Cheap solar panel built in one day
42 Monocrystalline cells @ 1.75W each

Abstract

A 42 cell solar panel was constructed in less than a day using low cost materials available from the hardware store. The enclosure was constructed out of plywood and coated in highly reflective mylar. The cells were joined together in series and glued on spacers on top of the mylar. UV resistant polycarbonate sheeting was used to protect the panel and to reflect tangental light onto the cells.

Keywords: Solar cells, Photovoltaic, PV, diy solar panel

LIST OF FIGURES

1. Connecting the solar cells together

Strands of copper wire were tinned and soldered to the pads on the back of each cell. Six points were pre-soldered on the conductive strip on the top of the solar cell using a low temperature soldering iron. We adjusted the temperature of the soldering iron using a variac.

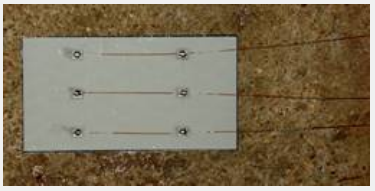


Figure 1. The back of the solar cell with copper wires (top). Top of the cell with six points pre-soldered onto the conductive strip (bottom)

Figure 2. A temperature controlled soldering iron using a variac

Cells were connected together in series by soldering the three lengths of copper wire to the top of the next cell.

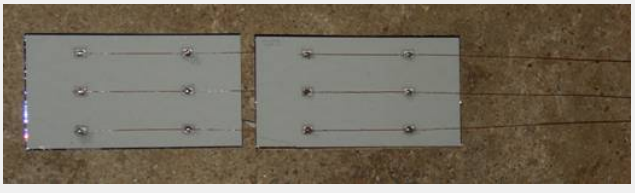


Figure 3. Cells are soldered together in series. Top view (left) and bottom view (right) are both shown

Three rows made from seven cells were connected in series to make a panel. (Two panels were constructed).

Figure 4. The cells soldered in series in three rows of seven on top of a wooden base

2. Constructing An Enclosure

Figure 5. An enclosure constructed using wooden ends to fit the corrugated polycarbonate sheeting over the top of the base

Wooden ends were cut to fit the corrugated polycarbonate sheeting. The polycarbonate sheeting protects the cells from physical damage and also protects the panel from UV light.

Highly reflective mylar sheet was glued to the surface of the wooden enclosure. This was used to reflect thermal radiation away from the base of the panel.

Figure 6. Highly reflective mylar sheet glued to the walls of the enclosure

Cardboard shock absorbers were glued between the fragile cells and the mylar sheet to hold them in place and protect them from cracking.

Figure 7. The cells glued to shock absorbing cardboard

The polycarbonate sheet was screwed to the curved plywood ends. Power is connected using brass bolts that protrude through the wood.

Figure 8. The polycarbonate sheet screwed to the wood

Figure 9. The corrugated dome catches additional tangential light which would normally be lost with a flat panel

Figure 10. The cells output is currently undergoing practical testing

3. Results: Updated 6/1/2013

The cells are extremely fragile and are easily damaged by falling braches.

Figure 11. The cells after 6 months practical testing

Figure 12. Cells without polycarb cover

17 undamaged cells are wired for final testing.

Figure 13. Closeup of damaged cells

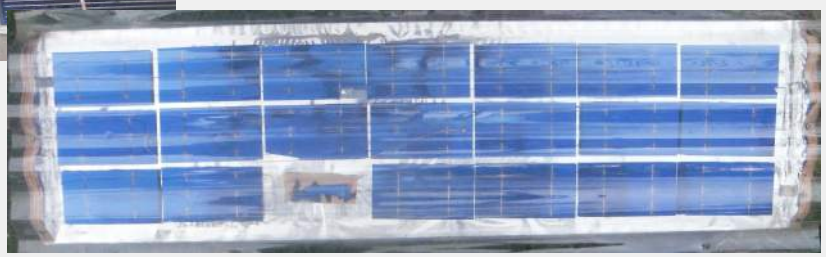


Figure 14. Solar panel with damaged cells bypassed

Measured Results after 6 Months of Testing

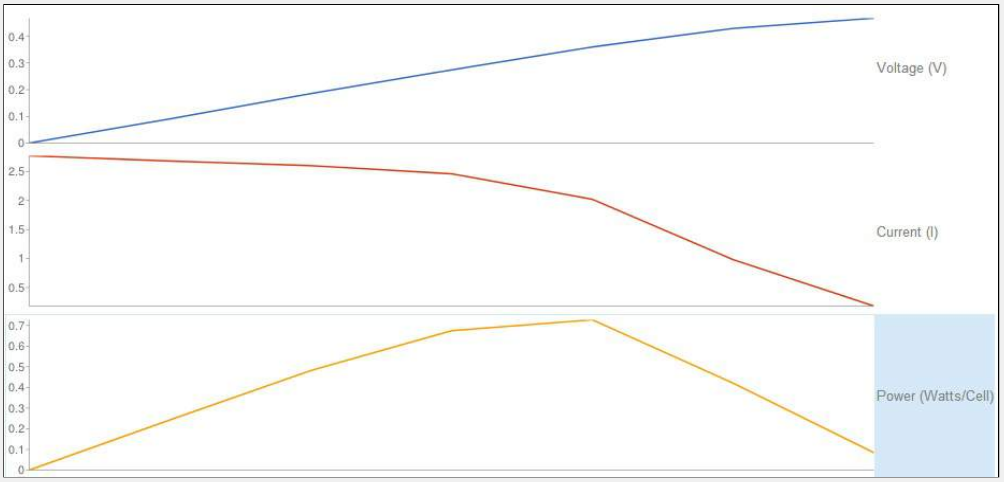


Figure 15. Measured results after 6 months testing

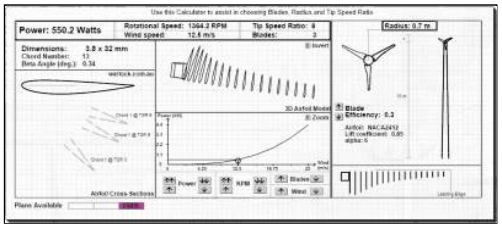
Ebay Specifications:

Average Values

Power (Watts): 1.75 Wp

Current (Amps): 3.5 Imax

Voltage (Volts): 0.5 Vmax



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