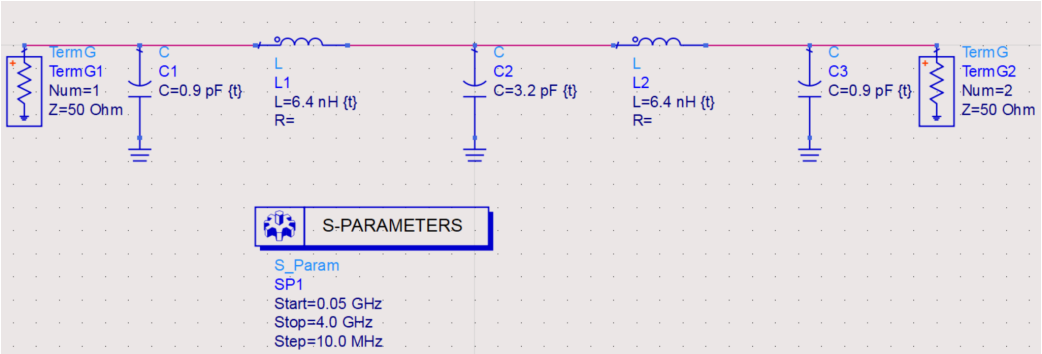
LPF Analysis on ADS

In this simulation, we aim to obtain the S-parameters of a low-pass filter (LPF), specifically the transmission (S21) and return loss (S11). It is well known that an LPF can be designed using inductors and parallel capacitors. Inductors exhibit low reactance at low frequencies, allowing low-frequency signals to pass through, while capacitors have high reactance, blocking high-frequency signals. Conversely, at higher frequencies, the inductor's reactance increases, impeding signal flow, whereas the capacitor's reactance decreases, providing a grounding path for the signal.




In the schematic below, we simulate the LPF by configuring inductors and capacitors to achieve the desired frequency response. The simulation parameters are set to analyze S-parameters over a frequency range from 0 to 4 GHz, with a step size of 10 MHz.

Upon analyzing the results, we observe two distinct curves: S21, representing the power transferred from port 1 to port 2, follows the behavior of an LPF, passing low frequencies while attenuating higher ones. The passive component values influence the cutoff frequency, determined by the filter's design, so fine-tuning the components could result in a higher cutoff frequency shifting the response, and resulting in a larger non-zero pole.

S11, representing the insertion loss (ideally approaching negative infinity for optimal power transfer), shows a prominent crest around 0.65 GHz, signifying efficient signal transmission at this frequency.