



LESSON 22

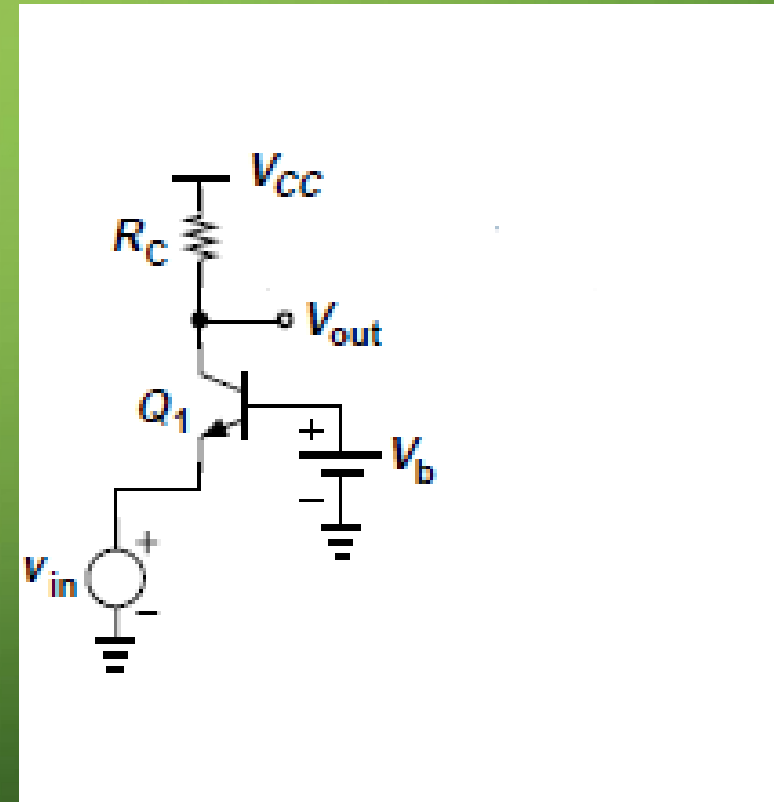
Common Base Stage

2014142046 백승현

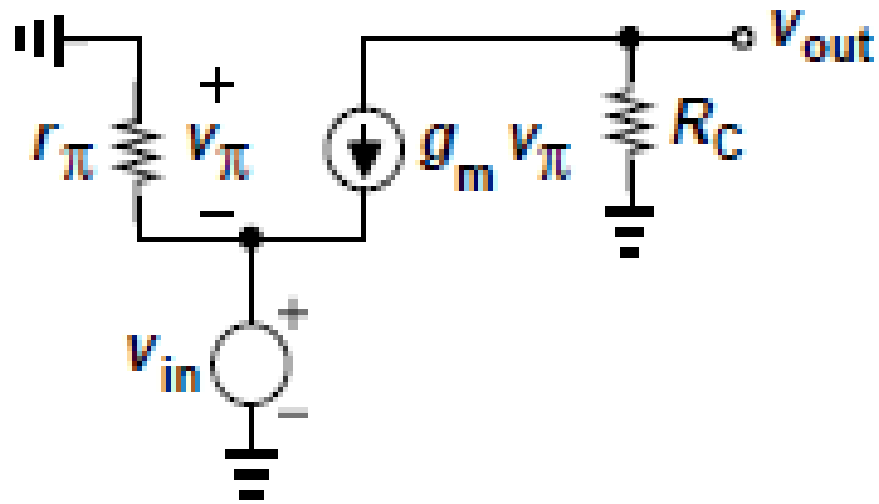
CB stage

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



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

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

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

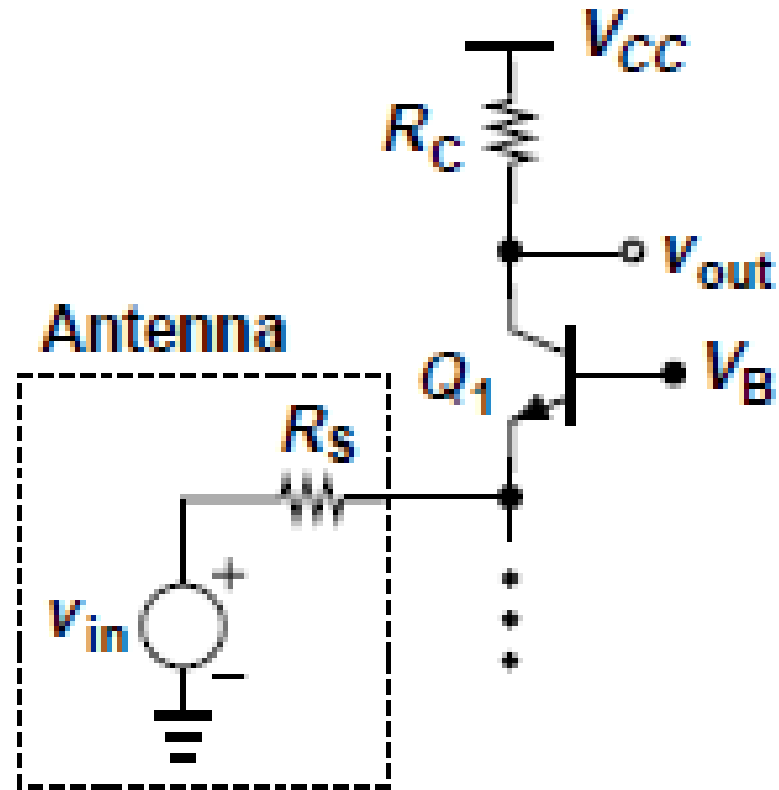
$$A_V = g_m R_C$$

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

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

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

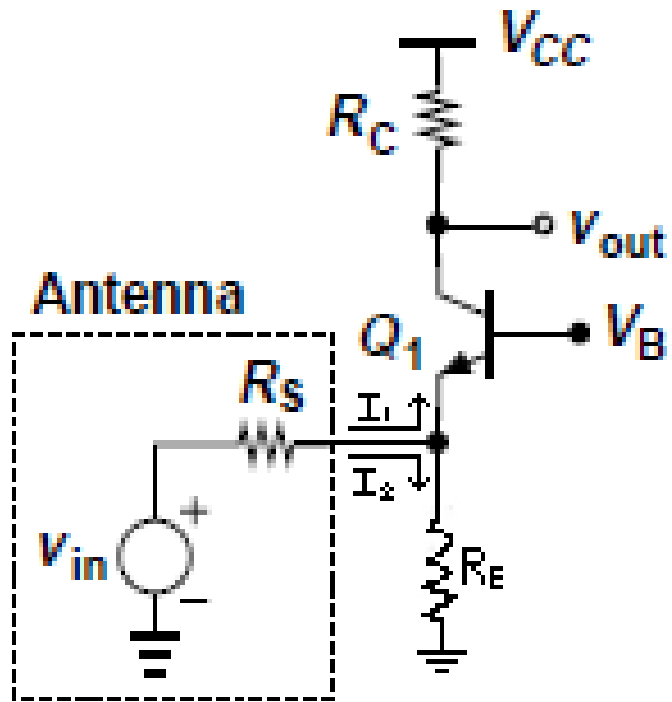
Bias design for a Common Base stage



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.

The image features a dark green background with a subtle gradient. In the four corners, there are decorative elements consisting of thin, light green lines that resemble circuit traces or fiber optic paths. These lines terminate in small, hollow circles, creating a sense of connectivity and technology. The central text is rendered in a clean, white, sans-serif font.

THANKYOU FOR LISTENING