# **6KW Grid Interactive Photovoltaic System**

System Summary Provided by Ben Nelson Account

Project: Nelson Residence Solar Garage

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# 1. System Summary

# 1.1. System Data

## 1.1.1. Summary

Location Info		
Climate Data Source Location	Oconomowoc, WI 53066 United States	
Latitude	43° 06'N	
Longitude	88° 30'W	
Design Low Temperature	-11°F (-24°C)	
Design High Temperature	90°F (32°C)	

## **Electrical Characteristics**

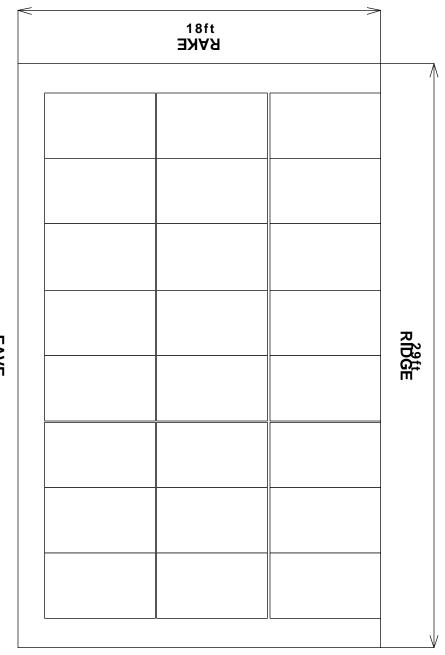
(24) Enphase M250-60-2LL-S22-IG	
Helios Solar 6T-250 (250W)	
24	
1 branch of 16 (16.0A), 1 branch of 8 (8.0A)	
6,000W	
5,400W	
5,211W	
24A	
7,603kWhr	

# 1.2. Array Layout 1.2.1. Roof Face South

Installation Area		
Installation area length	29ft	
Installation area width	18ft	
Slope	7/12 (30.3°)	
Installation area azimuth	180° (S)	

Configured Layout		
Column spacing	0.25in	
Row spacing	1in	
Module orientation	portrait	
Distance between tilted racks	1in	
Tilt angle of modules	0°	
Clearance at left	17.24in	
Clearance at right	17.24in	
Clearance at top	15.72in	
Clearance at bottom	Oft	
Total number of modules	24	
Total number of rows	3	
Layout length	26.13ft	
Layout width	16.48ft	
Area of array	429.66ft <sup>2</sup>	

Max. Values for Installation Area		
Max no. of modules	24	
Maximum no. of rows	3	
Max no. of modules in a row	8	
Maximum row length	26.13ft	
Maximum column length	16.48ft	
Area if layout full	432.58ft <sup>2</sup>	



RAKE

# 2. System Design Calculations Report (Non-Code)

## 2.1. PV Source Circuit Voltage Range Test

This test confirms that the voltage of the PV Source Circuit will always remain within the DC input voltage window of the system's inverter, microinverters, or power optimizers.

## 2.1.1. (1) 6T-250 (250W) in series

#### **Section Properties**

Description	(1) 6T-250 (250W) in series
Connected Device	M250-60-2LL-S22-IG
Connected Device Type	Microinverter
Design Low Temp.	-24°C
Design High Temp.	32°C
Module	6T-250 (250W)
Module Vmp	30.3V
Module Voc	37.4V
Microinverter Min. Input Voltage	16V
Microinverter Max. Input Voltage	48V
Mounting Method	Flush Roof Mount
Temp. Coefficient Voc	-0.12V/C
Voltage Loss Due to Degradation derate	0.0
Voltage Loss Due to Tolerance derate	0.0
Inverter Min. Voltage Increase Due to High Temperatures	0.0

#### Calculations

#### A. String Voc at Low Temperature 43.28V

The module Voc (37.4V) will increase to 43.28V at the design low temperature (-24°C). (-24°C - 25°C) X -0.12V/C + 37.4V = 43.28V The total Voc for the string is 43.28V.

43.28V X 1 = 43.28V

### B. String Vmp at High Temperature 25.26V

Estimated cell temperature equals the design high temperature (32°C) plus 35°C (the estimated difference between ambient temperatures and the cell temperature for a flush roof mount).

 $32^{\circ}C + 35^{\circ}C = 67^{\circ}C$ The module Vmp (30.3V) will drop to 25.26V at the design high temperature ( $32^{\circ}C$ ). ( $67^{\circ}C - 25^{\circ}C$ ) X -0.12V/C + 30.3V = 25.26V The total Vmp for the string is 25.26V.

25.26V X 1 = 25.26V

### Validation Tests

1.	The minimum Vmp must exceed the minimum input voltage of the connected device 25.26V > 16V = true	PASS
2.	The maximum Voc must not exceed the max input voltage of the connected device 43.28V < 48V = true	PASS