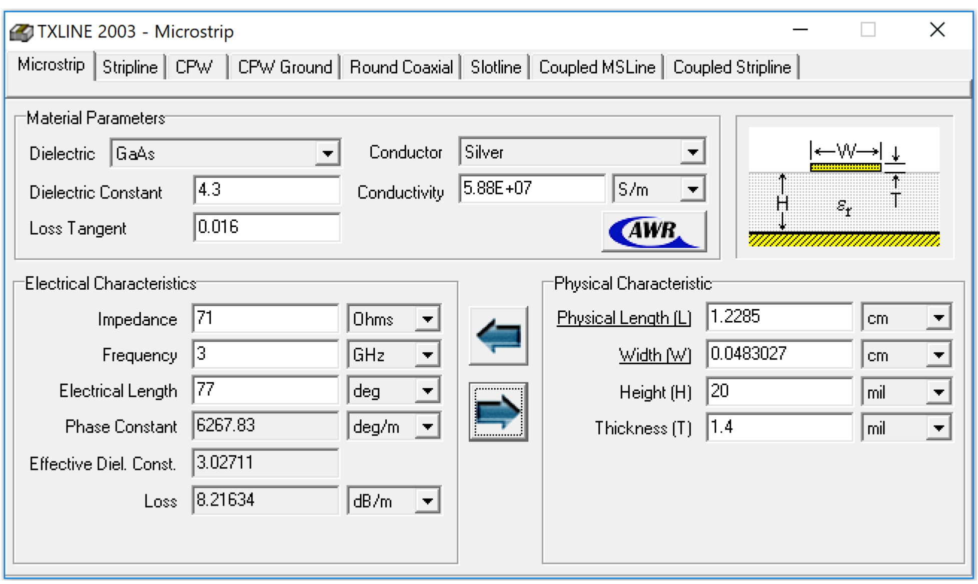
New Matching Circuit

From the measured circuit, we observed that the resonance of the circuit was phase shifted by λ/4 or 90˚ as shown in the polar chart of the measured PCB circuit. We were informed that this phase shift is caused by a transmission line on the PCB between the pads and antenna port.

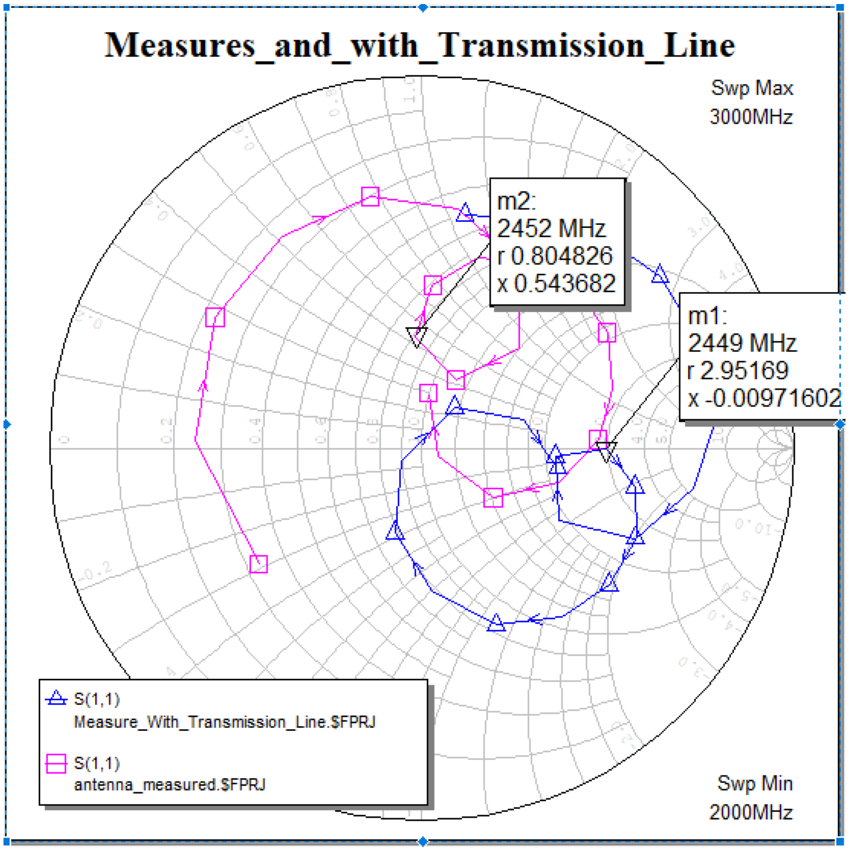


Redesigning our circuit, we need to account for this transmission line in the PCB. We use a transmission line component in AWR, TLIN model, to produce a phase shift.

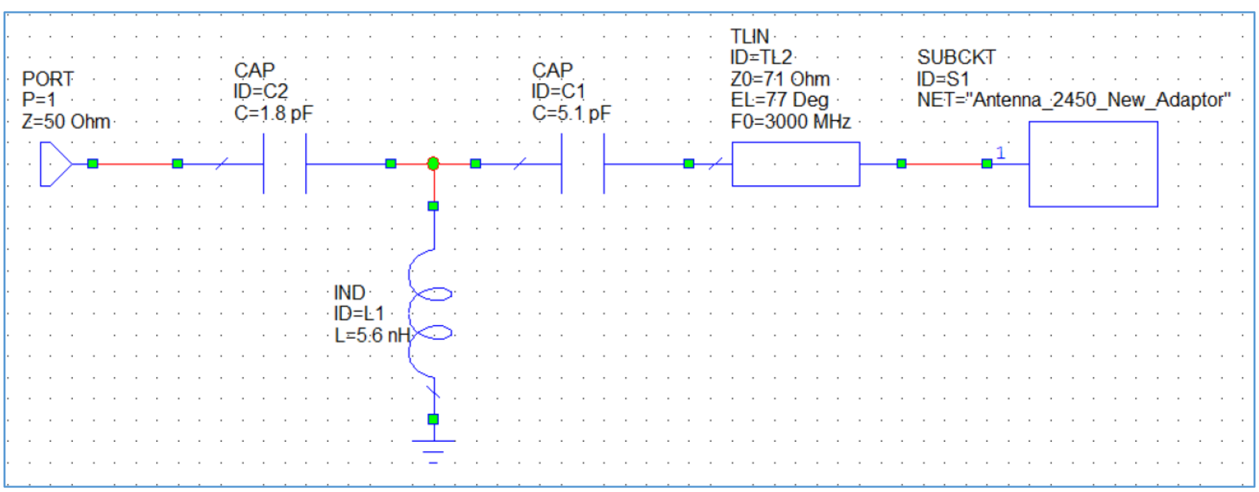


TXLine software modeling the transmission line on the PCB

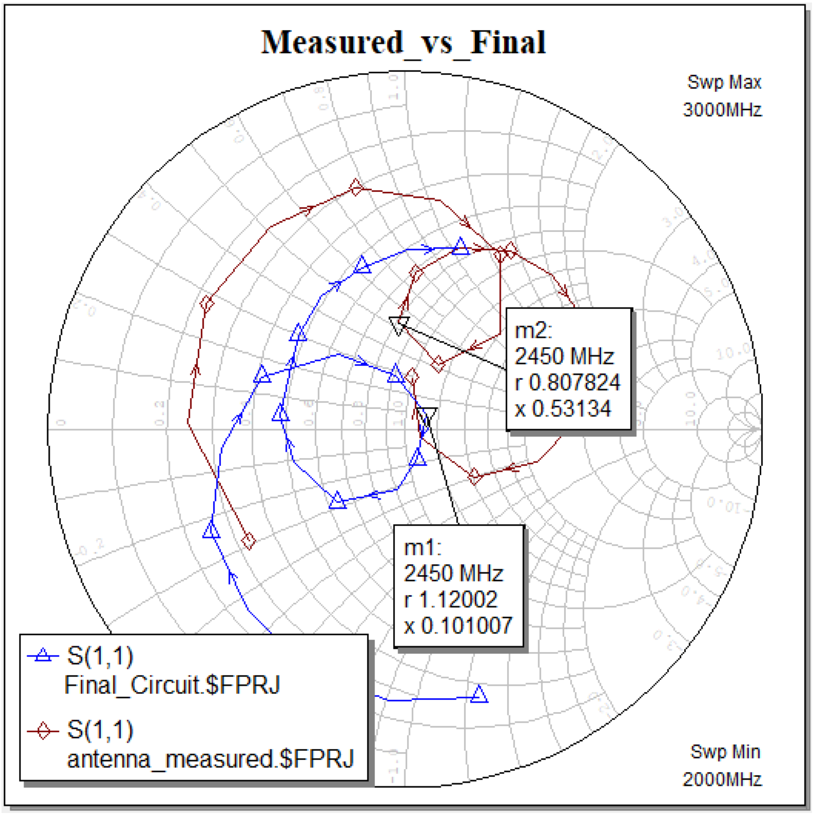
We find this matching component using the TXLine software. The physics characteristics of the transmission line on the PCB are inputted into software to give us our impedance and electrical length. The frequency, dielectric constant, and loss tangents are fundamental properties for microstrip PCB's.

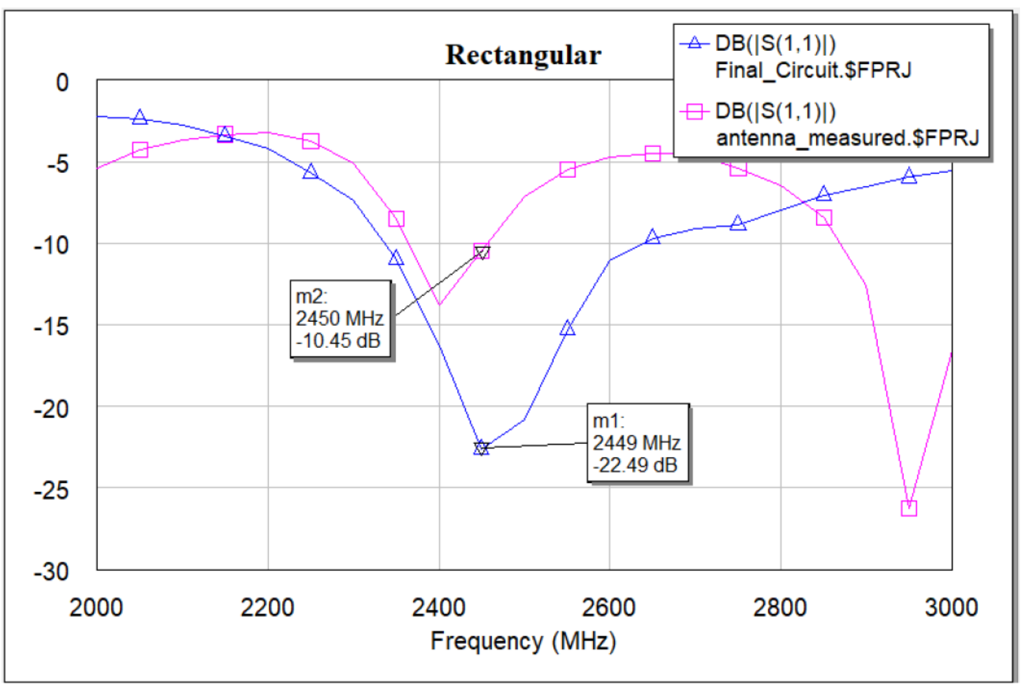


Smith Chart comparing the measured and with the transmission line



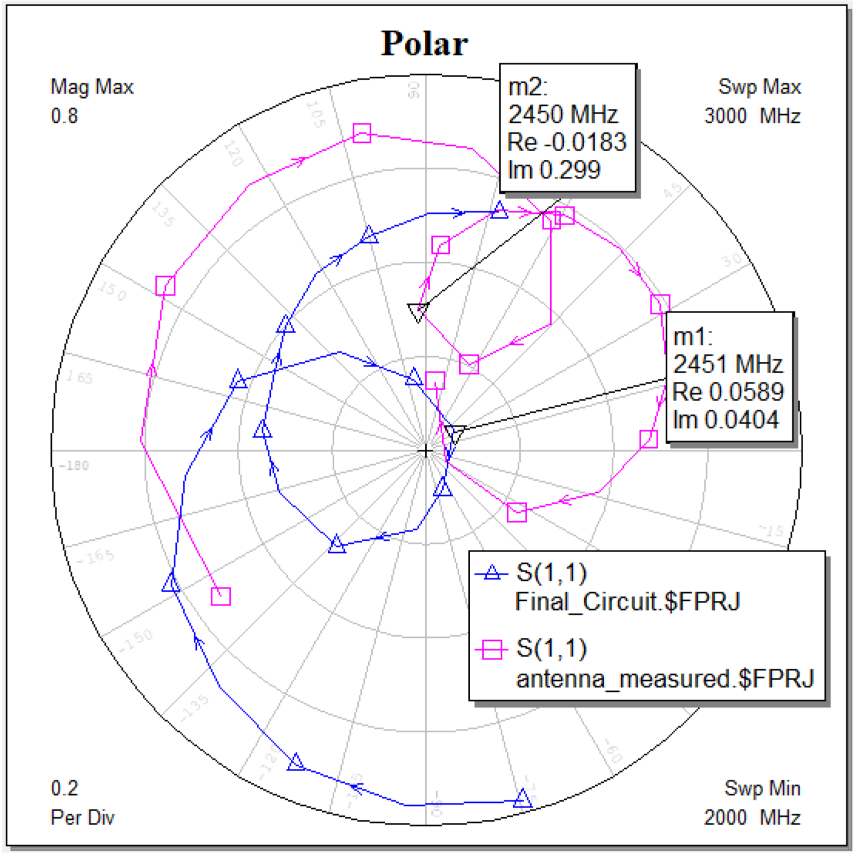
New matching circuit simulated in AWR





Rectangular plot for the fixed circuit

Looking at the rectangular plot of the circuit, we see that the power radiated from the antenna at 2.45 GHz is **<u>22.49 dB</u>**. This is **<u>12.04 dB</u>** more power radiated than the measured antenna.



Polar chart of measured vs final circuit

From the polar plot of our measured data, we can see that there is indeed a phase shift of under $\lambda/4$ as seen by the 90-degree shift from the resonated true impedance at -180 degrees. The final impedance matched circuit accounts for this shift and then paths near the center using new components.