

Experiment: TIA simple Z5 ZL

Filter 1

Filter Type: BP

$$Z(s): \left(\infty, \infty, R_3, \infty, \infty, \frac{L_R s}{C_L L_L s^2 + 1} \right)$$

$$H(s): \frac{L_L s (R_4 g_m - 1)}{C_L L_L R_4 g_m s^2 + C_L L_L s^2 + 2 L_L g_m s + R_4 g_m + 1}$$

$$\mathbf{Q}: \frac{C_L \sqrt{\frac{1}{C_L L_L}}}{2 g_m}$$

$$\omega_0: \sqrt{\frac{1}{C_L L_L}}$$

$$\text{Bandwidth: } \frac{2 g_m}{C_L (R_4 g_m + 1)}$$

Filter 2

Filter Type: BP

$$Z(s): \left(\infty, \infty, R_3, \infty, \infty, \frac{1}{C_L s + \frac{1}{R_L + \frac{1}{L s}}} \right)$$

$$H(s): \frac{L_L R_L s (R_4 g_m - 1)}{C_L L_L R_L R_L g_m s^2 + C_L L_L R_L R_L s^2 + L_L R_4 g_m s + 2 L_L R_L g_m s + L_L s + R_4 R_L g_m + R_L}$$

$$\mathbf{Q}: \frac{C_L R_L \sqrt{\frac{1}{C_L L_L}} (R_4 g_m + 1)}{R_4 g_m + 2 R_L g_m + 1}$$

$$\omega_0: \sqrt{\frac{1}{C_L L_L}}$$

$$\text{Bandwidth: } \frac{R_4 g_m + 2 R_L g_m + 1}{C_L R_L (R_4 g_m + 1)}$$