

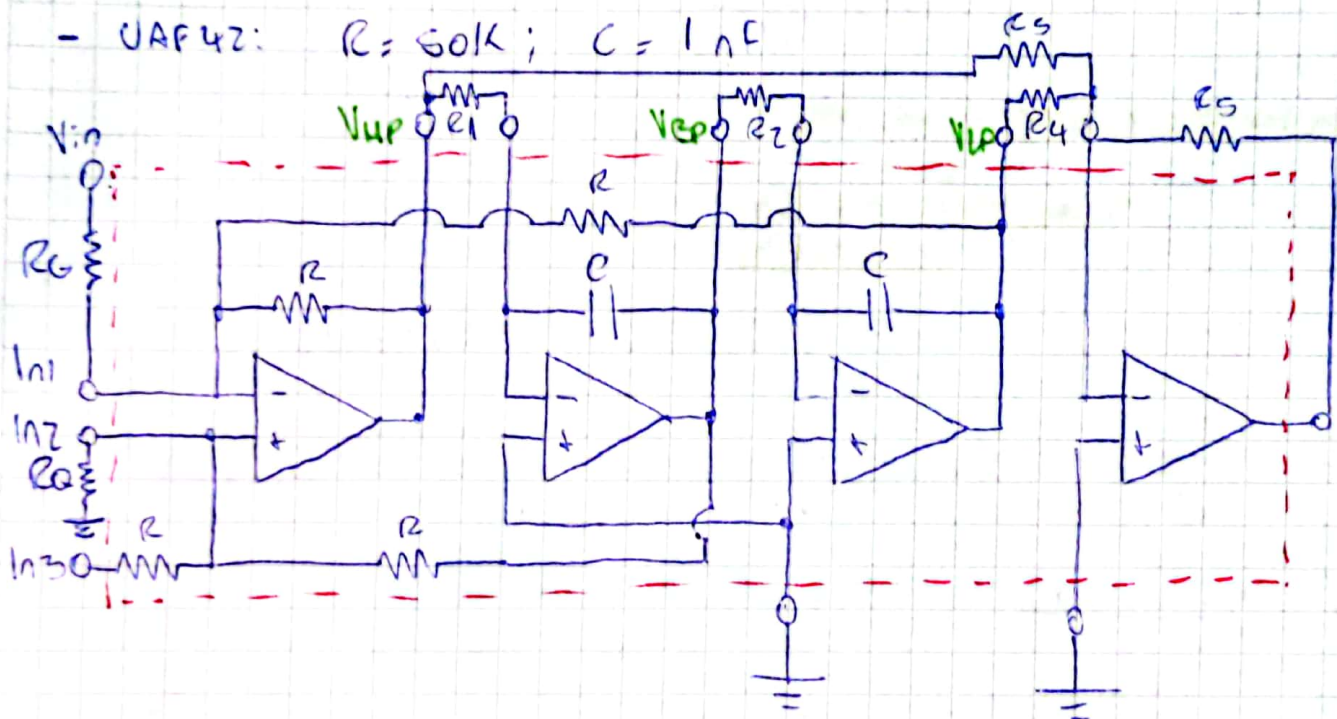
TP1:

Filtro Notch, $f_0 = 50 \text{ Hz}$, Ancho de banda = 3 dB

- Suma de HP y LP Butter orden 2:

$$T_1(\phi) = \frac{\phi^2}{\phi^2 + \sqrt{2}\phi + 1} ; T_2(\phi) = \frac{1}{\phi^2 + \sqrt{2}\phi + 1}$$

- UAF42: $R = 50 \text{ k}\Omega$; $C = 1 \text{ nF}$



- Ecuaciones de diseño por los interruptores:

$$\omega_n^2 = \frac{R}{R \cdot R_1 \cdot R_2 \cdot C^2} = \frac{1}{R_1 \cdot R_2 \cdot C^2}$$

$$\omega_n = 2\pi \cdot 50 \text{ Hz} = 100\pi \text{ rad/s} \Rightarrow \omega_n^2 = 98696,04 = \frac{1}{R_1 R_2 \cdot 1 \cdot 10^{-18}}$$

$$9,869 \cdot 10^{-14} = \frac{1}{R_1 R_2} ; R_1 = 2,2 \text{ M}\Omega \Rightarrow R_2 = 4,605 \text{ M}\Omega \approx 4,7 \text{ M}\Omega$$

- Ganancia filtro LP:

$$A_{LP} = \frac{R}{R_G} \Rightarrow A_{LP} = 1 \Rightarrow R_G = R = 50 \text{ k}\Omega$$

- Cálculo valor R_Q :

$$Q = \left(1 + \frac{R}{R_Q}\right) \cdot \frac{1}{\frac{1}{R} + \frac{1}{R} + \frac{1}{R_G}} \cdot \sqrt{\frac{R_1}{R_2 \cdot R_2}}$$

$$Q = \left(1 + \frac{R}{R_Q}\right) \cdot 16666,66 \cdot \frac{1}{50 \text{ k}\Omega} \cdot \sqrt{\frac{R_1}{R_2}}$$

$$Q = \frac{1}{\sqrt{2}} \Rightarrow 3,1 = 1 + \frac{R}{R_Q}$$

$$2,1 = \frac{R}{R_Q} \Rightarrow R_Q = 23809,52 \Omega \approx 22 \text{ k}\Omega$$

- sumados ganancia 1:

$$R_3 = R_4 = R_5 = 47\text{K}\Omega$$

- Valores finales:

$$R_1 = 2,2\text{M}\Omega$$

$$R_6 = 50\text{K}\Omega$$

$$R_2 = 4,7\text{M}\Omega$$

$$R_9 = 22\text{K}\Omega$$

$$R_3 = R_4 = R_5 = 47\text{K}\Omega$$