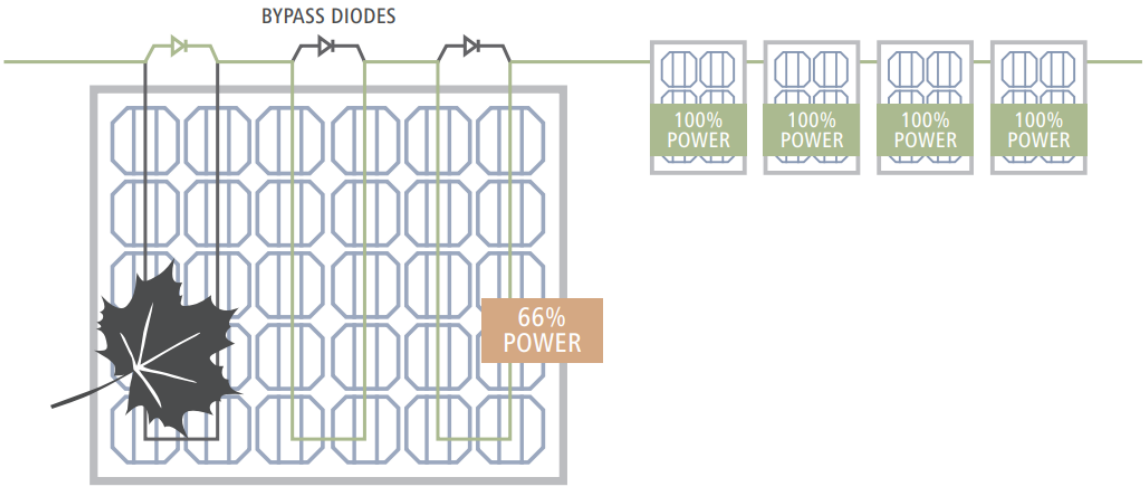
Solutions for Shady Situations

First, it is important to understand that, for minimal shading, additional hardware is not always required. Rooftop power electronics increase points of failure, as they are placed on every photovoltaic (PV) module. This can often result in costly truck rolls for servicing and inevitable downtime for system performance. This is why many providers wait until there are several failures to come onsite to repair the system.

Module-level power electronics also increase costs significantly as they are simply more components to install. In this white paper, we will explore technologies that support shade mitigation both with and without hardware in modern PV systems to help you ensure your system performance is never compromised.

How Modern PV Modules Combat Shading By Themselves

Thanks to advancing technology, if a part of a PV module is experiencing shading, the integrated bypass diode becomes conductive, and the affected part of the module is bypassed. A shaded module does not affect the performance of the remaining modules in the same string. As long as the string is performing well, these intelligent bypass diodes help to mitigate minimal shading issues.



Sometimes though, even the bypass diodes cannot combat the shady situation of a home or business. If this is the case, there are still a lot of options for mitigation with Solis to manage and ensure yield is consistent. These options include both integrated functionality as well as additional hardware options we will explore.

Integrated Yield Security with Global MPPT Tracking

String inverters are equipped with a Multi Maximum Power Point Tracking (MPPT) algorithm. There are many advantages of multiple MPPTs, including design flexibility for string sizing and placement. Shading on one string does not affect the performance of the other strings but only the shaded string. This is MPPT technology at its simplest. Solis' string inverter Multi MPPT algorithm is equipped with an extra kick. Not only does the S6 have more MPPTs than most competitors, it's MPPT Multi-peak Scanning is an advanced maximum power point tracking algorithm built into the inverter and each MPPT. This function, developed in the labs of Ginlong Technologies, Solis' parent company, ensures your PV array is functioning at peak output, no matter the variable shading a typical residential PV array might experience (see Figure 1).

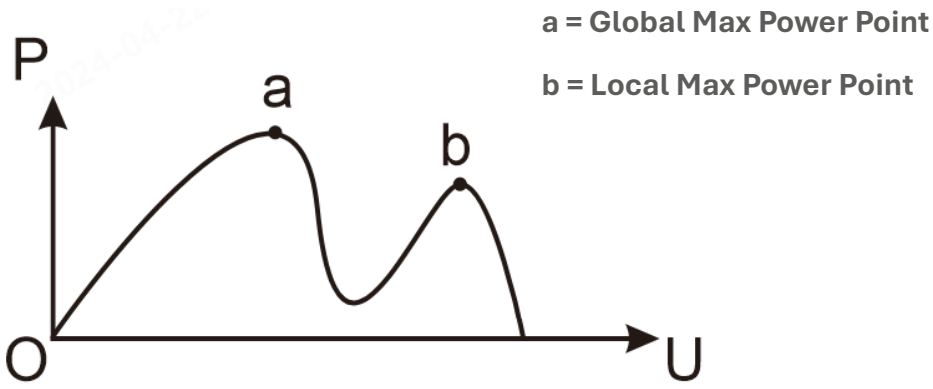


Figure 1.

This I-V curve scanning function, that can be set to scan the entire PV string I-V curve to find the global max power point at each PV string in the array, is optional and does not require any additional hardware. The Multi-peak Scanning can be turned ON or OFF by the operator and can be set to scan from 10 minutes to 3 hours, via the local inverter interface, or remotely via SolisCloud.

For sites with highly variable shading, this scanning function helps detect shading on the PV modules while the inverter MPPTs are consistently searching for the highest PV string output.

Increase your Return on Investment

In addition to this dynamic MPPT response to variable conditions, operators can apply an additional algorithm to the MPPTs to ensure the inverter is taking advantage of the very best power point at each PV string. Mitigating shading without purchasing hardware can potentially increase kilowatt hour yield, helping realize better return-on-investment on systems.

Highlights of Multi-peak Scanning

Better Yields & Efficiency

Available with Several Models

Highly Accurate

No Hardware Required

- Featured on all Solis US residential grid-tied inverters and residential hybrid inverters as well as Solis three-phase commercial inverters, 25-60K
- MPPT Multi-peak Scanning provides highly accurate PV string data because measurements are taken while the PV array and inverter(s) are operating.
- Operators have full control, with time intervals that can be set for roofs with highly variable shading or for roofs with less / very little shading
- MPPT Multi-peak Scanning does not require any external hardware, optimizes yield and provides useful data to O&M teams.

When Hardware is Required, We Got You.

Sometimes some roofs just cannot be saved from the dark side. Fortunately, Solis partners with many product providers in the industry to enhance our offering and enable solutions.

Solis's open ecosystem applies to technologies including Rapid Shutdown, Module-level monitoring, Module-level Optimization and battery storage. We partner with the leaders in their field to ensure we can bring our customers confidence in compatibility and their choice when it comes to suppliers.

Sometimes with heavy shading, additional optimization is necessary to drive the best yields. Solis works with a variety of optimizer providers so that you can choose when and where that extra hardware costs make sense. For a specific product, customers can check our website and product web page for the most up-to-date compatibility sheet.

String Inversion is Still the Way to Go for Most Systems

Since light or even medium shading can be addressed by technology built in, string inverter technology is still the best route for most systems. Reducing hardware on a job ultimately results in time and cost savings that are significant. By being able to reduce installer time and hardware costs, homeowners and businesses can realize overall system cost savings and realize scale easier, which is especially important as interest and utility rates continue to rise.

It also isn't just about saving money, but ensuring the system performs as expected and for the long-haul. This includes ensuring its ongoing operation in the event of component failure. Since rooftop power electronics can be costly to repair (truck rolls and multiple people onsite to access a rooftop), many times the system is only addressed when there are multiple failures. An intelligent inverter can help you troubleshoot remotely, for free, to save a truck roll or bypass issues, which unfortunately cannot always be done with module-level electronics. The ability of the S6 Hybrid inverter as well to operate without a grid and retain critical loads functioning when PV is producing. In short, higher lifetime production means a better long-term return on investment.

Regarding additional long-term benefits, string inverters are inherently backward compatible. That means if a failure does occur or systems age, consumers can rely on the fact a replacement component will always be available. The security, reliability and system adaptability of string inverters, especially Solis inverters, is a very strong argument to consider the topology to ensure customer satisfaction.

If you have any questions about Solis US Inverters or any of our useful features, please email us at sales_usa@solisinverters.com or visit solisinverters.com.