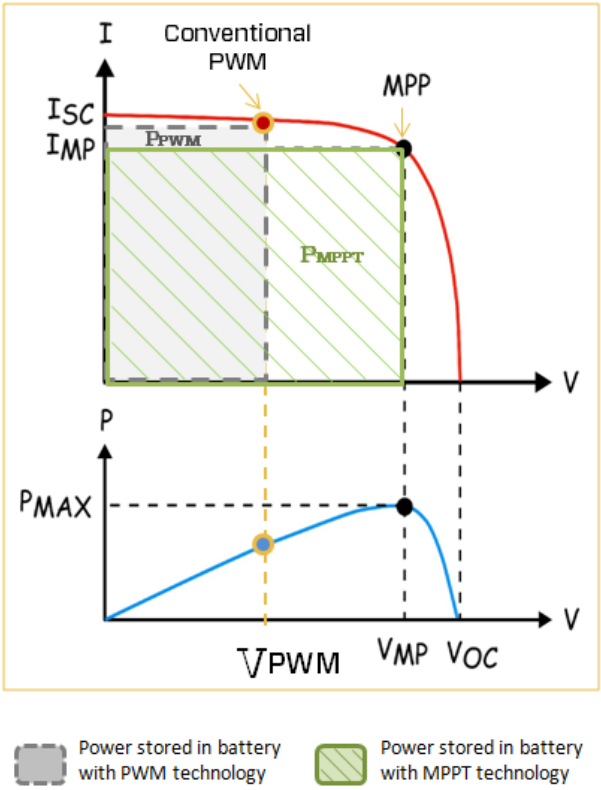
What is Maximum Power Point Tracking (MPPT)?

Maximum Power Point Tracking (MPPT), is an electronic system that operates the Photovoltaic (PV) modules in a manner that allows the modules to produce all the power they are capable of.

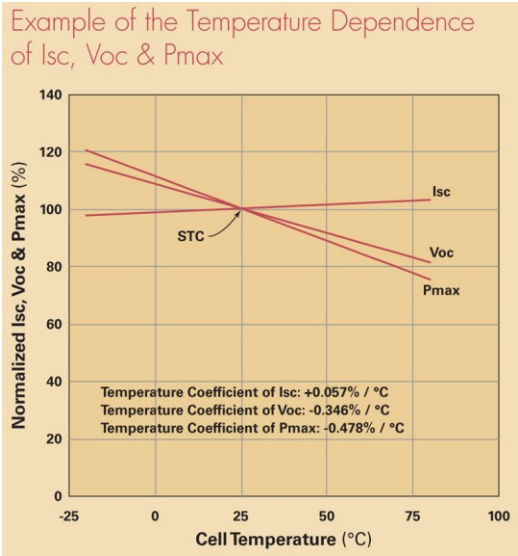
MPPT is a fully electronic system that varies the electrical operating point of the modules so that the modules are able to deliver maximum available power. Additional power harvested from the modules is then made available as increased battery charge current. The operation of a conventional charge controller is called PWM (Pulse Width Modulation). Its simply connects the modules directly to the battery. This forces the modules to operate at battery voltage, typically not the ideal operating voltage at which the modules are able to produce their maximum available power ($P_{PWM}<P_{MPPT}$)*.



** For the example shown, the conventional PWM controller simply connects the module to the battery and therefore forces the module to operate at 12V (Vpwm). By forcing a PV panel of 75W module to operate at 12V (Vpwm) the PWM artificially limits power production to ≈53W. The patented MPPT system in a Solar Boost™ charge controller calculates the voltage at which the module is able to produce maximum power (Vmp). In this example the MPPT extracts the full 75W (+30% power), regardless of present battery voltage.*

How do Solar Boost Charge Controllers increase Charge Current?

Actual charge current increase varies with operating conditions. Cooler PV module cell temperatures tend to produce higher VMP and therefore greater charge current increase. This is because VMP and available power increase as module cell temperature decreases as shown in the PV Module Temperature Performance graph. Modules with a 25°C VMP rating higher than 17V will also tend to produce more charge current increase because the difference between actual VMP and battery voltage will be greater. A highly discharged battery will also increase charge current since battery voltage is lower, and output to the battery during MPPT could be thought of as being “constant power”.



What most people see in cool comfortable temperatures with typical battery conditions is a charge current increase of between 10 – 25%. Cooler temperatures and highly discharged batteries can produce increases in excess of 30%. What this means is that current increase tends to be greatest when it is needed most; in cooler conditions when days are short, sun is low on the horizon, and batteries may be more highly discharged. In conditions where extra power is not available a Solar Boost™ charge controller will perform as a conventional PWM type controller. Patented Solar Boost MPPT technology operates the PV module at it’s optimum voltage where it can produce the greatest amount of power rather than at battery voltage. The higher power extracted from the module is then provided to the battery as increased charge current. The actual charge current increase you will see varies primarily with module temperature and battery voltage. In comfortable temperatures, current increase typically varies between 10 to 25%, with 30% or more easily achieved with a discharged battery and cooler temperatures. What you can be sure of is that Solar Boost charge controllers will deliver the highest charge current possible for a given set of operating conditions.