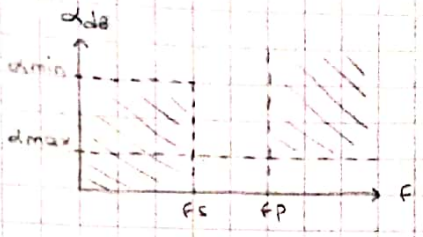
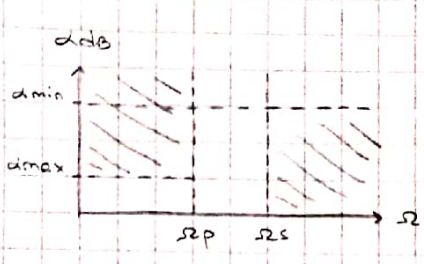
TP Lab



$F_p = 4{,}6\ kHz$ $\omega_p = 1$ $\alpha_{max} = 1\,dB$

$F_s = 1{,}2\ kHz$ $\omega_s = 0{,}261$ $\alpha_{min} = 20\,dB$

Chebyshev pasa alto



$k(\omega) = \frac{1}{\omega} = \Omega$ $\Omega p = 1$ $\Omega s = \frac{1}{\omega s} = 3{,}83$ } pasabajo

$\varepsilon_1^2 = 10^{\alpha max/10} - 1$

$\varepsilon_1^2 = 10^{1/10} - 1 = 0{,}2589$

$\alpha min = 10 \log \left\{ 1 + \varepsilon_1^2 \cosh^2 [n \cdot \cosh^{-1}(\Omega s)] \right\}$

$n = 2$: $\alpha min = 23{,}2\,dB \rightarrow$ cumple

Prototipo pasabajo

$$|Tc(j\omega)|^2 = \frac{1}{1+\varepsilon_1^2 C_2^2(\omega)} = \frac{1}{1+\varepsilon_1^2 (2\omega^2-1)^2} = \frac{1}{1+\varepsilon_1^2 (4\omega^4+4\omega^2+1)}$$

$$= \frac{1/4\varepsilon_1^2}{\omega^4 - \omega^2 + 1/4 + 1/4\varepsilon_1^2} = \frac{1/4\varepsilon_1^2}{\omega^4 - \omega^2 + 1{,}215}$$

$$|T(\xi)|^2 = |T(j\omega)|^2\Big|_{\omega = \xi/j} = \frac{1/4\varepsilon_1^2}{\xi^4 + \xi^2 + 1{,}215} = T(\xi) \cdot T(-\xi)$$

$$T(\xi) = \frac{1/2\varepsilon_1}{(\xi + 0{,}549 + j\,0{,}895)(\xi + 0{,}549 - j\,0{,}895)}$$

$$T(\xi) = \frac{1/2\varepsilon_1}{\xi^2 + \xi\,1{,}098 + 1{,}102}$$

Función de transformación $\rightarrow$ $\xi = \frac{1}{s}$

$$T(s) = \frac{1/2\varepsilon_1}{\left(\frac{1}{s}\right)^2 + \left(\frac{1}{s}\right)1{,}098 + 1{,}102} = \frac{s^2\,1/2\varepsilon_1}{1 + s\,1{,}098 + s^2\,1{,}102}$$

$$T(s) = \frac{0{,}983}{1{,}102} \frac{s^2}{s^2 + s\,0{,}996 + 0{,}907} \rightarrow \boxed{T(\xi) = 0{,}84 \frac{s^2}{s^2 + s\,0{,}996 + 0{,}907}}$$

cero en el origen y polos en $-0{,}498 \pm j\,0{,}812$

NOTA