

## CACESOL: Characterization of photovoltaic solar cells and modules. Experimental measurement of the V-I curves

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**CACESOL: Caracterización de celdas y módulos fotovoltaicos solares. Medida experimental de curvas V-I**

**Palabras clave:** *celdas y módulos fotovoltaicos solares, curvas V-I*

**Keywords:** *photovoltaic solar cells and modules, V-I curves*

**Abstract:** One of the essential practices in any research work related to the photovoltaic technology is the translation of the I-V curves of a photovoltaic generator measured at any irradiance and module temperature into Standard Test Conditions (STC). The STC rating involves only one module temperature (25 °C) and one irradiance (1000 W/m<sup>2</sup>).

This work manages to obtain, given any irradiance and module temperature, the I-V curve and representative parameters of this I-V curve (e.g. short circuit current,  $I_{SC}$ , and open circuit voltage,  $V_{OC}$ ) for either a photovoltaic cell and module. Then, these values will be translated into STC in order to compare the latter with the ones provided by the manufacturer.

It is highlighted the relationship between the irradiance and the short circuit current provided by the photovoltaic device. The higher irradiance, the higher the short-circuit current will be. Our study has been developed considering both indoor and outdoor tests. In both cases, it has been used a little photovoltaic monocrystalline module (CS20M20), and a photovoltaic polycrystalline module (Shell RSM 100S)

which have a maximum rated power of 2 and 100 W, respectively. The parameters to be measured were: module temperature ( $T_c$ ), ambient temperature ( $T_a$ ), irradiance ( $G$ ), the short circuit current ( $I_{sc}$ ) and open circuit voltage ( $V_{oc}$ ). The instrumentation used for the measurement of the different parameters mentioned above was: Surface temperature thermometers, voltmeter, a current sensor clamp and an irradiance sensor. For the indoor tests, different resistances were used in order to properly get the current and voltage values. Meanwhile, for the outdoor tests, it was used a PV analyzer so as to measure the I-V curves. Once the different tests were achieved, the measurements obtained were translated into STC conditions and compared with the ones provided by the manufacturer. It must be highlighted that our own measurements were in accordance with the manufacturer's data.

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