Low-pass Filter

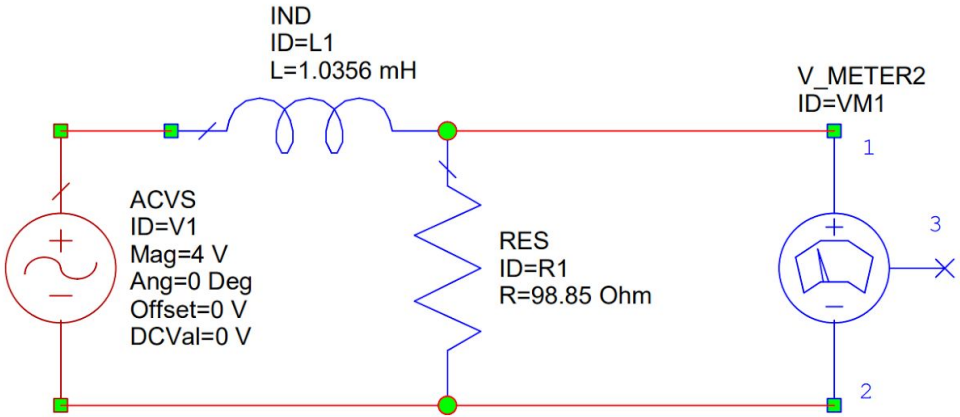

Figure 3a - Low-pass circuit built in AWR

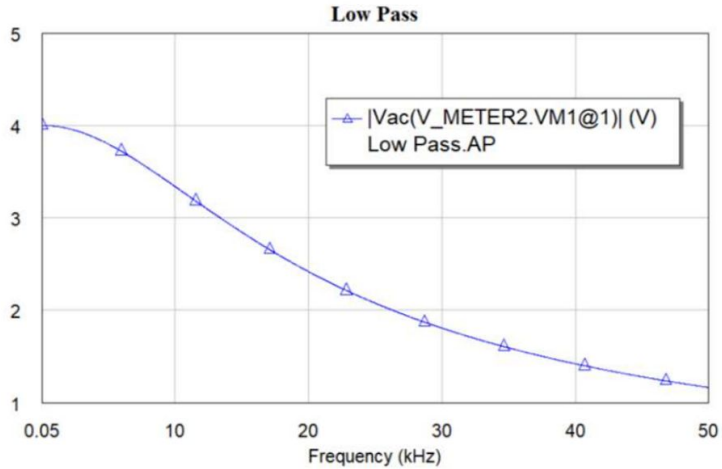

Figure 3b - Low-pass simulation in AWR

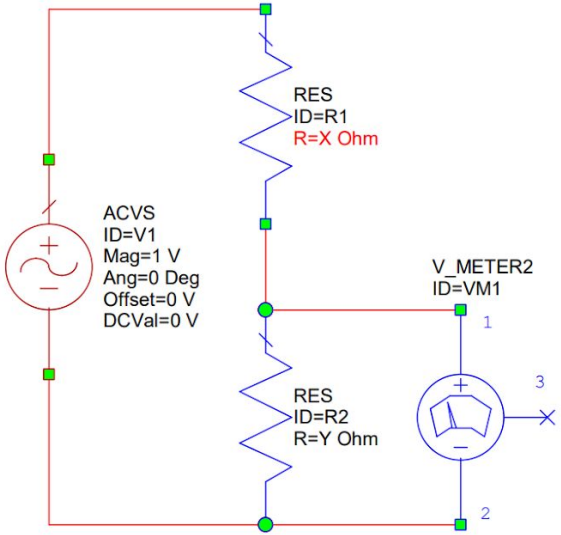

Figure 9 - Potential divider designed in AWR

Transfer function

$$\frac{V_{out}(\omega)}{V_{in}(\omega)} = H(\omega) = \frac{R}{j\omega L + R} \quad (17)$$

Magnitude of transfer function

$$|H(\omega)| = \frac{R}{\sqrt{(\omega L)^2 + R^2}} \quad (19)$$

Phase angle

$$\theta = \arg\left(Z_T(\omega)\right) = -\arctan\left(\frac{\omega L}{R}\right) \quad (20)$$

Outcomes

High frequencies attenuated

Low frequencies allowed to “pass”

Cutoff frequency - the frequency at which output = RMS of input

(Also when the phase angle is 45°)