Biasing Guidelines

Basic guidelines for biasing a common-emitter BJT amplifier that is stable over temperature, voltage and part variations.

1. Choose an appropriate transistor for your circuit. Make sure that $\beta \geq 100$ at the anticipated current level.
   *Allows the assumption that $I_c \approx I_e$ and $I_b \approx 0$.*

2. Choose $I_e$ to set the transistor transconductance.
   *Lessens the dependence of $I_c$ on Beta and temperature.*

3. Choose a collector resistor to set $V_c \approx 0.5V_{cc}$.
   *Gives the greatest output voltage swing.*

4. With chosen $I_e$, pick $R_e$ such that $V_e \geq 10V_t$. Voltages from 0.5V - 1V are typical.
   *Minimizes variations in $I_c$ due to $V_{be}$ temperature dependence.*

5. Create the base bias resistor network so that $V_b = V_e + 0.6$ with the constraint that the current through the bias resistors is $0.1I_e$. With $\beta \geq 100$, this corresponds to a bias resistor current that is $\geq 10I_b$.
   *Keeps variations in $\beta$ (thus, $I_b$) from effecting $V_b$.*