

1. Dependence of power on the area of the solar cell



Introduction

Solar cells are available in different sizes. With this experiment the dependence of the characteristic values voltage, current and power on the solar cell area should be investigated.



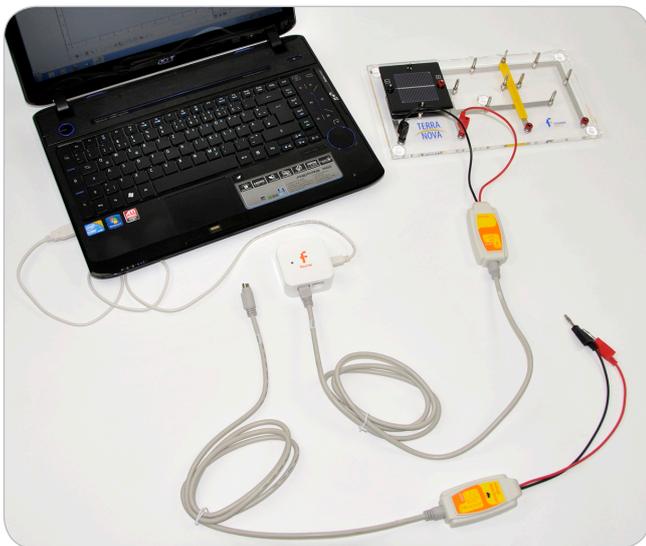
Equipment

1. Main board
2. 1 large solar cell
3. 3 solar cells cover sheets
4. 1 voltage sensor
5. 1 current sensor
6. NOVA LINK



Equipment Setup Procedure

1. Launch MultiLab.
2. Connect the USBLink to the USB port on the computer. The green LED will turn on when the USBLink is successfully connected to the computer.
3. Plug the solar cell onto the main board (left position).
4. For current measurement connect the current sensor parallel to the solar cell and to I/O 1 port of the USBLink.
5. For voltage measurement connect the voltage sensor parallel to the solar cell and to I/O 1 port of the USBLink.
6. Be aware not to connect both sensors at the same time





MultiLab Setup

1. Click .
2. Click **Next**.
3. Set **Select rate** to **Manual**.
4. Set **Select recording mode** to **Add**.
5. Click **Next**.
6. Set **by samples** to **50**.
7. Click **Finish**.



Experimental Procedure

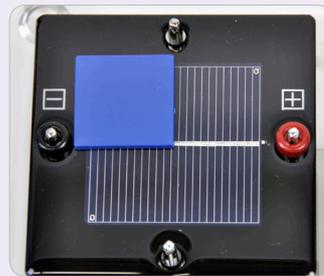
1. Connect the current sensor as described in the equipment setup.
2. Put all 3 covers onto the solar cell.



3. Click .
4. Take one cover away from the solar cell, so that there are two covers left



5. Repeat step 2 to 3 until no cover is on the solar cell.



6. Click .
7. Connect the voltage sensor as described under "Equipment Setup Procedure".
8. Repeat point 1 to 4.
9. Click .



Data Analysis

1. Click f_x .
2. Click **Functions**.
3. Set **Functions** to **Multiply**.
4. Set **G1** and **G2** to voltage and current measurement data.
5. Click **Ok**.
6. Go to **Table > Add manual column**.
7. Set **Column name** to **free active area**.
8. Click **Ok**.
9. Click .
10. Add the columns of free active area, the current and voltage measurement and of the calculated power function.
11. Click **Ok**.
12. Click .
13. Click Y_x .
14. Set **X-axis** to **free active area**.
15. Set **Y-axis** to the measured current and voltage data points.
16. Set the **Graph title** to **"Voltage / Current / Power - Area Dependence"**.
17. Click **Ok**.



Questions

1. How does the voltage V depend on the solar cell active area size?
2. How does the current I depend on the solar cell active area size?
3. What can therefore be conclusion for the power P ?
4. Advanced: Give an explanation for this behavior!
5. Advanced: In the experiment kit only relative small solar cells are included. In practice mostly so called 6-inch solar cells are used. They have a size of 156mm x 156mm. Apply a linear fit to your data and calculate the current and power of a 6-inch solar cell under the conditions of your experiment.