



**THE UNIVERSITY
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Mini Project 2

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Electrical and Computer Engineering

ELEC 301

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1 Introduction

In this lab, we will be using NI *Multisim*TM to simulate various transistors, measuring simulated values. We will also be calculating their respective theoretical values and comparing them with the simulated.

2 Part 1

2.1 Part a)

From the datasheet, we can see that the small signal parameters of the 2N3904 transistor for $V_{ce} = 10V, I_c = 1mA, f = 1kHz, T = 25^\circ C$ is as follows:

	Min	Max	Unit
h_{fe}	100	400	-
h_{ie}	1	10	$k\Omega$
h_{oe}	1	40	μmho

Table 1: Small Signal Values from Data Sheet

For this lab however, we will be using the average of those values. Therefore:

$$h_{fe} = 250, h_{ie} = 5.5, h_{oe} = 20.5$$

2.2 Part b)

Figure 1, Figure 3 and Figure ?? below shows I_b vs V_{be} , I_c vs V_{ce} and I_c vs V_{be} respectively.

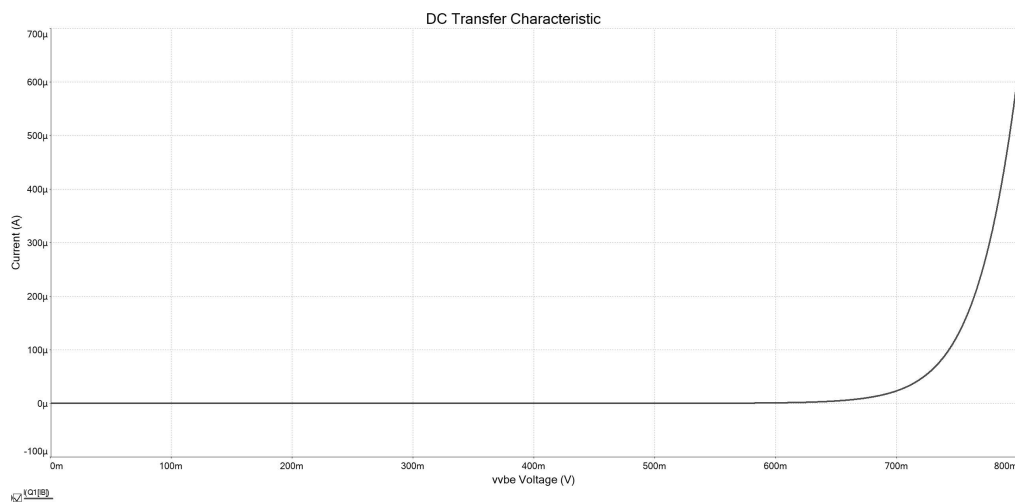


Figure 1: I_b vs V_{be}

The DC sweep of this simulation is about 0V to 2V in 0.01V increments.

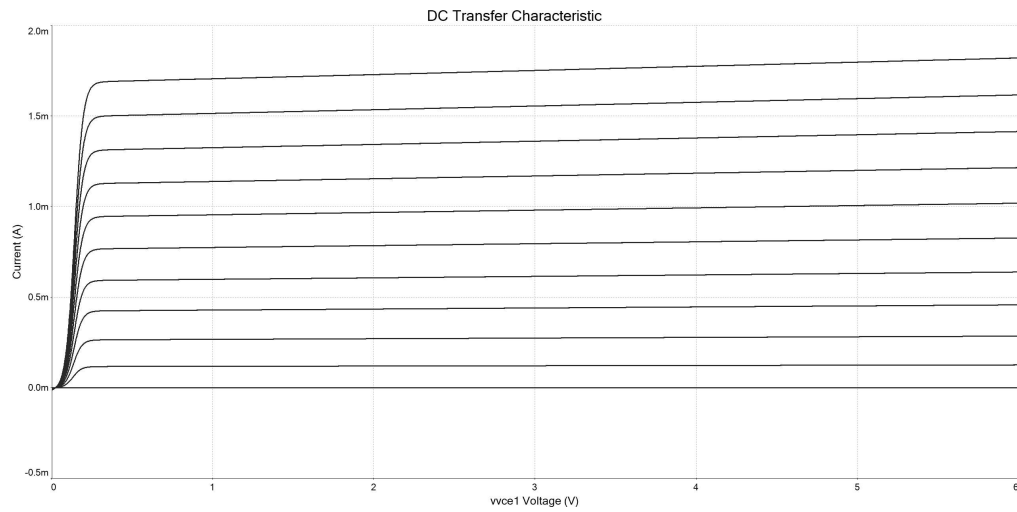


Figure 2: I_c vs V_{ce}

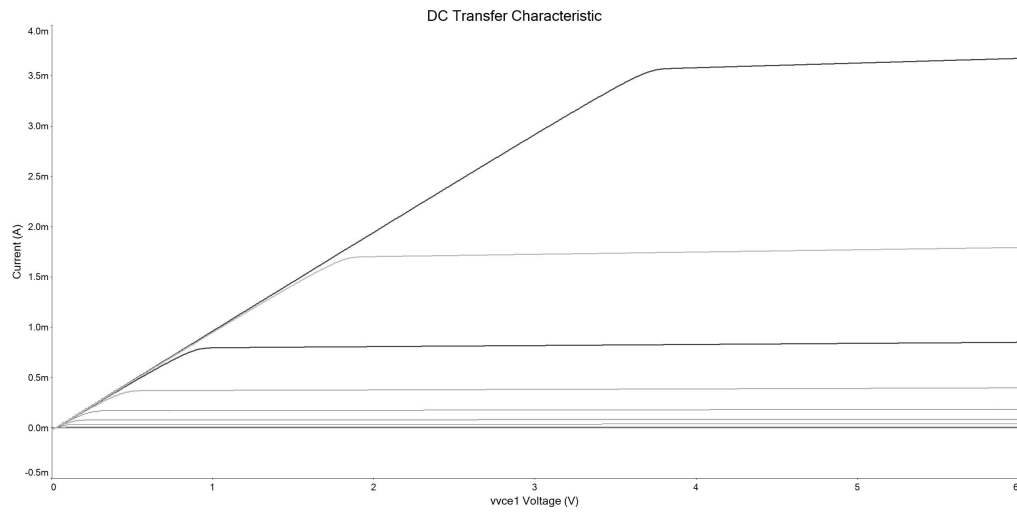


Figure 3: I_c vs V_{ce}

2.3 Part c)

3 References

1. <https://www.onsemi.com/pdf/datasheet/2n3903-d.pdf>
2. NI Multisim Manual