Comparative Test Report
for
Sunlinq and PowerFilm Folding Solar Panels

by
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http://charlespreston.net/solarpaneltest/Test-Report-Sunlinq-PowerFilm-Solar-Panels.pdf

Panels tested

Sunlinq 12 Watt folding solar panel
PowerFilm F15-1200 20 Watt folding solar panel

Figure 1

Test layout

Sunlinq panel on left with built-in controller

PowerFilm panel on right with PowerFilm voltage controller

ExTech light meter sensor between panels

2 Power Analyzer Pro digital meters for simultaneous measurements (because the measured light, and resulting power output, can change from second to second, simultaneous measurements are necessary for accuracy)

2 Odyssey PC1700 65 Ah lead acid batteries

Direct comparison of power output

Full direct sun
12 Watt Sunlinq maximum measured power while charging a battery = 8.5 Watts (71% of advertised rating)

20 Watt PowerFilm w/controller maximum measured power while charging a battery = 14.5 Watts (73% of advertised rating)

Heavy overcast
12 Watt Sunlinq maximum measured power while charging a battery = 0.63 Watts (5% of advertised rating)

20 Watt PowerFilm maximum measured power while charging a battery = 1.82 Watts (9% of advertised rating)

Note the difference in output between the two types of panel. Although their performance under full direct sun is similar, Sunlinq provided only about half the efficiency in overcast conditions.

The output of both types under cloudy skies was far less than you would expect if you just looked at advertised ratings.

I tested both brands of portable folding solar panel in Anchorage, Alaska, and found surprising differences in the power they provide under some conditions. Since coastal areas like Anchorage have a lot of overcast days, this may be an important factor in your choice of panels.

Background

Folding solar panels are quite expensive, and are typically purchased for use where there is no suitable alternative. Portable folding solar panels of around 12 to 20 Watts are widely advertised for charging batteries. Suggested uses by the manufacturers or dealers suggest recharging AA NiMH, gel cell 12 Volt batteries, or vehicle batteries if a battery is too run down to start a car.

Many people read the performance claims, or the nominal “rating”, and may try to use these panels when they are in remote areas or during natural disasters when commercial power is not available. You cannot rely on the manufacturers' tables of expected charging performance except under direct, full sun, and during several hours in the middle of the day when the sun is nearly overhead. Even under full, direct sun in Anchorage, Alaska, the highest measured performance was less than the advertised manufacturer’s ratings.

The Sunlinq 12 Watt panels had the following problems:

Of the 4 new panels, 1 provided almost no power, 1 provided about 50% of the stated power, and the replacements provided a maximum of 8.5 Watts under full, direct sun. Based on this small sample, it would be wise to measure a new solar panel before depending on it for power.

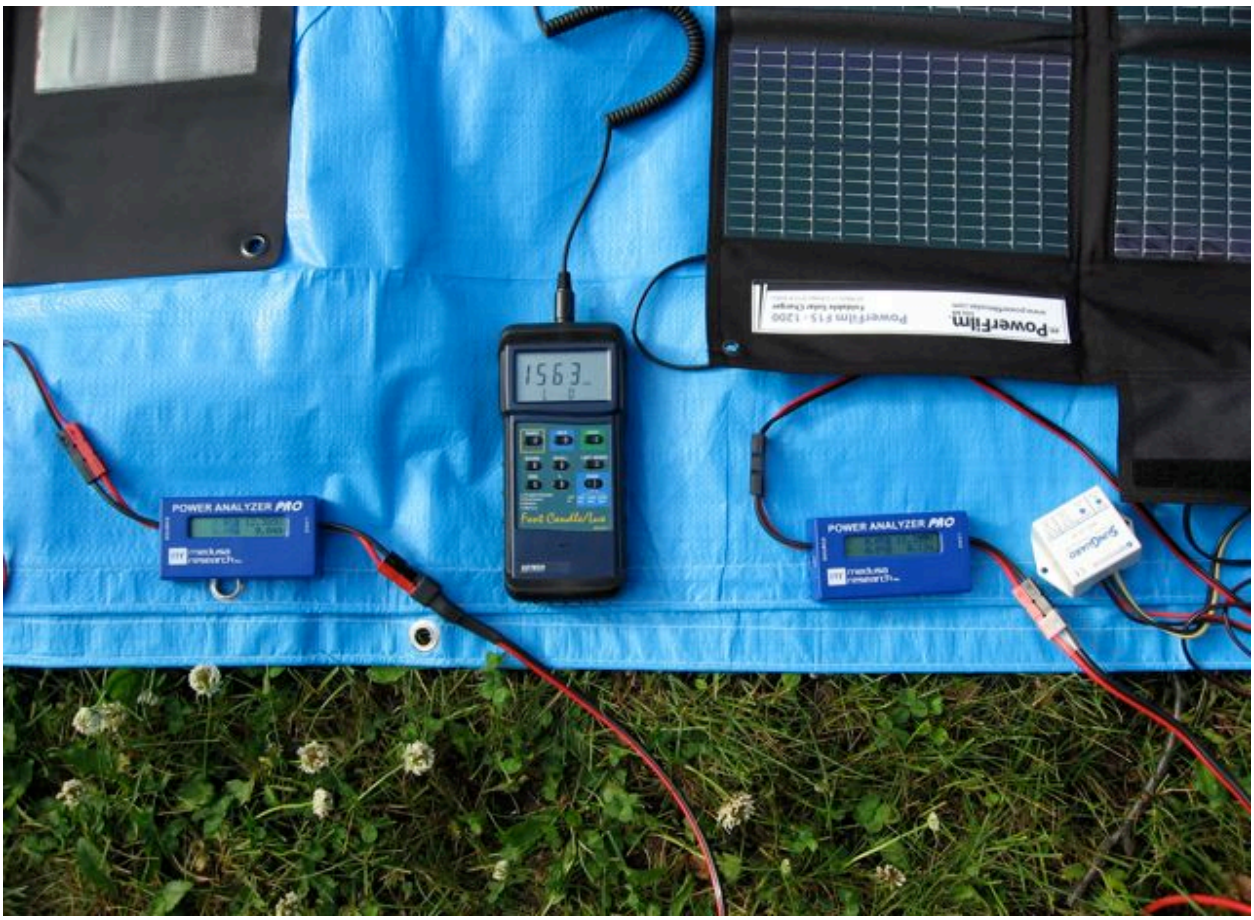

Figure 2

Overcast sky example
Output difference between Sunlinq and PowerFilm with both panels flat on the ground

The light meter display shows 15630 lux. This instrument has an unusual display, allowing only 4 digits on the top line, and with the 0 “multiplier” on the second display line.

Outdoor direct sun illumination can be 100,000 or more.

Figure 3

Closeup of left side of Figure 2

Power output from the (12 Watt) Sunlinq panel is 12.39 VDC at 0.04 A, which is 0.5 Watts.

It would be reasonable to expect about 60% of the power produced by the PowerFilm 20 Watt panel under the same conditions, but instead, the output is about 31%.

Figure 4

Closeup of right side of Figure 2

Power output from the (20 Watt) PowerFilm panel is 12.36 VDC at 0.13 A, which is 1.6 Watts

Conclusions from testing

PowerFilm panels use amorphous silicon, and Sunlinq are CIGS technology. Only one brand of CIGS panel and one brand of amorphous silicon was tested, so these differences may not apply to the technologies overall, but to design and manufacturing choices made for these brands.

1. Of the four Sunlinq panels tested, the output was different from each. Four PowerFilm panels had output very close to each other, and without a regulator, power was over 18 Watts. Based on this small sample, the chance was higher for getting a Sunlinq panel with low output.
2. Sunlinq panels did not perform as well when flat on the ground. There was a large drop in their output when they were not “aimed” at the sun. In use, this means more frequent attention to positioning.
3. Sunlinq panel output under an overcast sky was much lower compared with their rating than the PowerFilm panels.

4. Sunlinq panels are lower cost in dollars per Watt than PowerFilm for bright sun conditions ($24/W vs $34/W), and about the same in cloudy conditions ($260/W vs $256/W).

Precautions to increase reliability of measurements

Disclaimer
While I tried to take make these test results as accurate as possible, the instruments used were not expensive scientific instruments or test equipment with their calibration traceable to NIST standards. These results should be used as a guide, and not as the sole information for volume purchases. With a sample size of 4 Sunlinq panels and 4 PowerFilm panels, I chose to rely on the measurements for a $1000 purchase, but un-announced changes by manufacturers could change results for future panels.

- All panels were new and without previous use or abuse.
- Panels were tested side by side, at the same time
- A Solarex stationary panel was used as a reference.
- An Extech light meter was used for relative brightness in lux
- Batteries were very similar, or the same one was switched for measurements
- Battery state of charge was checked to assure a current load for each panel
- Batteries were exchanged while other test conditions remained the same
- Four Sunlinq panels tested
- Four PowerFilm panels tested.
- More than one PowerFilm panel tested against more than one Sunlinq panel
- Some tests were completely simultaneous, with same model power meter monitoring each of the pair.
- Panels were at the same angle in the same location, and were swapped left/right between brands.
- Power meters checked against Fluke 189 Multimeter for current and voltage.
- The higher output number was used for all tests where the last digit was changing +/- 1