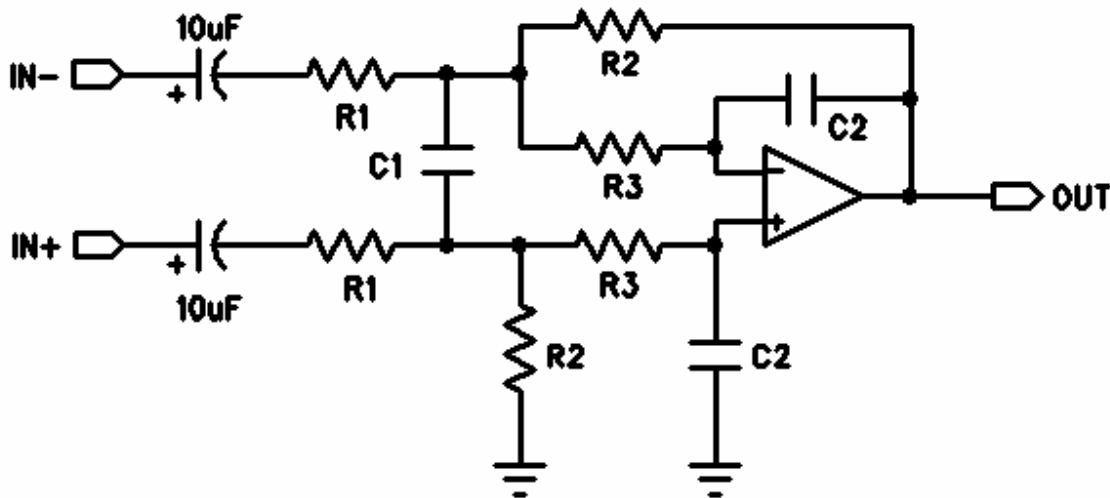


**Application Note AN1201-01:**  
**Differential-to-Single-Ended Two Pole Lowpass Filter Equations**

This application note provides the equations for determining resistor and capacitor values for the differential-to-single-ended two pole lowpass filter described in datasheet. The EV1201A specifications were determined with the original circuit. To adjust for other parameters including gain changes and cutoff frequencies, follow procedure listed below.



Procedure:

1. Select R1 output load resistors (  $R1 \geq 8.2k\Omega$  ).
2. Select cutoff frequency  $\omega_c = 2\pi f_c$  (  $f_c \geq 48kHz$  ).
3. Select Q (  $Q = 0.707$  for Butterworth filter ).
4. Select differential gain ( Gain = 0.5 for standard line level out, original circuit has Gain = 1 ).
5. Select C1 (  $C1 > Q \cdot R1 \cdot (Gain + 1) / (2 \cdot \omega_c \cdot Gain \cdot (R1)^2)$  ).
6. Select R2 (  $R2 = Gain \cdot R1$  ).
7. Select R3 (  $R3 = R1 \cdot R2 / (2 \cdot R1 \cdot R2 \cdot C1 \cdot (\omega_c / Q) - R1 - R2)$  ).
8. Select C2 (  $C2 = 1 / (2 \cdot R3 \cdot R2 \cdot C1 \cdot (\omega_c)^2)$  ).

Typical line level out values:

$$R1 = 10k\Omega \quad R2 = 4.7k\Omega \quad R3 = 11k\Omega$$

$$C1 = 470pF \quad C2 = 220pF \quad (\text{Gain} = 0.5, Q = 0.707, f_c \approx 48kHz)$$

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