

Experiment

I-V Characteristics of Solar Cell

Read the lab handout given and the supporting document first before performing the pre-lab simulation exercises.

The aim of this simulation exercise is to do the following-

1. Write NGSPICE netlist to obtain the dark I-V and lighted I-V characteristics of solar cell.
2. Plot I_d vs V_d for the solar cell under 3 conditions by DC sweeping the supply voltage from -2 V to 2 V :
 - (a) No light (0 current through LEDs)
 - (b) Illumination 1 (8 mA current through LEDs)
 - (c) Illumination 2 (10 mA current through LEDs)
3. Measure the fill factor for both illuminated conditions using the formula given.

The model files required for the exercise as given

(Note : In order to simulate for different lighted conditions, open the solar cell model file and keep one of the 3 current values while commenting out the other 2)

3 different I-V characteristics of the solar cell must be present, along with I_{sc} , V_{oc} , I_m , V_m and FF values for the illuminated conditions.

You are required to submit the NGSPICE netlist, 3 plots and above mentioned values.

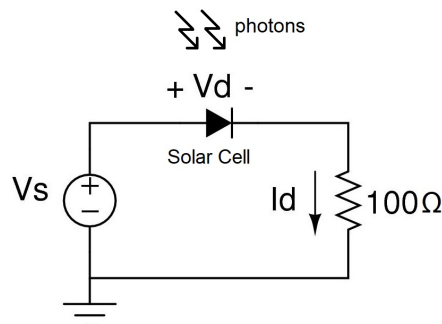


Figure 1: Solar Cell I-V circuit