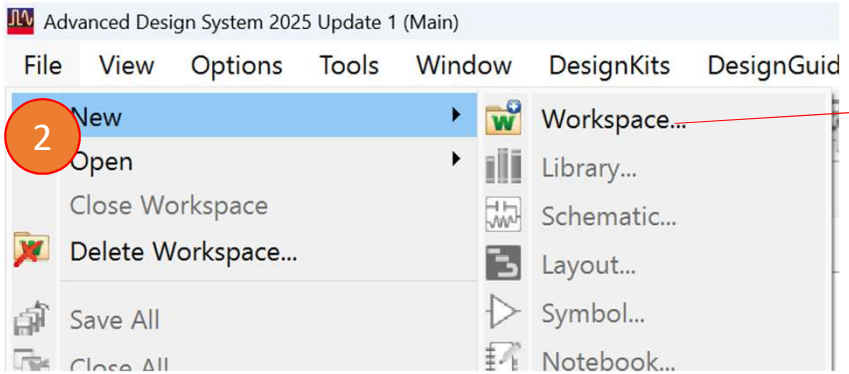
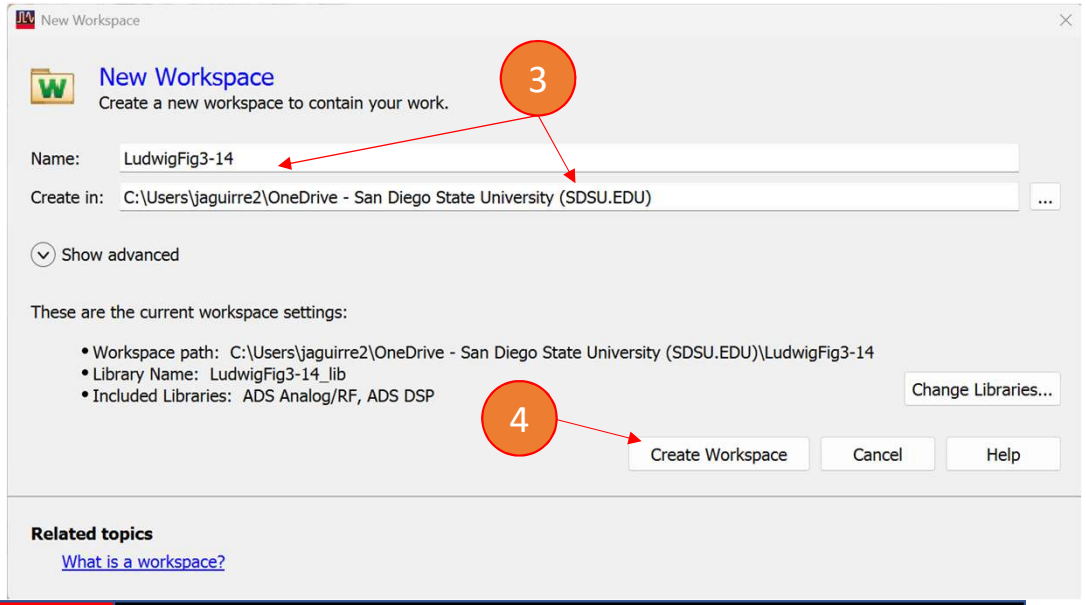
ADS

Smith Chart Utility

Getting Set up on ADS to Use Smith Chart Utility

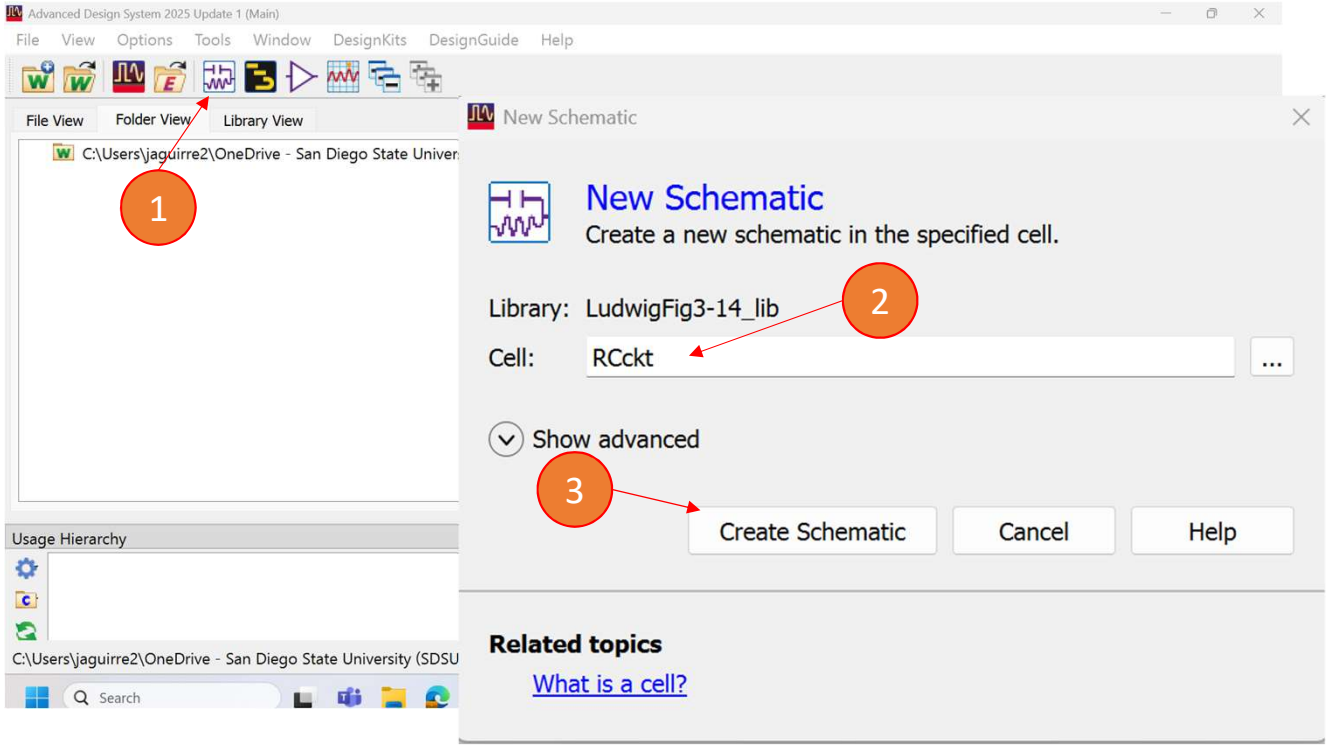
1. Open up Latest verion of Keysight Advanced Design System (ADS)
2. Create a New Workspace
3. Give Workspace a name and location off folder
4. Click Create Workspace





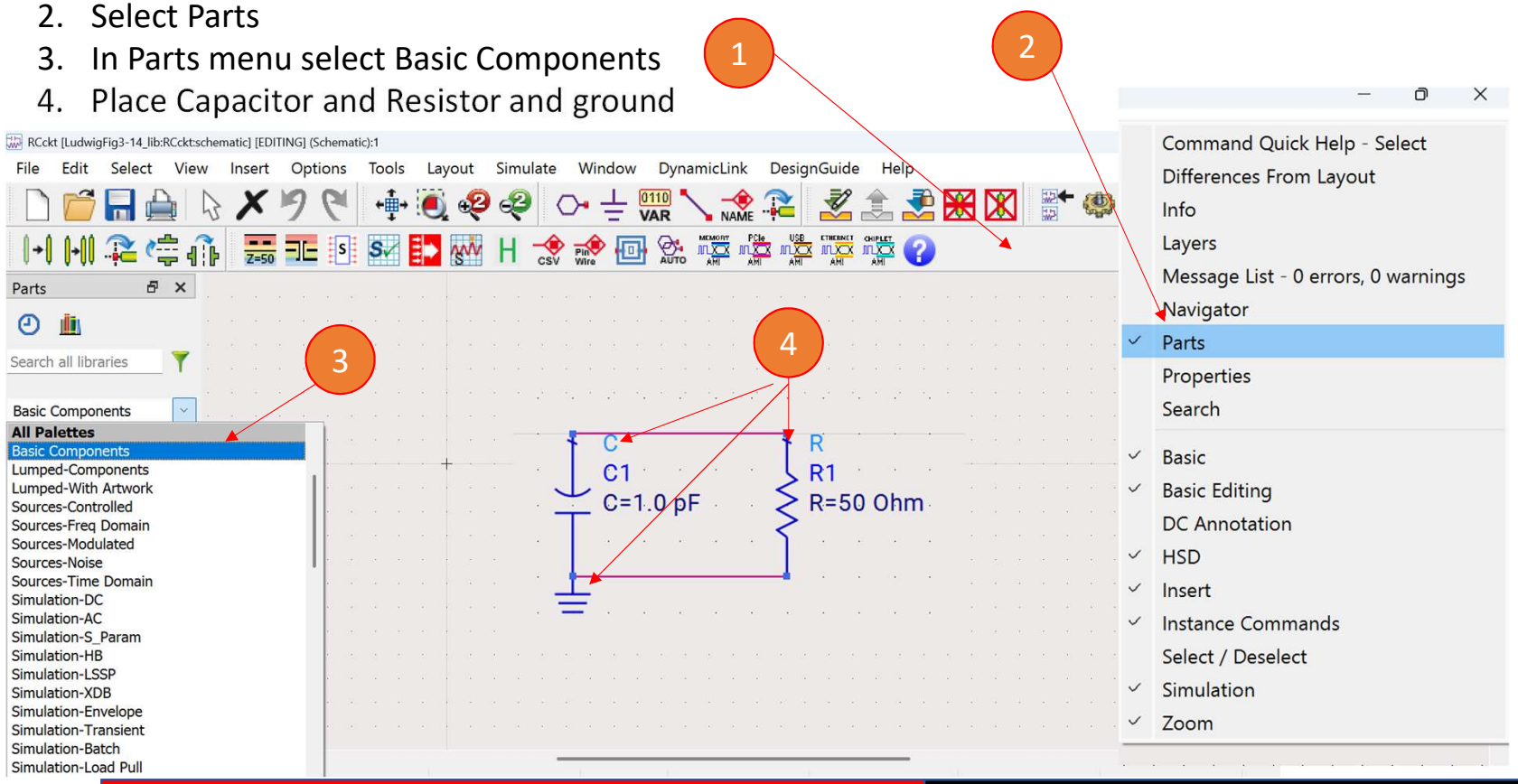
Getting Set up on ADS to Use Smith Chart Utility

1. Create a Schematic Cell (click on schematic icon)
2. Name the Cell
3. Click on Create Schematic



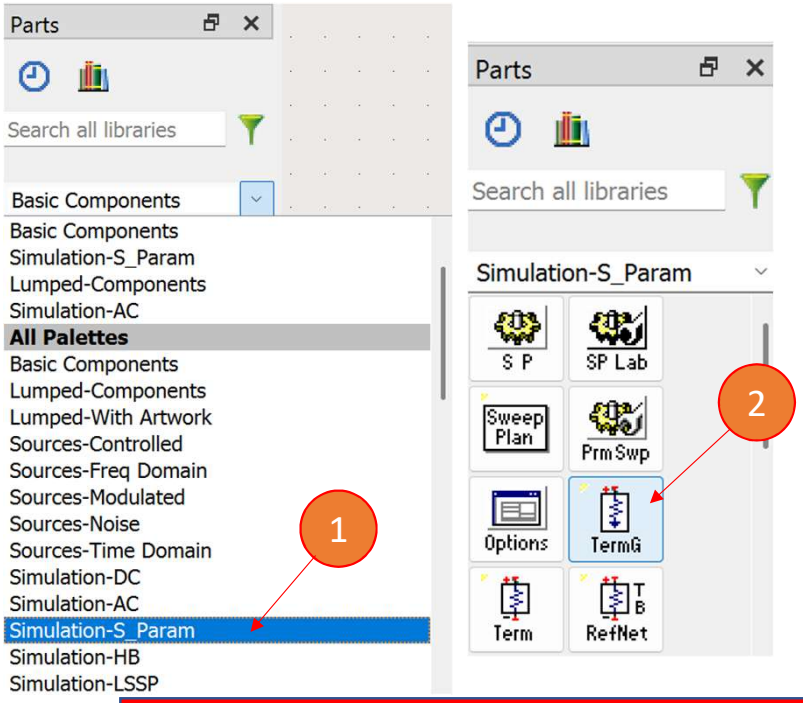
Getting Set up on ADS to Use Smith Chart Utility

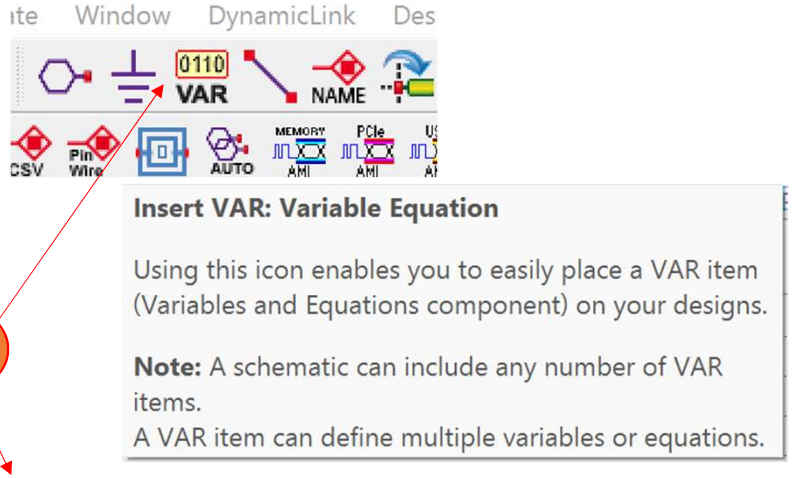
1. Rt click Tool Bar area
2. Select Parts
3. In Parts menu select Basic Components
4. Place Capacitor and Resistor and ground

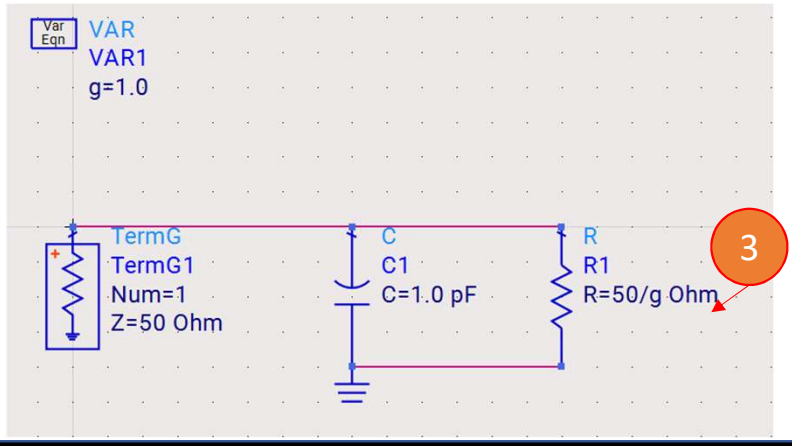


Getting Set up on ADS to Use Smith Chart Utility

1. Select the Simulation S_Param Palette in the Parts Menu
2. Select and Place TermG Source
3. Change Resistor resistance to Variable 50/g
4. Insert Var: Variable equation for ‘g’

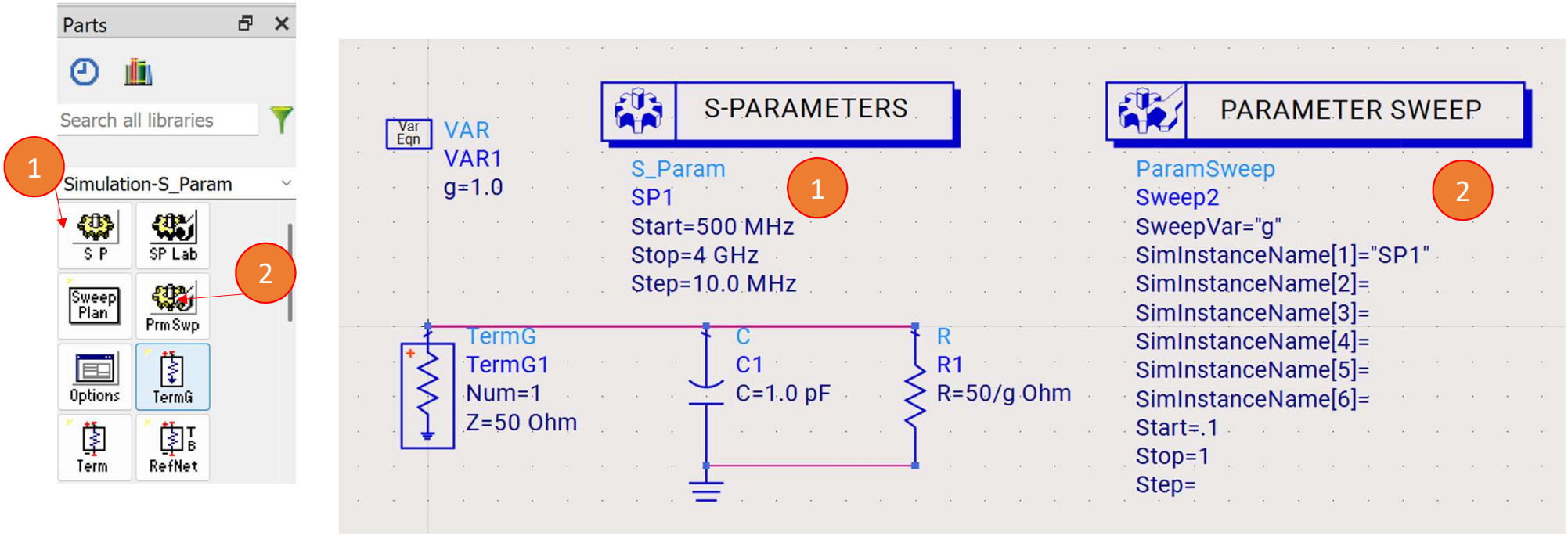






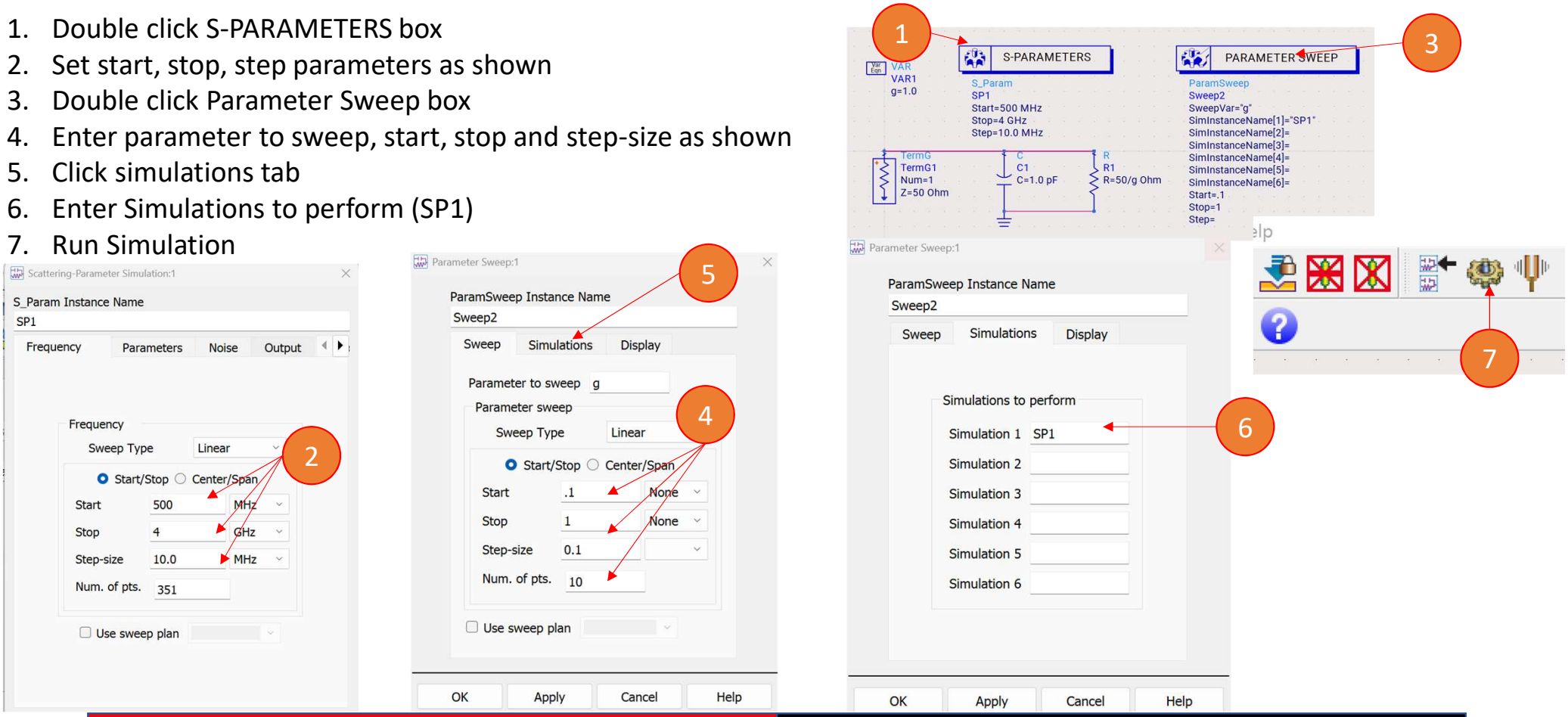
Getting Set up on ADS to Use Smith Chart Utility

1. Insert S-parameter Simulation (500 MHz to 4 GHz)
2. Insert Prm Swp

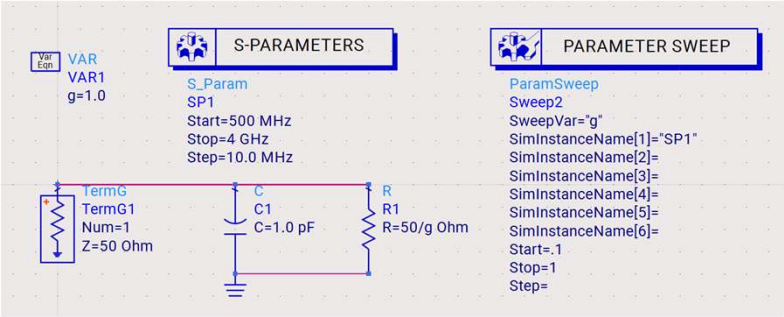


Getting Set up on ADS to Use Smith Chart Utility

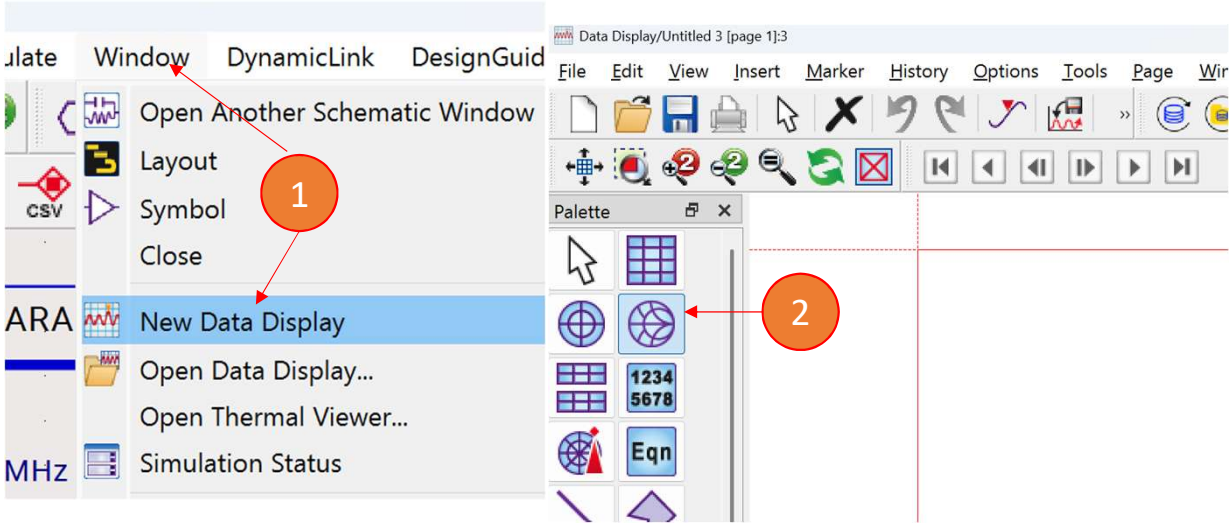
1. Double click S-PARAMETERS box
2. Set start, stop, step parameters as shown
3. Double click Parameter Sweep box
4. Enter parameter to sweep, start, stop and step-size as shown
5. Click simulations tab
6. Enter Simulations to perform (SP1)
7. Run Simulation

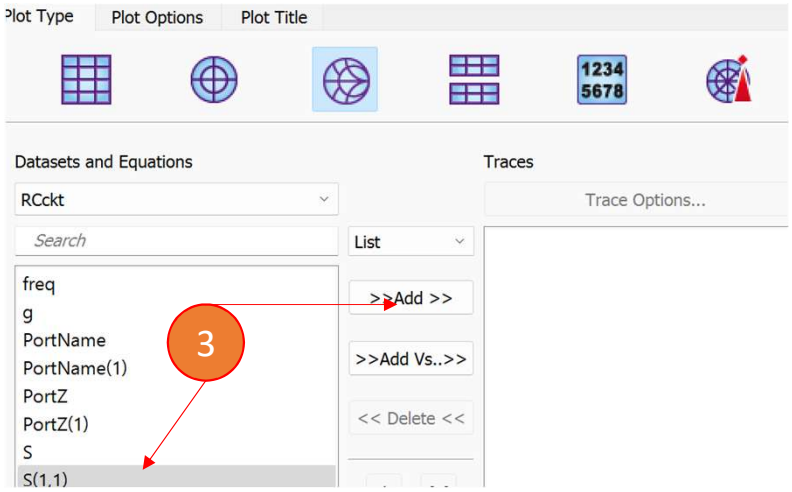


Admittance Response of Parallel RC Circuit at constant conductances



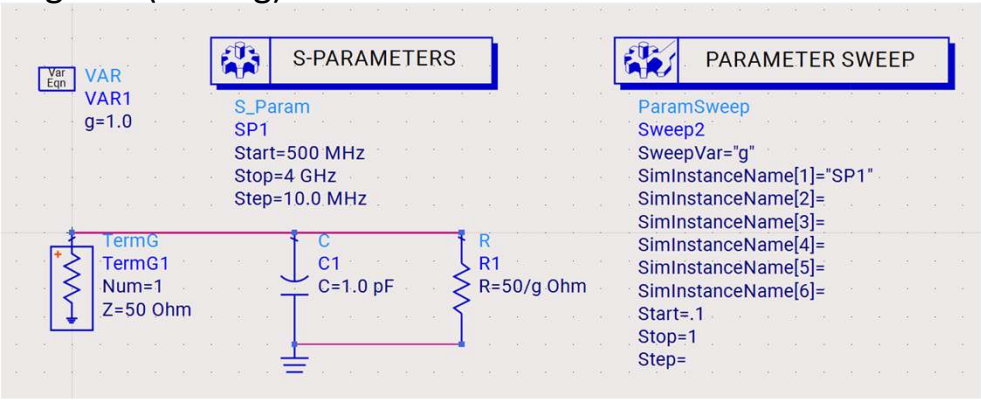
1. Open New Data Display Window>New Data Display
2. Select Smith Chart
3. Select Dataset and Add to Traces

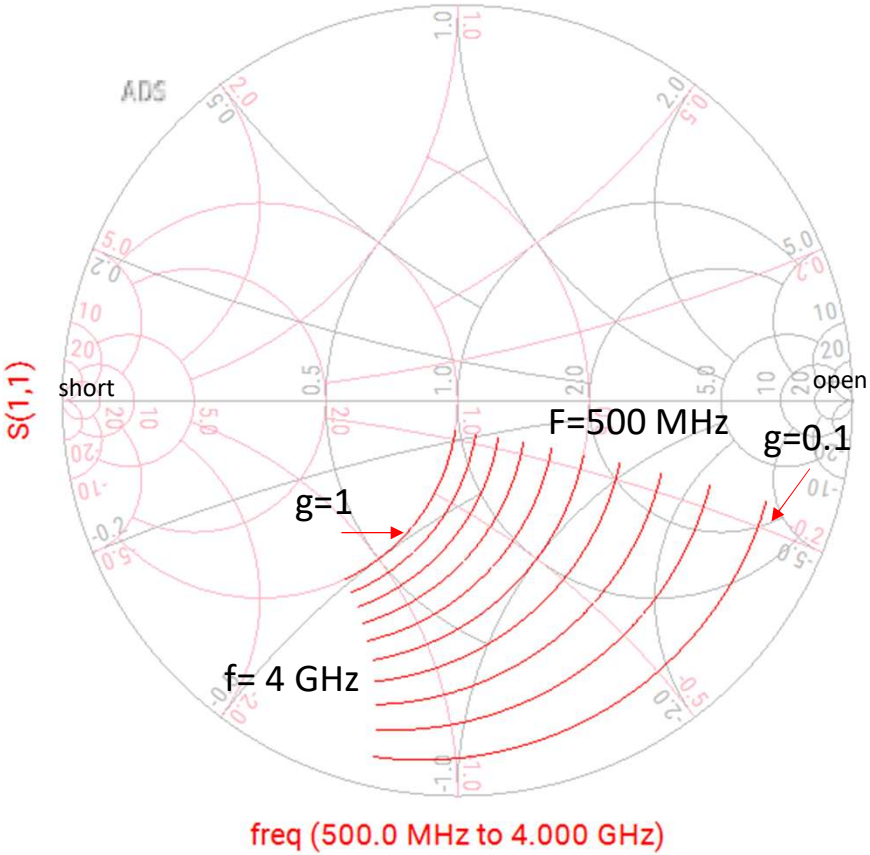




Admittance Response of Parallel RC Circuit at constant conductances g=.1 → 1

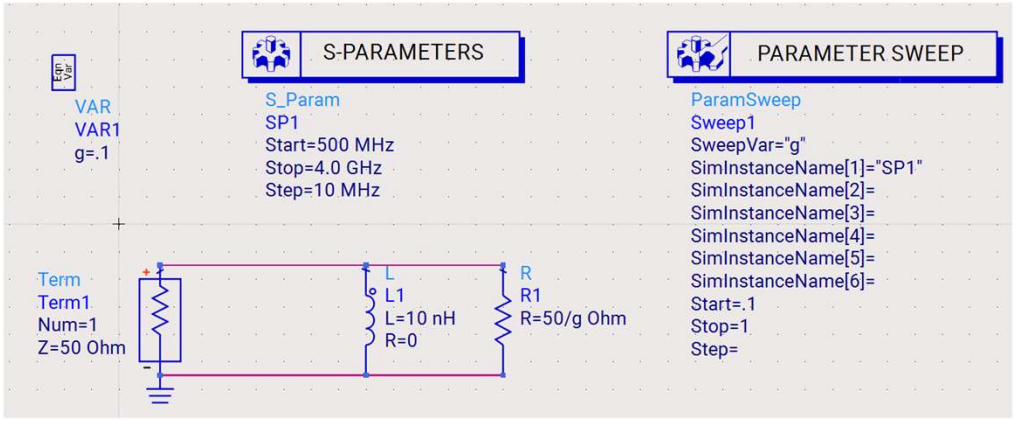
Fig 3-14(Ludwig)

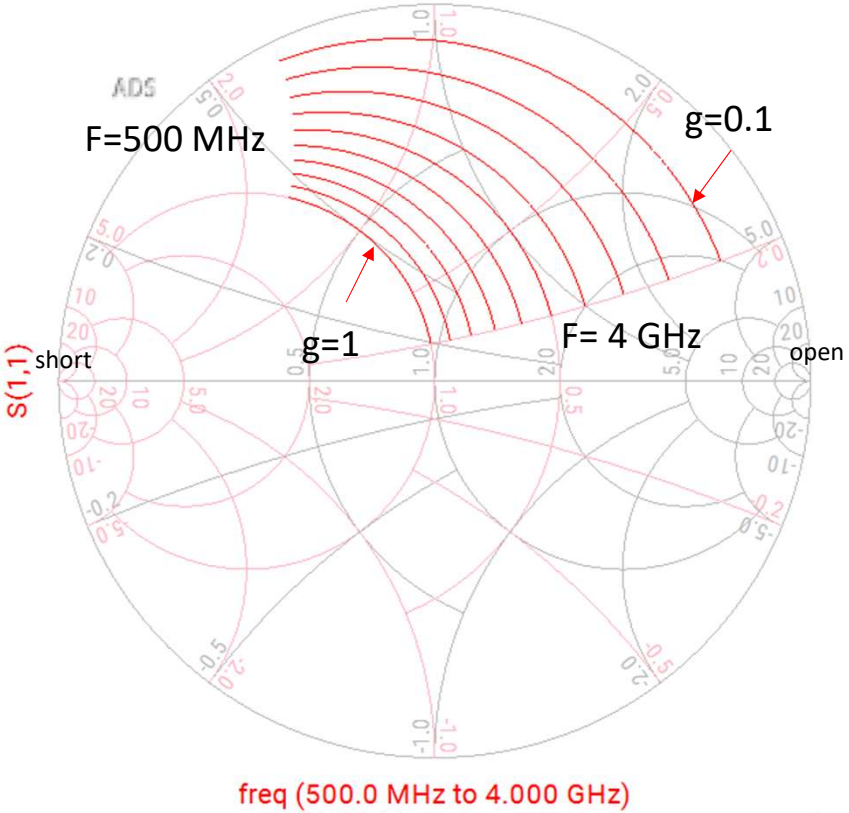




Admittance Response of Parallel RL Circuit at Constant Conductances g=.1 → 1

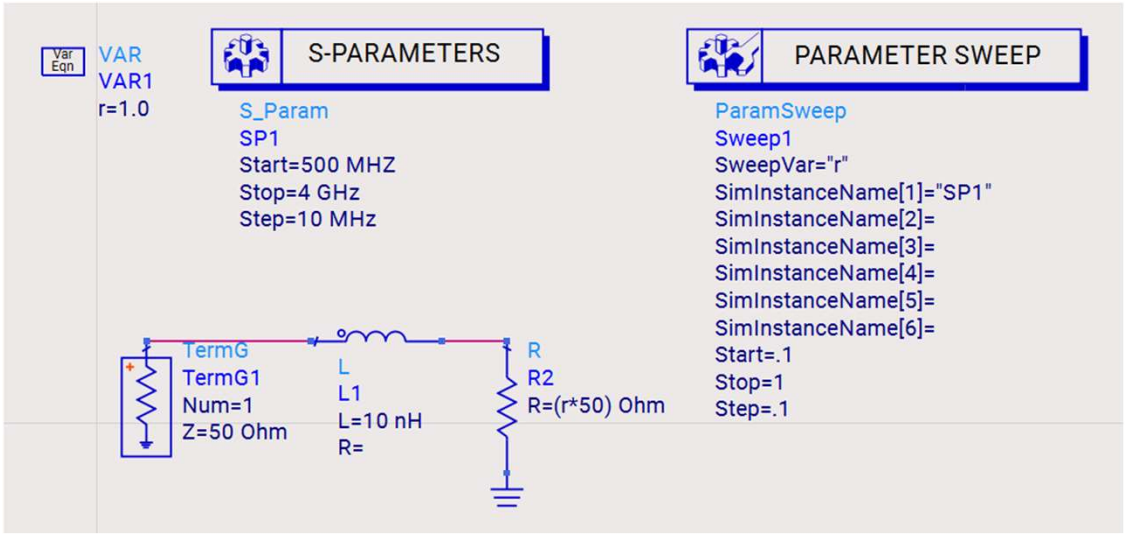
Fig 3-13 (Ludwig)

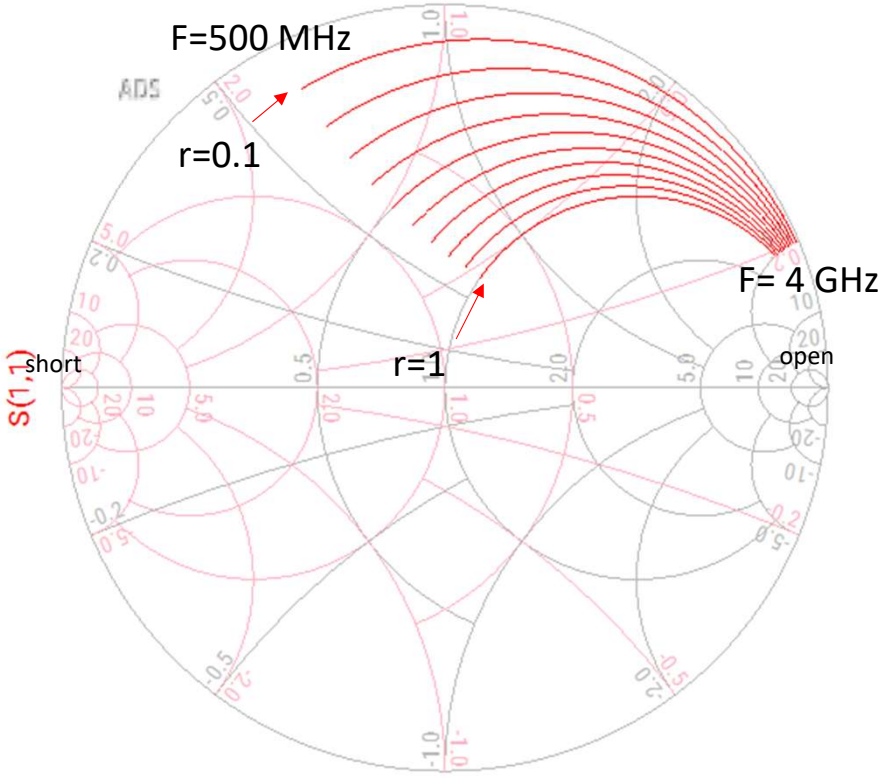




Admittance Response of Series RL Circuit at Constant Conductances g=.1 → 1

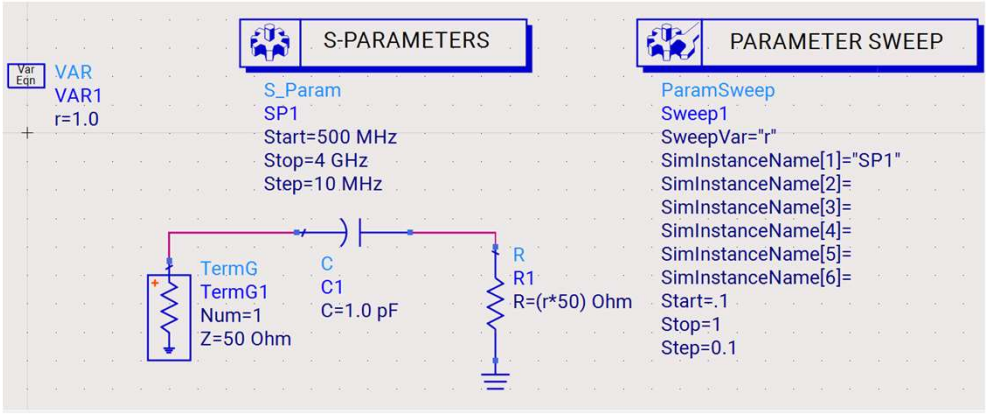
Fig 3-15 (Ludwig)

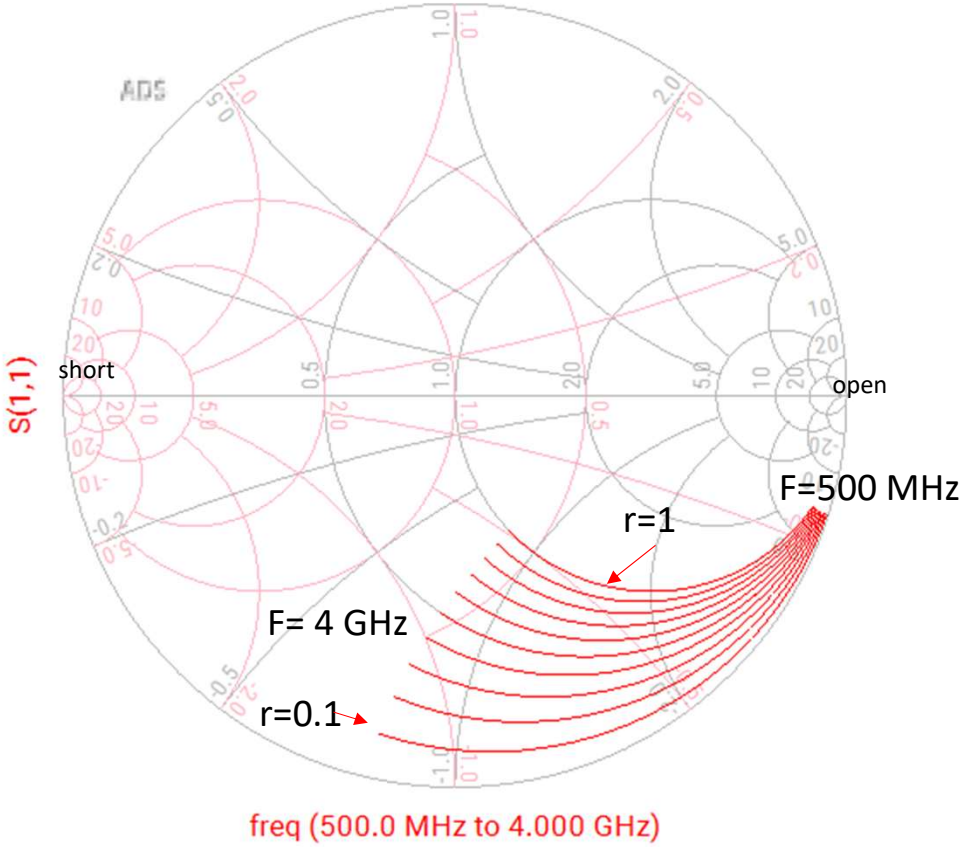




Admittance Response of Series RC Circuit at Constant Conductances g=.1 → 1

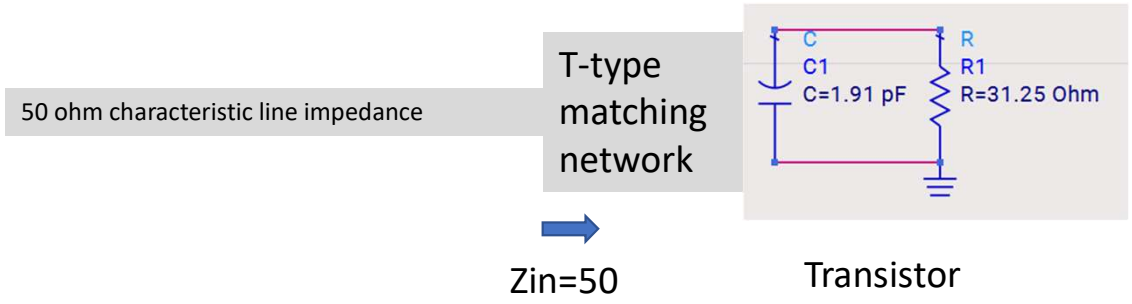
Fig 3-16 (Ludwig)





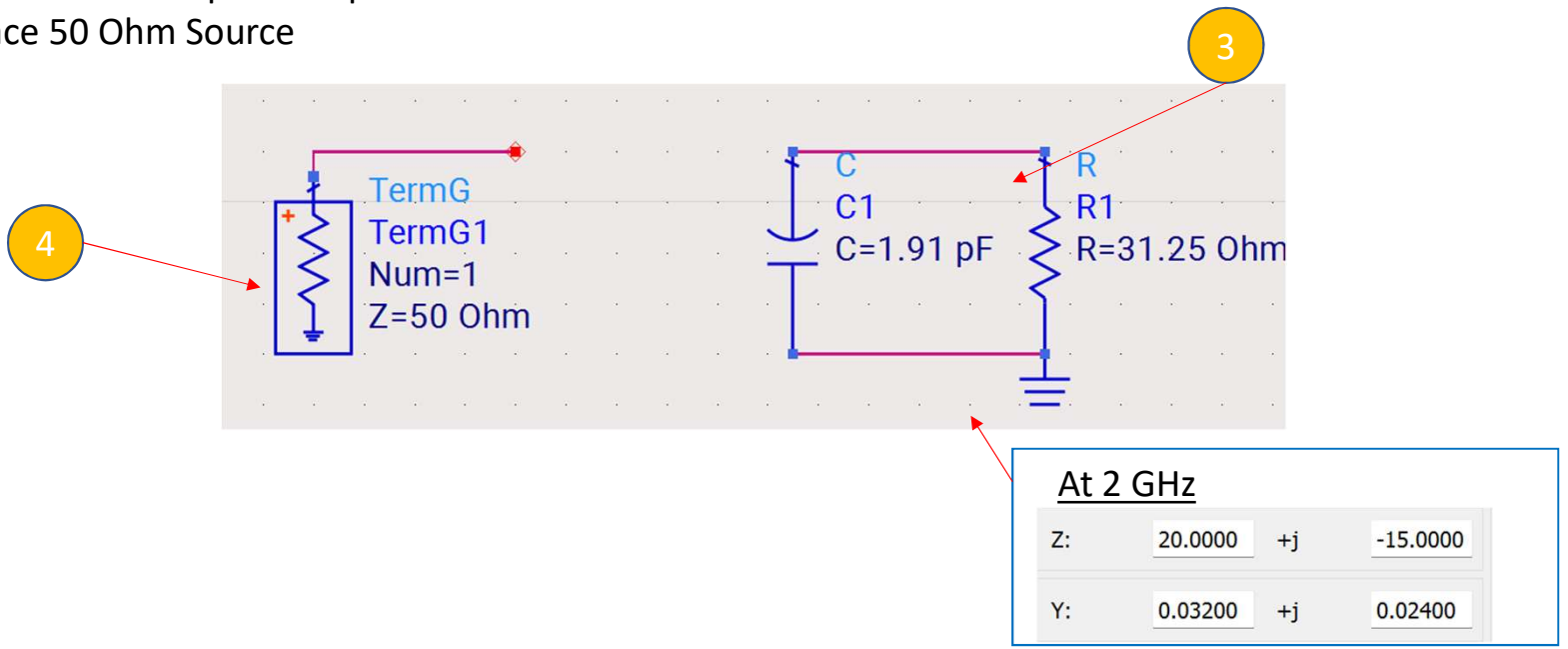
Smith Chart to design T-type network to match base-emitter input impedance of bipolar transistor

Match frequency = 2 GHz
Simulate from 500 MHz to 4 GHz
Transistor circuit as shown



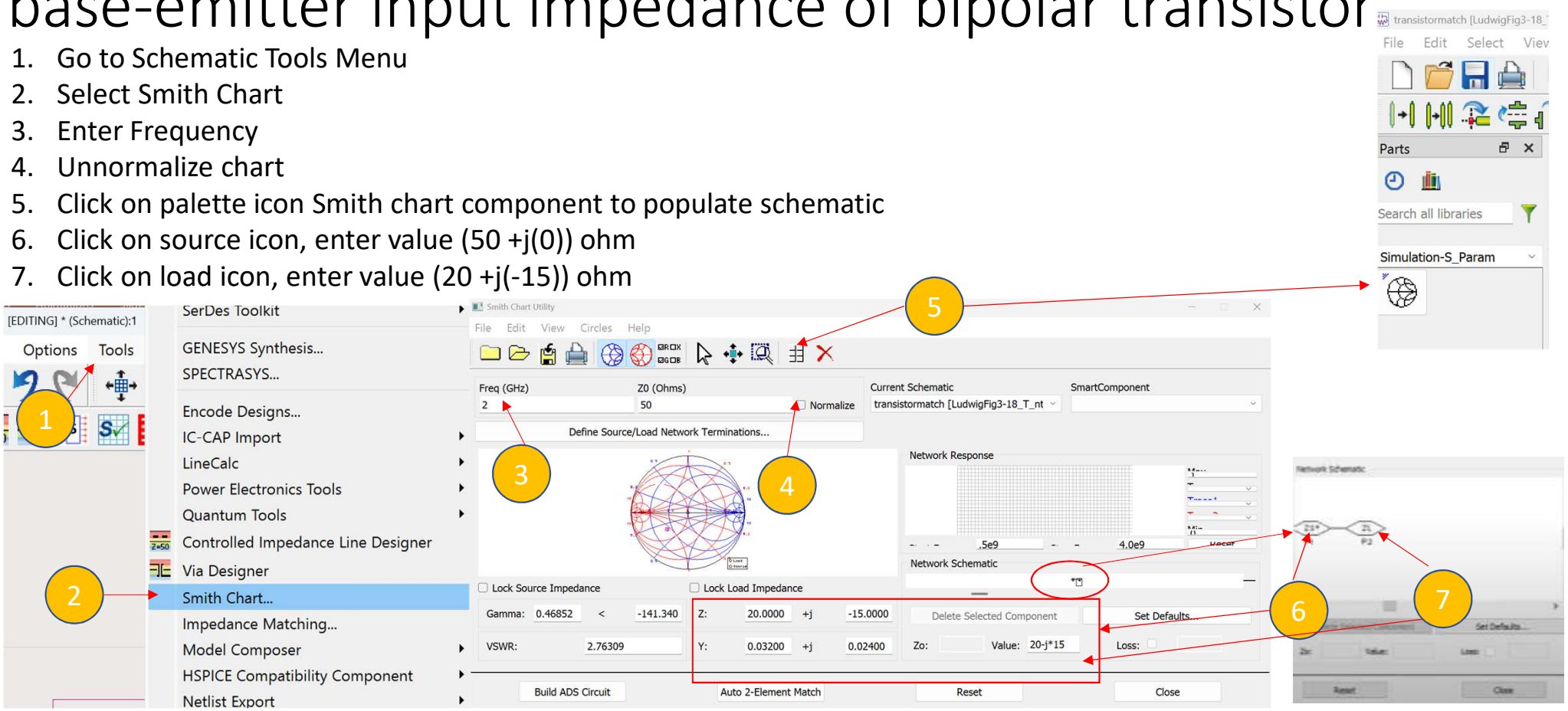
Smith Chart to design T-type network to match base-emitter input impedance of bipolar transistor

1. Create New Workspace
2. Create new schematic cell
3. From Basic components palette create Transistor circuit
4. Place 50 Ohm Source



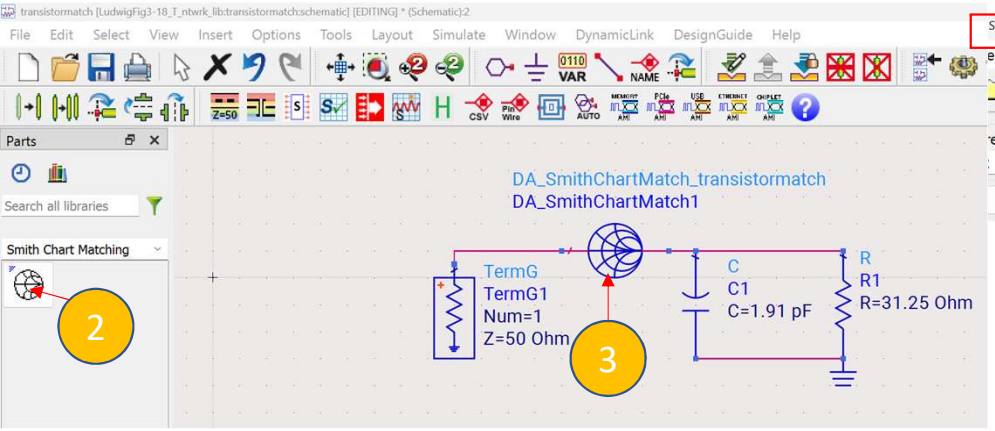
Smith Chart to design T-type network to match base-emitter input impedance of bipolar transistor

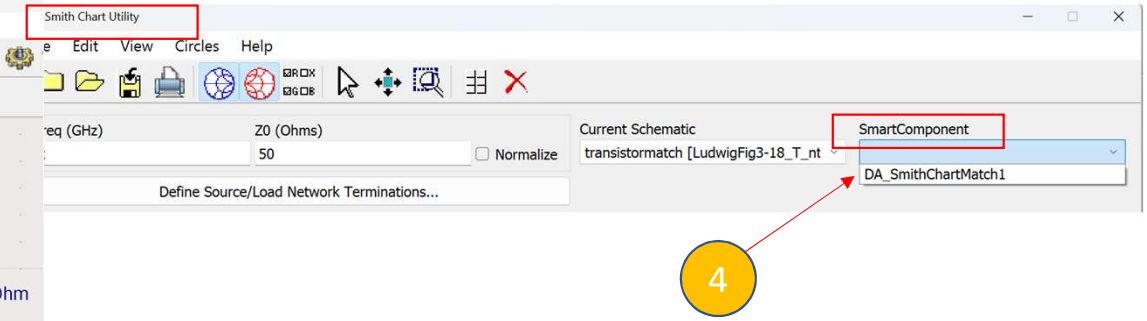
1. Go to Schematic Tools Menu
2. Select Smith Chart
3. Enter Frequency
4. Unnormalize chart
5. Click on palette icon Smith chart component to populate schematic
6. Click on source icon, enter value (50 +j(0)) ohm
7. Click on load icon, enter value (20 +j(-15)) ohm



Smith Chart to design T-type network to match base-emitter input impedance of bipolar transistor

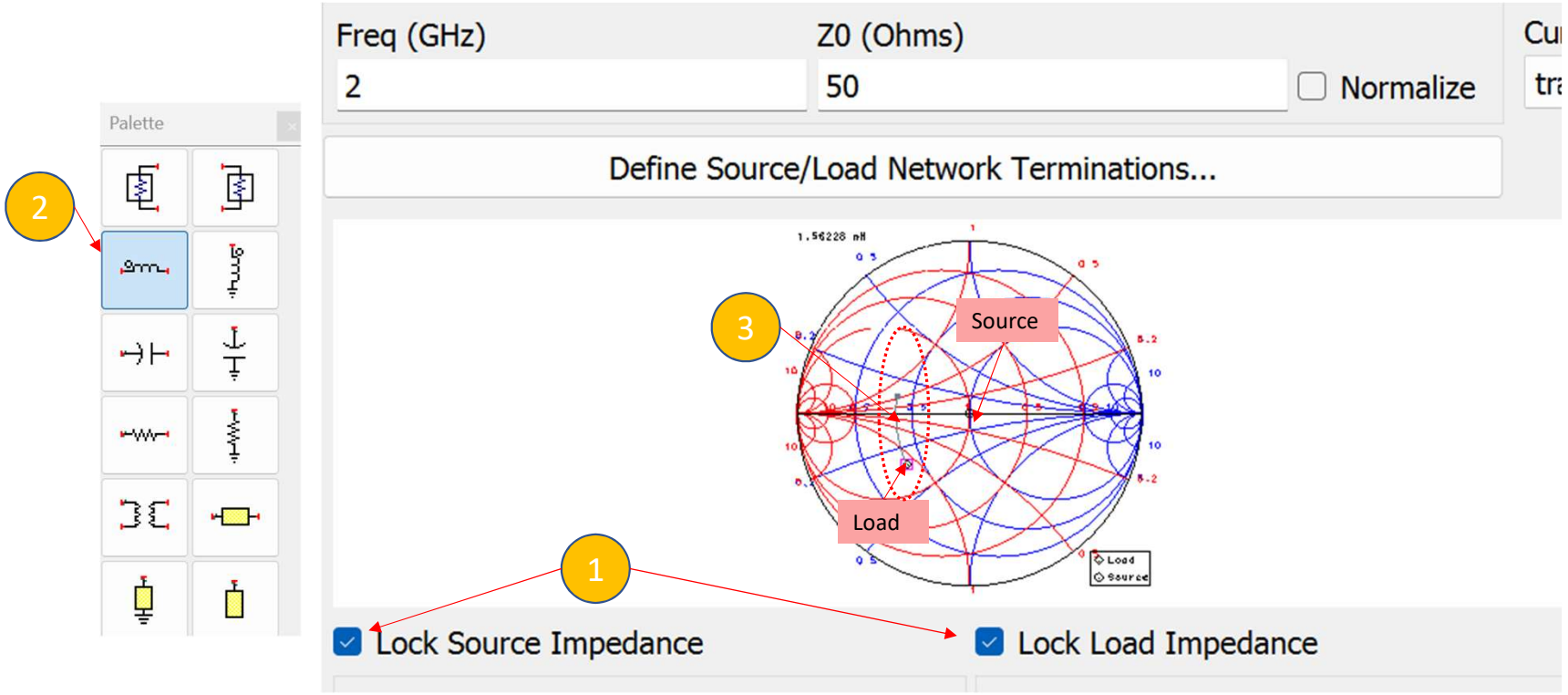
1. Go to Schematic
2. Select Smith Chart Smart Component
3. Connect to your design
4. Select this component as the SmartComponent in the Smith Chart Utility





Smith Chart to design T-type network to match base-emitter input impedance of bipolar transistor

1. In the Smith Chart Utility Lock source and load impedance
2. Select matching components from Palette
3. Note a manual movement of input impedance on Smith chart



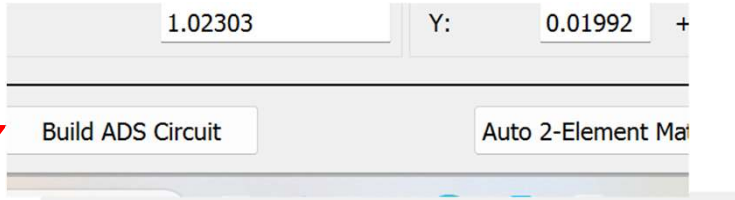
Smith Chart to design T-type network to match base-emitter input impedance of bipolar transistor

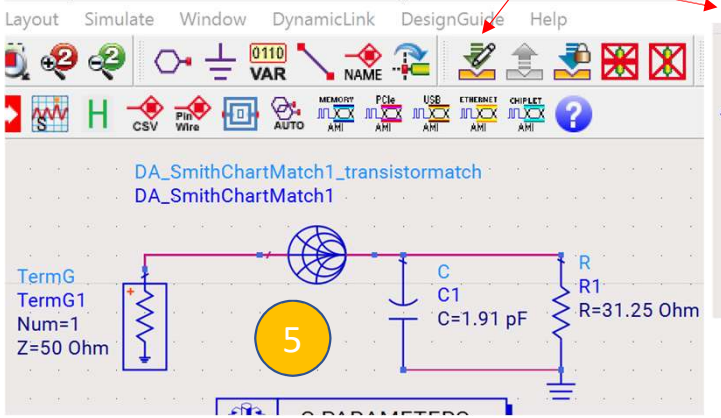
In Smith Chart Utility

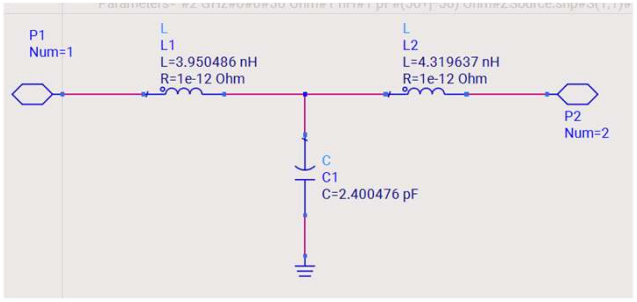
1. Add inductor graphically on Smith Chart
2. Add capacitor graphically on Smith Chart
3. Add inductor graphically to complete T-match
4. Build ADS Circuit

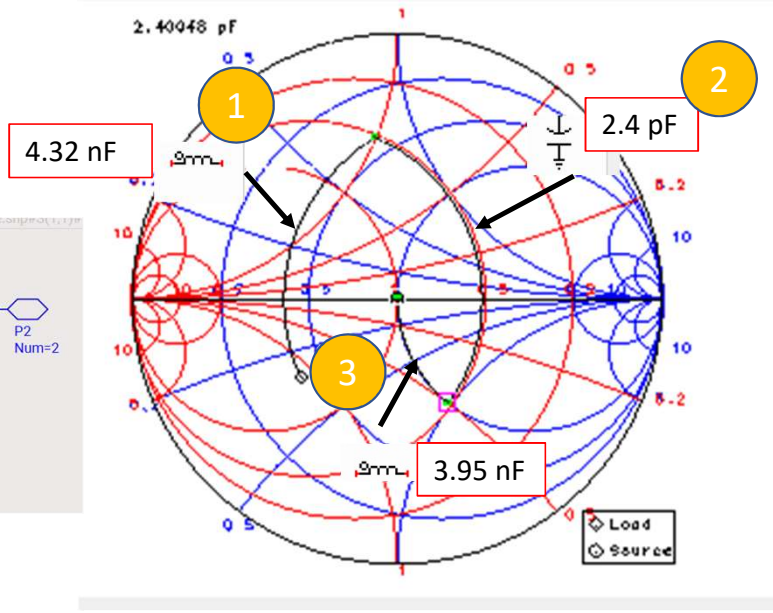
On Schematic

5. In schematic select (left cli[6]mith Chart component
6. push into Smart component to see circuit



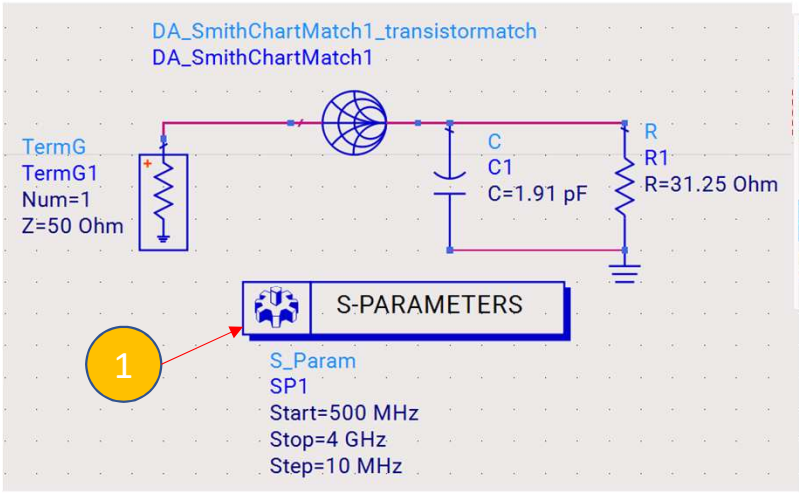


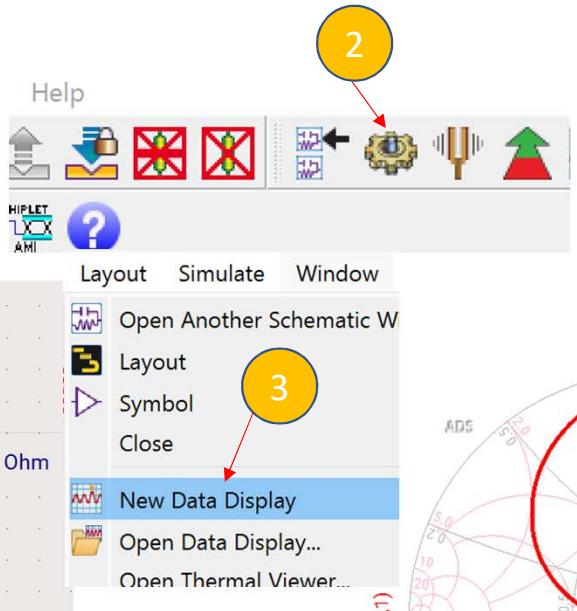


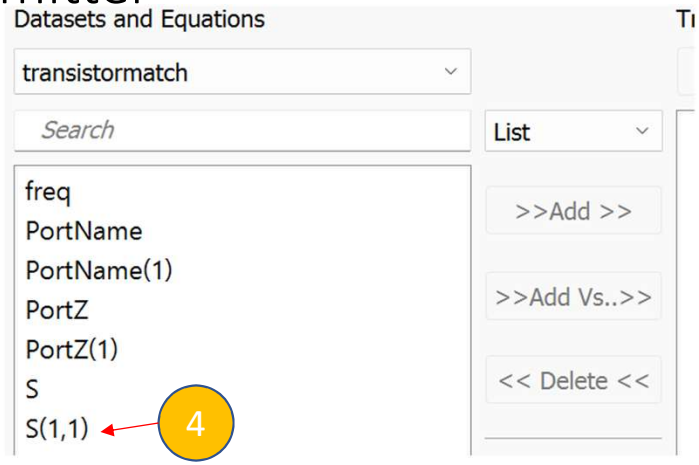


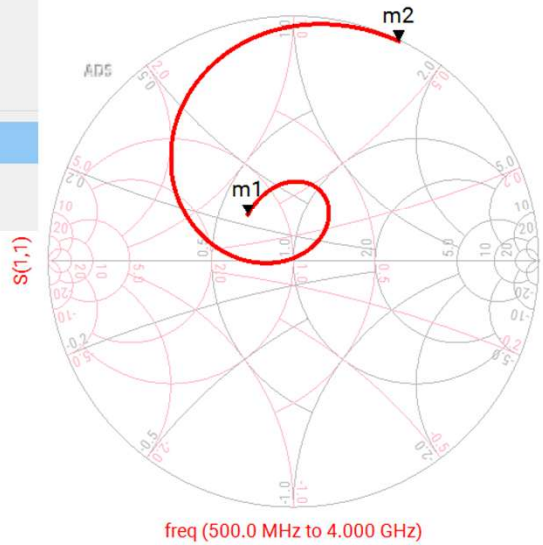
Smith Chart to design T-type network to match base-emitter input impedance of bipolar transistor

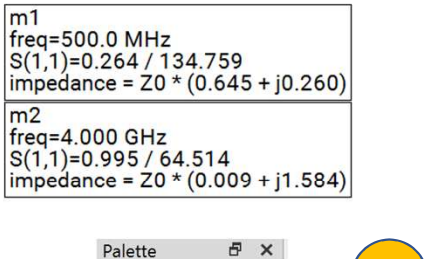
1. Insert Frequency sweep controller and
2. Simulate
3. Select Window>New Data Display
4. Select S11 dataset and Add
5. Select Smith Chart plot type

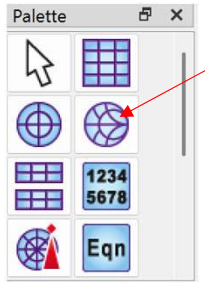








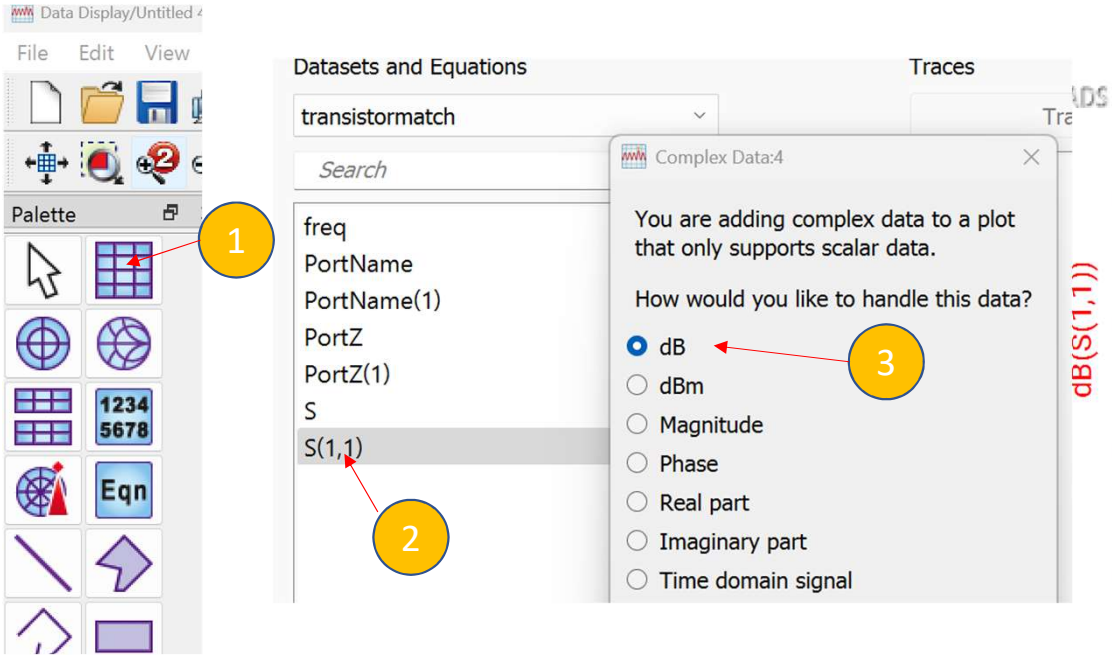


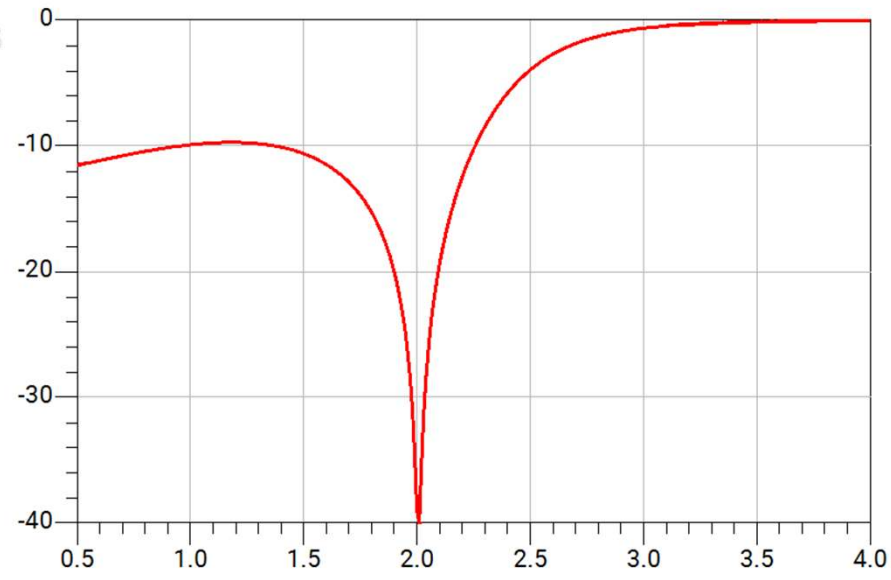


Smith Chart to design T-type network to match base-emitter input impedance of bipolar transistor

Plot rectangular return loss

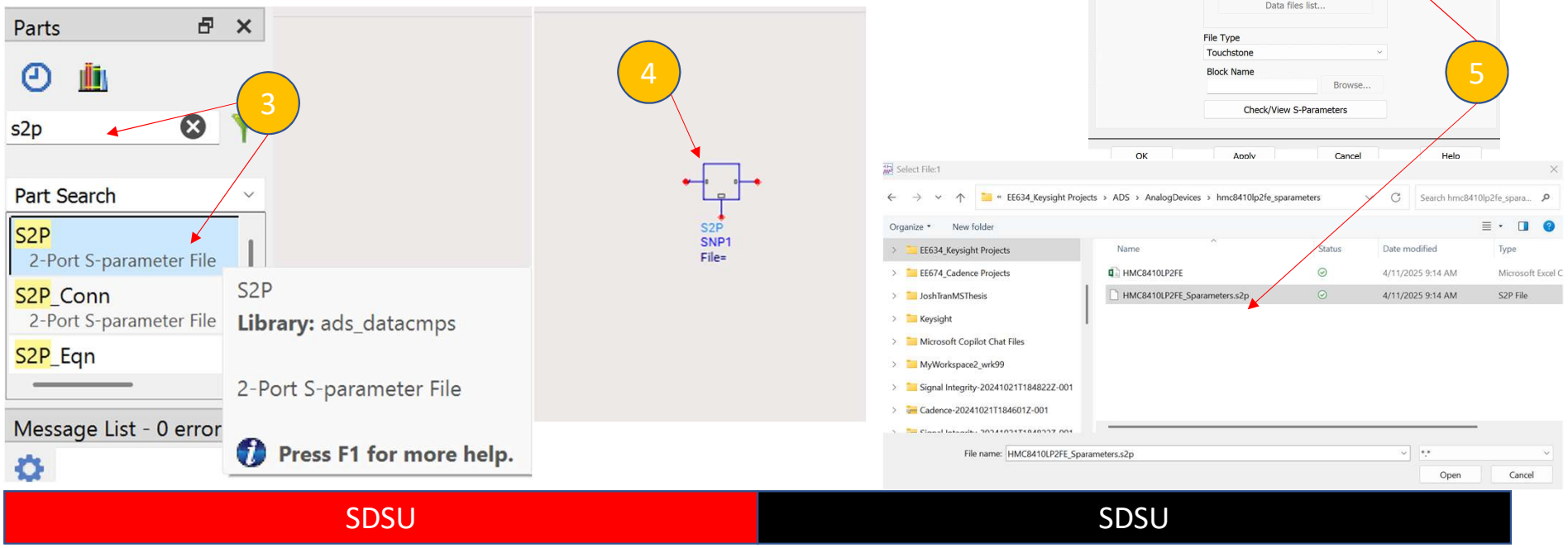
1. Select rectangular format
2. Select S(11) Dataset
3. Select dB handling of data





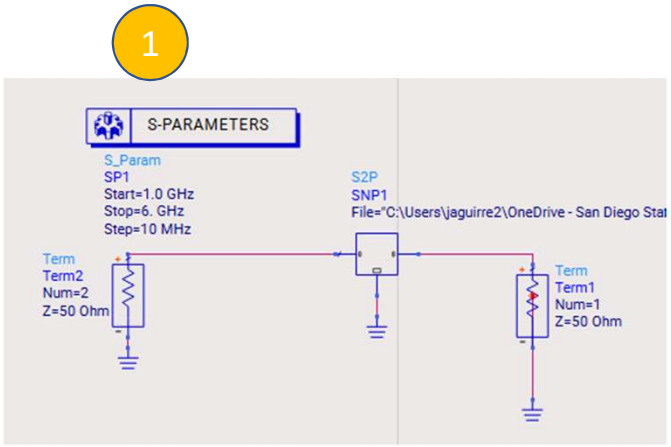
Smith Chart Utility for LNA Company Provided S-parameter file (from measurement on test board, assumed deembedded)

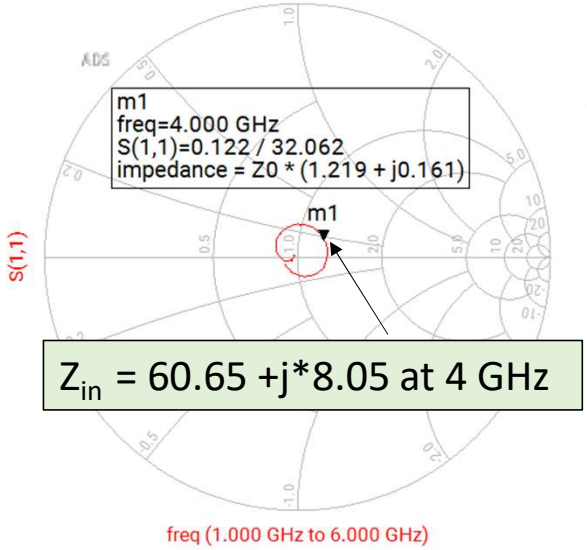
1. Create Workspace
2. Create schematic in workspace
3. Find S2P data component
4. Place in schematic
5. Browse for LNA S2P file



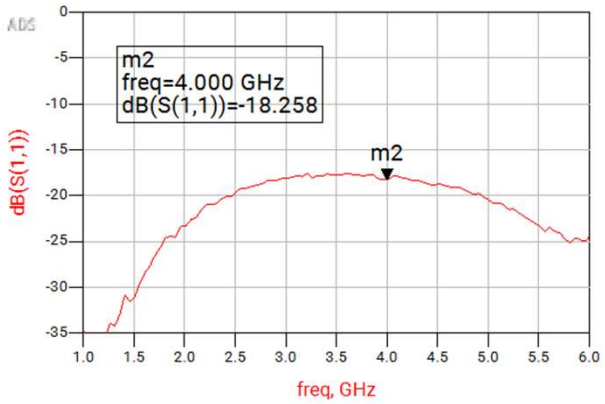
Smith Chart Utility for LNA Company Provided S-parameter file (from measurement on test board, assumed deembedded)

1. Draw schematic as shown
2. Run Simulation
3. Graph Dataset S11



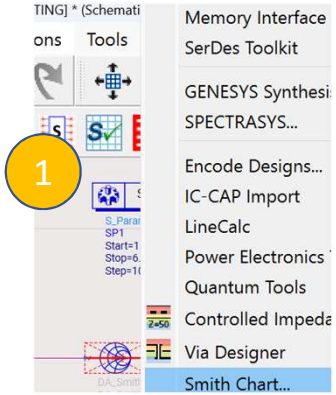


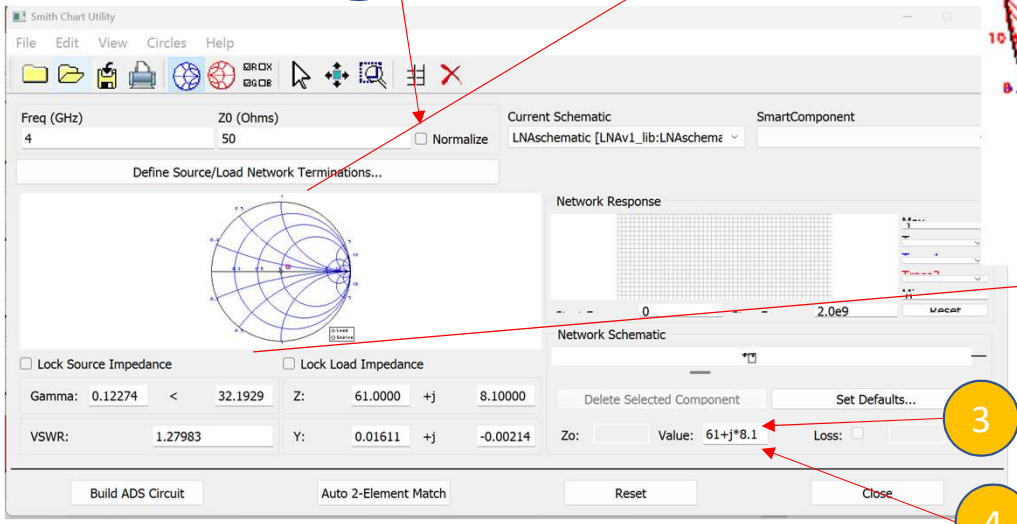
Z_{in} = 60.65 +j*8.05 at 4 GHz

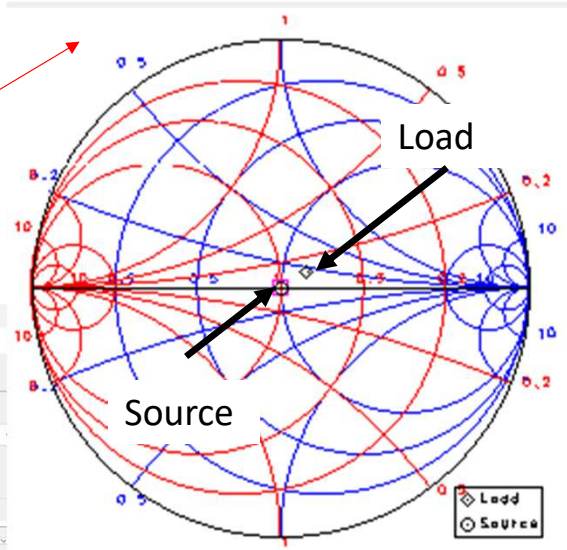


Smith Chart Utility for LNA Company Provided S-parameter file (from measurement on test board, assumed deembedded)

1. Tools > Smith Chart
2. Unnormalize
3. Set Load impedance (Zin to LNA)
4. Set source impedance (50 ohm)
5. Connect transmission line to load
6. Note new Zin on Smith Chart







50+j*0

Smith Chart Utility for LNA Company Provided S-parameter file (from measurement on test board, assumed deembedded)

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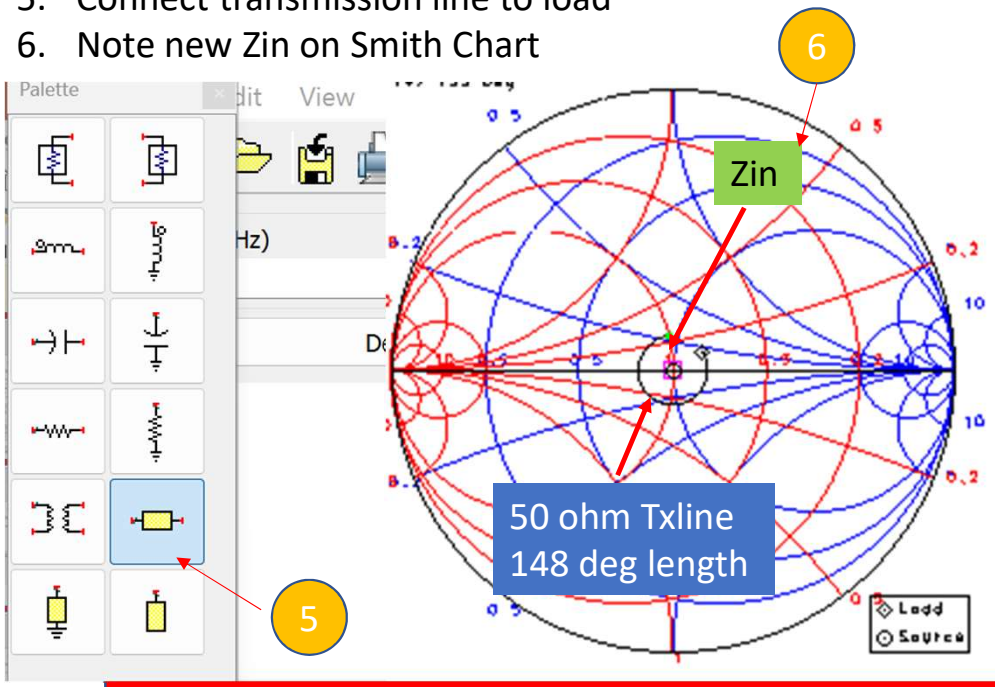
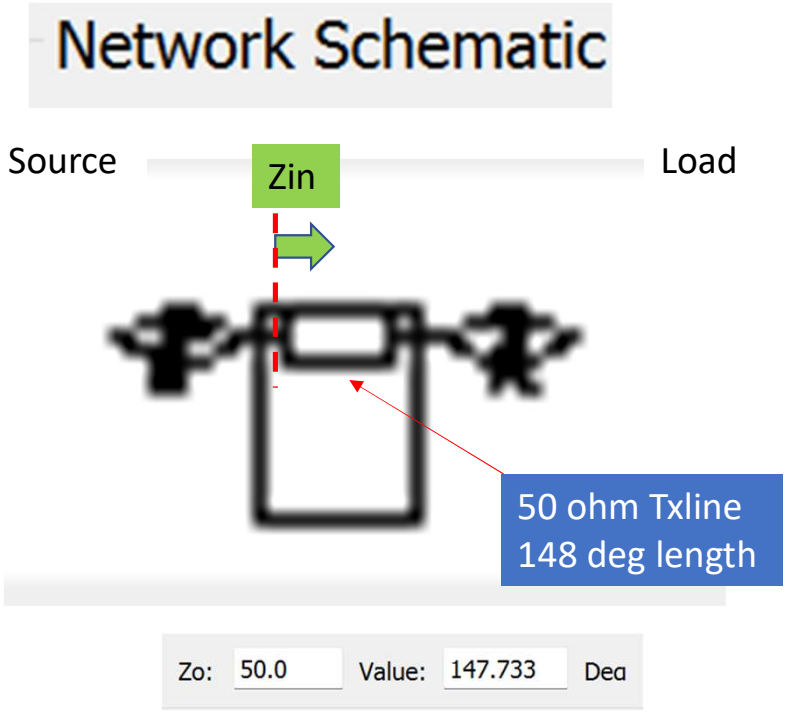
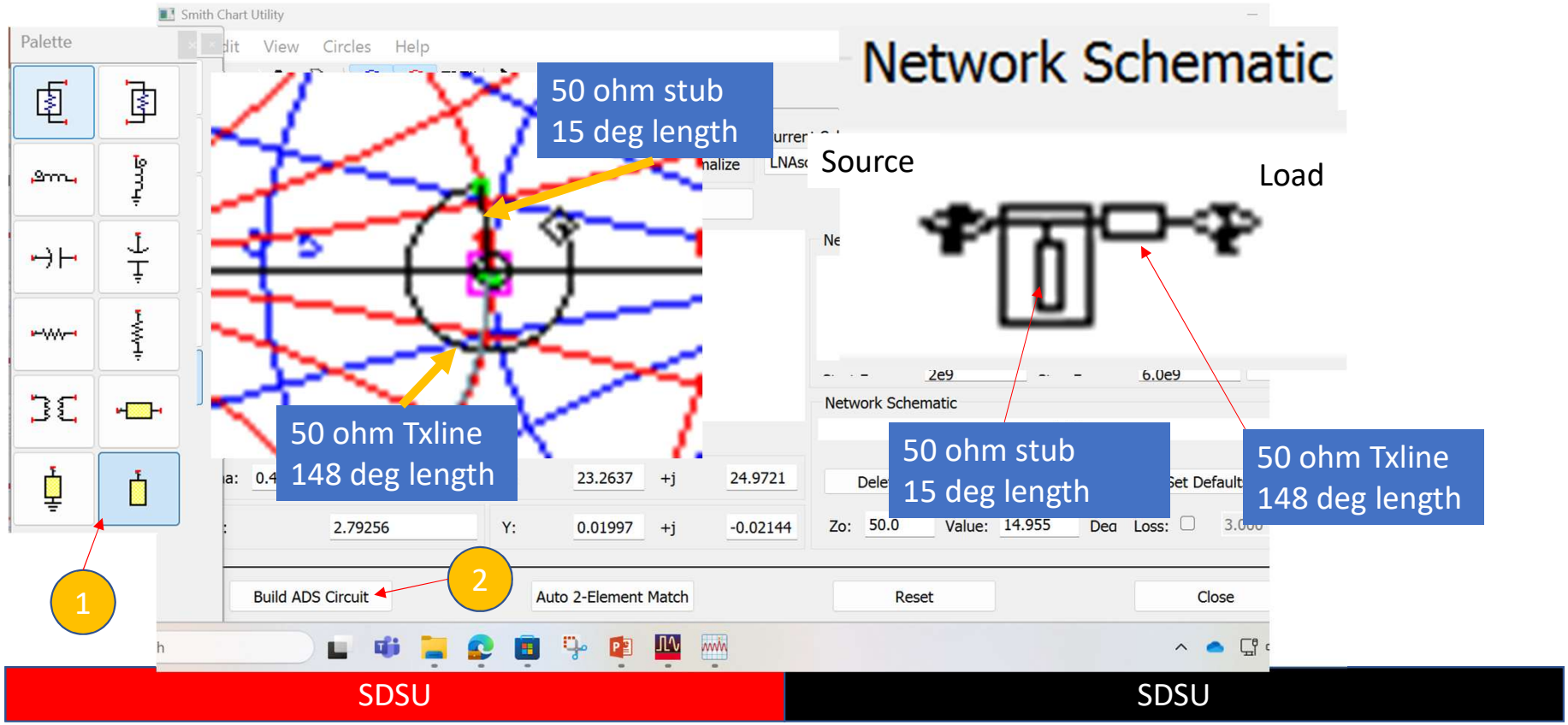




Smith Chart Utility for LNA Company Provided S-parameter file

(from measurement on test board, assumed deembedded)

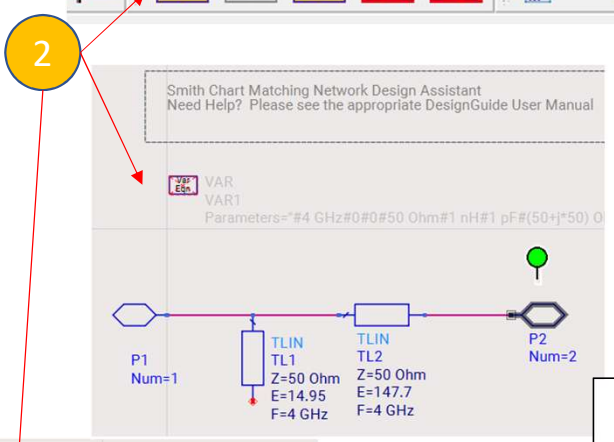
1. Add open stub from Palette to Network Schematic
2. Build ADS Circuit

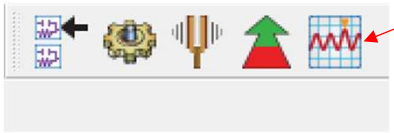


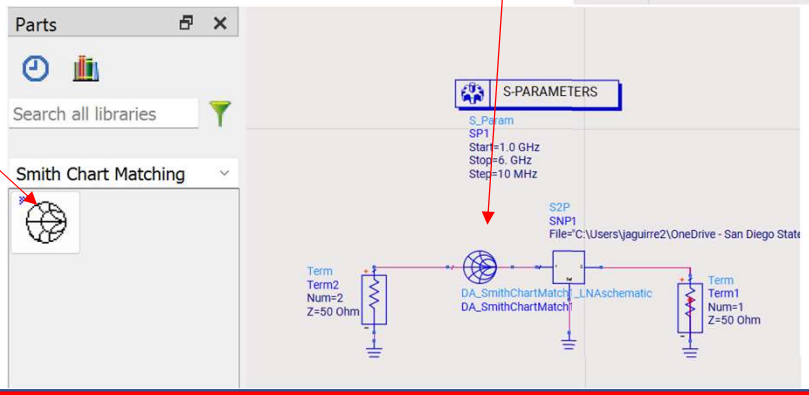
Smith Chart Utility for LNA Company Provided S-parameter file

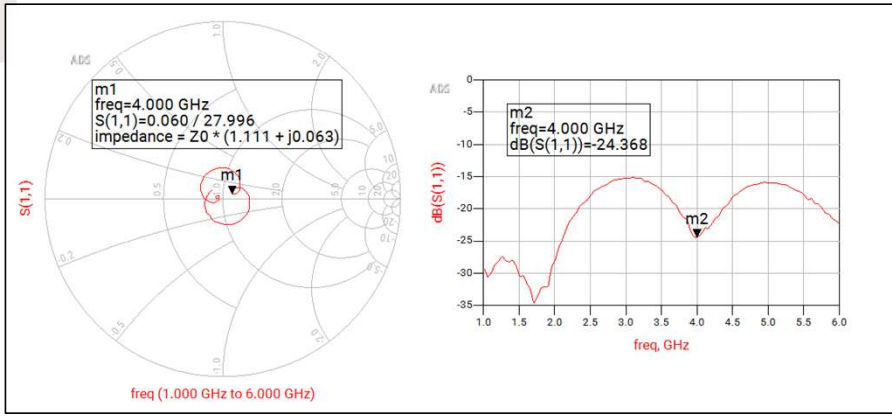
(from measurement on test board, assumed deembedded)

1. Insert Smith Chart Smart Component
2. Push into Smart component to see circuit
3. Run S-parameter simulation
4. Graph S11 in Smith and rectangular format



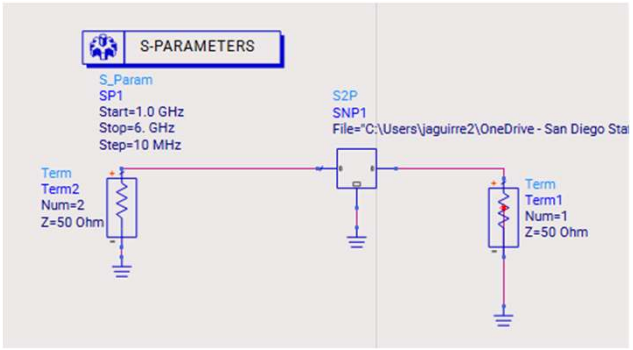


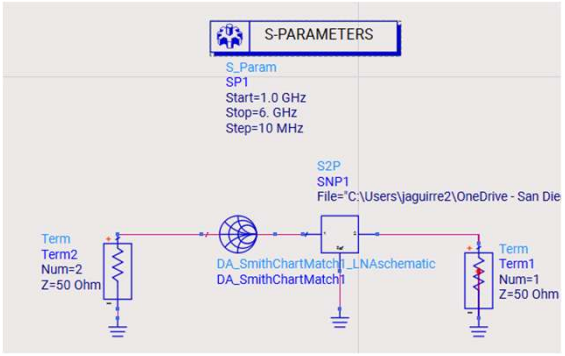




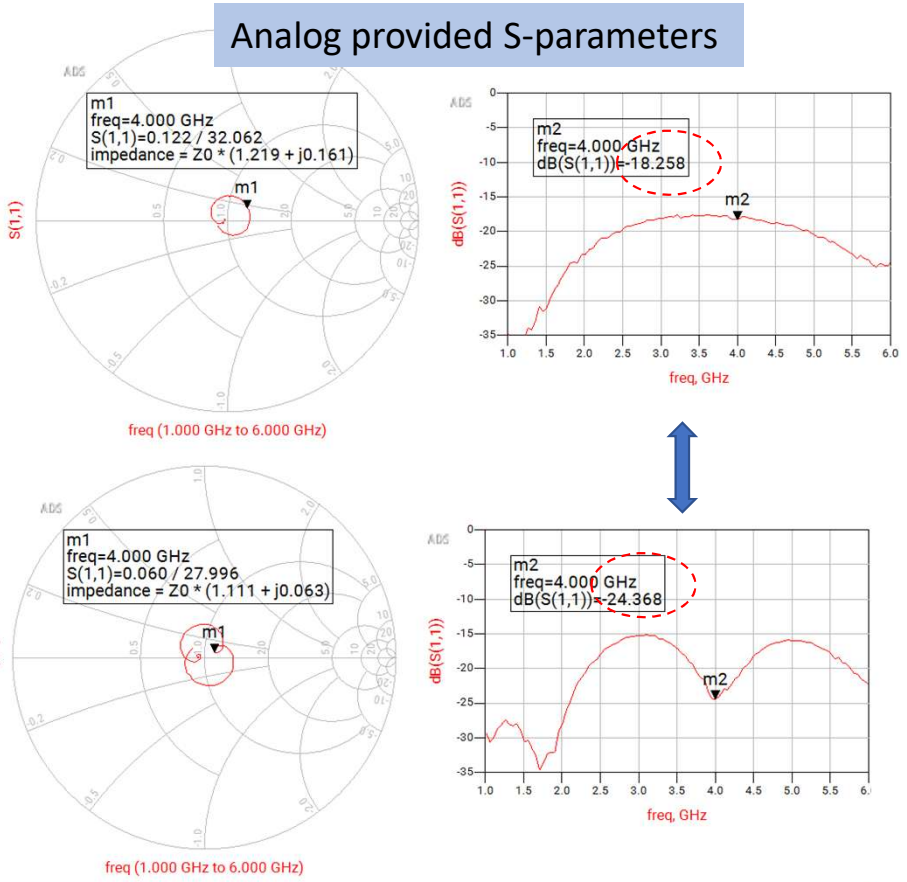
Smith Chart Utility for LNA Company Provided S-parameter file
(from measurement on test board, assumed deembedded)

- Compare LNA S-parameters for S11 with matched case





Analog provided S-parameters



The End