

1. A Norton source consists of a 1.20 mA peak current source in parallel with an $800\ \Omega$ resistor and a capacitor whose reactance is $-j120\ \Omega$ at the operating frequency. It is to drive a load $Z_L=60-j80\ \Omega$ through a lossless two-element L-network.

- (a) Find the power available from the source in dBm.
- (b) Find the power delivered to the load if it is connected directly to the source.
- (c) Find all four lossless L-network solutions. For each solution, state whether the series and shunt reactances are inductive or capacitive and state whether the shunt element is on the load side or source side.

2. A Norton source consists of a 3.0 mA peak current source in parallel with a $120\ \Omega$ resistor and a capacitor with reactance $-j60\ \Omega$. The source drives a $1500\ \Omega$ resistive load through an ideal transformer with turns ratio $1:N$, where $V_2=NV_1$ and $I_2=-I_1/N$.

- (a) Find P_{avs} in dBm.
- (b) Find the positive N that maximizes power delivered to the load.
- (c) Find the maximum delivered load power in dBm.
- (d) Find the load power if the transformer is removed and the $1500\ \Omega$ load is connected directly.

3. A $75\ \Omega$ source has $P_{avs}=12\ \text{dBm}$ and drives a load $Z_L=30+j120\ \Omega$.

- (a) Design the low-pass L-network whose series arm is connected to the source. Give X_L and X_C .
- (b) Find the power delivered if the load is connected directly to the source.
- (c) The two-element match is replaced by only one lossless capacitor, which may be used either in series or shunt. Find the best placement and reactance, and the resulting load power.