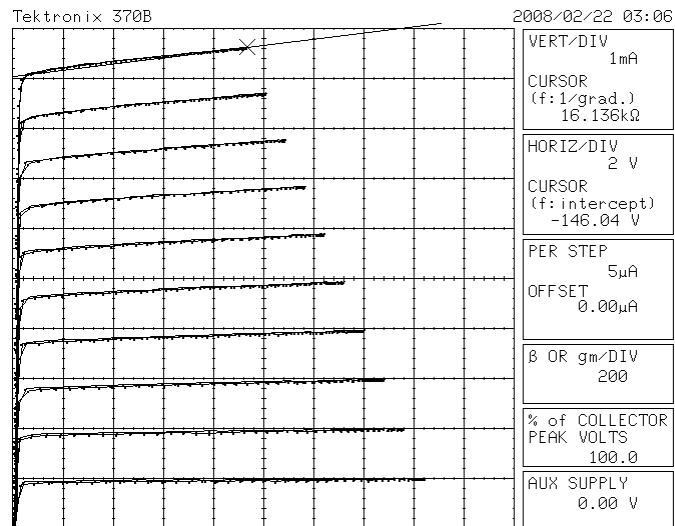


Obtaining Dominant SPICE Parameters from Curve Tracer Data

Output Characteristic



This is a plot of collector current versus collector to emitter voltage for stepped base current

Each major vertical step is 1 mA. Each major horizontal step is 2V.

The bottom curve is the base current is 5 microamps. The next 10, 15,

From the data from the curve tracer

Early Voltage $V_A := 146.04V$ This is the SPICE parameter VAF

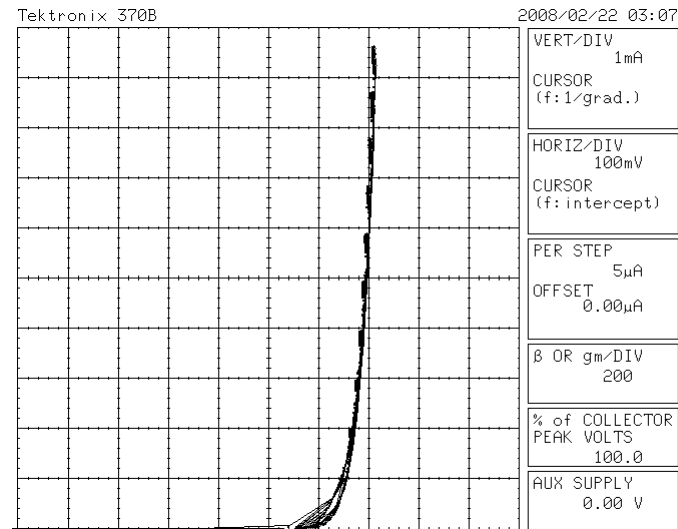
Arbitrary pick a point to measure the collector and base currents for a collector to emitter voltage

Pick $V_{CE} := 5V$ $I_B := 5.5\mu A$ $I_C := 4.8.1mA = 4.8mA$

$$\beta_o := \frac{\frac{I_C}{I_B}}{1 + \frac{V_{CE}}{V_A}} = 185.644$$

This is the SPICE parameter BF

Transfer Characteristic



"Transfer_NPN"

This is a plot of the collector current versus the base to emitter voltage

Pick a point and get values of collector current and base to emitter voltage

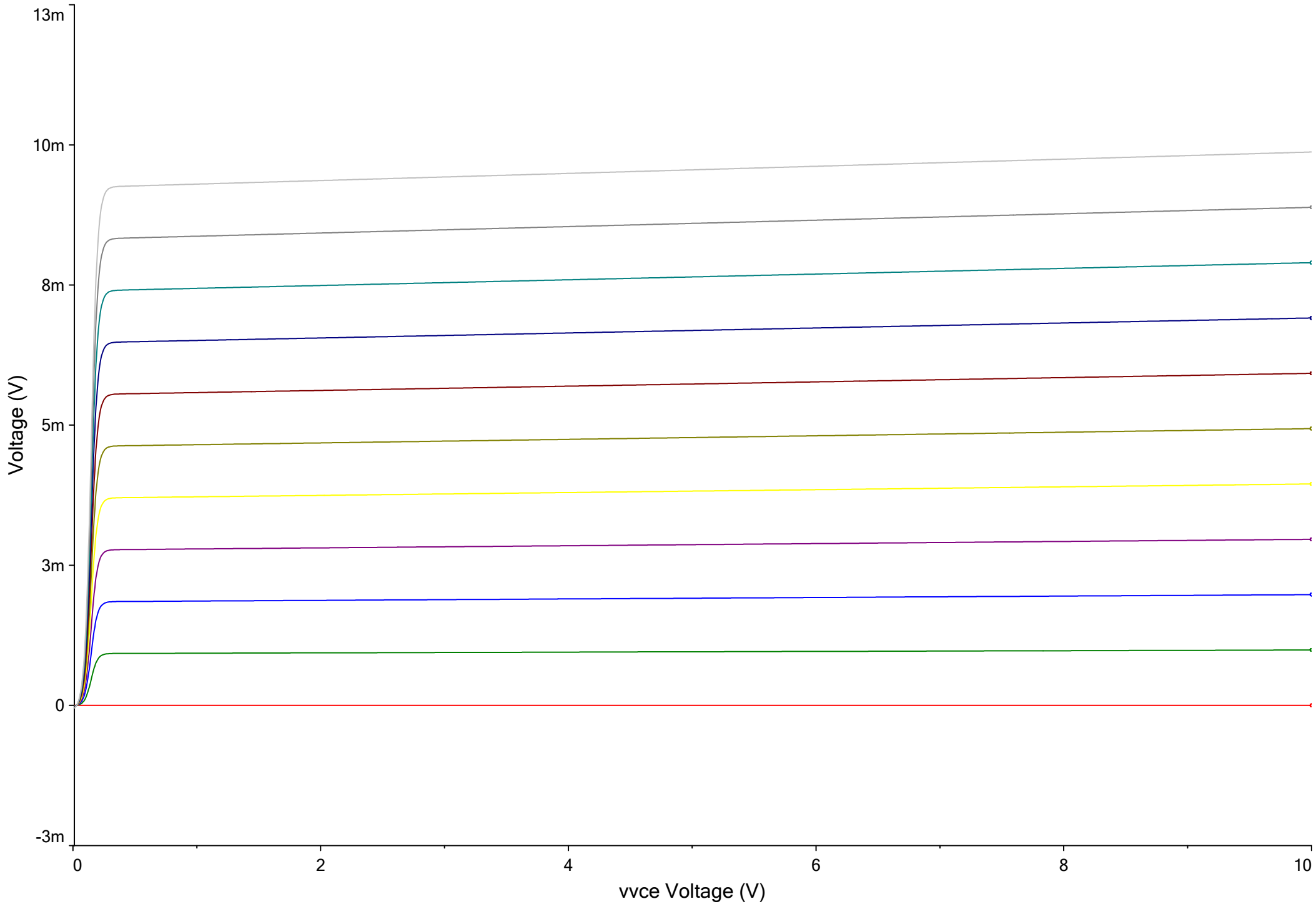
$$I_C := 5.1\text{mA} \quad V_{BE} := 0.7\text{V}$$

$$V_T := 25.9\text{mV}$$

$$I_{SO} := \frac{I_C}{1 + \frac{V_{CE}}{V_A}} \cdot \exp\left(\frac{-V_{BE}}{V_T}\right) = 8.844 \times 10^{-15} \text{A}$$

I_{SO} is the SPICE parameter IS

DC Transfer Characteristic



☒ $i_b=0$; @qq1[ic] ☒ $i_b=5e-006$; @qq1[ic] ☒ $i_b=1e-005$; @qq1[ic] ☒ $i_b=1.5e-005$; @qq1[ic] ☒ $i_b=2e-005$; @qq1[ic] ☒ $i_b=2.5e-005$; @qq1[ic] ☒ $i_b=3e-005$; @qq1[ic] ☒ $i_b=3.5e-005$; @qq1[ic]

0

1

2

3

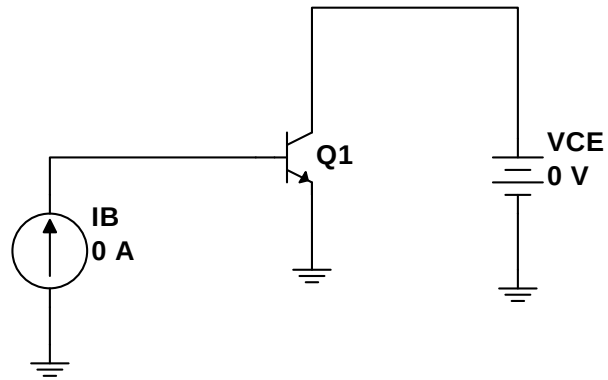
4

5

A

Circuit for Output Characteristic NPN BJT

A



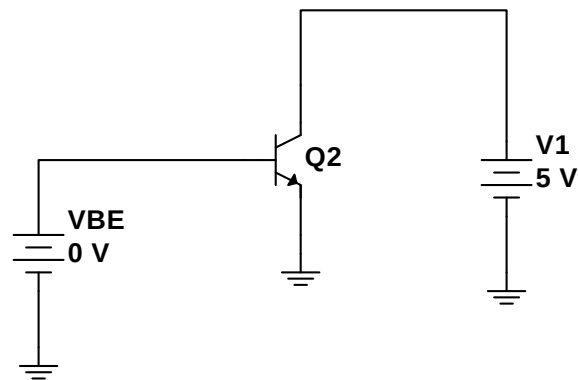
B

B

C

Circuit for Transfer Characteristic NPN BJT

C



D

D

0

1

2

3

4

5