

**Laboratory Guide: Determination of the IV curve of a photovoltaic module**

The aim of this laboratory task is to study different electrical connections between PV modules by tracing the IV curve of:

- One PV module,
- Two PV modules connected in series,
- Two PV modules connected in parallel.

The following parameters should be determined:

- Short circuit current,
- Open circuit voltage,
- Maximum power,
- Fill factor,
- Efficiency,
- Characteristic resistance,
- Series resistance,
- Shunt resistance,
- Voltage thermal coefficient,
- Current thermal coefficient.

In addition, the shadowing effect for the previous 3 configurations is studied by measuring the short circuit current and the open circuit voltage when:

- A module is shadowed,
- A cell is shadowed,
- Half of a cell is shadowed.

You should bring your own personal computer. PV modules with 300 mA of short circuit current and 1.5V of open circuit voltage are available in the laboratory, as well as variable resistors, a breadboard, multimeters, thermocouples, and a solar simulator.

The report should be written using the template made available in the same Moodle subsection. The report should be handed in two weeks after the practical session - that is, the second Thursday by 10am. These are to be handed in via email (rhalmeida@fc.ul.pt), with the reported attached in PDF **AND** WORD formats.