6KW Grid Interactive Photovoltaic System

System Summary

Provided by Ben Nelson Account

Project: Nelson Residence Solar Garage

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	
Summary	
Inverter	(24) Enphase M250-60-2LL-S22-IG
Module	Helios Solar 6T-250 (250W)
Number of Modules	24
Array Circuits	1 branch of 16 (16.0A), 1 branch of 8 (8.0A)
STC power of array	6,000W
PTC power of array	5,400W
CEC power output	5,211W
Max AC output current	24A
First-Year PV Watts Prod. Estimate	7,603kWhr

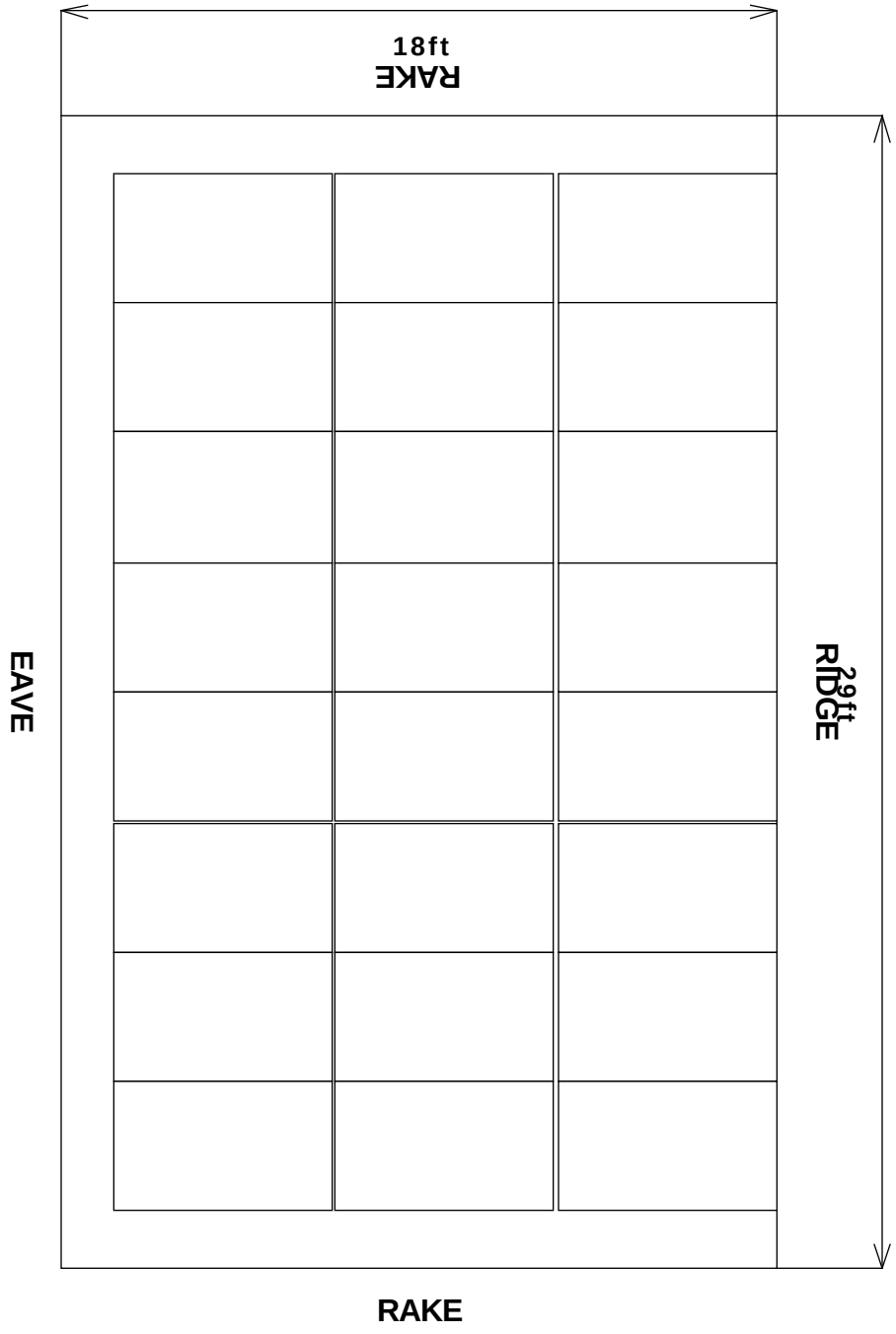
1.2. Array Layout

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	0ft
Total number of modules	24
Total number of rows	3
Layout length	26.13ft
Layout width	16.48ft
Area of array	429.66ft²

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	432.58ft²


18ft
RAKE
29ft
RIDGE
EAVE
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

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*

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°C + 35°C = 67°C
The module Vmp (30.3V) will drop to 25.26V at the design high temperature (32°C).

(67°C - 25°C) X -0.12V/C + 30.3V = 25.26V
The total Vmp for the string is 25.26V.

25.26V X 1 = 25.26V