

How to Integrate RF MEMS Switch with Microstrip Transmission Line

I had issues with setting up the Microstrip Transmission line with Lumped port issue, but that problem is solved. Microstrip line works correctly and RF MEMS Switch works correctly too.

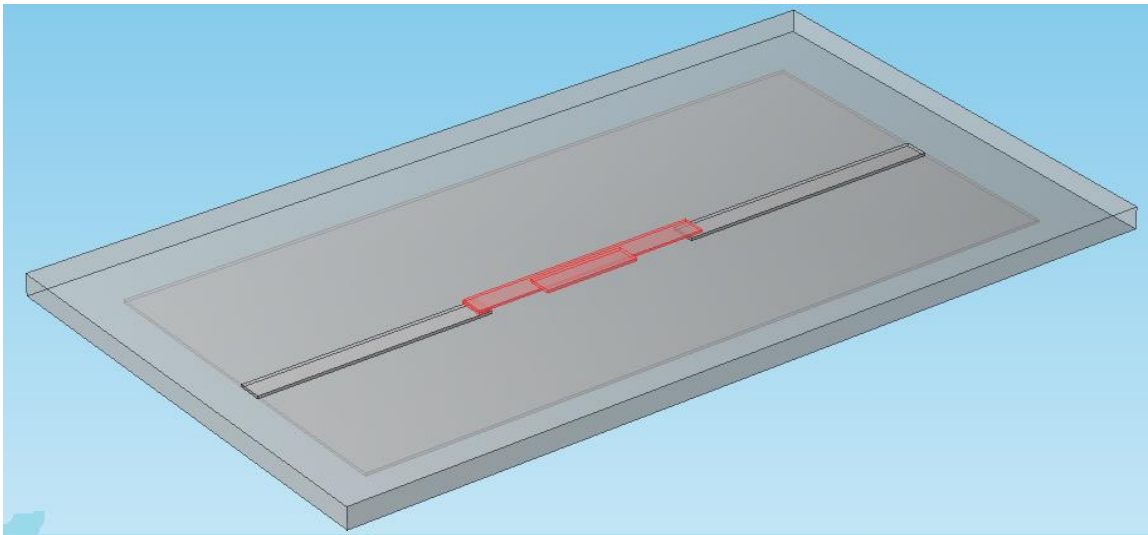
There are couple of issues which needs to be addressed,

1. To find the S-parameters for the RF MEMS Switch like insertion loss, isolation loss and return loss for the Switch. This requires switch to be connected to the Microstrip line.
2. When the **Switch is ON**, The Cantilever is touching the Microstrip line and need to calculate S21 parameter i.e.: insertion loss through the RF MEMS Switch.
3. When the **Switch is OFF**, The Cantilever and Microstrip line have a gap of $2\mu\text{m}$ and need to calculate S21 Parameter i.e.: Isolation through the RF MEMS Switch.

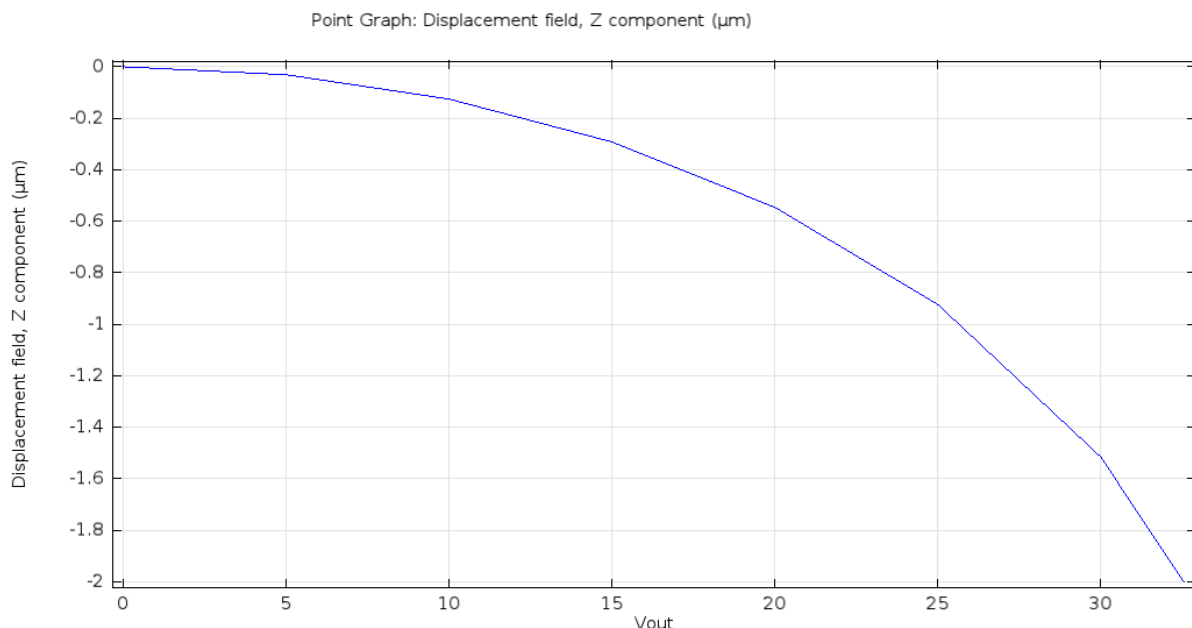
Q - How to simulate the above scenario? Q - How to pass RF signal through the RF MEMS Switch ?

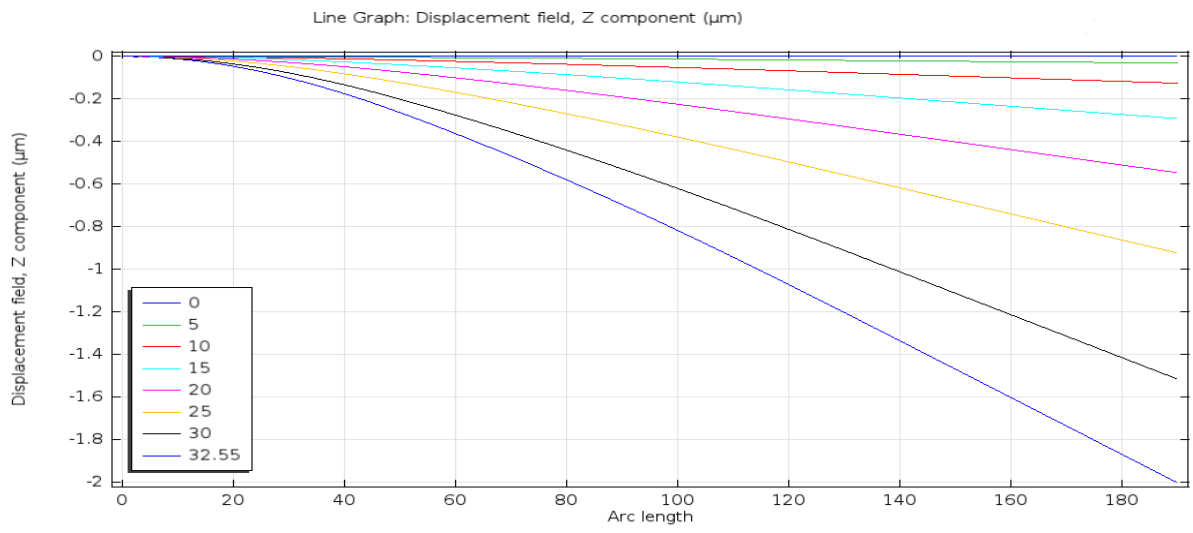
Design and Results obtained -

The Figure shows the **RF MEMS Switch on top of the Microstrip Line**. The highlighted red colour is the Cantilever based RF MEMS Switch with bottom Electrode.



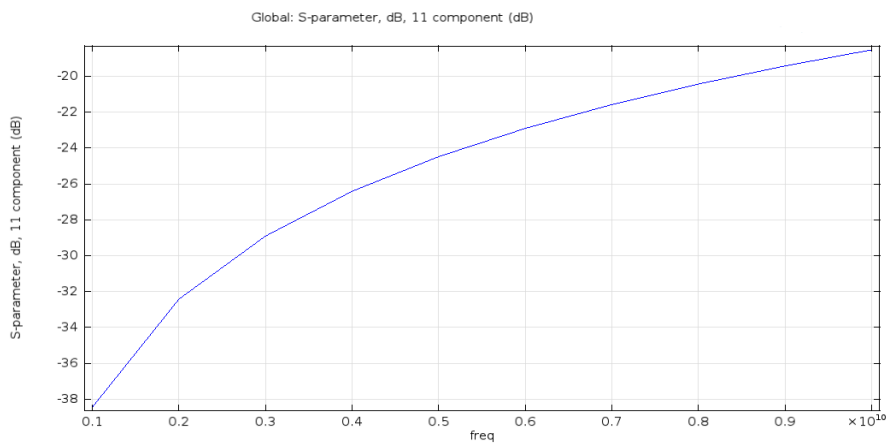
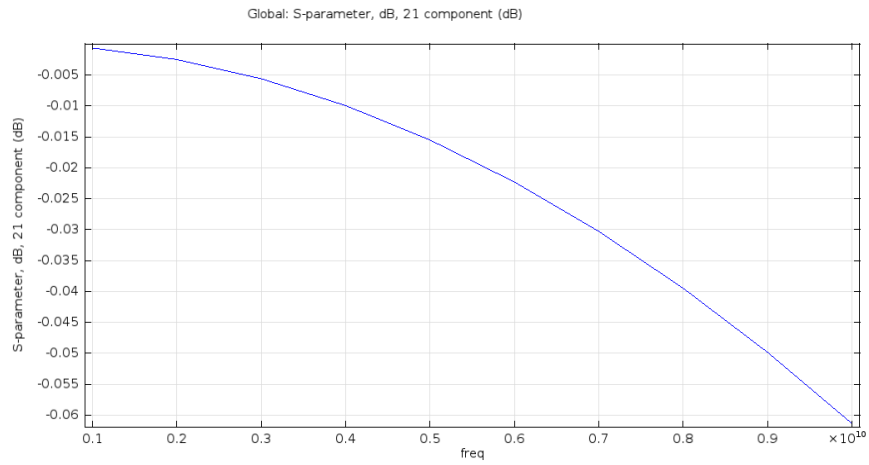
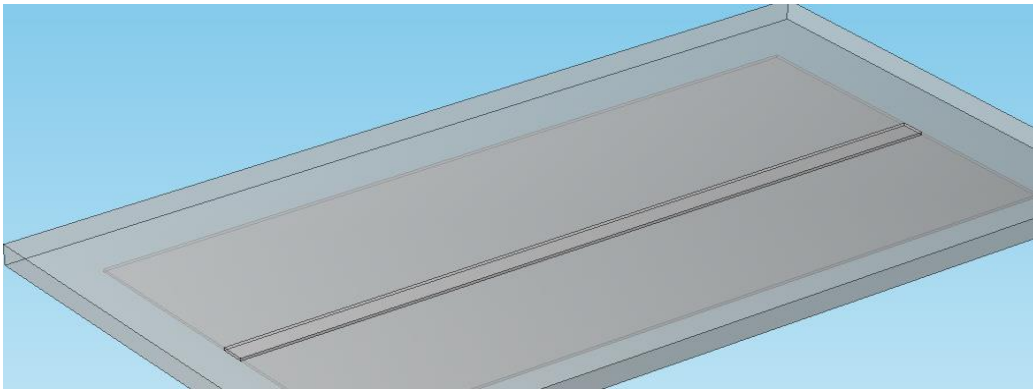
The Designed RF MEMS Switch is working correctly and was able to find the Actuation Voltage and Capacitance too. The Gap between the Cantilever and Microstrip line is $2\mu\text{m}$. The actuation Voltage required for $2\mu\text{m}$ displacement is 32.55 volts.



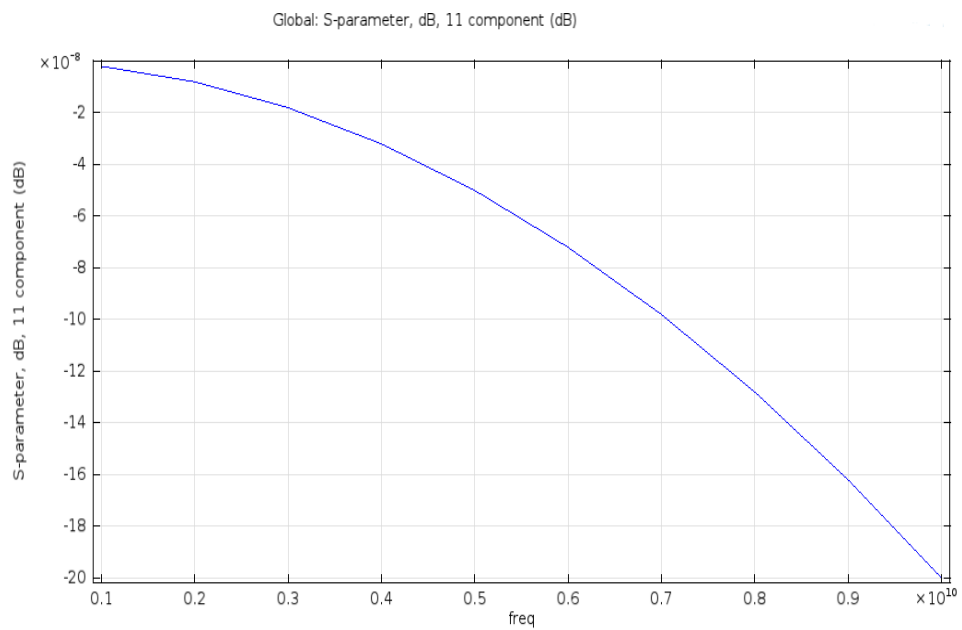
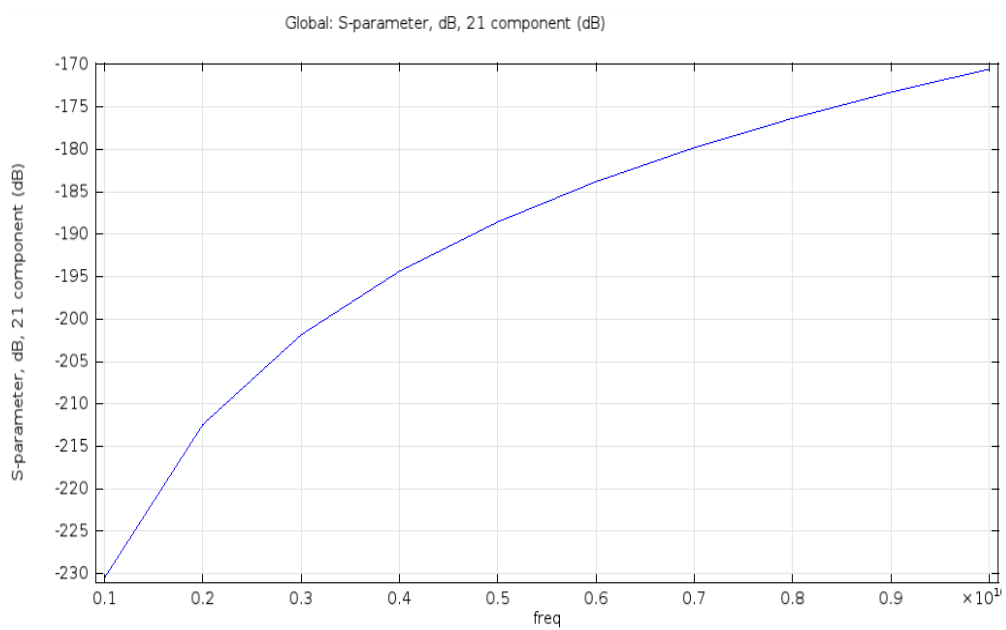
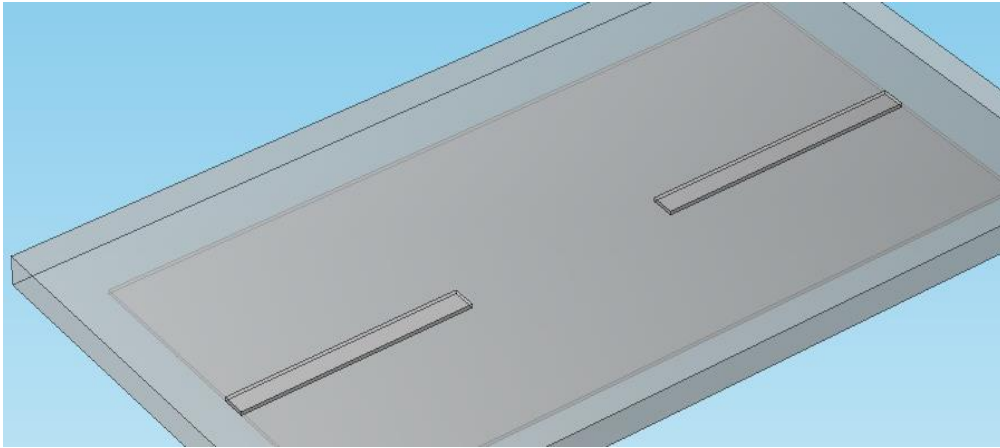


Microstrip Line Simulation –

The input and Output Lumped ports are setup. The Simulation of Transmission line for the following dimensions were performed. The S_{21} and S_{11} parameters are calculated.



Microstrip line with Gap –



This gap between the Microstrip line should be filled by the RF MEMS Switch. When the Switch is ON, The RF Signal should pass. When the Switch is OFF, RF Signal should not pass.