

Elektroniske enheter og kretser

Lab 01

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0. Introduction

This is the first report in this course, detailing the completion of the first lab exercise.

Note: As always, the L^AT_EX file and all other assets, such as text, images, graphs and code made by me for this project is open source with the MIT licence, see [my GitHub](#) 

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0.2. List of Tables

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1. Part 1 - Diode test

This Part is about testing a diode characteristics with a multimeter. This means it is inherently not perfect, but it will function as a reference measurement.

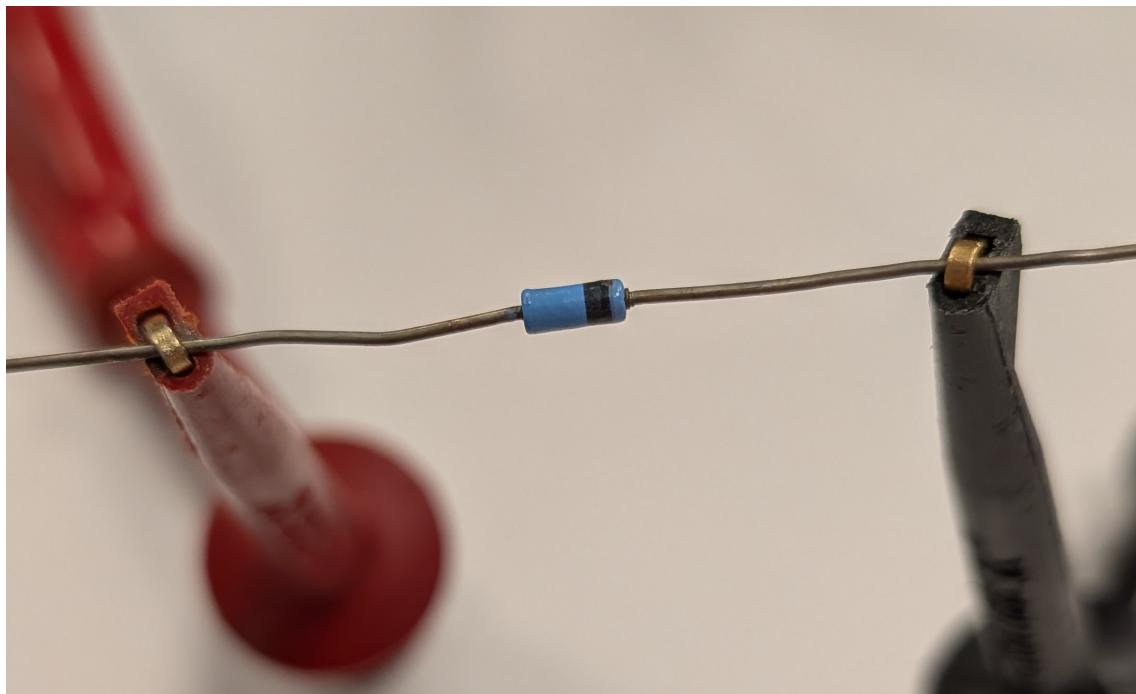


Figure 1.0: Diode being measured

Table 1.0: Diode measurements

Voltage forward	0.593 V	Resistance forward	225400 Ω
Voltage reverse	0L	Resistance reverse	0L

Interesting to note that the measured resistance in forward-bias of the diode fluctuated a lot. It went into high $M\Omega$ to low tens of $k\Omega$. It was most stable around $200\text{ k}\Omega$ and one of these measurements was therefore noted down. This could be because the multimeter is acting as a powersupply in resistance measuring mode and depending on the voltage chosen by the autoranging multimeter the diode behaviour differs.

2. Part 2 - Forward-bias characteristics

This Part is about testing the diode characteristics for forward-bias. The values was stored in a table (RAW data like this is found on the [GitHub](#)) and then a plot was made to compare the current through the diode I_D with the voltage drop over the diode V_D .

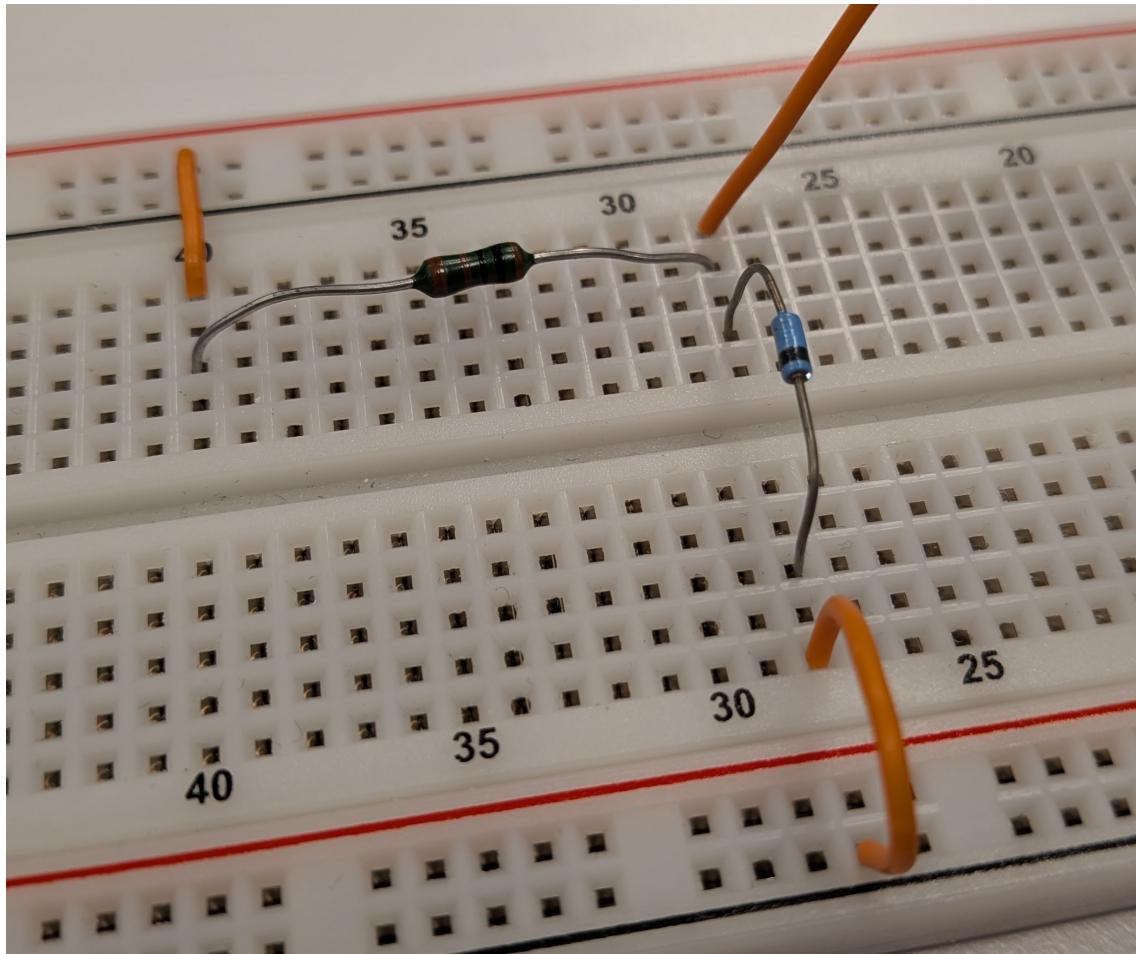


Figure 2.0: Part 2 circuit

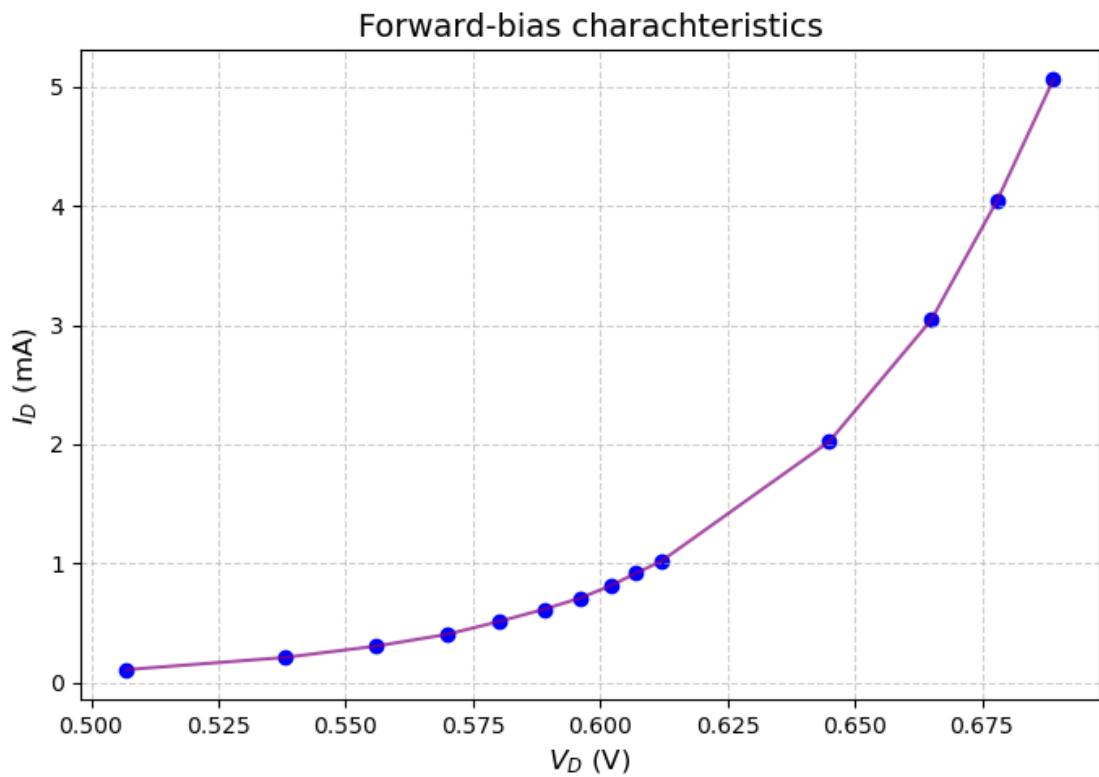


Figure 2.1: Plot of forward-bias characteristics

Now when when extending the plot all the way to the origin it gets a characteristic that looks a lot different. As seen in Figure 2.2 it looks like after the initial curve the value gets linear.

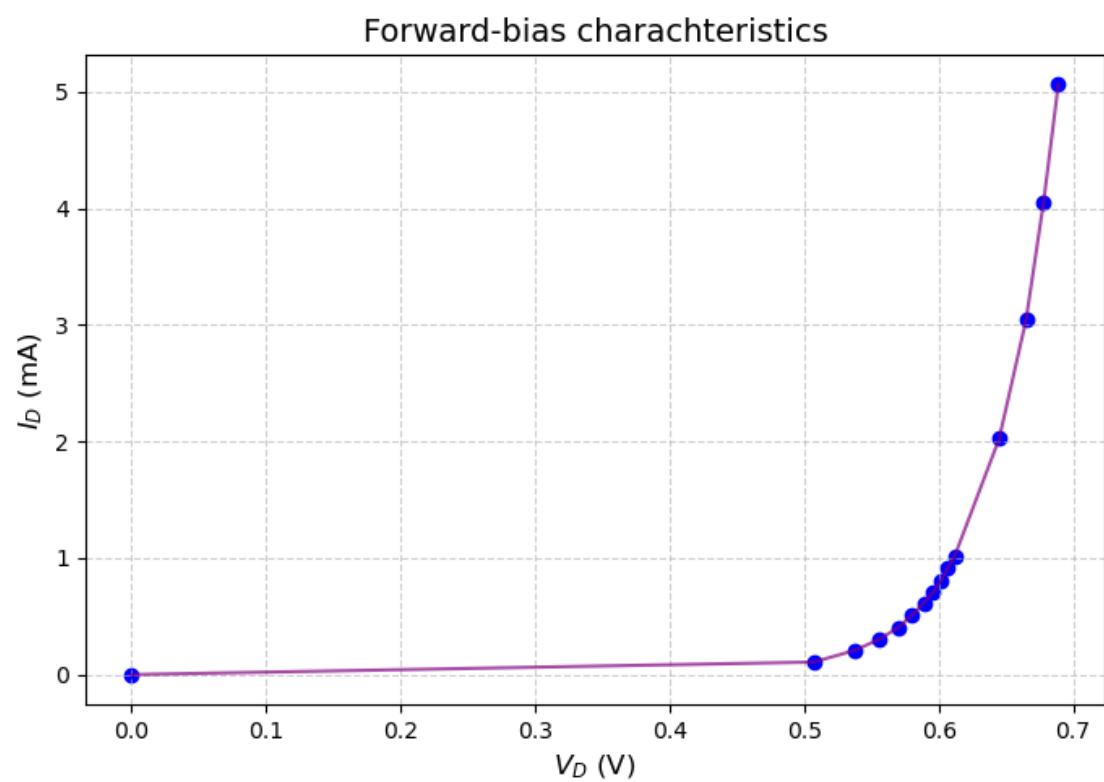


Figure 2.2: Extended plot of forward-bias charachteristics

3. Part 3 - Reverse-bias

This Part is about testing the reverse-bias current. Measurements were made and noted in the table, note that the assumed resistive value of the voltmeter is specified by the assignment.

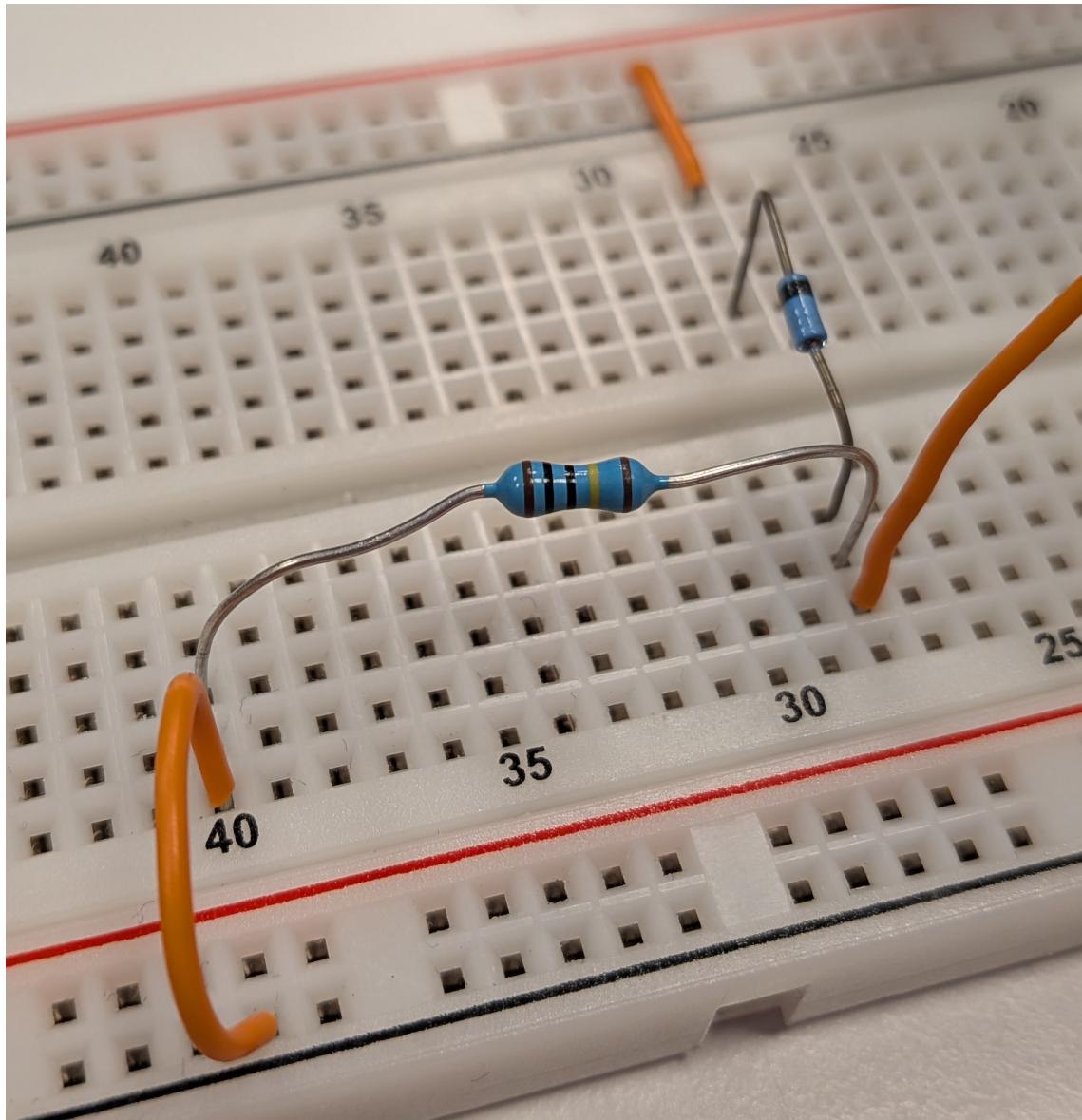


Figure 3.0: Part 3 circuit

Table 3.0

E (Measured)	20.03	V
R_M (Assumed)	10	MΩ
R (Measured)	1002.5	kΩ
V_R (Measured)	6.2	mV
I_S (Calculated)	6.805	nA
R_{DC} (Calculated)	2942.71	MΩ

It looks as if the values for I_S and R_{DC} miss by an order of magnitude or two as the calculated reverse-bias resistance often leads to values between hunders of kΩ and up to a hundred MΩ. The inherent inaccuracies in the measurments are probably the cause of this magnitudinal error.

4. Part 4 - LED characteristics

This part is about testing the characteristics of LED's.

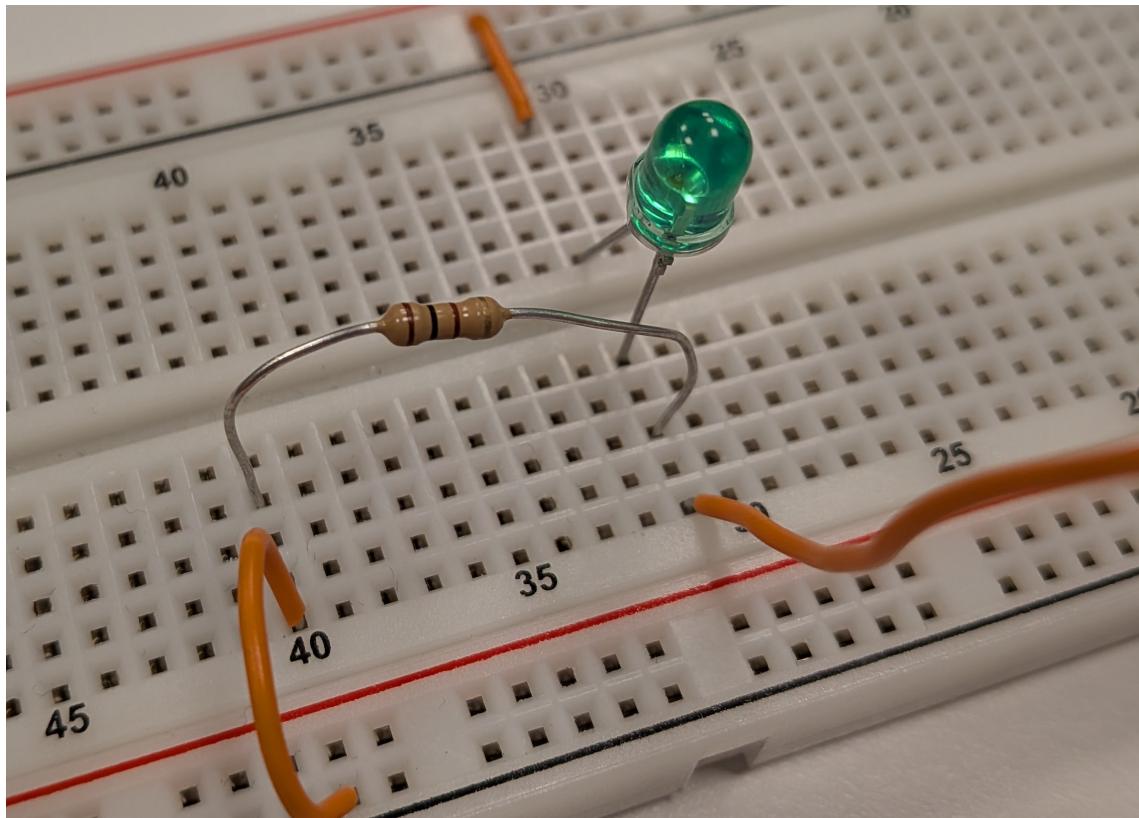
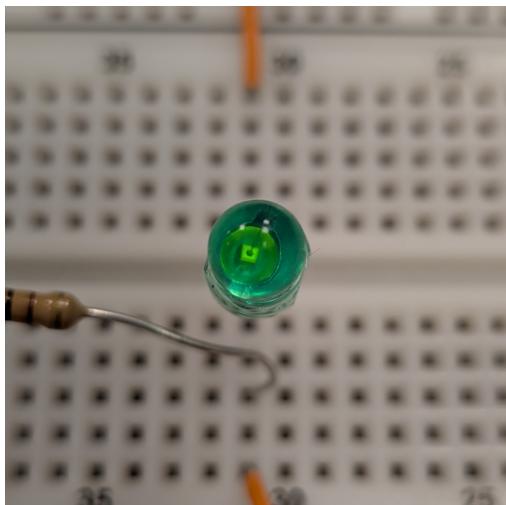


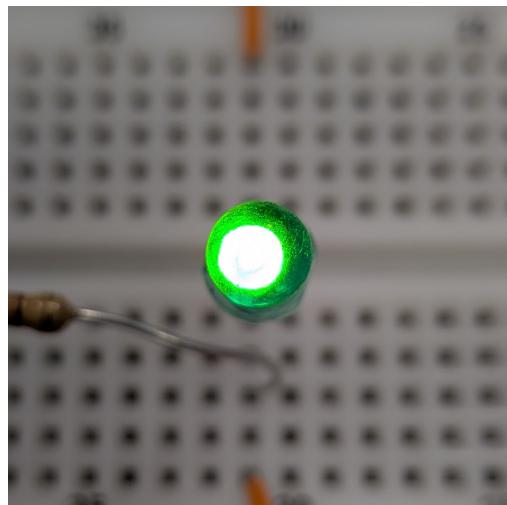
Figure 4.0: Part 4 circuit

Table 4.0

Measurements	First light	Bright
V_D (Measured)	1.787 V	2.185 V
V_R (Measured)	17.8 mV	3.632 V
I_D (Calculated)	179.980 μ A	36.724 mA



(a) First light



(b) Bright

Figure 4.1: Part 4 circuit