

E1.0 The Basic Amplifier

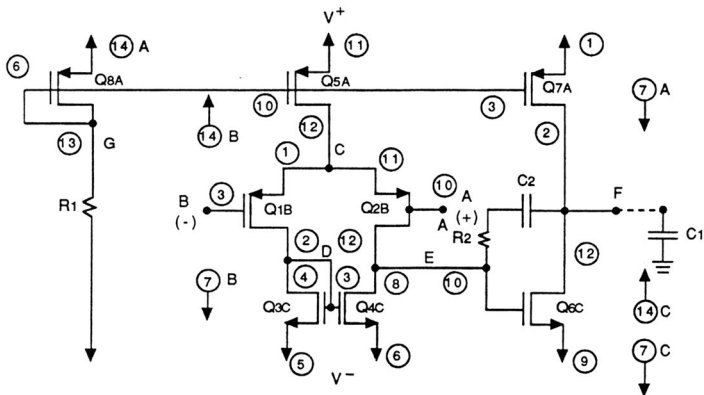


Figure 23.2 A Basic Two-Stage CMOS Op Amp. Three CD4007 arrays (A, B, C) are required. Pin numbers are for the corresponding package. Note the 6 substrate connections, which are essential for correct operation of the arrays

E1.1 DC Operation

- Assemble the circuit shown in Fig. 23.2 using ± 8 V supplies, $R_1 = 220\text{ k}\Omega$, $R_2 = 1\text{ M}$, and $C_2 = 1\text{ pF}$. Connect the positive input (A) to ground, the negative input (B) to the output (F), and a capacitor $C_1 = 0.1\mu\text{F}$ from output (F) to ground.
- 有些情況下，特別是在COMS的電路，電路會在高頻產生負電阻(negative resistor)，所以量測訊號時，要串聯一個正電阻來抵消負電阻，才能量到真正的值。
Using your DVM with a series $10\text{ k}\Omega$ resistor as a probe (See Appendix E13), measure dc voltages at nodes A through G.

E2.0 AC Unity-Gain Operation

E2.1 Over-Compensated Operation with a Dominant Load Pole

- Connect the circuit of Fig. 23.2 as indicated in Exploration E1.1 above, but with input A connected to a waveform generator (node J), via a resistor, $R_S = 10\text{ k}\Omega$. Using your (normalized) dual-channel oscilloscope, and a 4 Vpp input square wave at 100 Hz, compare the waveforms at A and F. Sketch the waveforms at A and F.
- With conditions otherwise the same as in the previous step, change the generator input to a sine wave and measure the voltage gain by comparing peak-to-peak values. Now, raise the input frequency until the gain is 0.707 of its lower-frequency value (that is, until it has dropped by 3dB).