Application Note - SolarEdge Power Optimizer Compatibility with PV Modules

Version History

- Version 1.0, January 2025 – release

Contents

Introduction

SolarEdge Power Optimizers are designed to maximize the energy output from each PV Module by individually tracking the maximum power point (MPPT) of each module. To ensure optimal performance and safety, it is crucial to match the Power Optimizer's specifications with the PV Module's electrical characteristics.

CAUTION!

PV Module to optimizer compatibility is crucial and failing to follow the following guidelines will void the warranty of the product.

Connector Compatibility Options

PV modules use a variety of interface connectors. To enable you to use the PV module of your choice, SolarEdge offers several options for supporting these connectors. For list options and their respective warranty terms refer to: SolarEdge Power Optimizer Input Connector Compatibility - Technical Note

Key Compatibility Parameters

When matching a PV module to a SolarEdge power optimizer, consider the following key parameters from the power optimizer datasheet:

Power Optimizer Parameters

Parameter		Description	Example Value in S1200 Datasheet
1.	**Rated Input DC Power(p)**	The rated power of the PV module, at STC, must not exceed the rated input DC power of the power optimizer.	1260W
2.	**Absolute Maximum Input Voltage (Voc)**	The Voc of the connected PV module in the lowest temperature. (See PV Module Parameters below)	125Vdc
3.	**Maximum Continuous Input Current**	The power optimizer is rated to operate in continuous current up to this value.	15A
4.	**Maximum Short Circuit Current (Isc) of the connected PV module**	The STC Isc is indicated in the datasheet of the connected PV module.	20A

PV Module Parameters

The following table shows an example of PV modules compatible with the SolarEdge S1200 Power Optimizer.

PV Module Type	Maximum Power (Pmax)	Open Circuit Voltage (Voc)	Maximum Input Current (Imp)	Short Circuit Current (Isc)	Temperature Coefficient of Voc (%)	Important notes when checking the compatibility of the PV module with the S1200 optimizer
Module A	585W	41.1V	13.32A	14.18A	-0.36% per °C	Power, Voc, and Isc within limits.
Module B	625W	48.4V	15.6A	16.0A	-0.36% per °C	Power, Voc, and Isc are within limits, but Imp is slightly above the Maximum Continuous Input Current (See the following note).
Module C	585W	41.55V	17.1A	17.88A	-0.36% per °C	Power, Voc, and Isc are within limits, but Imp is significantly above the Maximum Continuous Input Current (See the following note).

NOTE

During power production, the Power Optimizer shall draw no more than the maximum continuous input current from the PV module. Depending on the module Imp and the site design and climate, input current clipping could happen in cases where the Imp of the PV module is higher.
For accurate clipping calculations, refer to the SolarEdge Designer web application.

Negative Temperature Coefficient Effect

The following table shows example parameters of the coefficient effect of Module A at 5°C (The theoretical lowest temperature ever recorded as per your regional guidelines):

Parameter	Description	Example value in PV module datasheet
Open Circuit voltage (Voc) at STC	The maximum voltage the panel can produce when not connected to any load or circuit. The voltage is measured under STC.	41.1V
Temperature Coefficient of Voc	This temperature coefficient shows how Voc increases as the temperature decreases.	-0.31% per 1°C
Temperature Difference	The difference between STC conditions (25°C) and the lowest temperature relevant to the site (in this example - 5°C).	25°C - 5°C = 20°C
Voltage Change	The percentage change in Voc is due to the difference in temperature compared to STC.	20°C x (-0.31%/°C) = -6.2%
Voltage Increase	The increase in voltage occurs under certain conditions, such as lower temperatures or higher irradiance levels.	41.1V x 6.2% = 2.55V
Adjusted Voc at 5°C	Calculate a PV module's Adjusted Voc (Open Circuit voltage) at 5°C. This includes considering the temperature coefficient of Voc provided by the panel's manufacturer.	41.1V + 2.55V = 43.65V

NOTE

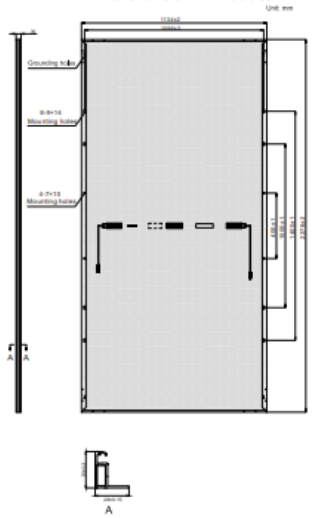
If two PV modules are connected in series to a single optimizer (2:1), multiply all values by 2, and then, validate that the maximum input voltage of the power optimizer (125V) is not exceeded.

Compatibility of Bi-facial Modules with Power Optimizers

When using bi-facial PV modules, select power optimizers supporting the maximum power, current, and voltage of the PV modules. Consider only the front-side electrical gain values, specified in the module datasheet (disregard the backside gain).

The figure below shows the electrical STC parameters essential when selecting a photovoltaic (PV) module. Note that the electrical characteristics of the backside of the PV module and the Nominal Module Operating Temperature (NMOT) should not be considered. The example provided is from the RSM144-9-560-585BNDG datasheet.

Dimensions of PV Module



ELECTRICAL DATA (STC)

Model Type	RSM144-9-560-585BNDG					
Rated Power in Watts-Pmax(Wp)	**560**	**565**	**570**	**575**	**580**	**585**
Open Circuit Voltage-Voc(V)	51.37	51.57	51.77	51.97	52.17	52.37
Short Circuit Current-Isc(A)	13.89	13.95	14.01	14.06	14.12	14.18
Maximum Power Voltage-Vmpp(V)	43.00	43.20	43.40	43.60	43.80	44.00
Maximum Power Current-Impp(A)	13.04	13.10	13.15	13.21	13.26	13.32
Module Efficiency (%) ★	21.7	21.9	22.1	22.3	22.5	22.6

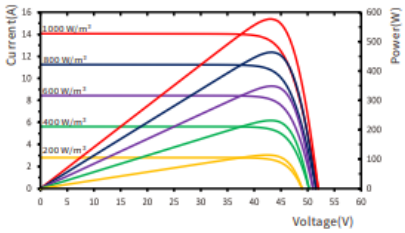
STC: Irradiance 1000 W/m², Cell Temperature 25°C, Air Mass AM1.5 according to EN 60904-3.
Bifacial factor: 80±10(%) ★Module Efficiency (%): Rounding to the nearest number

Electrical characteristics with 10% rear side power gain

Total Equivalent power -Pmax (Wp)	616	622	627	633	638	644
Open Circuit Voltage-Voc(V)	51.37	51.57	51.77	51.97	52.17	52.37
Short Circuit Current-Isc(A)	15.27	15.34	15.41	15.47	15.53	15.60
Maximum Power Voltage-Vmpp(V)	43.00	43.20	43.40	43.60	43.80	44.00
Maximum Power Current-Impp(A)	14.35	14.41	14.47	14.53	14.59	14.65

Rear side power gain: The additional gain from the rear side compared to the power of the front side at the standard test condition. It depends on mounting (structure, height, tilt angle etc.) and albedo of the ground.

RSM144-9-575BNDG
I-V characteristics at different irradiations

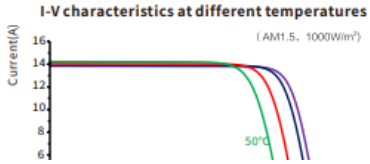


ELECTRICAL DATA (NMOT)

Model Type	RSM144-9-560-585BNDG					
Maximum Power-Pmax (Wp)	424.7	428.6	432.3	436.1	439.8	443.6
Open Circuit Voltage-Voc (V)	47.77	47.96	48.15	48.33	48.52	48.70
Short Circuit Current-Isc (A)	11.39	11.44	11.48	11.53	11.58	11.63
Maximum Power Voltage-Vmpp (V)	39.90	40.09	40.28	40.46	40.65	40.83
Maximum Power Current-Impp (A)	10.64	10.69	10.73	10.78	10.82	10.87

NMOT: Irradiance at 800 W/m², Ambient Temperature 20°C, Wind Speed 1 m/s.

I-V characteristics at different temperatures



MECHANICAL DATA

Solar cells	*n*-type TOPCon
Cell configuration	144 cells (6×12+6×12)
Module dimensions	2278×1134×30mm
Weight	31kg
Superstrate	High Transmission, AR Coated Heat Strengthened Glass
Substrate	Heat Strengthened Glass
Frame	Anodized Aluminium Alloy, Silver Color
J-Box	Potted, IP68, 1500VDC, 3 Schottky by pass diodes

Support Contact Information

If you are having technical problems concerning SolarEdge products, please contact us:

https://www.solaredge.com/service/support

Before contacting SolarEdge, make sure to have the following information at hand:

- The model and serial number of the product in question.
- The error is indicated on the LEDs, the SetApp mobile application, the LCD screen, or on the monitoring platform, if there is such an indication.
- System configuration information, including the type and number of modules connected and the number and length of strings.
- The method of communications with the SolarEdge server, if the site is connected.
- The product's software version as it appears in the ID status screen.