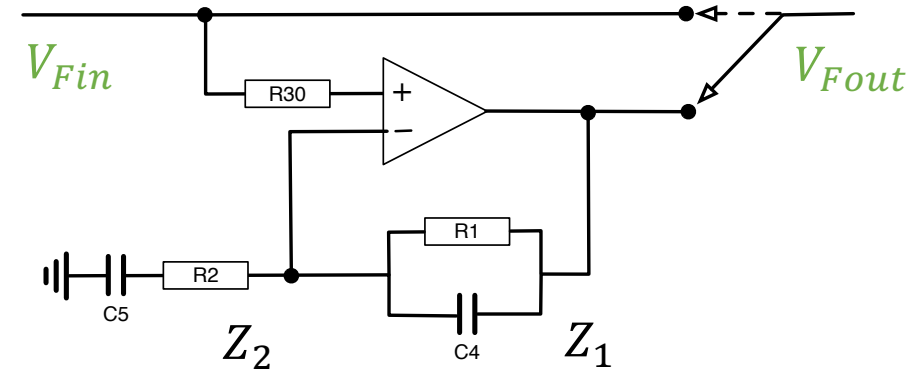
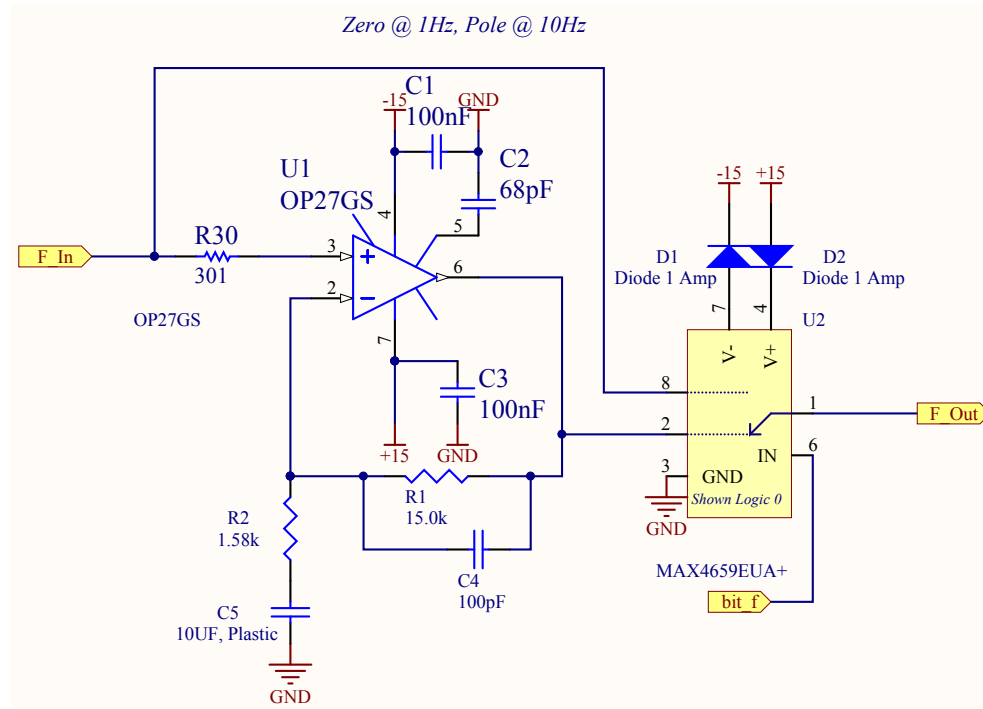


# II.3 Review of the Circuit: (c) Whitening Stages

From pg 4 of [D1001530-v7...](#)

These can be redrawn as a non-inverting amplifier...



$$Z_1 = \frac{R_1(1 + 1/i\omega C_4)}{(R_1 + 1/i\omega C_4)} = \frac{R_1}{(1 + i\omega R_1 C_4)}$$

$$Z_2 = R_2 + 1/i\omega C_5 = \frac{(1 + i\omega R_2 C_5)}{i\omega C_5}$$

$$\frac{V_{Fout}}{V_{Fin}} = 1 + \frac{Z_1}{Z_2} = 1 + \frac{\frac{R_1}{(1 + i\omega R_1 C_4)}}{\frac{(1 + i\omega R_2 C_5)}{i\omega C_5}} = \frac{1 + i\omega(R_1 C_5 + R_1 C_4 + R_2 C_5) - \omega^2(R_1 R_2)(C_4 C_5)}{(1 + i\omega R_2 C_5)(1 + i\omega R_1 C_4)}$$

$$f_Z^F = 1/(2\pi(R_1 C_5 + R_1 C_4 + R_2 C_5)) = 0.960 \text{ Hz}$$

$$f_Z^F = 1/[(2\pi)^2(R_1 R_2 C_4 C_5)] = 1.069 \text{ MHz}$$

$$f_p^F = 1/(2\pi(\cancel{R_2} C_5)) = 10.073 \text{ Hz}$$

$$f_p^F = 1/(2\pi(\cancel{R_1} C_4)) = 106.103 \text{ kHz}$$