RC Filter Circuits

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Constants and Definitions:

$k \equiv 1000 \cdot ohm$ $kHz := 1000 \cdot Hz$ $MHz := 10^6 \cdot Hz$ $\mu F := 10^{-6} \cdot farad$ $dB(x) := 20 \cdot \log(x)$

$V_{in} := 1 \cdot volt$ $R \equiv 5 \cdot k$ $C \equiv 1 \cdot \mu F$

Frequency Range for graphing filter response:

Low Frequency Limit $f_{low} := 0.01 \cdot Hz$

High Frequency Limit $f_{high} := 10 \cdot MHz$

Frequency Index

$$f := \log\left(f_{low} \cdot Hz^{-1}\right), \log\left(f_{low} \cdot Hz^{-1}\right) + \left[\frac{\log\left(\frac{f_{high}}{f_{low}}\right)}{500}\right] .. \log\left(f_{high} \cdot Hz^{-1}\right)$$

$g(f) := 10^f \cdot Hz$

Equations for RC Filters:

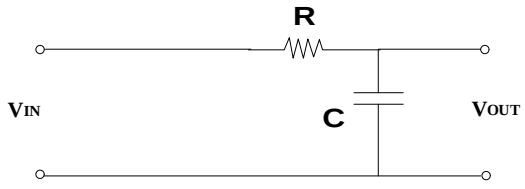
$$A_{HP}(f) := \frac{(2 \cdot \pi \cdot g(f)) \cdot R \cdot C}{\sqrt{(2 \cdot \pi \cdot g(f))^2 \cdot R^2 \cdot C^2 + 1}}$$ Amplitude of high pass filter

$$A_{LP}(f) := \frac{1}{\sqrt{(2 \cdot \pi \cdot g(f))^2 \cdot R^2 \cdot C^2 + 1}}$$ Amplitude of low pass filter

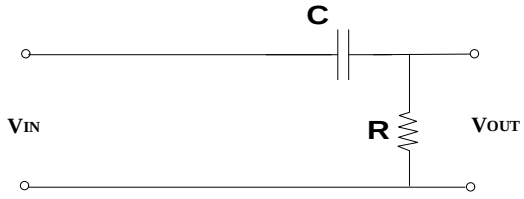
$$\phi_{HP}(f) := \operatorname{atan}\left[\frac{1}{(2 \cdot \pi \cdot g(f)) \cdot R \cdot C}\right]$$ Phase of high pass filter

$$\phi_{LP}(f) := \left[-\operatorname{atan}\left[\frac{-1}{(2 \cdot \pi \cdot g(f)) \cdot R \cdot C}\right] - \frac{\pi}{2}\right]$$ Phase of low pass filter

Low Pass Filter



High Pass Filter



$R \cdot C = 0.005 \cdot \text{sec}$

$$\frac{1}{2 \cdot \pi \cdot R \cdot C} = 31.831 \cdot \text{sec}^{-1}$$