

Electronic Component Solar Panels

PowerFilm Electronic Component panels are well suited to power the wireless devices and sensors of the emerging IoT industry as well as many other battery operated and remote electronics.

Whether it's a harsh outdoor environment or an indoor desktop, PowerFilm has an optimal solution for your application.

Classic Application Series

Classic Application Series panels are optimized to collect sunlight outdoors and are a small representation of PowerFilm's wide range of custom options including size, voltage and more.

These panels are well suited to power the wireless devices and sensors of the emerging IoT industry as well as many other electronics. Sizes range from inches to feet squared with a standard thickness of 0.22mm.

Power output is directly proportional to surface area, with our smallest stock panel producing 70mW at 3V and our largest stock panel producing 1.54W at 15.4V. For permanent outdoor installations, a UV stabilized surface option is available. An edge seal can be added to make the panels weatherproof or they can be mounted inside a clear weatherproof enclosure.

Indoor Light Series

Indoor Light Series panels are identical to the Classic Application Series except they are optimized to harvest indoor light instead of sunlight.

With industry-leading performance, these panels are ideal to integrate with ultra-low power wireless devices, sensors and electronics. For application notes and examples, check out our Indoor Solar Development Kits which make prototyping and experimenting with these panels simple.

Indoor Light Series panels are compatible with all common indoor light sources including LED, fluorescent, incandescent, halogen and indirect sunlight. All panels are tested and are guaranteed to perform in dim 200 lux and brighter 1000 lux environments.

Four standard sizes are offered. Additionally, there are a wide range of custom options available. Panel performance will degrade if exposed to direct sunlight for extended periods of time. Limited, intermittent outdoor use only.

RC Aircraft Series

The RC Aircraft Series panel is designed to be easily integrated with a variety of RC aircraft. This panel is very lightweight, can be soldered from the back of the panel via the extended copper tape, and has an extra edge seal for protection from fuel contamination and weather.

This panel is also available with Pressure Sensitive Adhesive (PSA) making installation easy. These panels do not have a UV-stabilized surface, but are suitable for intermittent outdoor use. For connection, melt through laminate and solder to copper tape.

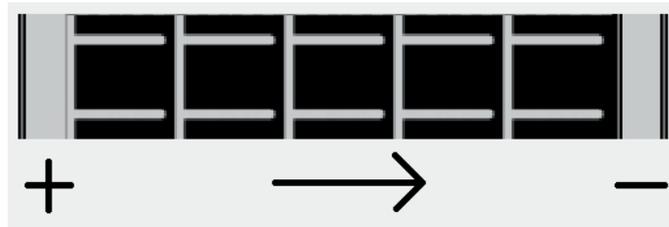
WeatherPro Series

The WeatherPro Series is the perfect choice for permanent outdoor applications that are directly exposed to the elements. The especially rugged construction of these panels includes a UV-stabilized surface, extra edge seal for weather protection, and tin-coated copper leads that extend from the panel. Coating the leads with an RTV silicon compound can provide a tightly sealed package.

Connections and Busbars

Electrical connection can be made via soldering onto front or backside contacts, conductive adhesive, or mechanical connection. Directly soldering wire leads to the busbars is the easiest way to connect to an Electronic Component Solar Panel.

Positive and negative busbars are located on the sides of the panels. Polarity can be determined by observing the orientation of the silver fingers which point from positive to negative.



Copper waffle tape or ribbon busbars are currently available between 3/16" – 1/2" widths.

Most panels will be fully encapsulated and may also have black cosmetic tape covering the busbars. A soldering iron can be used to burn through these layers to reach and connect to the busbar.

Laser ablation options are available which can remove the encapsulation above or below the busbar to provide direct access to connect from the front or back side.

Mounting

Electronic Component Solar Panels can be mounted via adhesive bond, mechanical fasteners, or lamination (thermal adhesive) onto a substrate.

Panels are compatible with a wide range of adhesive materials including PSA, acrylic, butyl, VHB and others. Peel and stick options are available.

A wide variety of mechanical fasteners such as rivets, grommets, screws, clamps, etc. can be used for mounting. In general, make sure fasteners are at least 1/4" away from active solar material and busbars.

Panels can also be laminated or vacuum formed to plastic, metal, fiberglass, vinyl, fabric, carbon fiber, and other surfaces.

DO NOT PLACE PCB MOUNTED PANELS IN A REFLOW OVEN.

PCB Mounting and Connection

Electronic Component Solar Panels can be mounted to PC Boards using glue dots in addition to compatible methods mentioned above.

Placement onto a PCB can be made via tape and reel, robotic placement, or manual placement.

Electrical connection to a PCB can be made using selective solder, conductive epoxies, conductive inks, conductive adhesives, z-axis adhesives, wire leads or manual soldering.

UV Stability

For applications with extended exposure to direct sunlight, UV stable laminates are available for all Electronic Component Solar Panels.

In general, for indoor and intermitted outdoor applications, UV stability is not required.

Weather Proofing

Electronic Component Solar Panels in the Classic Application Series and Indoor Light Series do not have moisture sealed edges. Over time direct contact with moisture, high humidity and temperature can cause corrosion to ingress from the edges of the panels.

A weather sealing lamination can be added to any stock Electronic Component Solar Panel which will make it completely weather and moisture proof.

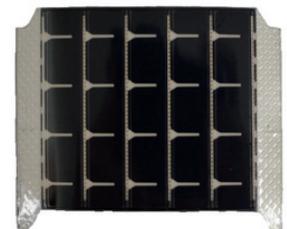
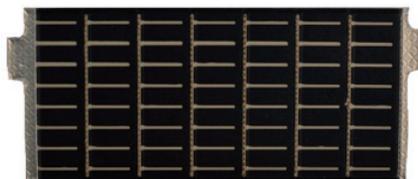
The weather sealing process may significantly increase module cost so often mounting the panel in a clear weatherproof enclosure is a more cost-effective option.

In general, for indoor and intermittent outdoor applications, weather proofing is not required.

Custom Die Cutting

In general, the active solar material can only be manufactured into rectangular panels but the substrate around the panel can be die cut into any desired shape.

Busbar tabs can also be included in the die cut which could be folded underneath the panel (see below photos).



Custom Sizing

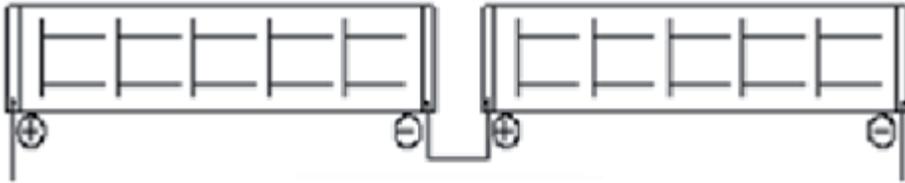
Panels can be manufactured in a wide range of custom sizes spanning from less than a square inch up to multiple square feet.

Contact us for more information on available custom sizing options.

Connecting Electronic Component Panels In Series & Parallel

For rapid prototyping and testing, panels can be connected together to increase output voltage, current, and power to quickly meet application requirements. Panels can be connected in series to increase output voltage or parallel to increase output current.

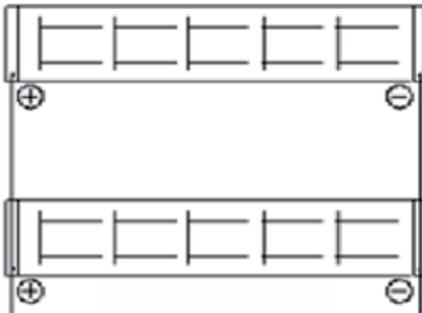
Series Connection



The voltages of series connected panels sum together increasing overall output voltage.

NOTE: For series connected panels, current is limited by the panel which produced the lowest current. For this reason, only panels that output the same amount of current can be connected together in series.

Parallel Connection



The current of parallel connected panels sum together to increase overall output current.

NOTE: Parallel connecting different voltage panels could cause damage to the panels. Only parallel connect panels with the same output voltage.

For large quantity applications, a custom sized panel is always recommended over combining multiple smaller panels.

Thickness

Electronic Component Solar Panel thickness ranges from 0.22 – 0.5+mm depending on lamination stack used. Panels can be mounted onto thicker substrate to increase rigidity.

Flexibility

Standard Electronic Component Solar Panels have a minimum bend radius of 1 inch for fixed installations and 3 inches for repetitive flexing.

Battery Charging and Charge Controllers

Storage elements play an important role in a total power solutions. Devices can store extra energy produced during sunny days and use it at night or on cloudy days. The most common storage elements are rechargeable batteries and capacitors/supercapacitors.

The way a storage element is charged varies widely for different technologies and material chemistries, so it is very important to understand what storage element you are using and how it is charged.

Rechargeable batteries have the strictest charging requirements which are unique for different battery chemistries; Li-Ion vs NIMH vs NiCd etc. **IMPROPER CHARGING COULD RESULT IN FIRE OR EXPLOSION.**

Capacitors and supercapacitors are much simpler to charge. They can be charged and discharged to any voltage under their rated max voltage. Although simpler, they usually have much lower capacity and higher self-discharge when compared to rechargeable batteries.

For typical applications, a charge controller can be used to ensure safe and efficient charging. Many off the shelf charge controllers and reference designs exist for most storage element technologies.

A Max Power Point Tracking charge controller will extract the most power from our Electronic Component Solar Panels.

PowerFilm can recommend, source, or design controllers based on your application requirements.

More Information

Interested in learning more about our Electronic Component Solar Panels?

Contact us for more information regarding your specific application and we can get started on your ideal solution today.