LESSON 22

Common Base Stage

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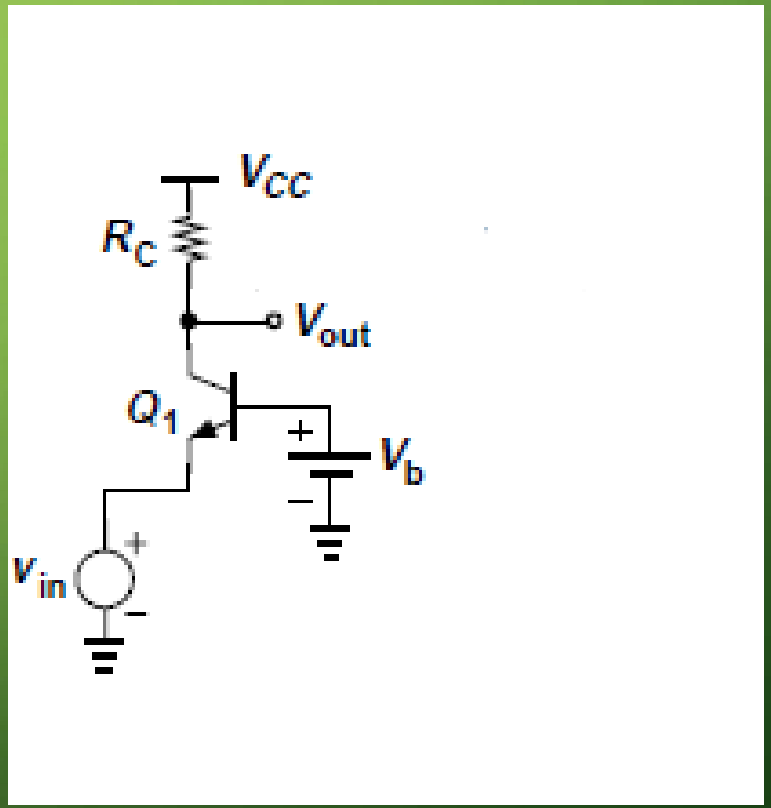
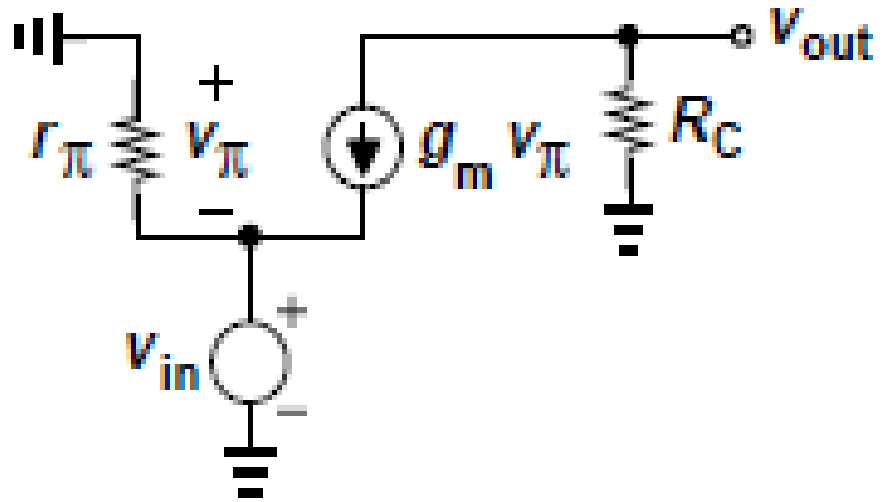
CB stage

Common base amplifier is one of three basic single-stage bipolar junction transistor(BJT) amplifier topologies

In this circuit, the emitter terminal of the transistor serves as the input, collector serves as the output and the base is connected to ground or common.



Small-signal model of CB stage



$$V_\pi = -V_{in}$$

$$V_{out} = -g_m V_\pi R_c$$

$$A_V = g_m R_c$$

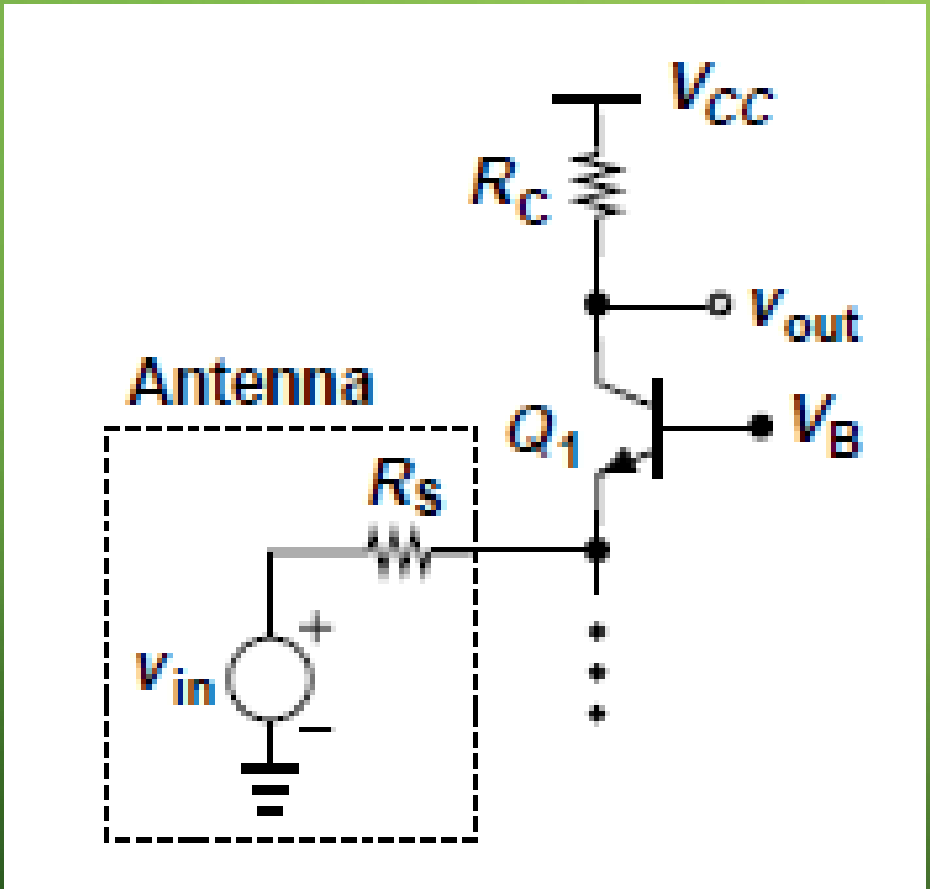
$$i_{in} = -\left(g_m V_\pi + \frac{V_\pi}{r_\pi}\right)$$

$$R_{in} = \frac{\beta}{(\beta+1)g_m}$$

$$\frac{V_{in}}{i_{in}} = R_{in} = \frac{r_\pi}{r_\pi g_m + 1}$$

$$r_\pi = \frac{\beta}{g_m} \quad \frac{\beta}{\beta+1} \approx 1 \quad R_{in} = \frac{1}{g_m}$$

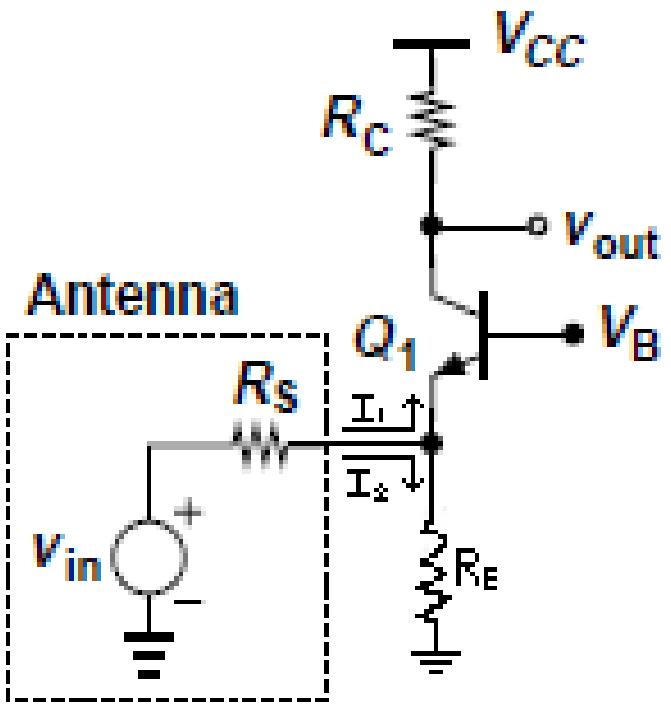
Bias design for a Common Base stage



Because Antenna doesn't allow us to have current

So we have to add some other device to carry the bias current of transistor.

Bias design for a Common Base stage



$$I_1 = \frac{R_E}{R_E + \frac{1}{g_m}} I_{out}$$

We can reduce current lose by increasing Emitter Resistor value.

THANKYOU FOR LISTENING