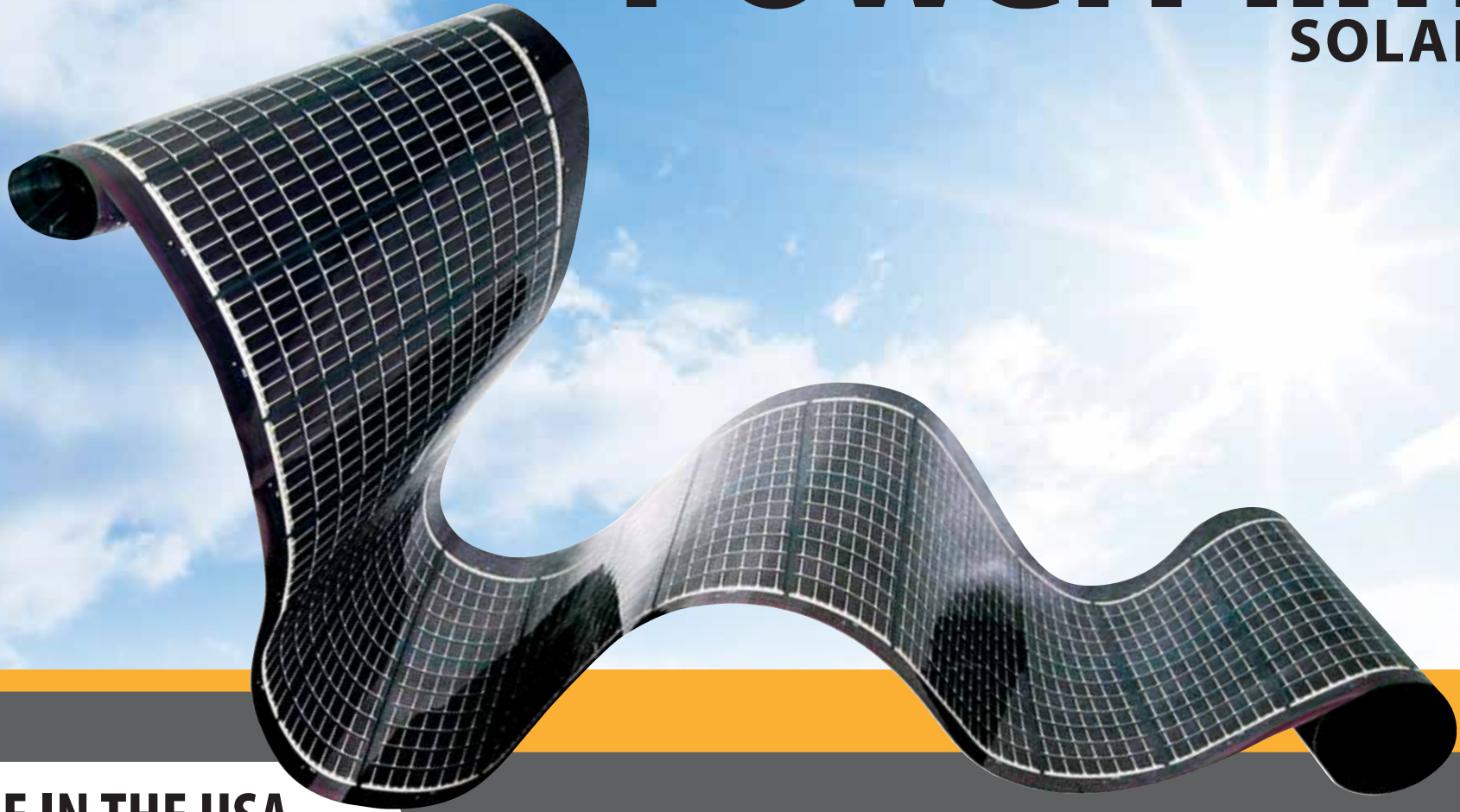


PF **PowerFilm**[®]
SOLAR



MADE IN THE USA

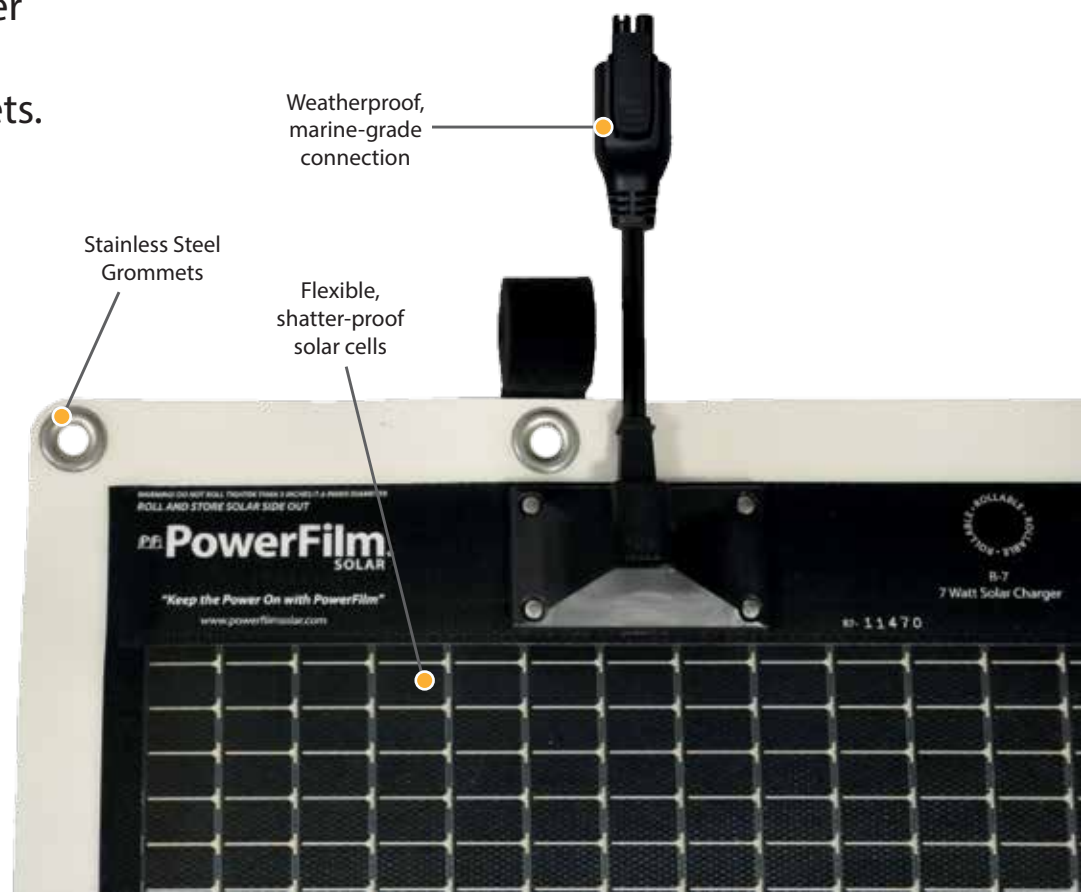
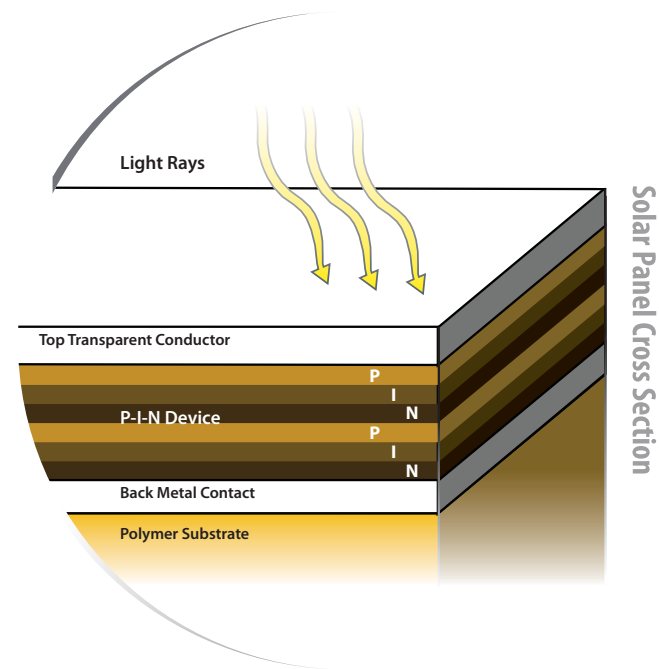


Since our founding in 1988, PowerFilm has been committed to providing top-quality thin-film solar power solutions for a wide variety of applications. We take pride in being the sole thin-film, flexible solar manufacturer producing panels in the USA.

We continue to build upon our history of innovation in the design and manufacturing of thin-film solar panels. To accomplish this mission, we employ top talent in many fields including engineering, physics and manufacturing.

The company's objective is to supply remote power solutions to select portable and remote power applications and custom OEM solar module markets. PowerFilm actively looks to identify partnerships with companies whose products, branding and distribution channels are established to bring total solar solutions to the marketplace.

**Contact us today at
1-888-354-7773 or online at
www.powerfilmsolar.com**



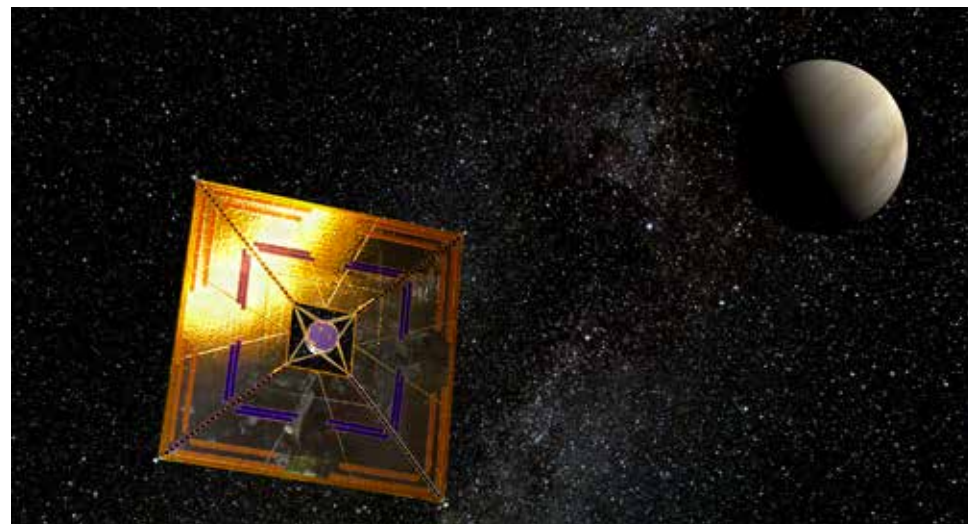
Asset Tracking



The Challenge: When the leading manufacturer of asset tracking equipment approached PowerFilm, they needed to create a reliable solar powered semi-trailer monitoring product. The vehicle tracking system required solar panels that were extremely durable; capable of surviving years of power washing, snow, hail and bird droppings. The solar panels also had to be extremely thin, lightweight and be integrated with the system's electronics. The vehicle tracking computer system used GPS, cellular data networks, wireless sensors and needed a solar power solution at a specific voltage that worked well in all weather conditions.

The Approach: PowerFilm worked with the customer designing an appropriate case and mounting system as well as the solar module to power their instruments. The end product contains the electronics and battery as well as the solar module. It lies very flat on the top of the trailer. Thousands of these units have been successfully installed in the field and semi-trailers around the world are continuously monitored - thanks to PowerFilm Solar.

Solar Yacht to Venus



The Challenge: Using solar radiation as propulsion for interplanetary travel has been the subject of science fiction for 100 years. Project IKAROS made this a reality, flying radiation probes to Venus and beyond using a solar sail. For propulsion they used a gigantic, extremely lightweight sail which used radiation pressure from the sun to drive the spacecraft to Venus. They needed solar modules to power the instrumentation over the long voyage. The modules had to be extremely light weight, durable, and flexible enough to withstand the stowage and deployment of the solar sail.

The Approach: PowerFilm worked with the creators of this solar yacht to design modules to mount on their sail. We used a special 25 μ thick substrate and a cell configuration which gave appropriate voltage for their power bus minimizing wiring harness weight. These combined with other design features to create a module putting out over 1200 W per kilogram.

High Altitude Balloon



The Challenge: High-altitude balloons and airships rely on an increasing amount of electronics to perform critical functions in an extremely challenging environment. GPS, instrumentation, radio equipment and other electronics systems require a robust solar power system. Customers need a power source that is light weight and reliable

The Approach: PowerFilm's product development team has worked with a number of organizations who require solar power for high altitude balloons. We have responded by designing custom, extremely lightweight modules and attachment methods to meet their specific needs. These applications call for some of our lightest weight substrates and encapsulation materials. A key design feature for this application, beyond the basic module voltage and current capability, is a wiring harness that collects the power and gets it to the appropriate location with minimal loss.

Electric Boat Solar Panel



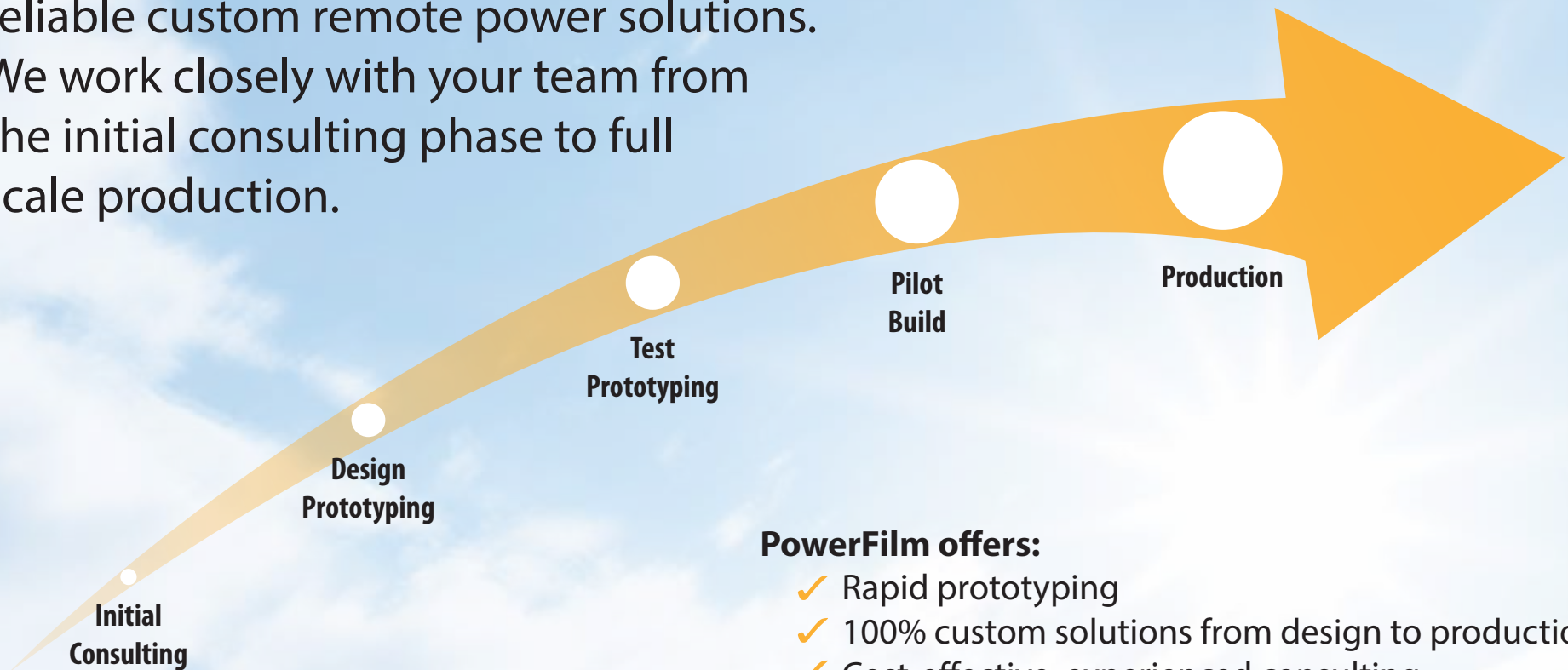
The Challenge: Sea Eagle makes quality inflatable boats and kayaks for the outdoor/recreational watersport market. They wanted to combine their products with Torqeedo electric propulsion motors. With this package, customers would be able to experience the fun of small-craft boating without the hassle of gasoline engines.

Both Sea Eagle and Torqeedo saw a need to use solar panels for electric boat motors. Each company worked closely with PowerFilm to develop a solution that would fit this market.

Solar panel technologies such as crystalline panels would not work well in this application due to the weight, thickness and other limitations.

The Approach: PowerFilm created a solar panel which serves as part of the top canopy for the boat. The canopy now serves double duty as shade and a solar power source for the boat's electric motor. This solar module uses highly durable encapsulation material for long life in outdoor installations and saltwater environments.

PowerFilm is the industry leader in providing reliable custom remote power solutions. We work closely with your team from the initial consulting phase to full scale production.



PowerFilm offers:

- ✓ Rapid prototyping
- ✓ 100% custom solutions from design to production
- ✓ Cost-effective, experienced consulting
- ✓ U.S. based engineering and production
- ✓ Size and shape flexibility
- ✓ Expertise in charging circuitry, lamination, battery types, connectors, cables and mounting options
- ✓ Variety of power & voltage options available

- ✓ **MULTIPLE ENCAPSULANTS** PowerFilm has the unique capability to encapsulate our solar modules with a variety of standard and custom encapsulants.
- ✓ **VERSATILE SUBSTRATE** PowerFilm can mount solar modules on fabric, metals, plastic, foam, even magnets, giving you multiple options for product integration and development.

- ✓ **WIDE ARRAY OF VOLTAGES AND CURRENTS** PowerFilm can modify the electrical characteristics of our solar modules to match your needs.
- ✓ **STRONG PARTNERING MENTALITY** PowerFilm works as your partner all the way to market.

RC Aircraft Solar Module Series

The PowerFilm RC Aircraft Solar Module Series is designed to be easily integrated with remote controlled aircraft.



RC7.2-75F
270 mm x 90 mm | 7.2 V | Current: 100 mA



RC7.2-75PSAF**
270 mm x 90 mm | 7.2 V | Current: 100 mA

**Pressure Sensitive Adhesive

Wireless Electronics Solar Module Series

Modules in the PowerFilm Wireless Electronics Series offer a new opportunity to solve the old problem of limited power for wireless electronics in both portable and remote electronic applications.



SP3-37
64 mm x 37 mm | 3 V
Current: 22 mA



MP3-25
114 mm x 25 mm | 3 V
Current: 25 mA



MP3-37
114 mm x 37 mm | 3 V
Current: 50 mA



MPT3.6-75
73 mm x 74 mm | 3.6 V
Current: 50 mA



SP4.2-37
84 mm x 37 mm | 4.2 V
Current: 22 mA



MPT3.6-150
74 mm x 150 mm | 3.6 V
Current: 100 mA



MPT4.8-75
94 mm x 75 mm | 4.8 V
Current: 50 mA



MPT4.8-150
94 mm x 150 mm | 4.8 V
Current: 100 mA



MPT6-75
114 mm x 75 mm | 6 V
Current: 50 mA



MPT6-150
114 mm x 150 mm | 6 V
Current: 100 mA



MP7.2-75F
253 mm x 75 mm | 7.2 V
Current: 100 mA



MP7.2-150F
253 mm x 150 mm | 7.2 V
Current: 200 mA



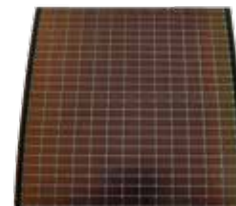
MPT15-75
253 mm x 75 mm | 15.4 V
Current: 50 mA



MPT15-150
253 mm x 150 mm | 15.4 V
Current: 100 mA



MPT16-160*
314 mm x 160 mm | 15.4 V
Current: 150 mA



MPT16-160*
314 mm x 320 mm | 15.4 V
Current: 300 mA

*Thermal Adhesive Backing with black cosmetic tape. Includes UV stabilizer encapsulation.

WeatherPro Series

The PowerFilm WeatherPro Series is the perfect choice for permanent outdoor applications that are directly exposed to the elements.



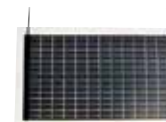
P7.2-75F
270 mm x 100 mm | 7.2 V
Current: 100 mA



P7.2-150F
270 mm x 175 mm | 7.2 V
Current: 200 mA



PT15-75
270 mm x 100 mm | 15.4 V
Current: 50 mA



PT15-150
270 mm x 175 mm | 15.4 V
Current: 100 mA



PT15-300
270 mm x 325 mm | 15.4 V
Current: 200 mA

Minimum Package Quantities required on all OEM pieces



Photo by Tony Bynum

F15-300N



F15-600



F16-1200



F16-1800



F16-3600



F16-5400

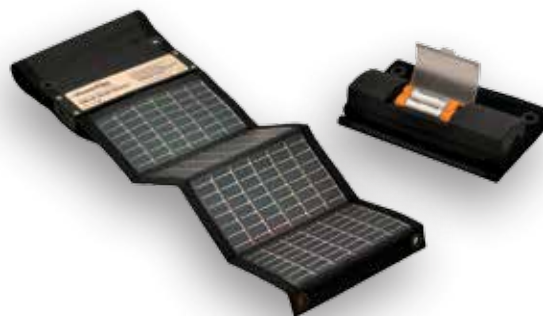


PowerFilm Foldable Chargers come in a wide range of power output configurations and are virtually unlimited in application.

✓ **PERFORMS EVEN IN LOW LIGHT** PowerFilm Foldable Solar Chargers have been designed to absorb light even during light low conditions. The panel is able to charge for more hours per day than competing technologies.

✓ **EXTREMELY DURABLE** PowerFilm Foldable Solar Chargers resist point damage extremely well, resulting in a charger that still functions, with minimal loss of output, even after being subject to puncturing.

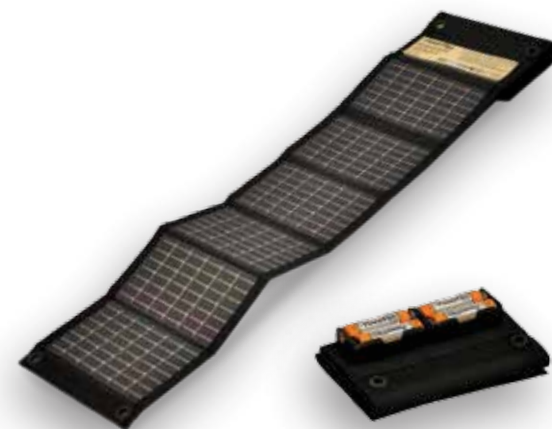
✓ **INSTANT POWER** PowerFilm Foldable Solar Chargers **DO NOT** require sun-soaking prior to use.



USB+AA Solar Charger

Go from fully spent to fully charged in just four hours (in direct sun conditions). In addition to battery charging, utilizing the Universal Serial Bus (USB) port and working with two rechargeable batteries allows for direct charging of most small USB devices, like cell phones, smart phones and iPods.

Includes: Two AA Rechargeable NiMH Batteries



F16-7200



AA Solar Charger

Designed to provide a convenient, compact, ultra lightweight, portable battery charging solution. Perfect for small electronics running on AA batteries, ranging from radios to gaming devices. The PowerFilm AA Foldable Solar Charger keeps fresh batteries available, no matter how remote the location.

Includes: 4 AA Rechargeable NiMH Batteries & AAA Battery converters

| Product | F15-300N | F15-600 | F16-1200 | F16-1800 | F16-3600 | F16-5400 | F16-7200 | USB+AA | AA |
|---------------------|---------------|-----------------|-------------|-------------|-------------|------------|-------------|-----------------|----------------|
| Wattage | 5 W | 10 W | 20 W | 30 W | 60 W | 90 W | 120 W | 1.5 W | 2.2 W |
| Operating Voltage | 15.4V | 15.4 V | 15.4 V | 15.4 V | 15.4 V | 15.4 V | 15.4 V | 3.6 V | 3.6 V |
| Folded Dimensions | 3.3"x10.5"x1" | 3.5"x10.5"x1.3" | 6.5"x11"x1" | 9.5"x11"x1" | 9.5"x11"x2" | 11"x14"x3" | 14"x14"x3" | 5.5"x3.25"x1.4" | 5.5"x3.3"x1.4" |
| Unfolded Dimensions | 10.5"x24.4" | 21"x23.7" | 31.7"x30" | 31.7"x41.3" | 43"x59" | 54.4"x68" | 86.5"x54.5" | 5.5"x24" | 5.5"x31.5" |
| Weight | 0.45 lbs | 0.73 lbs | 1.27 lbs | 1.76 lbs | 3.19 lbs | 5 lbs | 6.5 lbs | 4.9 oz | 4.18 oz |



Built with same technology that goes into every PowerFilm solar module, the Rollable Solar Charger line is extremely durable, lightweight and easily integrated to provide power for a number of charging applications.

- ✓ **PERFORMS EVEN IN LOW LIGHT** PowerFilm Solar Chargers have been designed to absorb light even during low light conditions. The panel is able to charge for more hours per day than competing technologies.
- ✓ **WATERPROOF** A perfect solar solution for wet and waterlogged environments, PowerFilm Rollable Solar Chargers are fully waterproof and constructed with marine grade connectors to provide a portable solar solution for marine environment.
- ✓ **EXTREME DURABILITY** PowerFilm Rollable Solar Chargers resist point damage extremely well, resulting in a charger that still functions, with minimal loss of output, even after being subject to puncturing. *(note: puncturing will affect the ability of the solar panel to repel water.)*



Includes: RA-2 and RA-11



| Product | R7 | R14 | R21 | R28 | R42 | R60 |
|---------------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| Wattage | 7 W | 14 W | 21 W | 28 W | 42 W | 60 W |
| Operating Voltage | 15.4 V | 15.4 V | 15.4 V | 15.4 V | 15.4 V | 15.4 V |
| Rolled Dimensions | 4" dia. x 14.5" | 4" dia. x 14.5" | 4" dia. x 14.5" | 4" dia. x 14.5" | 4" dia. x 26.1" | 4" dia. x 26.1" |
| Unrolled Dimensions | 14.5"x23" | 14.5"x42" | 14.5"x60.75" | 14.5"x79.75" | 26.1"x60.75" | 26.1"x86" |
| Weight | 0.59 lbs | 0.98 lbs | 1.42 lbs | 1.8 lbs | 3.2 lbs | 4.0 lbs |



Light Saver Series

The Light Saver Series includes a few of the most portable and versatile solar charging solutions PowerFilm offers. With battery and USB output built into this solar charges, having portable power in your pocket just got a whole lot easier.

| Wattage | 1 W | 2 W |
|---------------------|-----------------|-----------------|
| Output | 1 Amp | 1 Amp |
| Rolled Dimensions | 4" dia. x 14.5" | 4" dia. x 14.5" |
| Unrolled Dimensions | 14.5"x23" | 14.5"x42" |
| Weight | 0.59 lbs | 0.98 lbs |



Solar Golf Cart Kit

Thin, Lightweight, flexible solar panel with quick and easy stainless steel snaps designed to maintain charge and reduce depth of discharge in electric carts. Reduces costs associated with charging, increases range, extends battery life, and comes complete with all materials for easy self installation

| Wattage | 36 W/ 48 W |
|-------------------|-------------|
| Operating Voltage | 15.4 V |
| Dimensions | 37.5"x55.6" |
| Weight | 7 lbs. |

PowerTour RV Solar Panels

PowerTour RV Solar Panels offset all parasitic power loss from smoke or propane detectors, clocks and other items that drain your battery. Maintain the primary battery, extends battery life, frees you from the need for a direct power source, runs the power jack and activates the power slide without plugging in. Comes complete with an optional installation kit with peel-and-stick adhesive backers.

| | RV15-2700 | RV15-3900 |
|-------------------|---------------|---------------|
| Wattage | 42 W | 60 W |
| Operating Voltage | 15.4 V | 15.4 V |
| Dimensions | 26.14"x60.81" | 26.14"x86.05" |
| Weight | 4 lbs | 6 lbs |



All PowerFilm authorized accessories include marine-grade components with connectors that match the PowerFilm Series output cord.



KITS:

ADVENTURE

Outdoor Activity Charging Components
Includes: RA-1, RA-6, and RA-8

ASSURANCE

Battery Charging Components

Includes: RA-6, RA-8, RA-9 and RA-11



RA-1 | 12 Volt Cigarette Lighter Adapter

RA-2 | 12 Volt Female Cigarette Lighter Adapter

RA-3b | 12 Volt Battery Charger Pack for AA and AAA

RA-6 | Daisy Chain Accessory

RA-7 | 15 ft. Extension Cord

RA-8 | 15 ft. Extension Cord with Alligator Clips

RA-9 | Charge Controller

RA-11 | 15 ft. Extension Cord with O-ring Battery Terminal

RA-13 | Anderson Power Pole Connector

RA-14 | USB 12V Power Port Adapter

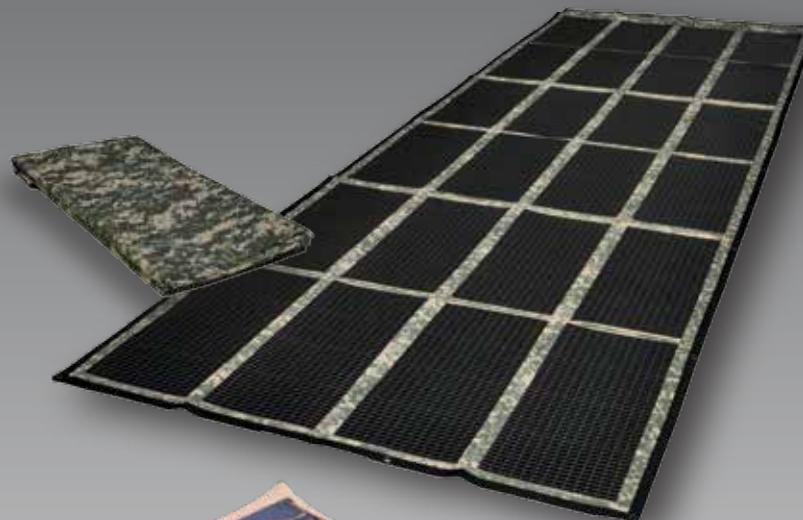
RA-16 | 3ft. Extension Adapter with 4.75mm Barrel

PP-7 | Multiple Device Charger Cable

PowerFilm solar modules have passed the rigors of the Aberdeen Proving Grounds and Mil Standard 810F.

PowerFilm, Inc. has collaborated extensively with the U.S. Military to develop solar solutions for military use. In well over a decade of work with the military, PowerFilm has teamed with the Army Research Center at Natick to develop unique and field-ready alternative energy solutions, as well as developed top-secret solar applications for the Special Forces.

The knowledge and high standards gained from collaboration with the military go into all of PowerFilm's solar products.



220W Solar Quad

The PowerFilm 220W foldable Solar panel can be used for a wide variety of purposes for field communication radios, GPS systems, satellite phones and laptop computer.

| | | |
|----------------------|------------|------------|
| Wattage: | 220 W | 220 W |
| Operating Voltage: | 16 V | 32 V |
| Operating Current: | 14 A | 7 A |
| Folded Dimensions: | 27"x14"x4" | 27"x14"x4" |
| Unfolded Dimensions: | 56"x168" | 56"x168" |
| Weight: | 14 lbs | 14 lbs |



PowerShade Solar Field Shelter

Solar field shelters reduce dependence on fuel-fired generators that are noisy and require a constant supply of costly fuel. Used for a variety of purposes, ranging from lighting to ventilation to power for remote bases of operation, disaster relief and communication hubs when grid power is not available.

| | | | |
|------------------------|---------|---------|---------|
| Wattage: | 1.8kW | 3.6kW | 5.4kW |
| Clear Span Dimensions: | 24'x27' | 48'x27' | 72'x27' |
| Staked Dimensions: | 42'x20' | 66'x46' | 90'x20' |



- ✓ PowerFilm has been building products for government agencies, the military, and NASA for over 20 years
- ✓ With our unique manufacturing ability, PowerFilm seeks to assist in development and customization of solar solutions to fit the unique requirements of military application – if it doesn't exist today, PowerFilm can develop and manufacture it for tomorrow
- ✓ PowerFilm has long standing relationships working directly with government agencies and major defense contractors to create solar solutions
- ✓ The research and development department at PowerFilm is actively pursuing cooperative, leading-edge, alternative energy technology solutions for the future



PowerFilm, Inc.
1287 XE Place
Ames, Iowa 50014 USA
Tel: +1 515 292 7606
Toll Free: +1 888 354 7773
Fax: +1 515 292 1922
www.powerfilmsolar.com

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