The PNP Transistor

양승재

Structure and Operation

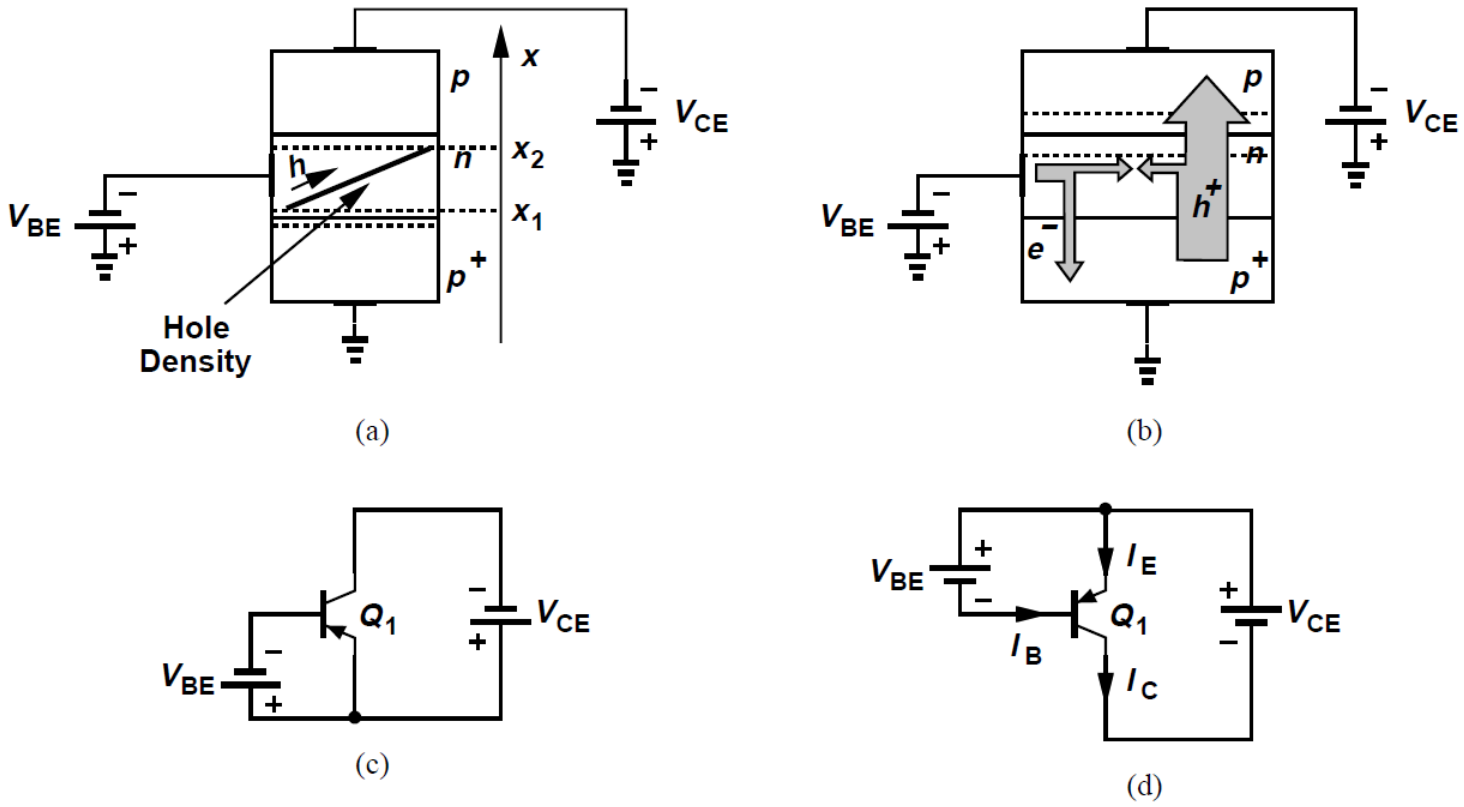


Figure 4.38 (a) Structure of *pnp* transistor, (b) current flow in *pnp* transistor, (c) proper biasing, (d) more intuitive view of (c).

Structure and Operation

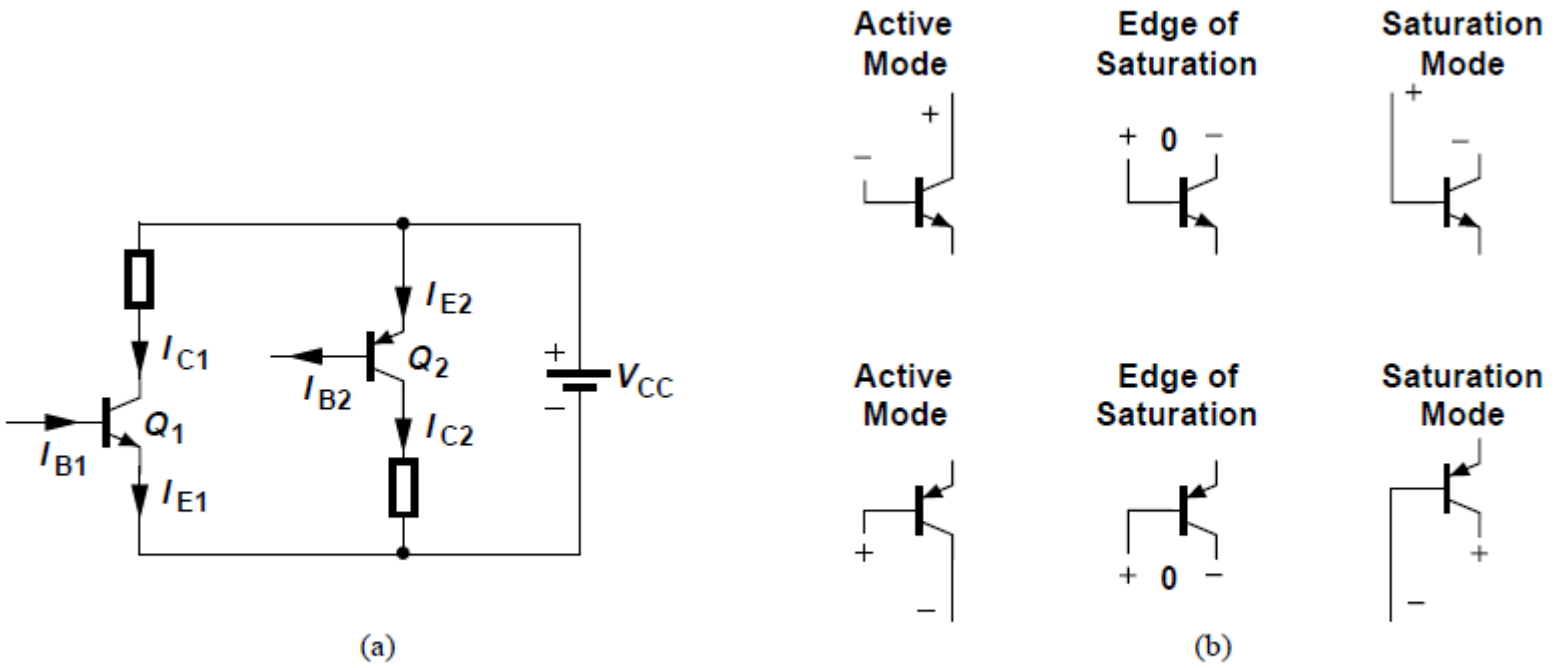
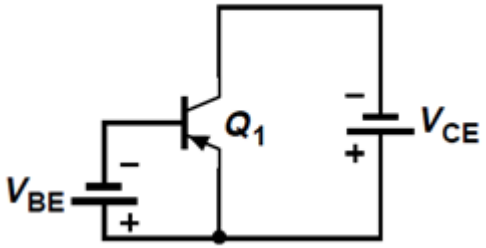


Figure 4.39 (a) Voltage and current polarities in *npn* and *pnp* transistors, (b) illustration of active and saturation regions.

Large-Signal Model



$$I_C = I_S \exp \frac{V_{EB}}{V_T}$$

$$I_C = \left(I_S \exp \frac{V_{EB}}{V_T}\right)\left(1 + \frac{V_{EC}}{V_A}\right).$$

$$I_B = \frac{I_S}{\beta} \exp \frac{V_{EB}}{V_T}$$

$$I_E = \frac{\beta + 1}{\beta} I_S \exp \frac{V_{EB}}{V_T}$$

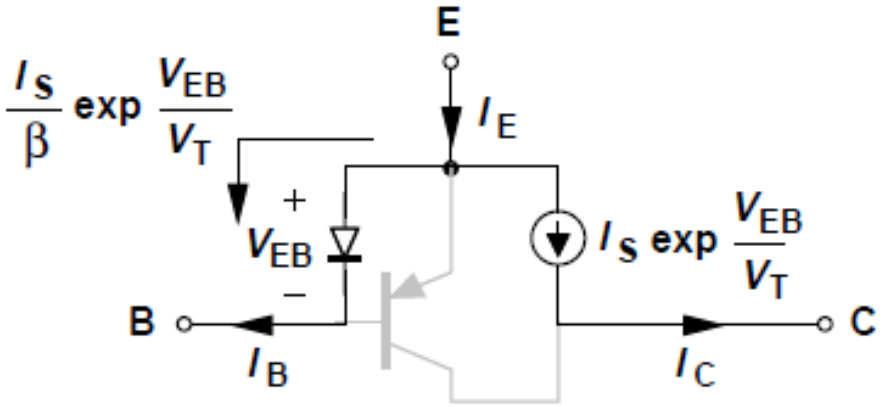


Figure 4.40 Large-signal model of *pnp* transistor.

Small-Signal Model

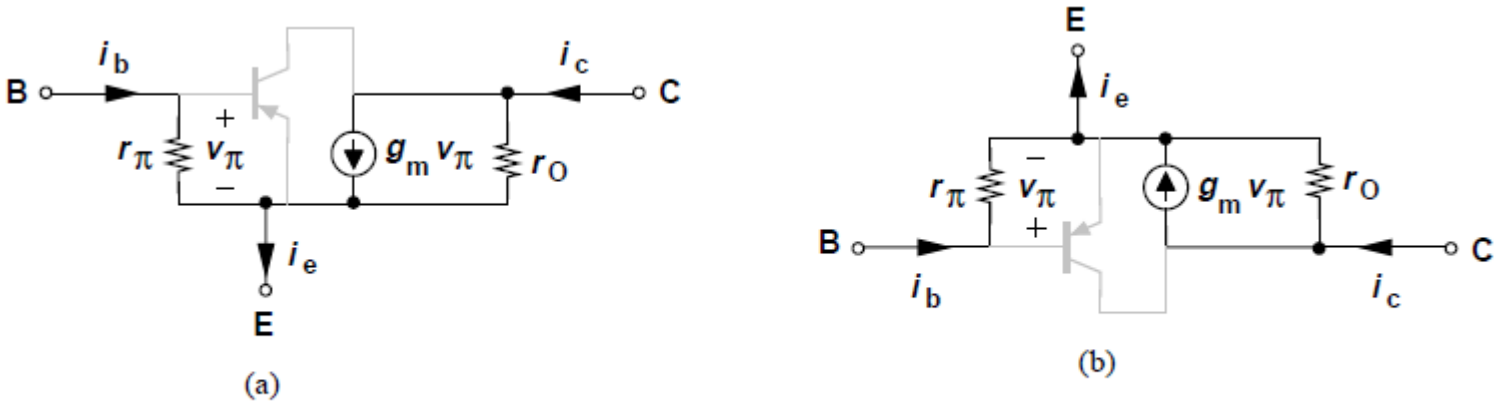


Figure 4.43 (a) Small-signal model of *pnp* transistor, (b) more intuitive view of (a).

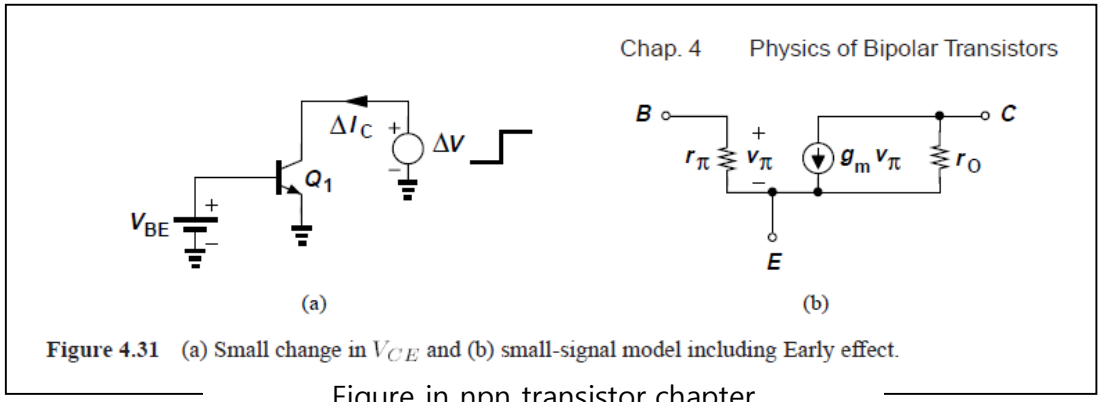


Figure 4.31 (a) Small change in V_{CE} and (b) small-signal model including Early effect.

Figure in npn transistor chapter