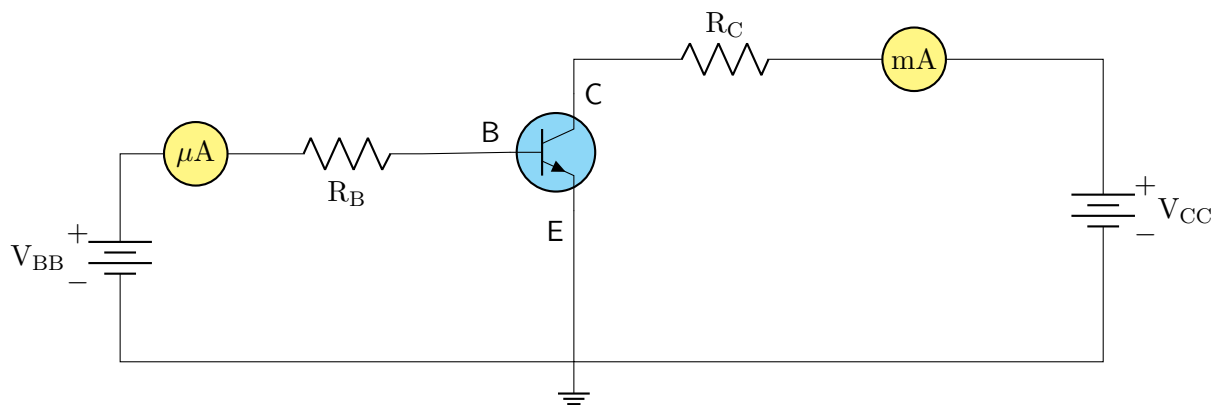# Experiment 02: Study of Transistor Characteristics

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(Subgroup - A7)

1 Aim

To obtain the input and output characteristics of a transistor in CE configuration.

2 Theory

Figure 1: Circuit diagram of a common emitter configuration of a NPN transistor

2.1 Bipolar Junction Transistor (BJT)

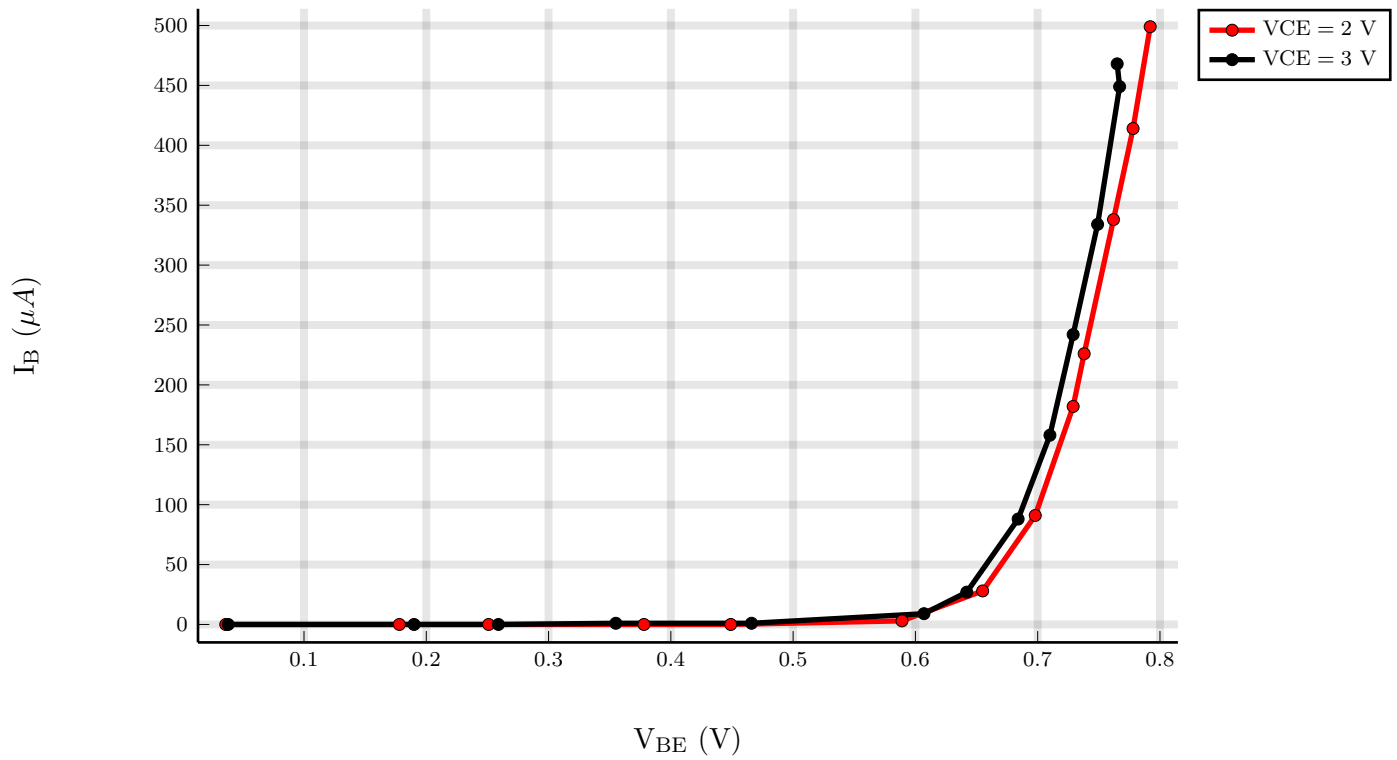It has been seen

2.2 Common Emitted Configuration of BJT

Hello world!

3 Data and Calculations

3.1 Input Characteristics

V_{BB} (V)	V_{BE} (V)	I_B (mA)	I_C (mA)	V_{CC} (V)	V_{CE} (V)
0	0.036	0	0	2	2
0.1	0.178	0	0	2	2
0.2	0.251	0	0	2	2
0.3	0.378	0	0	2	2
0.4	0.449	0	0	2	2
0.5	0.589	3	5	2	2
0.6	0.655	28	4.7	2	2
0.7	0.698	91	16.3	2	2
0.8	0.729	182	32.6	2	2
0.9	0.738	226	41.1	2	2
1	0.762	338	61.6	2	2
1.1	0.778	414	76.1	2	2
1.2	0.792	499	92.3	2	2

V_{BB} (V)	V_{BE} (V)	I_B (mA)	I_C (mA)	V_{CC} (V)	V_{CE} (V)
0	0.038	0	0	3	3
0.1	0.19	0	0	3	3
0.2	0.259	0	0	3	3
0.3	0.355	1	0	3	3
0.4	0.466	1	0	3	3
0.5	0.607	9	1.6	3	3
0.6	0.642	27	5	3	3
0.7	0.684	88	16.2	3	3
0.8	0.71	158	29.4	3	3
0.9	0.729	242	45.9	3	3
1	0.749	334	64.8	3	3
1.1	0.767	449	87.2	3	3
1.2	0.765	468	93	3	3

3.2 Output Characteristics

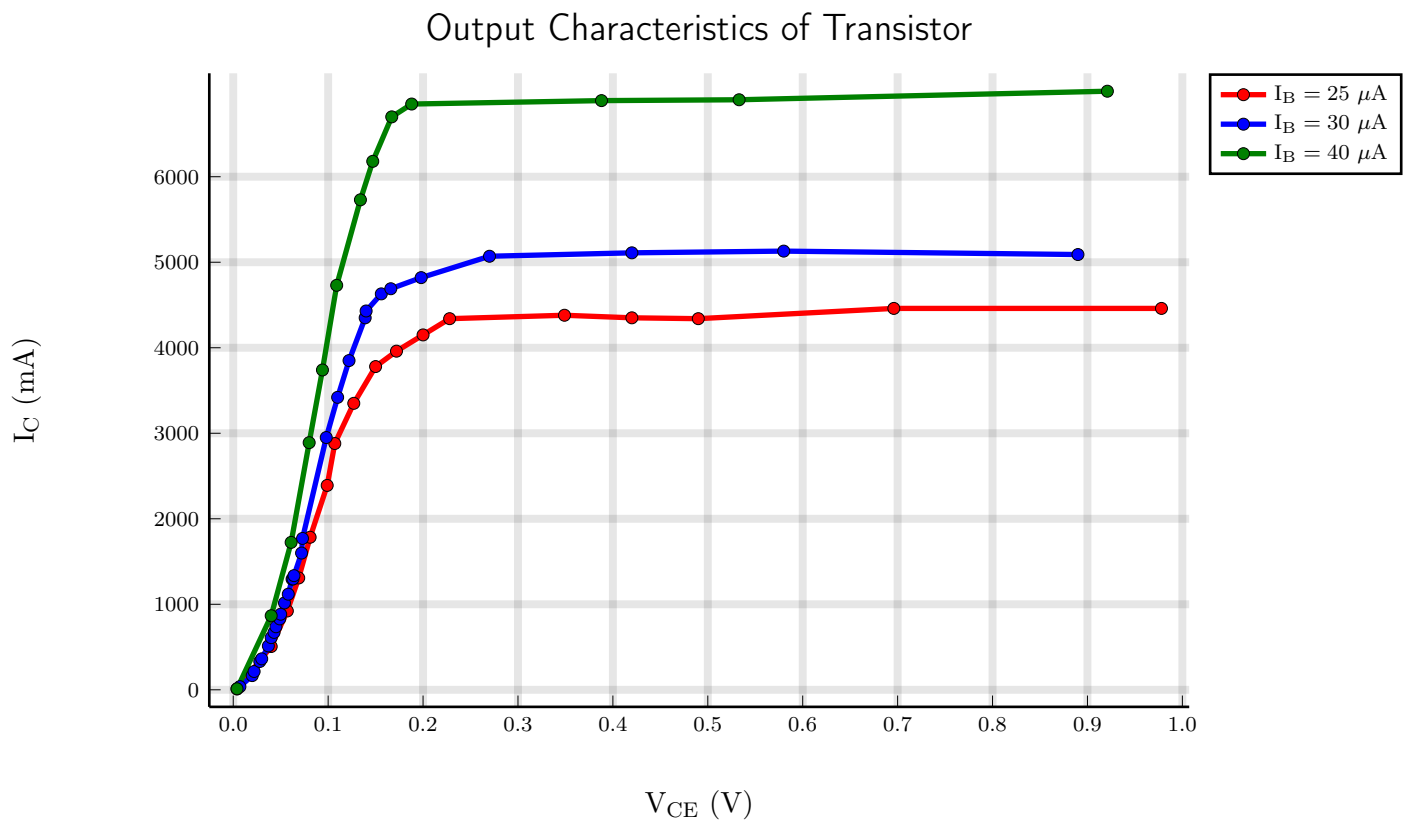| V$_{BB}$ (V)	I$_B$ (μA)	V$_{CC}$ (V)	V$_{CE}$ (mV)	I$_C$ (μA)
0.5	25	0.0	0.004	10
0.5	25	0.5	0.04	506
0.5	25	1.0	0.057	922
0.5	25	1.5	0.069	1308
0.5	25	2.0	0.081	1784
0.5	25	2.5	0.099	2390
0.5	25	3.0	0.107	2880
0.5	25	3.5	0.127	3350
0.5	25	4.0	0.15	3780
0.6	25	4.2	0.172	3960
0.6	25	4.4	0.2	4150
0.6	25	4.6	0.228	4340
0.6	25	4.8	0.42	4350
0.6	25	4.7	0.349	4380
0.6	25	5.0	0.49	4340
0.6	25	5.2	0.696	4460
0.6	25	5.5	0.978	4460

Table 1: Data obtained for output characteristics at I$_B$ = 25 μA

V_{CC} (V)	V_{BB} (V)	I_B (µA)	V_{CE} (mV)	I_C (µA)
0	0.5	30	0.007	37
0.1	0.5	30	0.02	166
0.2	0.5	30	0.022	214
0.3	0.5	30	0.028	331
0.4	0.5	30	0.03	362
0.5	0.5	30	0.037	513
0.6	0.5	30	0.04	610
0.7	0.5	30	0.043	671
0.8	0.5	30	0.045	737
0.9	0.5	30	0.049	829
1	0.5	30	0.05	884
1.1	0.5	30	0.054	1016
1.2	0.5	30	0.058	1118
1.3	0.5	30	0.062	1294
1.4	0.5	30	0.063	1296
1.5	0.5	30	0.064	1335
1.8	0.5	30	0.072	1599
2	0.5	30	0.073	1770
3	0.5	30	0.098	2950
3.5	0.6	30	0.11	3420
4	0.6	30	0.122	3850
4.5	0.6	30	0.139	4350
4.6	0.6	30	0.14	4430
4.8	0.6	30	0.156	4630
4.9	0.6	30	0.166	4690
5	0.6	30	0.198	4820
5.5	0.6	30	0.27	5070
5.6	0.6	30	0.42	5110
5.8	0.6	30	0.58	5130
6	0.6	30	0.89	5090

Table 2: Data obtained for output characteristics at $I_B = 30$ µA

V_{BB} (V)	I_B (µA)	V_{CC} (V)	V_{CE} (mV)	I_C (µA)
0.5	40	0.0	0.004	12
0.5	40	1.0	0.04	866
0.5	40	2.0	0.061	1724
0.5	40	3.0	0.08	2890
0.5	40	4.0	0.094	3740
0.6	40	5.0	0.109	4730
0.6	40	6.0	0.134	5730
0.6	40	6.5	0.147	6180
0.6	40	7.0	0.167	6700
0.6	40	7.2	0.188	6850
0.6	40	7.4	0.388	6890
0.6	40	7.6	0.533	6900
0.6	40	8.0	0.921	7000

Table 3: Data obtained for output characteristics at $I_B = 40$ µA

Output Characteristics of Transistor

4 Sources of Error

5 Discussion and Conclusion