

BJT differential amplifier

Experiment: Procedure/Observation

1. Wire up the differential amplifier shown in Fig. 1 (a) using a matched BJT pair from CA3086. With $V_{i1} = V_{i2} = 0$ V (i.e., both inputs grounded), what values would you expect for V_{C1} and V_{C2} ? Verify with measurement.
2. Connect a sinusoidal input (10 mV peak-to-peak, 1 kHz) to input 1, with $V_{i2} = 0$ V. Measure the gain $A_d = V_{C1}/V_{i1}$ (i.e., single-ended output).
3. Connect the two inputs together and apply a large sinusoidal input voltage (say, 1 V peak-to-peak, 1 kHz). Measure the common-mode gain $A_c = V_{C1}/V_i$.
4. If the supply voltage is changed from ± 15 V to ± 12 V, how will A_d and A_c change? Verify with measurement.
5. Wire up the simple current source shown in Fig. 1 (b) (use another CA3086 chip for Q_3 and Q_4 ; it will make your wiring easier). What do you expect the current I_0 to be? Verify with measurement.

Use two other values for R_L (say, 18 k and 27 k), and verify that the current remains the same.
6. Replace R_{EE} in Fig. 1 (a) with the simple current source (see Fig. 1 (c)), and repeat steps 1 to 3 (use ± 15 V supply).

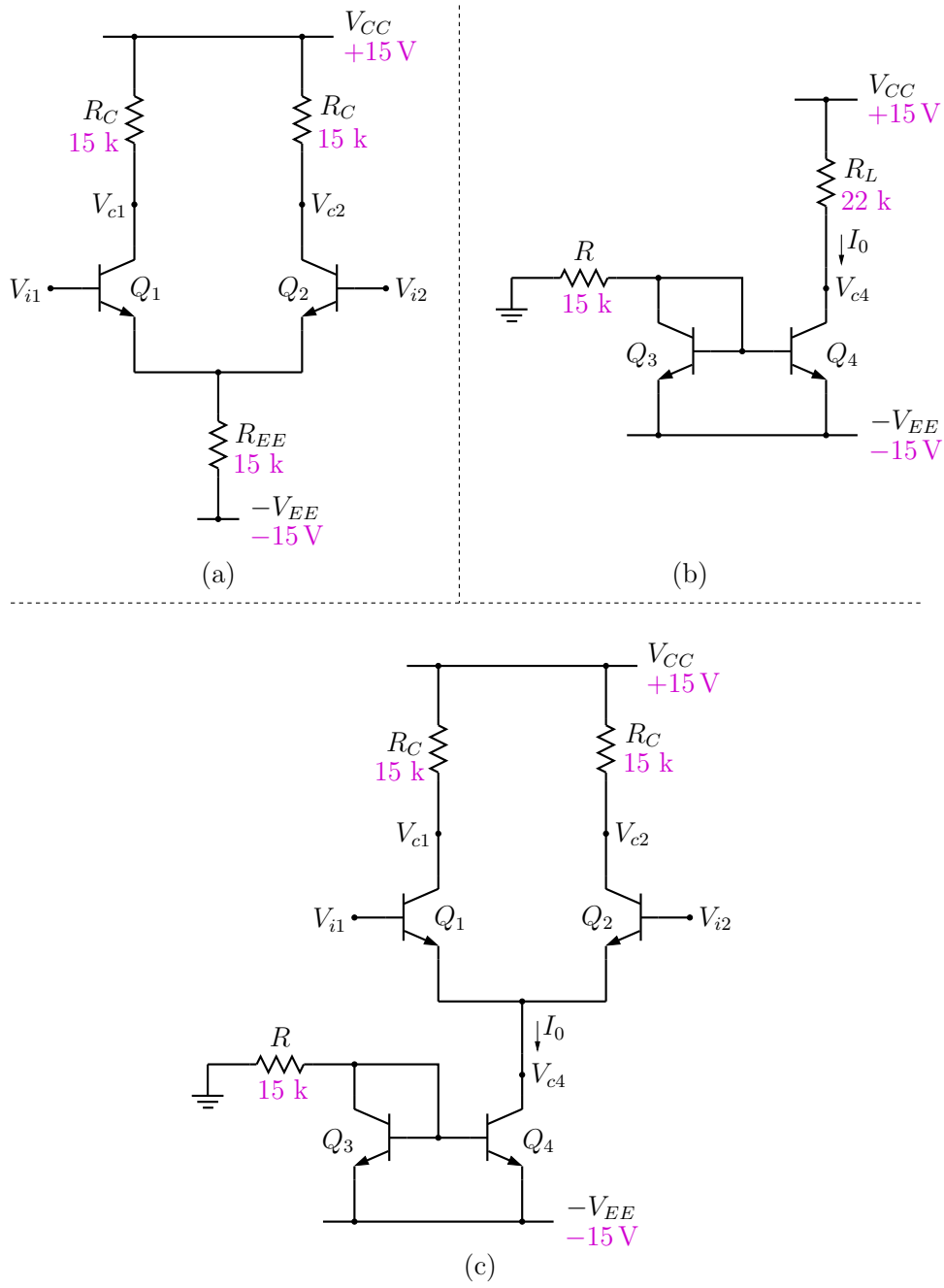


Figure 1: (a) Differential amplifier circuit with a simple biasing arrangement (R_{EE}), (b) A current mirror circuit, (c) Differential amplifier circuit with bias current provided by a current mirror.