HOJA Nº

FECHA

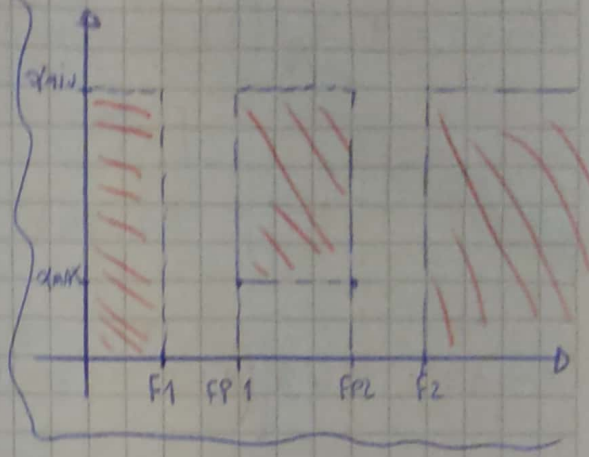
PLANTILLA "D" LADO

$F_0 = 6\,KHz$; $Q = 3$; $\alpha_{max} = 2,5\,dB$

$F_1 = 0,6\,KHz$; $F_2 = 60\,KHz$; $\alpha_{min} = 15\,dB$

$W_{S1,2} = 2\pi F_{1,2}$

PLANTILLA PASA BAJOS



$W_{P1-N} = W_{P1}/W_0$; $W_{S1-N} = F_1/F_0 \Rightarrow W_{S1-N} = 0,1$

$W_{P2-N} = W_{P2}/W_0$ $W_{S2-N} = F_2/F_0 \Rightarrow W_{S2-N} = 10$

$$\Omega_{S1-N} = Q\frac{(W_{S1-N}^2 - 1)}{W_{S1-N}} \Rightarrow \Omega_{S1-N} = 3\cdot\frac{(0,1^2 - 1)}{0,1} \Rightarrow \Omega_{S1-N} = -29,7$$

$$\Omega_{S2-N} = \frac{3\cdot(10^2 - 1)}{10} \Rightarrow \Omega_{S2-N} = 29,7$$

PLANTILLA PASA-BAJOS PROTOTIPO

$\varepsilon^2 = 10^{2,5/10} - 1 \rightarrow \varepsilon^2 = 0,7783$

$\varepsilon = 0,8822$

NOTA

$$\alpha_{min}(n) = 10\log\left[\left(1+\varepsilon^2\cosh^2\left(n\cosh^{-1}(\omega_s)\right)\right)\right]$$

$$\alpha_{min1} = 10\log\left(1+\varepsilon^2\omega_s^2\right) = 28{,}37\,dB$$

$\omega_s = 29{,}7$

$\varepsilon = 0{,}7783$

$\rightarrow n = 1$

$$\alpha_{min2} = 10\log\left[\left(1+\varepsilon^2\cosh^2\left(2\cosh^{-1}(29{,}7)\right)\right)\right]$$

$\alpha_{min2} = 63{,}89\,dB \rightarrow n = 2$

$$T_{LP}(\omega) = \frac{1}{1+C_1^2(\omega)} = \frac{1}{1+\varepsilon^2\omega^2} \; ; \; T_{LP}(s) = T_{LP}(\omega)\Big|_{\omega = s/j} = \frac{1}{1-\varepsilon^2 s^2}$$

$$T_{LP}(s) = \frac{1}{a_0+b} \cdot \frac{1}{-a_2+b} = \frac{1}{-\varepsilon^2 s^2+1} \; ; \; -a_2 s^2 + s(a_2-a_0) + b^2$$

$$\begin{cases} a_2^2 = \varepsilon^2 \rightarrow a_2 = \varepsilon \\ b = 1 \end{cases} \; ; \; T_{LP}^2(s) = \frac{1}{\varepsilon s + 1} \rightarrow T_{LP}(s) = \frac{1/\varepsilon}{s + 1/\varepsilon}$$

$$T_{BP}(s) = T_{LP}(s)\Big|_{s = \frac{s^2+1}{s}Q} = \frac{1/\varepsilon}{\left(\frac{s^2+1}{s}\right)Q + 1/\varepsilon} = \frac{(1/\varepsilon)s}{Qs^2 + Q + \frac{1}{\varepsilon}s}$$

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$$T_{BP}(S) = \frac{\frac{1}{\varepsilon Q} S}{S^2 + \frac{1}{\varepsilon Q} S + 1} \quad ; \quad T_{BP}(S) = \frac{0,378}{S^2 + 0,378 S + 1}$$

$Q = 3 \quad ; \quad \varepsilon = 0,8822$

BUSCO FP1 Y FP2 (FRECUENCIAS DE CORTE)

$$W_o^2 = W_{P1} W_{P2} \qquad F_o^2 = F_{P1} \cdot F_{P2}$$

$$W_{P2} - W_{P1} = 2KHz \; \rightarrow \; BW = BW_{2M} \qquad BW = F_{P2} - F_{P1} \rightarrow F_{P2} = F_{P1} + 2KHz$$

$$F_o^2 = F_{P1}^2 + 2KHz\, F_{P1} \rightarrow F_{P1}^2 + 2KHz\, F_{P1} - 6KHz^2$$

$F_{P1A} = 5,080\,KHz \quad ; \quad F_{P2} = 7,080\,KHz$

$F_{P1B} = -7,080\,KHz$

VERIFICO

$$F_o^2 = F_{P1} \cdot F_{P2} \rightarrow 6KHz^2 = F_{P1} \cdot F_{P2} \quad ; \quad \sqrt{F_{P1} \cdot F_{P2}} = F_o$$

$F_o = 5,99\,KHz$ ✓

NOTA

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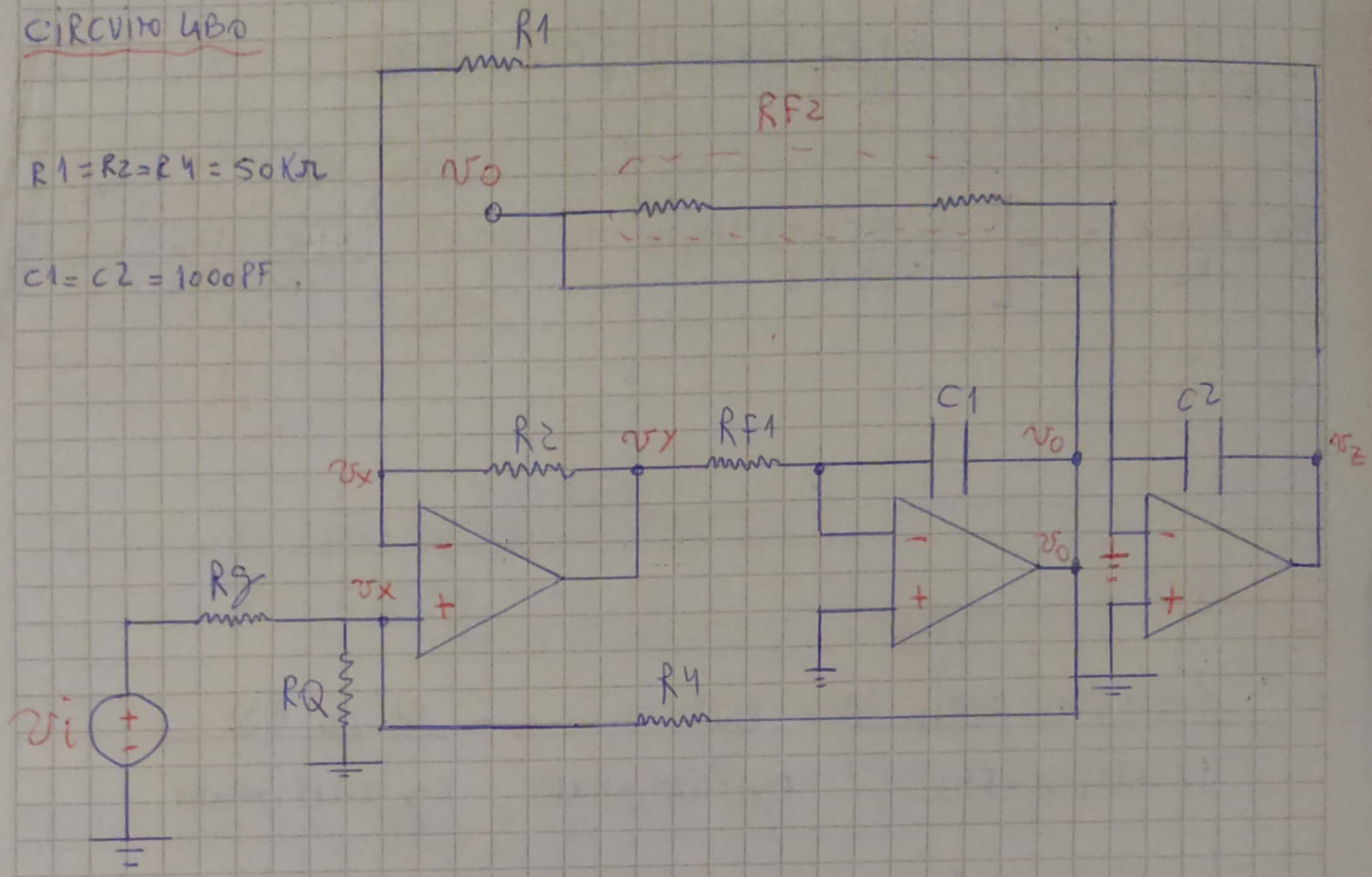
CIRCUITO 4B0

$R1 = R2 = R4 = 50K\Omega$

$C1 = C2 = 1000PF$



$$vx\left(\frac{1}{RG}+\frac{1}{RQ}+\frac{1}{R4}\right)-\frac{1}{RG}vi-\frac{1}{R4}vo=0 \quad ; \quad vx\left(\frac{1}{R2}+\frac{1}{R1}\right)-\frac{1}{R2}vy-\frac{1}{R1}vz=0$$

$$vx\,\frac{RgRQ+RgR4+RQR4}{RgRQR4}=\frac{R4vi+Rgvo}{RgR4} \quad / \quad vz=\frac{R1+R2}{R2}vx-\frac{R1}{R2}vy \quad (2)$$

$$vx=RQ\,\frac{(R4vi+Rgvo)}{Rg(RQ+R4)+RQR4} \quad (1) \quad ; \quad vy\,\frac{1}{RF1}=-Sc1\,vo$$

$$vy=-RF1\,Sc1\,vo \quad (3)$$

$$Sc2\,vz=-\frac{1}{RF2}vo \Rightarrow vz=-\frac{1}{Sc2RF2}vo \quad (4)$$

NOTA

④ y ③ en ②

$$-\frac{1}{sC_2R_{F2}}v_o = \frac{R_1+R_2}{R_2}v_x + \frac{R_1}{R_2}(+R_{F1}sC_1v_o)$$

$$v_x\frac{R_1+R_2}{R_2} = -\left[\frac{1+s^2C_1C_2R_{F1}R_{F2}\frac{R_1}{R_2}}{sC_2R_{F2}}\right]v_o \Rightarrow v_x = -\frac{R_2(1+s^2C_1C_2R_{F1}R_{F2})}{(R_1+R_2)sC_2R_{F2}}v_o \quad (R_1\|R_2)$$

⑤

⑤ = ①

$$-\frac{R_2(1+s^2C_1C_2R_{F1}R_{F2})}{(R_1+R_2)sC_2R_{F2}}v_o = \frac{R_Q R_4 v_i}{R_g(R_Q+R_4)+R_Q R_4} + \frac{R_g v_o R_Q}{R_g(R_Q+R_4)+R_Q R_4} \quad (R_1\|R_2)$$

$$-\frac{R_2(1+s^2C_1C_2R_{F1}R_{F2})(R_g(R_Q+R_4)+R_Q R_4)}{(R_1+R_2)sC_2R_{F2}}v_o = R_Q R_4 v_i + R_g R_Q v_o \quad (R_1\|R_2)$$

$$-\frac{R_2(1+s^2C_1C_2R_{F1}R_{F2})(R_g(R_Q+R_4)+R_Q R_4)+R_g R_Q(R_1+R_2)sC_2R_{F2}}{(R_1+R_2)sC_2R_{F2}}v_o = R_Q R_4 v_i \quad (R_1\|R_2)$$

$$T(s) = \frac{-sC_2R_{F2}R_Q R_4(R_1+R_2)}{\frac{R_1R_2}{R_2}s^2C_1C_2R_{F1}R_{F2}(R_g(R_Q+R_4)+R_4R_Q) + sC_2R_{F2}R_gR_Q(R_1+R_2) + R_2(R_g(R_Q+R_4)+R_Q R_4)}$$

$$T(s) = \frac{-s\frac{R_Q R_4(R_1+R_2)}{(R_g(R_Q+R_4)+R_4R_Q)R_1C_1R_{F1}}\cdot\frac{R_g}{R_g}}{s^2 + \frac{1}{C_1R_{F1}}\frac{R_gR_Q(R_1+R_2)}{(R_g(R_Q+R_4)+R_4R_Q)R_1}s + \frac{R_2}{R_{F1}R_{F2}C_1C_2R_1}}$$

NOTA

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$$T(S) = -\frac{R4}{Rg} \cdot \frac{\frac{1}{C1RF1}\,S}{S^2 + \frac{1}{C1RF1}\cdot\frac{RgRQ(R1+R2)}{R1(Rg(RQ+R4)+RQR4)}\,S + \frac{R2}{R1RF1RF2C1C2}}$$

Si $R1 = R2 = R4 = R = 50K\Omega$

$C1 = C2 = C = 1000PF$

$$T(S) = -\frac{R}{Rg} \cdot \frac{\frac{1}{CRF1}\,S}{S^2 + \frac{1}{CRF1}\cdot\frac{RgRQ2R}{R(Rg(RQ+R)+RQR)}\,S + \frac{1}{RF1RF2C^2}}$$

TENIENDO UNA T(S) IGUAL A:

$$T(S) = \frac{0{,}378\,S}{S^2 + 0{,}378S + 1} \rightarrow \text{NORMALIZADA}$$

$$T(S) = \frac{0{,}378\,\omega w\,S}{S^2 + 0{,}378\cdot\omega w S + \omega w^2}, \quad \omega w = 24\cdot 6KHz$$

$$\frac{1}{RF1\,RF2\,C^2} = \omega w^2 \Rightarrow RF1\cdot RF2 = \frac{1}{C^2\cdot\omega w^2} \Rightarrow RF1\cdot RF2 = 703{,}61\,M\Omega^2$$

Si $RF1 = 10K\Omega \rightarrow RF2 = 70{,}36K\Omega \cong 68K\Omega + 2{,}2K$ ó $68K\Omega + 2K\Omega$

NOTA

$$\frac{1}{RF1C} \cdot \frac{\frac{2R_g RQ}{R_g(RQ+R)+RQR}}{1} = 0,378 \cdot \Omega w$$

$$\frac{R}{R_g} = 1 \;;\; R = R_g \rightarrow \frac{1}{RF1C} \cdot \frac{2RQ}{2RQ + R} = 0,378\,\Omega w$$

↳ K = 1

$$2RQ = 2RQ\, RF1 \cdot C \cdot 0,378\,\Omega w + R\, RF1C \cdot 0,378\,\Omega w$$

$$2RQ\left[\underbrace{1 - RF1C \cdot 0,378 \cdot \Omega w}_{0,857}\right] = \underbrace{R \cdot RF1C\; 0,378\,\Omega w}_{2268^{\Omega}}$$

$$2RQ = 8,31\,K\Omega$$

$$RQ = 4,16\,K\Omega \cong 3,9\,K\Omega + 220\,\Omega$$

↳ VALORES COMERCIALES