Microwave filter

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Slot: F1

Subject: Microwave Engineering

OBJECTIVE

1. For the given filter specifications, design and simulate the LPFs using Richard's Transformation and Stepped Impedance methods
2. Implement on standard substrate εr =4.4, H=1.6 mm, T=0.05 mm, Tanδ=0.001. System Impedance (Ohm)= 30
3. Given Z_0=45 Ohm
4. F-cutoff=4.5Ghz
5. Insertion-loss=-30DB at 8Ghz
6. Ripple magnitude=0(maximally flat)
7. Low Impedance= 35 Ohm
8. High Impedance= 125 Ohm

Procedure

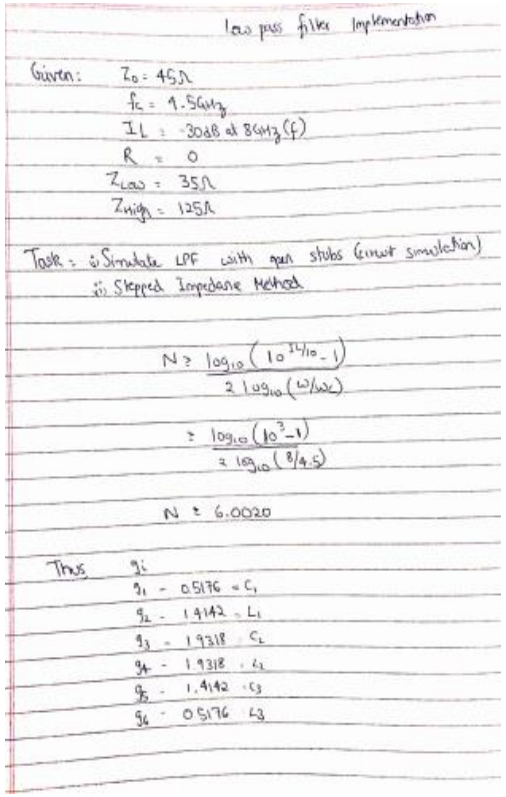
Richard's Transformation

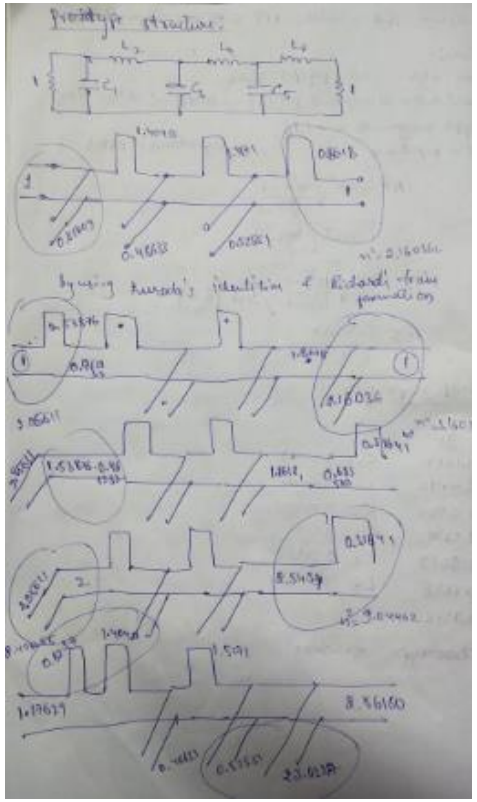
1. Find value of N for corresponding ripple factor
2. Simplify the circuit to open circuit configuration using kurdos identity.
3. Create a schematic for the following circuit.
4. Run a frequency analysis.
5. Plot the graph.

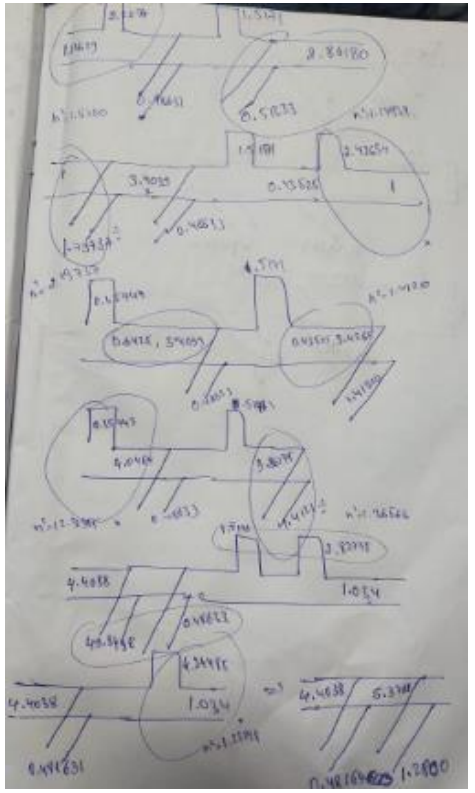
Stepped impedance method

1. Find value of N for corresponding ripple factor
2. Simplify the circuit using respective values of low impedance and high impedance.
3. Create a schematic for the following circuit.
4. Run a frequency analysis.
5. Plot the graph.

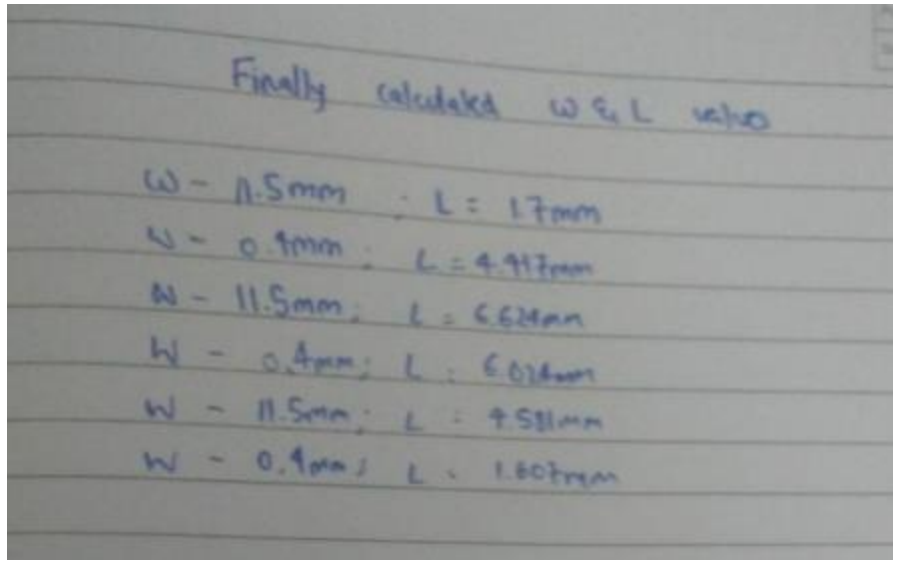
Calculations

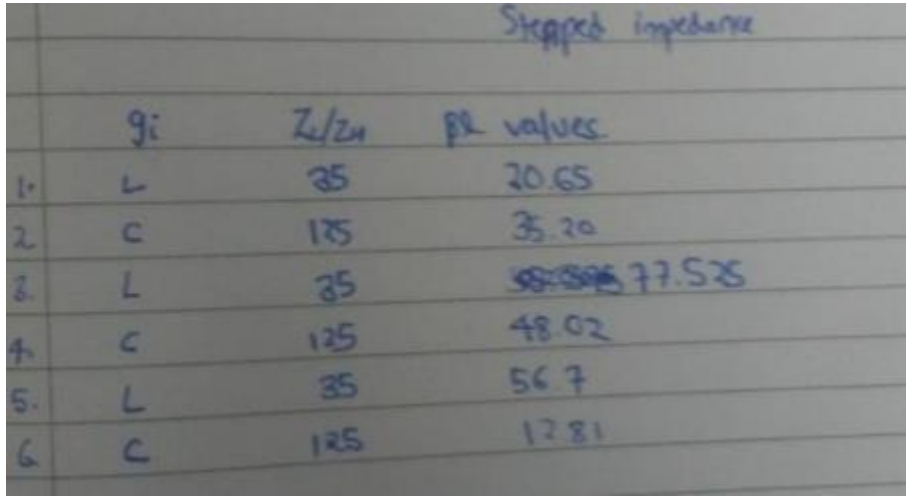




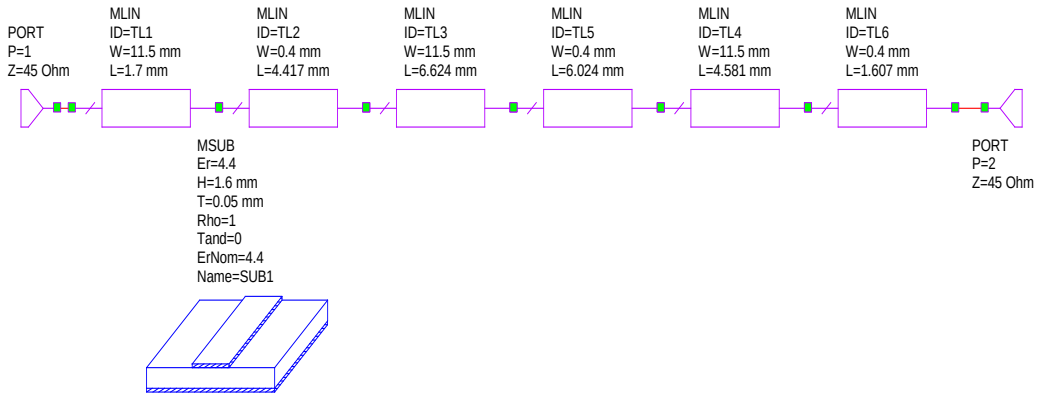


Calculations



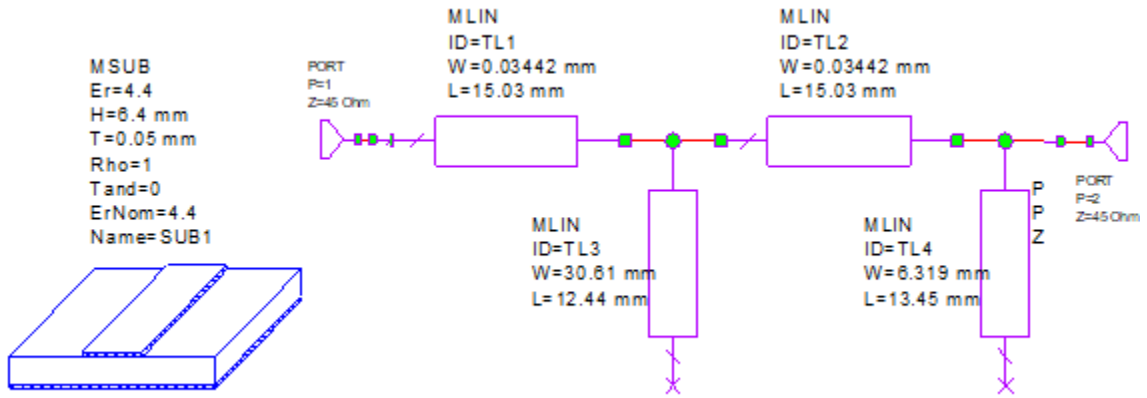


Design



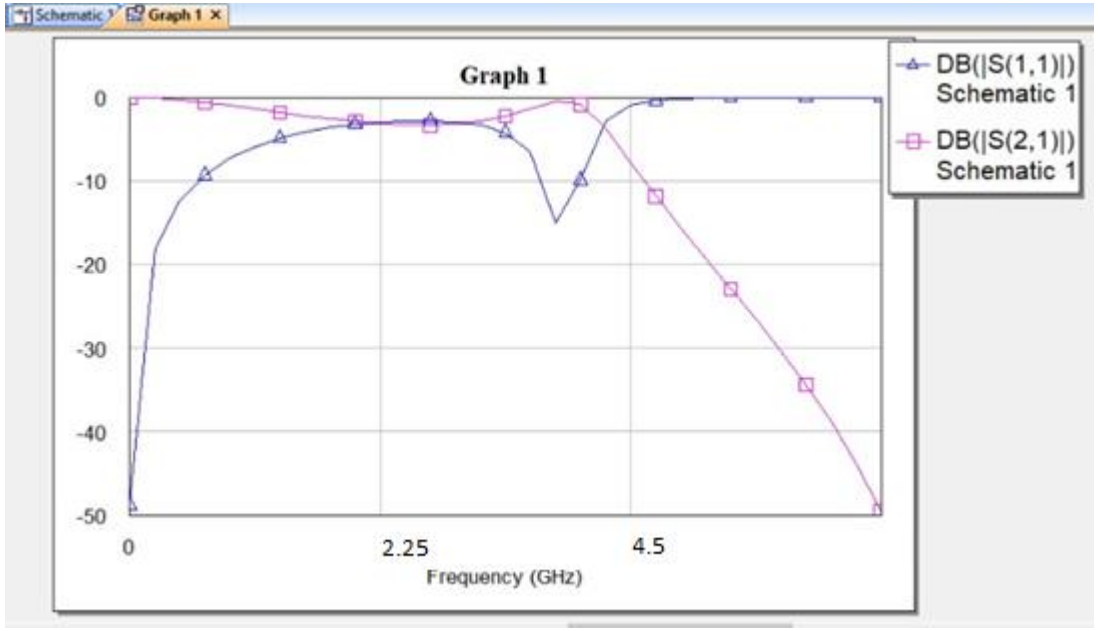
Richard's Transformation

Stepped impedance method

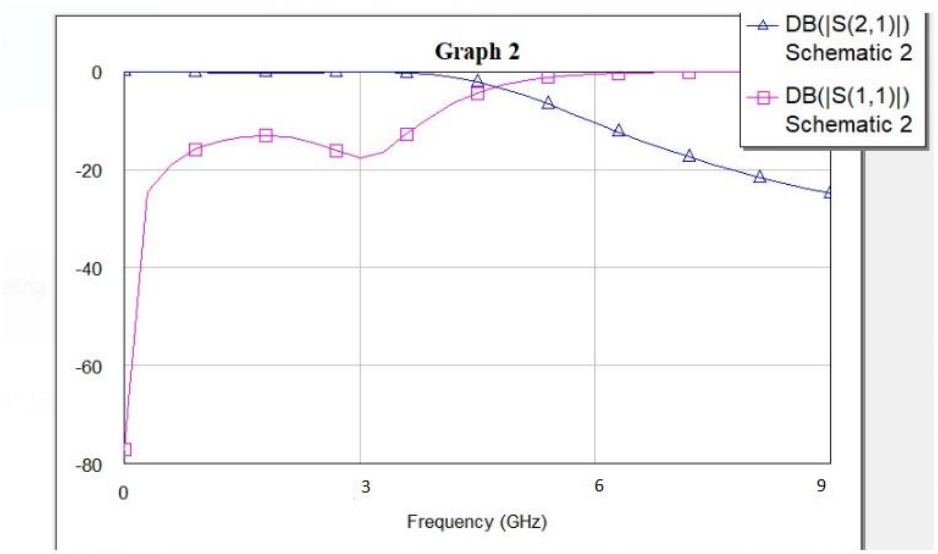


Graph

Richard's Transformation



Stepped impedance method



Results

- N=6
- Fc=4.5Ghz

Richard’s Transformation

- N=6
- Fc=4.5Ghz

Stepped impedance method

Inferences

The Low pass filter has been designed using Richard’s transformation and Step impedance method.

The graphs have been constructed and the output values have been recorded.

References

- Microwave Engineering- David M. Pozar
- https://www.tutorialspoint.com/microwave_engineering/microwave_engineering_introduction.htm
- https://www.microwaves101.com/encyclopedias/waveguide-mathematics
- https://en.wikipedia.org › wiki › Microwave_engineering