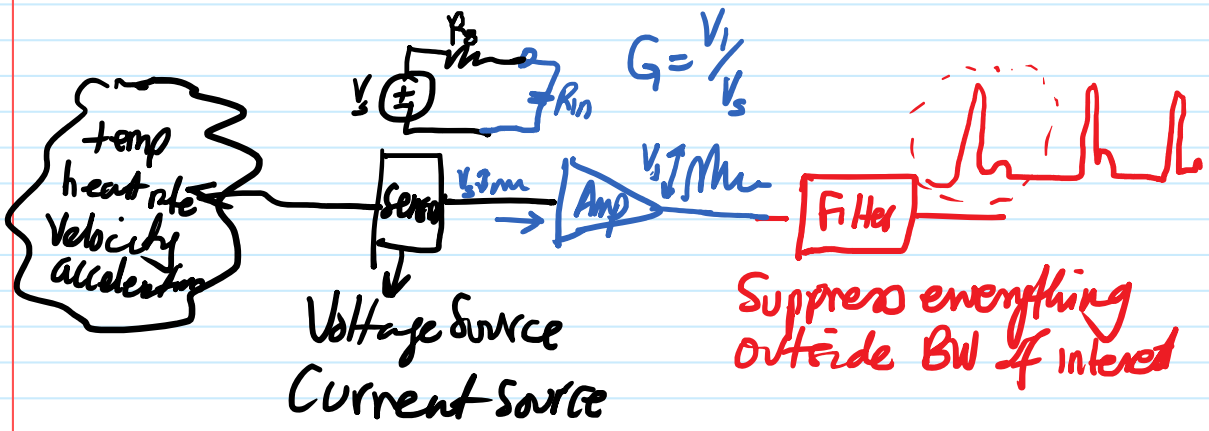
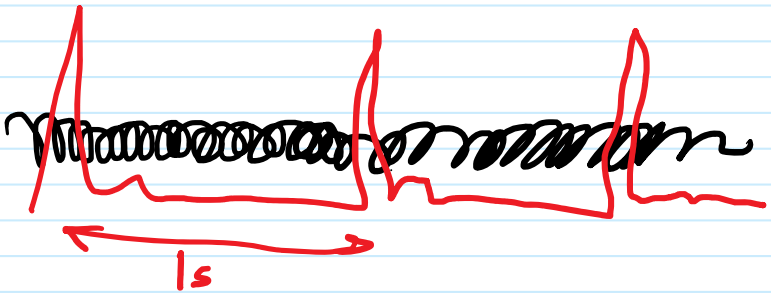
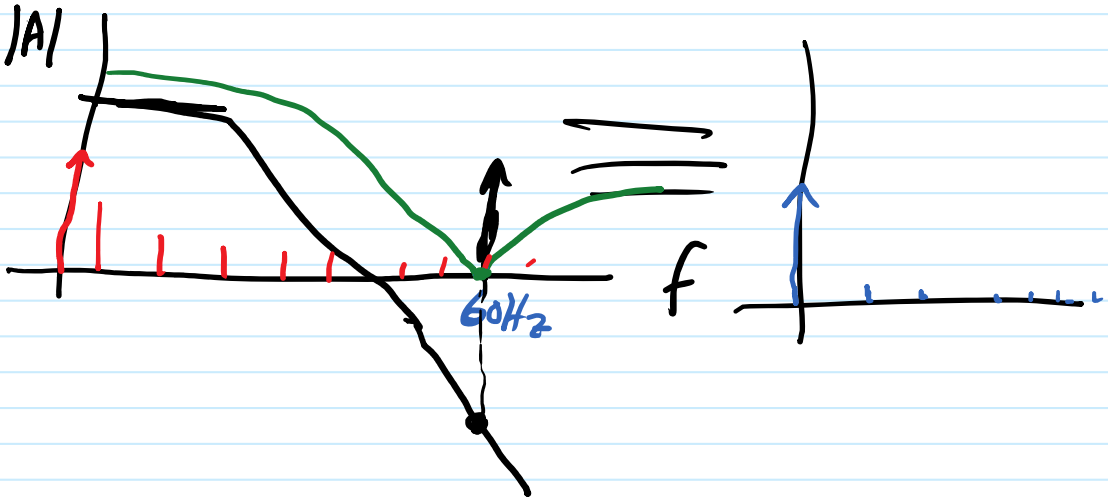
Filters

Monday, February 26, 2024 4:07 PM







Four types of filters

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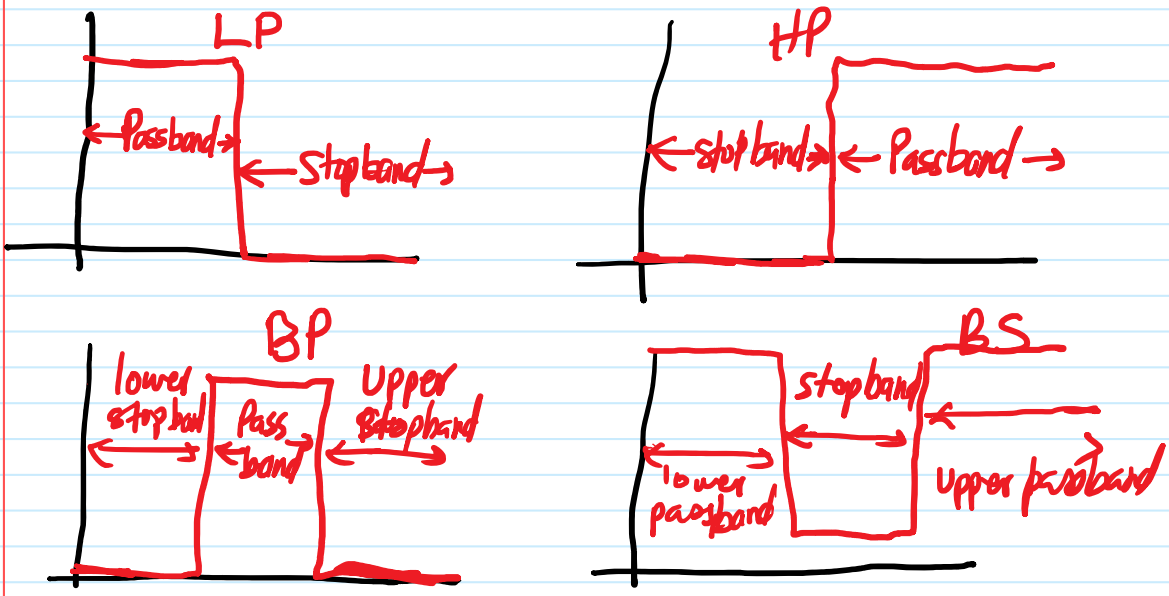
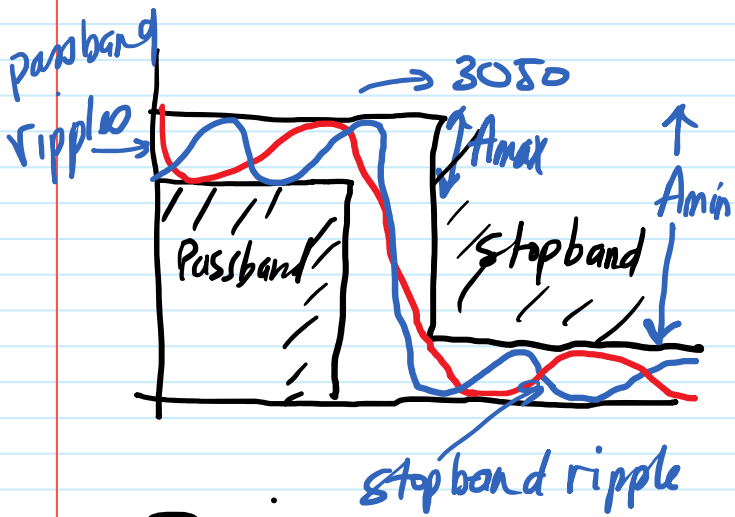
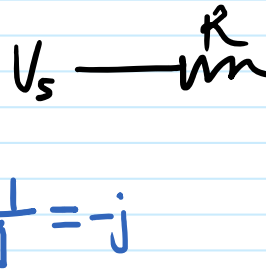




Passive Examples

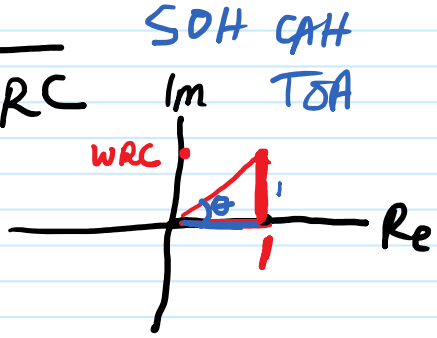


$$\frac{V_o}{V_s} = \frac{\frac{1}{sC}}{\frac{1}{sC}+R} = T(s)$$

$\frac{1}{j} = -j$

$$T(s) = \frac{1}{1+sRC}$$

$$T(j\nu) = \frac{1}{1+j\omega RC}$$



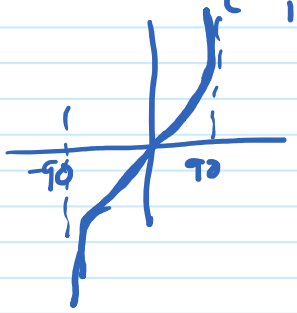
1

$$|T(j\omega)| = \frac{1}{\sqrt{1+(\omega RC)^2}}$$

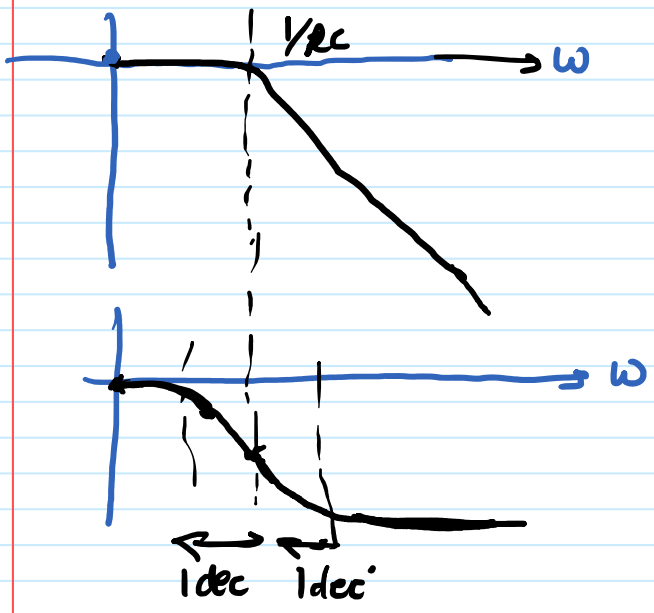
$$\angle T(j\omega) = 0 - \tan^{-1}\left(\frac{\omega RC}{1}\right)$$

$\tan\theta = \frac{\omega RC}{1}$

$\theta = \tan^{-1}\left(\frac{\omega RC}{1}\right)$



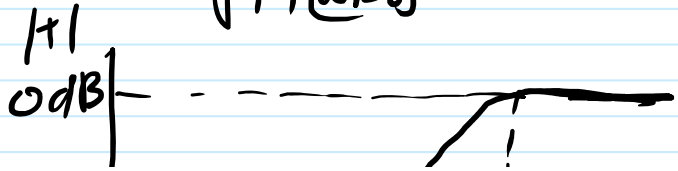
	$\omega=0$	$\omega=\infty$	$\omega=1/RC$
$\lvert T\rvert$	1	0	$\frac{1}{\sqrt{2}}$
$\angle T$	0	-90	-45

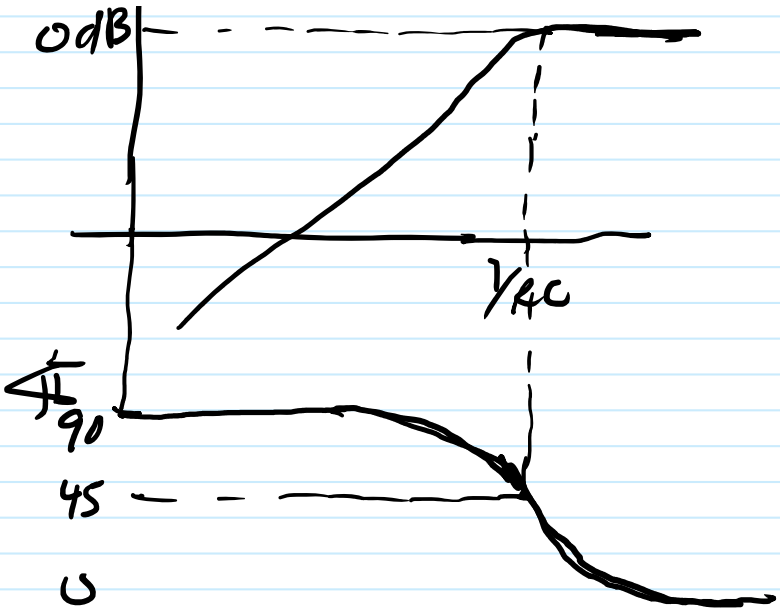


$$T = \frac{V_o}{V_s} = \frac{R}{R+\frac{1}{sC}} = \frac{sRC}{1+sRC}$$

$$T(j\omega) = \frac{j\omega RC}{1+j\omega RC}$$

$$|T| = \frac{\omega RC}{\sqrt{1+(\omega RC)^2}} \qquad \angle 90 - \tan^{-1}\left(\frac{\omega RC}{1}\right)$$




0dB
ω_{RC}
$\frac{\pi}{4}$
90
45
0