ECET425L Lab 2- Solar Panels

Objectives:

* Learn some basic solar panel terminology
* Be able to distinguish between different solar panel types and efficiencies
* Understand how solar panels can be used in series and parallel

Parts List:

* 12 volt solar panel-PV(photovoltaic)
* Solar Panel Spec Sheets in Doc Sharing

Introduction:

The first solar cell was developed over 100 years ago. Solar panels are arrays of solar cells and are used to capture the sun’s energy or insolation and convert it into energy. There are many different types of solar panels and we will look at several different ones.

Step 1: Solar Panel Definitions

Define the following as pertaining to solar panels:

OCV or Open Circuit Voltage

SSC or Short Circuit Current

Maximum Power Point Voltage

Maximum Power Point Current

Polycrystalline Solar Panels

Moncrystalline Solar Panels

Amorphous Solar Panels

Organic Solar Panels

Solar Panel Concentrator

Off Grid PV System

Grid Tied PV System

Charge Controller

Inverter

Step 2: Questions about the Solar Panel Spec Sheet

1. What is the OCV of your 12 volt solar panel?
2. What is the SSC of your 12 volt solar panel?
3. What is the output power of your 12 volt solar panel?
4. Define the STC parameters for PV panels.

Step 3: Procedure

1. Measure the OCV of your solar panel in the sun or with a 100 watt incandescent bulb shining on it.
2. Measure the SSC of your solar panel in the sun or with a 100 watt incandescent bulb shining on it.
3. What is the physical size of your solar panel in meters?
4. What is the efficiency of your solar panel from your calculations? Use an insolation value of 1000 watt/meter^2
5. State how many sun hours it would take for one of your solar panel s to fully charge your 12 volt 5 amp-hour battery?
6. What is the OCV and SSC with your two solar panels in parallel?
7. What is the OCV and SSC with your two solar panels in series?

Step 4: Calculations and Series Parallel Connections

1. Using a BP 4200J 200 Watt Solar Panel how many panels would be need for a 300 volt DC 1000 watt system?
2. A typical 10k watt sine wave inverter would require how much current from a 48 volt battery system at full output power? Assume 80% efficiency. Remember Power=Voltage\*Current
3. If only 12 volt 250 amp-hour batteries are used.

What is the configuration for a 48 volt 1000 amp-hour system? How many in series and how many in parallel? What is the configuration for a 72 volt 250 amp hour system?

How long can a 12 volt 4 amp pump operate from one 250Ah battery with a 50% DOD?