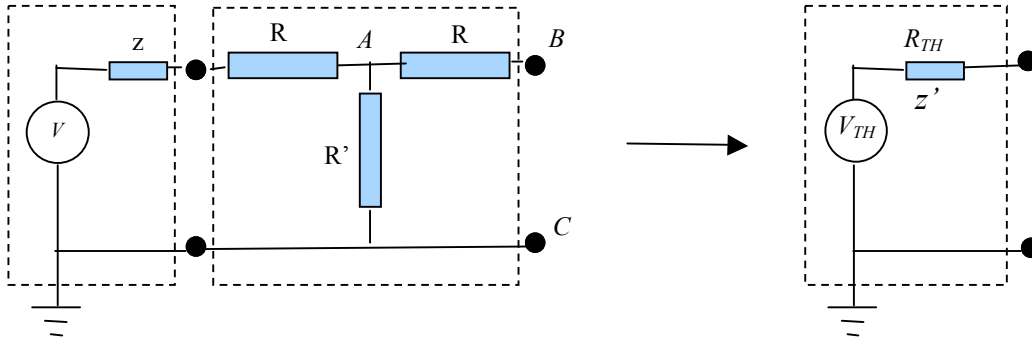


Tee Attenuator

When using a simple voltage divider we can attenuate the input signal strength but will have difficulty in keeping the source impedance the same ($z=z'$). A tee-attenuator will allow us to do this.



Use Thevenin's Approach

$$V_{TH} = V_{BC} = V_{AC} = \frac{R'}{z + R + R'} V$$

$$R_{TH} = \frac{(z + R)R'}{(z + R) + R'} + R$$

$$= (z + R) \left(\frac{V_{BC}}{V} \right) + R$$

Attenuation of the Tee Attenuator

$$\frac{V_{BC}}{V} = \frac{R'}{z + R + R'}$$

Output Impedance of the Tee Attenuator

$$z' = R_{TH} = (z + R) \left(\frac{V_{BC}}{V} \right) + R$$

Example:

Let $\alpha = V_{BC} / V = 0.1$ attenuation level,

$z' = z = 50\Omega$ output impedance matching input impedance

$$R = \frac{1 - \alpha}{1 + \alpha} z = \frac{0.9}{1.1} 50\Omega = 41\Omega$$

$$R' = \frac{\alpha(z + R)}{1 - \alpha} = 10.1\Omega$$