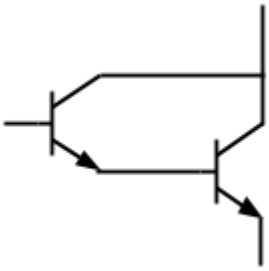
Lecture 5, Introduction to Bipolar Junction Transistors
E151/3 F17 – Matthew Spencer



1. The above configuration of transistors is referred to as a Darlignton Pair or simply a Darlington.

(a) What is the effective Beta of the Darlington Pair? i.e. the ratio of current injected into the left transistor to the combined collector current.

(b) What is the effective Vbe,on of the Darlington Pair? i.e. the total voltage drop from the base of the left transistor to the emitter of the right one.

(c) If Vbe and Vce of the Darlington are varied, what regions of operation do each of the transistors pass through?

2. The above configuration of transistors is referred to as a diode connection

(a) What region of operation does a diode connected BJT operate in?

(b) What is the large signal I-V relationship of a diode connected BJT?

(c) Why is this called a diode connection?

3. Plot gm/Ic vs. Ic for a 2N3904 transistor over an interesting range. An LTSpice simulation may help you to do this. In general, consider LTSpice to be available for any homework problem.

This plot is useful in high performance circuit designs because it relates your transistor's gain to the current (power) you spend on it.