

1 In-Lab Data Collection

1.1 Standard Downward Characteristics

$$R_B = 10.16\Omega$$

$$R_C = 287.7\Omega$$

Here we will study I_C vs V_{BE} characteristics and β versus I_C characteristics.

V_{BE} (mV)	I_B	V_{CE} (V)	I_C
500	0.027 μA	1.500	0.14 μA
550	0.088 μA	1.500	0.92 μA
600	0.280 μA	1.499	6.02 μA
650	0.956 μA	1.500	39.76 μA
700	3.541 μA	1.500	259.0 μA
750	0.01295 mA	1.503	1.3666 mA
800	0.03919 mA	1.503	4.6170 mA
850	0.09654 mA	1.523	9.1807 mA

Table 1: Standard Downward Characteristics for transistor 1

1.2 Upwards Operation

Here we look at the upwards gain of transistor 1 as a function of voltage.

V_{BE} (mV)	I_B	V_{CE} (V)	I_C	β
550	0.237 μA	1.500	1.24 μA	5.232
600	1.465 μA	1.500	7.82 μA	5.337
650	9.675 μA	1.501	54.82 μA	5.666
700	44.564 μA	1.504	274.16 μA	6.152
750	0.17097 mA	1.507	1.0551 mA	6.171
800	0.52758 mA	1.500	2.7671 mA	5.244

Table 2: Standard Upwards Characteristics for transistor 1

1.3 Base Resistance

Total Resistance between X and Y in pattern 1 is: 5.021k Ω

Total Resistance between X and Y in pattern 2 is: 61.7k Ω

1.4 Lateral *pn*p Devices

We can measure the gain of the lateral pnp transistor by taking the current values of $I_B = 0.1007 \text{ mA}$ & $I_C = 1.0460 \text{ mA}$ at values of $V_{CE} = -1.50 \text{ V}$. This gives a gain of 10.4526.

We can also measure the gain of the lateral pnp transistor where the outer p diffusion is used as an emitter and the center p diffusion is used as the collector. The value of gain that we get with the currents of $I_B = 0.1000 \text{ mA}$ & $I_C = 0.0404 \text{ mA}$ at values of $V_{CE} = -1.50 \text{ V}$. Giving us a gain of 0.404.