

$$S_1 = e + S_2 - S_3$$

$$S_1 = e + \left(-\frac{S_1}{jRC\omega}\right) - \left(+\frac{S_1}{(jRC\omega)^2}\right) \Rightarrow S_1 \left(1 + \frac{1}{jRC\omega} + \frac{1}{(jRC\omega)^2}\right) = e$$

$$S_1 \left(\frac{(jRC\omega)^2 + jRC\omega + 1}{(jRC\omega)^2}\right) = e \Rightarrow \frac{S_1}{e} = \frac{(jRC\omega)^2}{(1 + jRC\omega + (jRC\omega)^2)} = \text{Den}$$

$$\left|\frac{S_1}{e}\right| = \frac{\sqrt{(RC\omega)^4}}{D} = \frac{(RC\omega)^2}{\sqrt{[1 - R^2C^2\omega^2]^2 + (RC\omega)^2}}$$

Rappel:  $z = a + jb$   
 $|z| = \sqrt{a^2 + b^2}$

$$\text{Den} \rightarrow 0 \Rightarrow \left|\frac{S_1}{e}\right| \rightarrow 0 \Rightarrow \left|\frac{S_1}{e}\right|_{dB} \rightarrow -\infty$$

$$\omega \rightarrow \infty$$

$$\left|\frac{S_1}{e}\right| \rightarrow 1$$

$$\left|\frac{S_1}{e}\right|_{dB} \rightarrow 0 \text{ dB}$$

Passer Haut

$$\frac{S_2}{e} = -\frac{S_1}{jRC\omega} \Rightarrow \frac{S_2}{e} = -\frac{1}{jRC\omega} \cdot \frac{S_1}{e} = j$$

$$\frac{S_2}{e} = -\frac{jRC\omega}{\text{Den}} \Rightarrow \left|\frac{S_2}{e}\right| = \frac{\sqrt{(RC\omega)^2}}{\sqrt{[1 - R^2C^2\omega^2]^2 + (RC\omega)^2}}$$

$$\omega \rightarrow 0 \quad \left|\frac{S_2}{e}\right| \rightarrow 0 \quad \left|\frac{S_2}{e}\right|_{dB} \rightarrow -\infty$$

$$\omega \rightarrow \infty \quad \left|\frac{S_2}{e}\right| \rightarrow 0 \quad \left|\frac{S_2}{e}\right|_{dB} \rightarrow -\infty$$

P bande

$$\omega = \frac{1}{RC} \Rightarrow \left|\frac{S_2}{e}\right| = \frac{1}{\sqrt{[1 - 1]^2 + 1}} = 1 \Rightarrow 0 \text{ dB}$$