

# MODELLING OF THE V-I CURVES OF A PV (PHOTOVOLTAIC) CELL

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## ABSTRACT

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Global warming is getting worst day to day and it has become perhaps the most complicated issue facing by world leaders. This phenomena may cause by many factors includes the unlimited usage of non-renewable energy for certain purpose such as the combustion of fossil fuel to generate the electric or others machines. Therefore, the use of renewable energy instead of non-renewable energy is the main solution to resolve or restrain the global warming issue to continue getting worst. Photovoltaic cell is one of the renewable energy which converts the solar energy into the electrical energy. Photovoltaic cell is a most effective components or renewable energy in today's green energy, it use the solar power to provide the affordable electrical energy to isolated communities. Since, PV cell are so important today, hence the solid foundations of the knowledge of voltage and current characteristics of a PV cell under certain load are very important. In case we want to use the PV cell in any application, the first thing we need to understand is the knowledge of voltage and current characteristics of a PV cell under certain load. Besides that, the Photovoltaic cells are modular and flexible in terms of size and applications; it can be built into any size in response to amount of energy needed. They are flexible all the time and can be enlarged or moved easily. In some urban application, PV cell can eliminate the need for costly trenches in streets, therefore, it is cost effective components.

The objective of the project is to design and develop the source code by using the MATLAB source code and MATLAB SIMULINK to model the load characteristics of a commercially available photovoltaic cell with the irradiance within  $250 \text{ W/m}^2$  to  $1000 \text{ W/m}^2$  and the temperature within  $0^\circ\text{C}$  to  $75^\circ\text{C}$ . The simulation is able to model a photovoltaic cell by plotted out the I-V curve and P-V curve to indicate the electrical characteristics of the PV cell. Besides that, the additional outcome will be the "PV calculator" which designed by using MATLAB GUI. PV calculator allows the user to key in the parameters includes the open-circuit voltage; short-circuit current, temperature coefficient, number of series cells and ideal factor of the PV cell, after that the I-V curve and P-V curve will be shows to indicate the electrical characteristic of the PV cell. All methods above are a scientific way use to modelling the PV cell to allow the user to investigate it before purchase the actual one.