

# Solar Cell I-V Curve Investigation Practice Assessment

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## Part I

## The Plan

### 1 Working Title

the working title of the investigation

An investigation to show the I-V Characteristics of a Solar cell

### 2 Aim

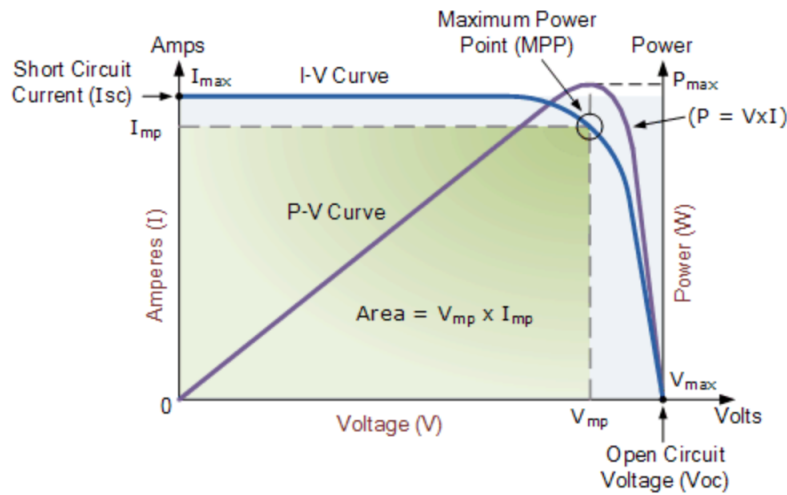
the aim of the investigation

This investigation will

1. Investigate the change of potential difference and current as the external resistance changes
2. Investigate this with different intensities

### 3 Reaserch

As this invetigation is to find the I-V charachteristics of a solar cell, I found an article explanining the predicted I-V Curves of solar cells. The article explains the general shape of an I-V Curve of a solar cell, which can be approximated by a reflected log curve, as seen in the graphic below:



This graph also shows the Maximum Power Point, when the Current and Volatage are at their maximum, so the power is at the maximum, as  $P = IV$  We will hopefully be able to comapre this graph to our actual results from the experiment.

## 4 Initial Experiments

an outline of the initial experiments

For ease of recording, we want the apparatus to return values that can be accurately and quickly recorded. This means we want the equiptment to return values between 0 and 999, and no more than two decimal places

- Find appropate sensitivity settings for the ammeter and voltmeter
  - First, the solar cell was set up on a clamp stand, and the circuit constructed
  - Then, the lamp was turned on and the light meter placed next to the solar cell
  - The resistor was then closed to its lowest resistance, and the volt-meter sensitivity was set to the correct level. The lowest resistance will result in the highest voltage, so we set the voltmeter so that the greatest value of resistsance is not more than the sensitivity level is capable of showing
  - The resistor was then opened to its greatest resistance, and the am-meter sensitivity was set in the same way as the voltmeter, as the highest resistance will reuslt in the highest current
- Find appropriate variable resistors to use

- Once the Rheostat had been used, other potentiometers were provided
- To see if the range of resistance for these was appropriate, each was connected to the current setup, and the maximum and minimum resistance was tested to see if the experiment could provide useful data with the sensitivity options provided by the multimeters
- The  $100\Omega$  and  $400\Omega$  variable resistors were rejected as they would not provide useful results, but the  $50\Omega$  and  $10\Omega$  were used

## 4.1 Initial Experiment Results

Table 1: Initial Experiment Results

| Resistor Setting | Potential Difference | Current |
|------------------|----------------------|---------|
| Open (minimum)   | 105.0                | 123     |
| Closed (maximum) | 0.0                  | 442     |

These results show that the sensitivity settings are correct, as the maximum results are within the range of the multimeter, and give results to a suitable decimal place.

## 5 Apparatus

a list of the required apparatus

1. Solar Cell
2. Clamp stand
3. 2x Multimeters for Voltmeter and Ammeter
4. Desk lamp
5. Light Meter
6. Crocodile clips and cables
7. Rheostat and Potentiometers

## 6 Initial Diagram

a diagram of the initial experiment

## 7 Risk Assessment

a risk assessment

## 8 Timeline

a rough breakdown of how the two-week period of intensive practical work will be spent

## Part II

# The Report

## 9 Aim

a statement of aim

This investigation will

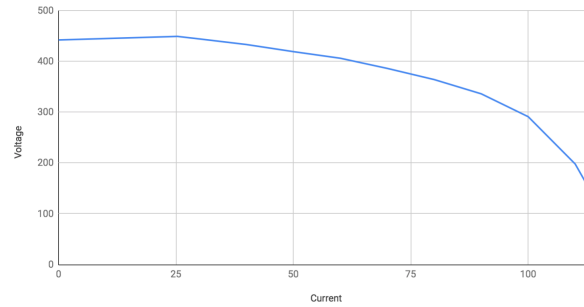
1. Investigate the change of potential difference and current as the external resistance changes
2. Investigate this with different intensities

## 10 Results

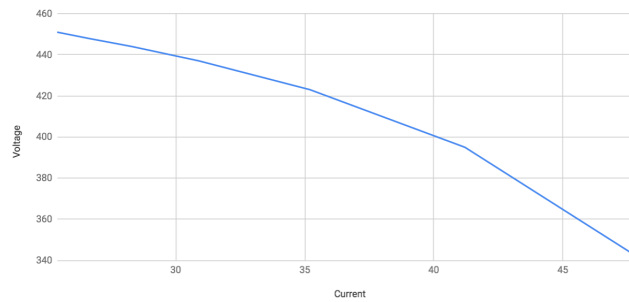
Table 2: Measuring change in Potential Difference and Current with change in Light Level

| 320,000 Lux |          | 120,000 Lux |          | 50,000 Lux  |          |
|-------------|----------|-------------|----------|-------------|----------|
| Current     | PD       | Current     | PD       | Current     | PD       |
| <i>200m</i> | <i>2</i> | <i>200m</i> | <i>2</i> | <i>200m</i> | <i>2</i> |
| 114         | 133      | 54.3        | 62       | 24.2        | 28       |
| 110         | 198      | 52.7        | 234      | 24          | 43       |
| 105         | 123      | 48.1        | 340      | 23.9        | 145      |
| 100         | 291      | 41.2        | 395      | 23.4        | 211      |
| 90          | 336      | 35.2        | 423      | 22.7        | 262      |
| 80          | 364      | 30.9        | 437      | 21.8        | 298      |
| 70          | 386      | 28.3        | 444      | 21          | 320      |
| 60          | 406      | 26.6        | 448      | 20.2        | 338      |
| 50          | 419      | 25.4        | 451      | 19.7        | 350      |
| 40          | 433      | 0           | 495      | 0           | 473      |
| 30          | 444      |             |          |             |          |
| 25.3        | 449      |             |          |             |          |
| 0           | 451      |             |          |             |          |

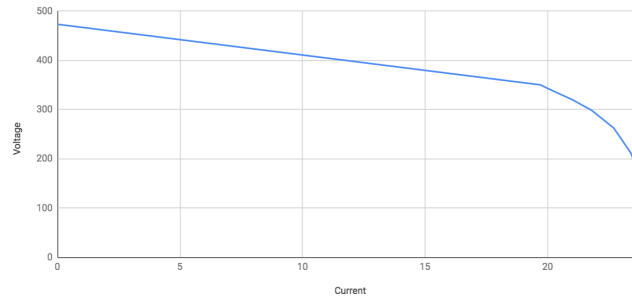
I-V Curve for 320,000 Lux



I-V Curve for 120,000 Lux



I-V Curve for 50,000 Lux



## 11 Summary

a word-processed summary of approximately 300 words written after completing the project, including an outline of any changes from the original plan

From these results, we can see that each of the curves roughly approximate the predicted I-V curve. The characteristic curve at 320,000 Lux shows many of the similar properties, with a plateau until