5. Design of input and output matching networks

Now, after the selection of Γ_S and Γ_L, the transistor needs to be matched to the $50\ \Omega$ transmission lines on either side. The Smith Chart matching utility is used perform the impedance matching and convert $50\ \Omega$ to Γ_S , Γ_L. The screenshots of the Smith chart utility used to design the input and output matching networks are shown in Fig. 14 and Fig. 15.

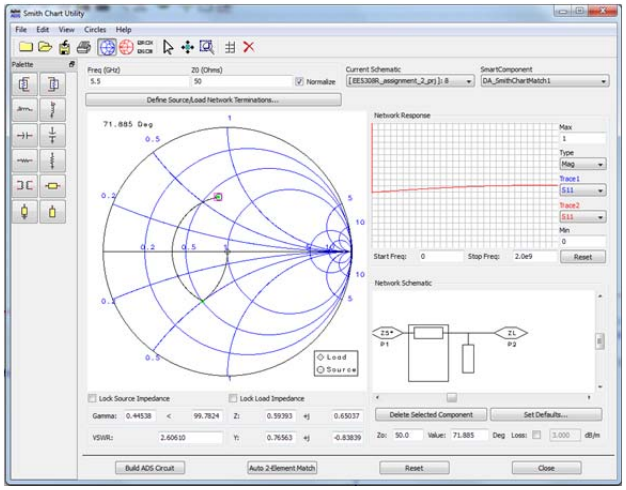

Fig. 14: Smith chart utility for input matching network

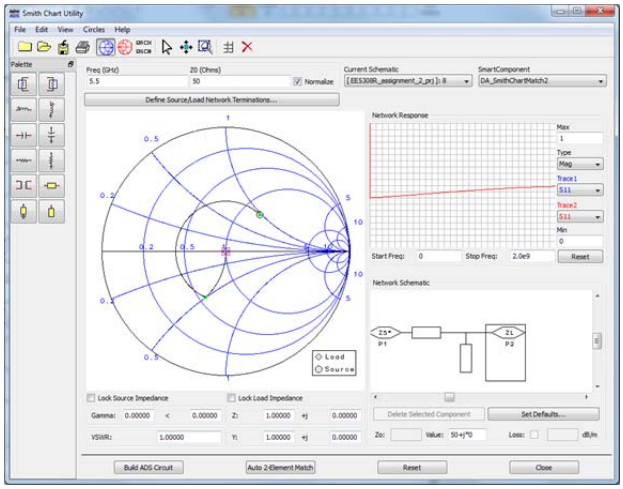

Fig. 15: Smith chart utility for output matching network

This utility is used to update the impedance matching component which is inserted into the schematic circuit from the Smith Chart Matching toolbox in ADS. The component together with its internal definition can be seen in Fig. 16. The physical dimensions of the microstrip transmission line depend the chosen substrate (which is the Rogers™ RT/Duroid 5880 with $\epsilon_r = 2.2$ and thickness $= 0.8$ mm).

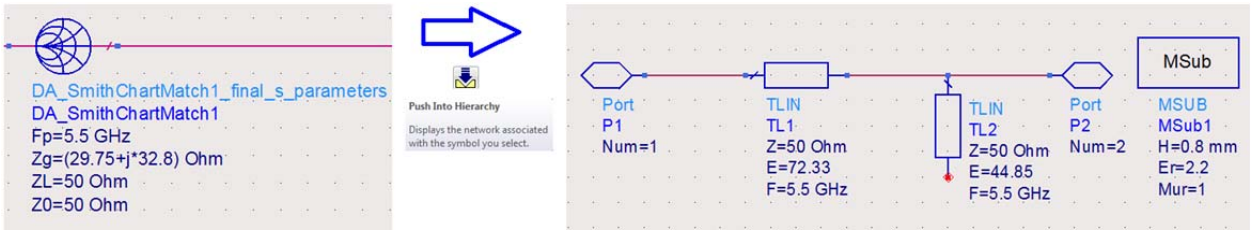

Fig. 16: Impedance matching circuit using Smith chart matching component

Thus the design of the various sections of the amplifier has been completed. The overall schematic including the transistor, biasing network, input/output matching networks and the source/load can be seen in Fig. 17.

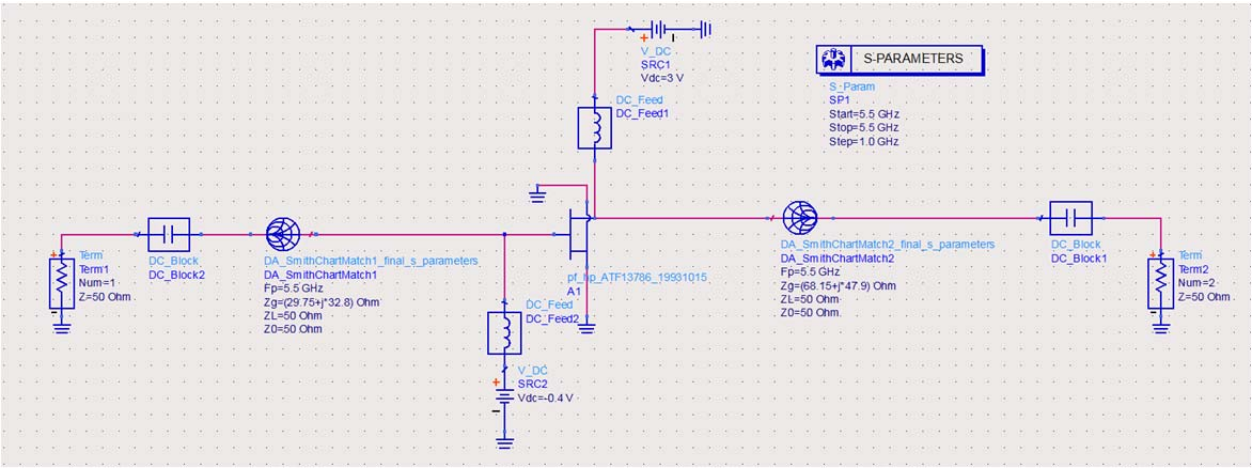

Fig. 17: Overall amplifier schematic

In the next section, the characterization of this amplifier will be carried out and the required parameters will be evaluated.