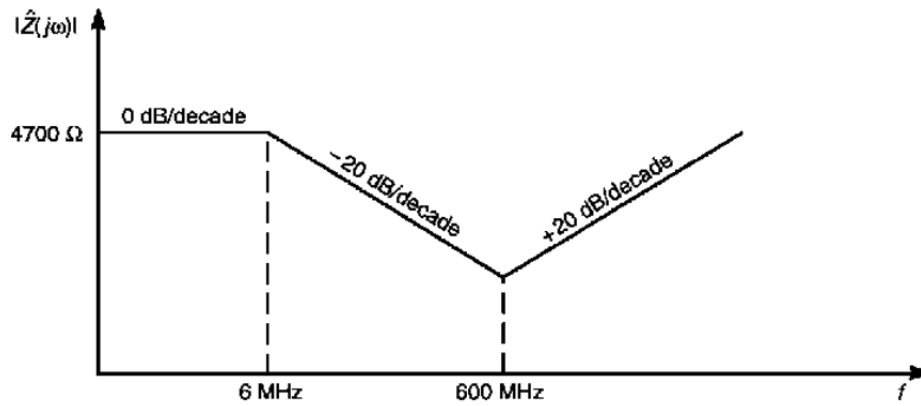


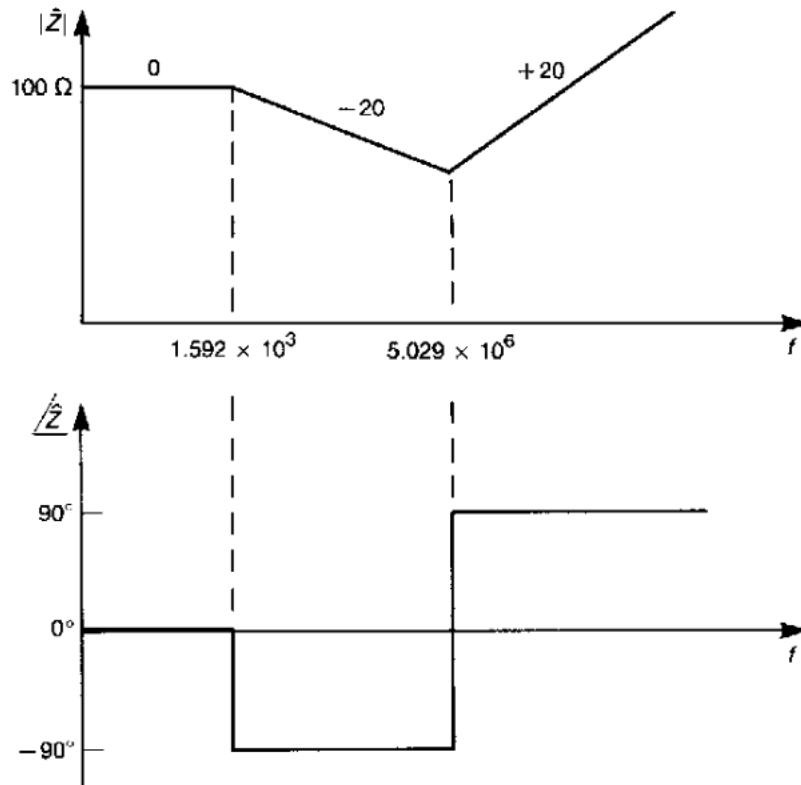
Recommended Reading: Paul: Chapter 5.

1. A 1/8 -W carbon resistor has the measured Bode plot of the impedance shown below. Determine the lead inductance and parasitic capacitance.

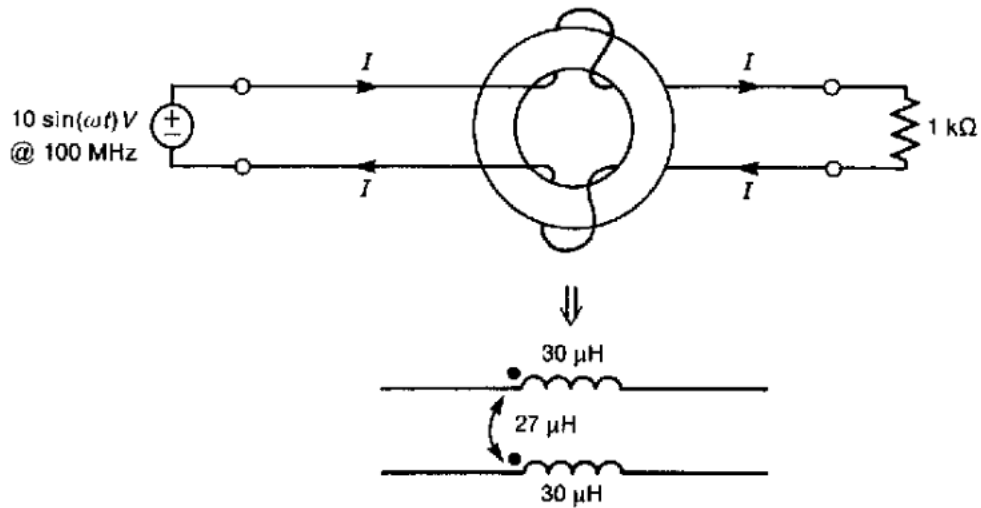


2. A $50\ \Omega$, 100 MHz sinusoidal signal source is terminated in a $50\ \Omega$ load resistor.
- a) Determine the value of a capacitor that when placed at the load end will reduce the voltage by 20 dB. How do you connect the capacitor, in series or parallel with load resistor?
 - b) Determine the value of an inductor that when placed at the load end will reduce the voltage across the load resistor by 20 dB. How do you connect the inductor, in series or parallel with load resistor?

3. A component is measured and found to have an impedance whose (asymptotic) frequency response is shown below. Synthesize an equivalent circuit to represent this impedance.



4. An ideal common-mode choke (windings perfectly symmetric and having no losses) is connected between a source and load as shown below. Determine the amplitude of the load voltage, assuming that all common-mode currents have been eliminated by the common-mode choke.



5. **(For grad students, 5 point bonus for undergrads)** Verify your answer in problem 3 and 4 using LTspice.

6. A small DC motor has the input impedance frequency response shown below. Synthesize an equivalent circuit to represent this motor at its input terminals.

