



August 6, 2019

SnapNrack
775 Fiero Lane, Ste. 200
San Luis Obispo, CA 93401
TEL: (877) 732-2860

Attn.: SnapNrack - Engineering Department

Re: Report # 2017-03227.11 – SnapNrack Ultra Rail Solar Photovoltaic Racking System with UR-40 Rail
Subject: Engineering Certification for the State of Florida

PZSE, Inc. – Structural Engineers has provided engineering and span tables for the SnapNrack Ultra Rail Racking System with UR-40 Rail, as presented in PZSE Report # 2017-03227.11, "Engineering Certification and Span Tables for the SnapNrack Ultra Rail Solar Photovoltaic Racking System". All information, data, and analysis therein are based on, and comply with, the following building codes and typical specifications:

- Building Codes:
1. ASCE/SEI 7-10, Minimum Design Loads for Buildings and Other Structures, by American Society of Civil Engineers
 2. 2017 Florida Building Code, 6th Edition
 3. 2017 Florida Residential Code, 6th Edition
 4. AC428, Acceptance Criteria for Modular Framing Systems Used to Support Photovoltaic (PV) Panels, November 1, 2012 by ICC-ES
 5. Aluminum Design Manual 2015, by The Aluminum Association, Inc.
 6. ANSI/AWC NDS-2015, National Design Specification for Wood Construction, by the American Wood Council

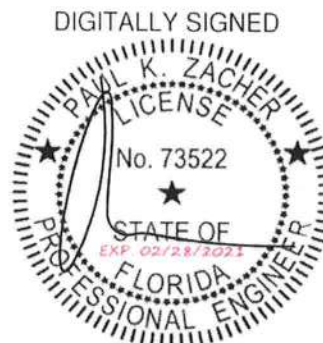
Design Criteria:

Risk Category II
Seismic Design Category = A - E
Basic Wind Speed (ultimate) per ASCE 7-10: up to 190 mph
Ground Snow Load = 0 to 120 (psf)

This letter certifies that the loading criteria and design basis for the SnapNrack Ultra Rail Racking System with UR-40 Rail Span Tables are in compliance with the above codes.

If you have any questions on the above, do not hesitate to call.

Prepared by:
PZSE, Inc. – Structural Engineers
Roseville, CA

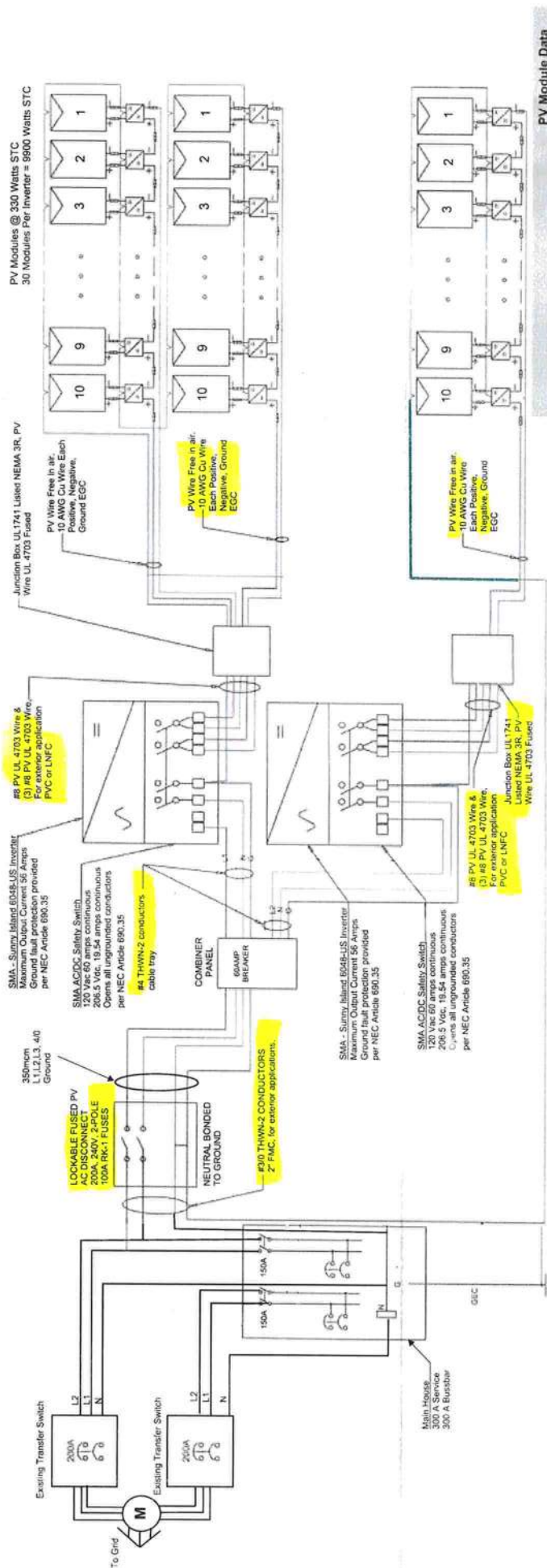


08/06/2019

8150 Sierra College Boulevard, Suite 150, Roseville, CA 95661

T 916.961.3960 F 916.961.3965 W www.pzse.com

Experience | Integrity | Empowerment



Eaton general duty cartridge fuse safety switch

DG224NRK

UPC:782113213507

Dimensions:

- **Height:** 25.5 IN
- **Length:** 11.25 IN
- **Width:** 16 IN

Weight:55 LB

Notes:Maximum hp ratings apply only when dual element fuses are used. 3-Phase hp rating shown is a grounded B phase rating, UL listed.

Warranties:

- Eaton Selling Policy 25-000, one (1) year from the date of installation of the Product or eighteen (18) months from the date of shipment of the Product, whichever occurs first.

Specifications:

- **Type:** General duty, cartridge fused
- **Amperage Rating:** 200A
- **Enclosure:** NEMA 3R
- **Enclosure Material:** Painted galvanized steel
- **Fuse Class Provision:** Class H fuses
- **Fuse Configuration:** Fusible with neutral
- **Number Of Poles:** Two-pole
- **Number Of Wires:** Three-wire
- **Product Category:** General duty safety switch
- **Voltage Rating:** 240V

Supporting documents:

- [Eatons Volume 2-Commercial Distribution](#)
- [Eaton Specification Sheet - DG224NRK](#)

Certifications:

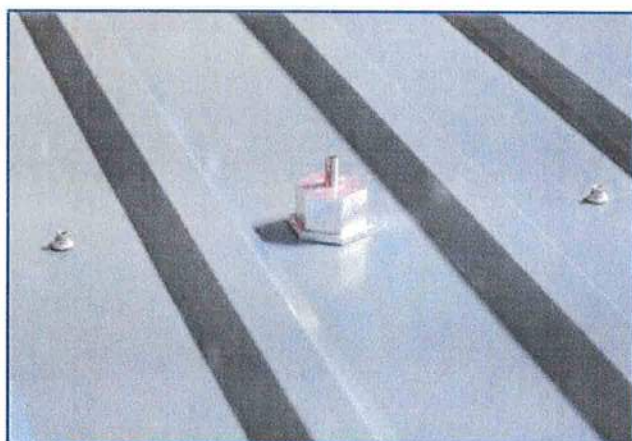
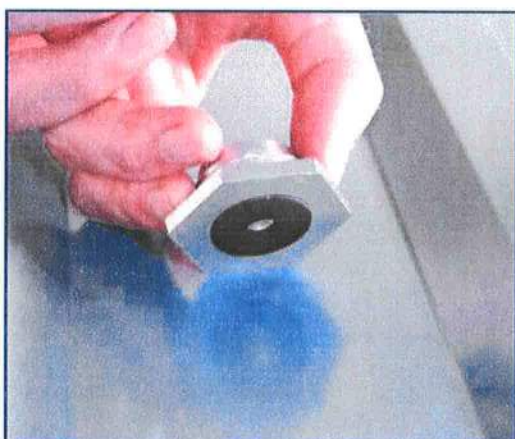
- UL Listed

Product compliance: No Data



Series 100 Metal Roof Base

The Metal Roof Base (MRB) provides a robust, self-sealing mounting base for common corrugated metal roof profiles with a flat mounting surface. The base seals to the roof with an integral EPDM Rubber Washer and a sealing top cap. The completed assembly has a 5/16" stud compatible with existing SnapNrack accessories. The MRB can't be beat for ease of installation and reliability over the service life of the system.



242-02036



242-02037

Features Include



Single Tool
Installation



Preassembled
hardware

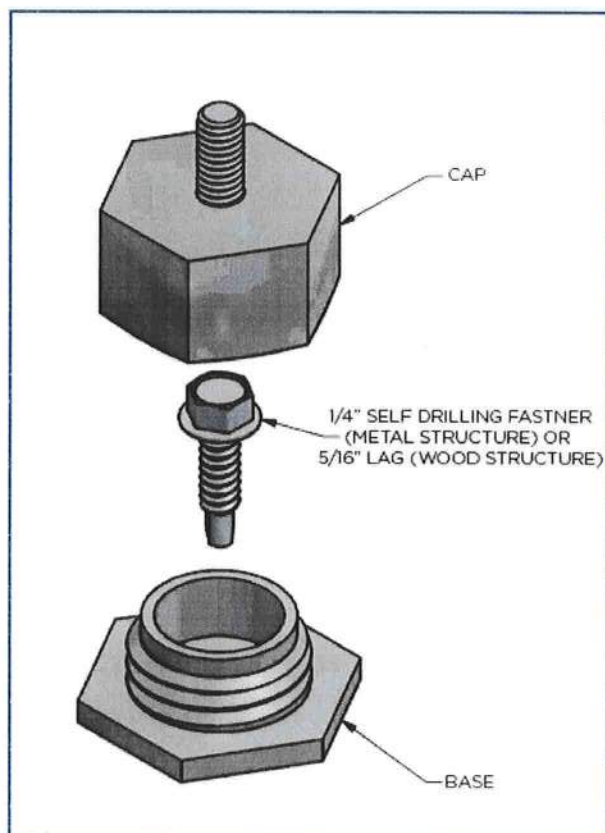


Integrated bonding



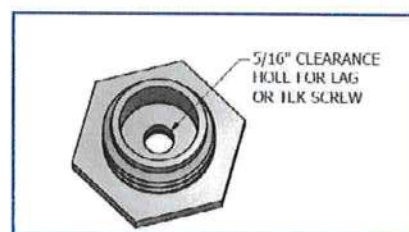
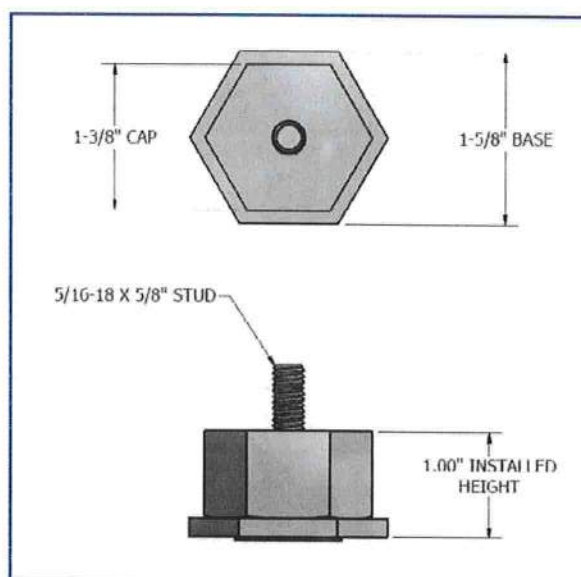
UL 2703 Certified

Metal Roof Base Assembly



Self-Drilling screw or lag is not provided with assembly

Metal Roof Base Dimensions



METAL ROOF BASE TECHNICAL DATA

Materials

- 6000 Series aluminum
- EPDM rubber seals
- Stainless steel stud

Material Finish

Silver anodization

Design Uplift Load

340 lb

Torque Specification

Flange nut: 10-16 ft lbs

DESCRIPTION:

SNAPNRACK, UR-40 RAIL

DRAWN BY:

mwatkins

REVISION:

B

SnapNrack™
Solar Mounting Solutions

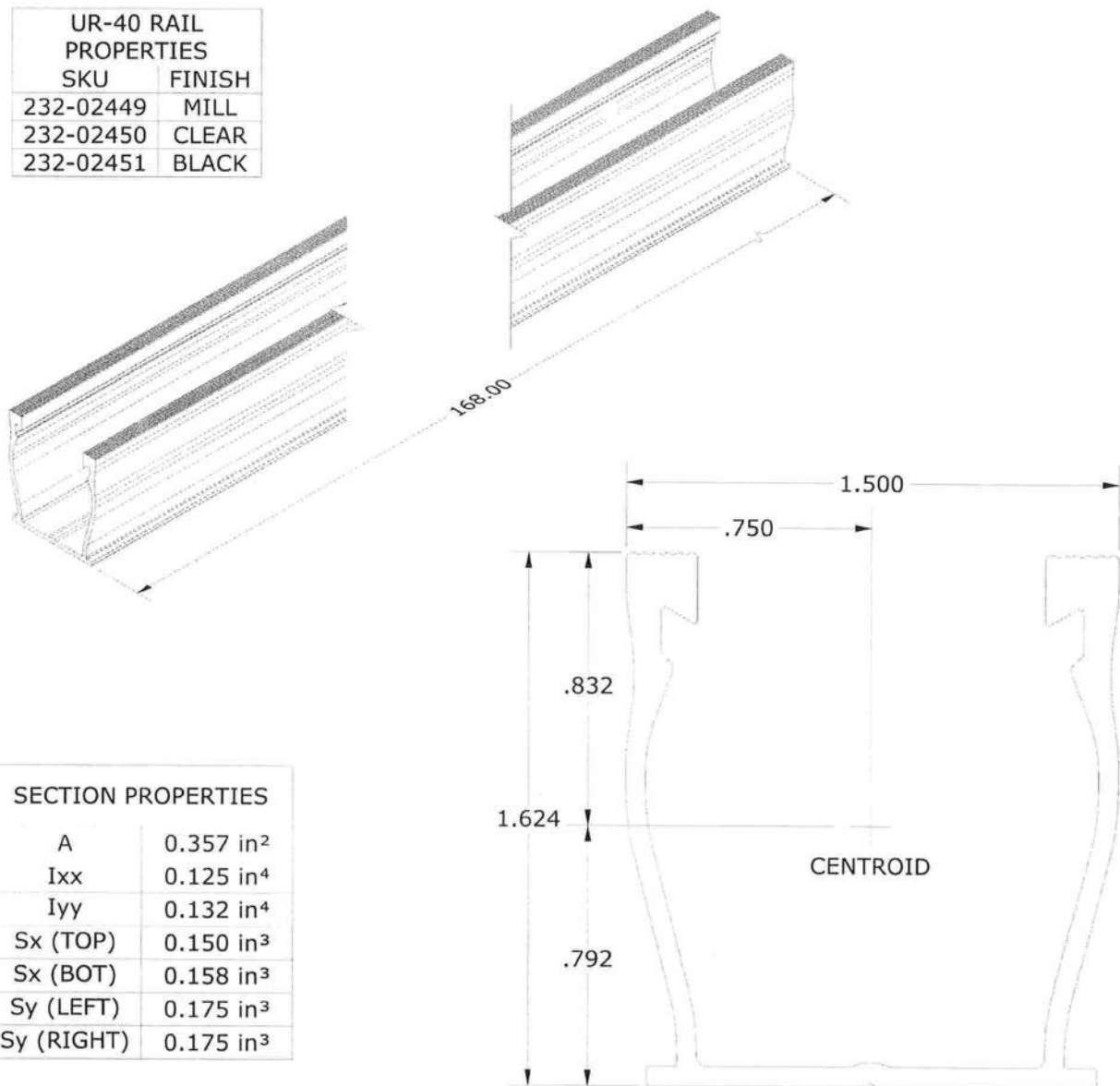
595 MARKET STREET, 29TH FLOOR • SAN FRANCISCO, CA 94105 USA
PHONE (415) 580-6900 • FAX (415) 580-6902

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PART NUMBER(S):

232-02449, 232-02450, 232-02451

UR-40 RAIL PROPERTIES	
SKU	FINISH
232-02449	MILL
232-02450	CLEAR
232-02451	BLACK



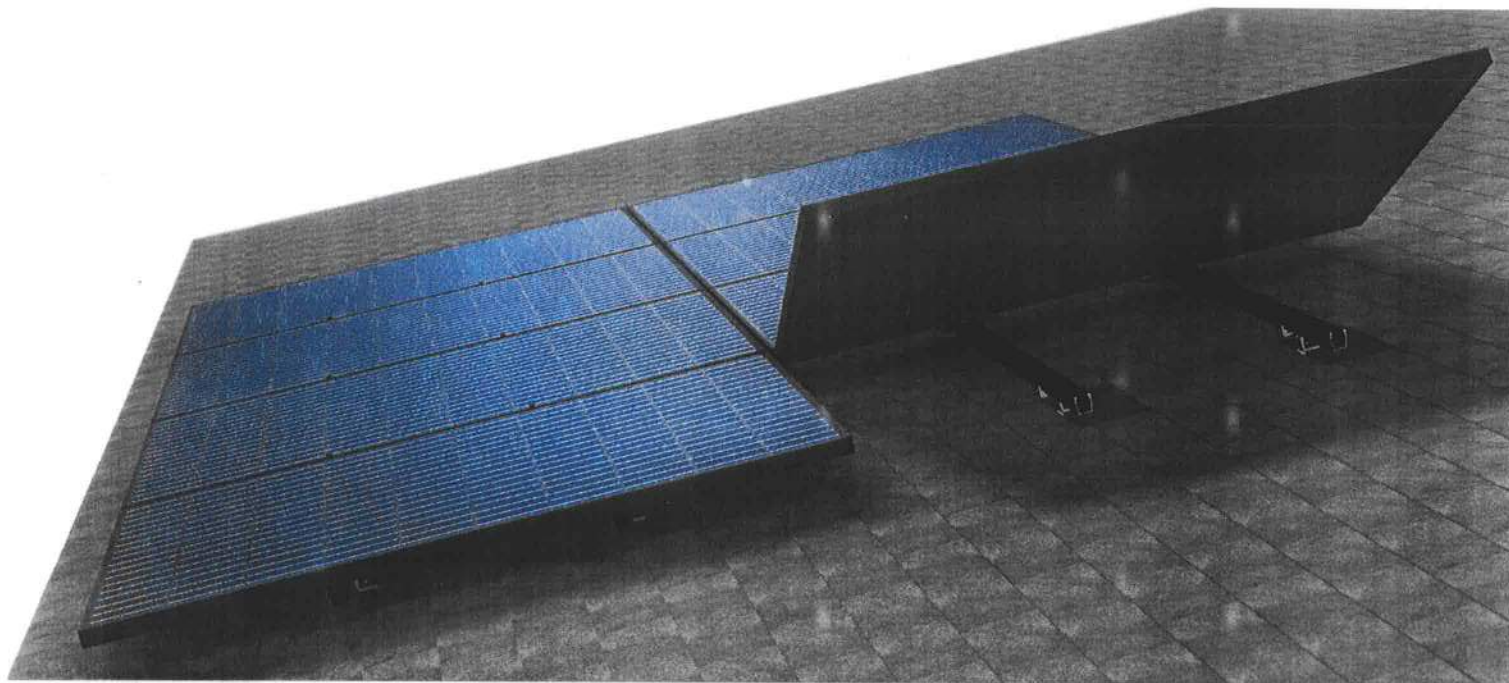
SECTION PROPERTIES

A	0.357 in ²
I _{xx}	0.125 in ⁴
I _{yy}	0.132 in ⁴
S _x (TOP)	0.150 in ³
S _x (BOT)	0.158 in ³
S _y (LEFT)	0.175 in ³
S _y (RIGHT)	0.175 in ³

ALL DIMENSIONS IN INCHES

MATERIALS:	6000 SERIES ALUMINUM	OPTIONS:
DESIGN LOAD (LBS):	N/A	CLEAR / BLACK ANODIZED
ULTIMATE LOAD (LBS):	N/A	MILL FINISH
TORQUE SPECIFICATION:	N/A LB-FT	BUNDLES OF 144
CERTIFICATION:	UL 2703, FILE E359313	BOXES OF 8
WEIGHT (LBS):	5.85	

Ultra Rail



The Ultimate Value in Rooftop Solar



Industry leading Wire
Management Solutions



Mounts available for all
roof types



An install experience
unlike any other



Compatible with all
Series 100 Module
Clamps & Accessories

Start Installing Ultra Rail Today

RESOURCES
DESIGN
WHERE TO BUY

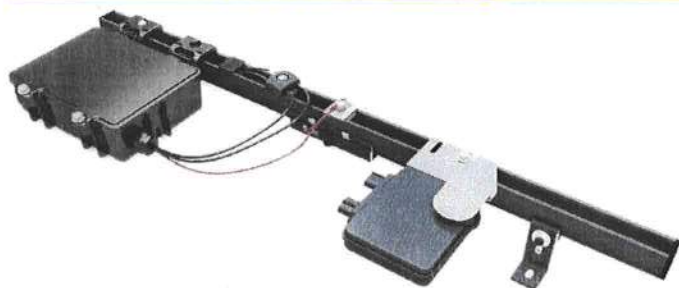
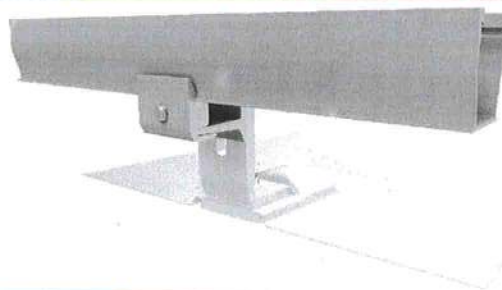
snapnrack.com/resources
snapnrack.com/configurator
snapnrack.com/where-to-buy

The SnapNrack Ultra Rail

is a sleek, lightweight rail solution for mounting solar modules on the roof.

The Entire System is a Snap to Install

- New Ultra Rail Mounts include snap-in brackets for attaching rail
- Compatible with all the SnapNrack Mid Clamps and End Clamps customers love
- Universal End Clamps and snap-in End Caps provide a clean look to the array edge



Unparalleled Wire Management

- Open rail channel provides room for running wires resulting in a long-lasting quality install
- Industry best wire management offering includes Junction Boxes, Universal Wire Clamps, MLPE Attachment Kits, and Conduit Clamps
- System is fully bonded and listed to UL 2703 Standard

The Largest Span Capabilities of any Light Rail Solution

This table was prepared in compliance with applicable engineering codes and standards. Values are based on the following:

- ASCE 7-10
- Chapter 30 Wind Loads & Chapter 7 Snow Loads
- Roof Slope: 7 - 27 deg
- Roof Height: 0 - 30 ft
- Exposure: B
- Roof Zone: 1
- Module Orientation: Portrait
- Roof Type: Comp

Visit SnapNrack.com for detailed span tables and certifications.

System Span Key	
6 ft Spans	
4 ft Spans	
2 ft Spans	

		Ultra Rail, UR-40 Rail System Spans															
		Wind (mph)															
Snow (psf)		110	115	120	125	130	135	140	145	150	155	160	165	170	175	180	190
	0																
	5																
	10																
	15																
	20																
	25																
	30																
	35																
	40																
	45																
	50																
	60																
	70																
	80																
	90																
	100																
	110																
	120																

Quality. Innovative. Superior.

SnapNrack Solar Mounting Solutions are engineered to optimize material use and labor resources and improve overall installation quality and safety.

877-732-2860

www.snapnrack.com

contact@snapnrack.com

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Cheetah HC 60M 325-345 Watt

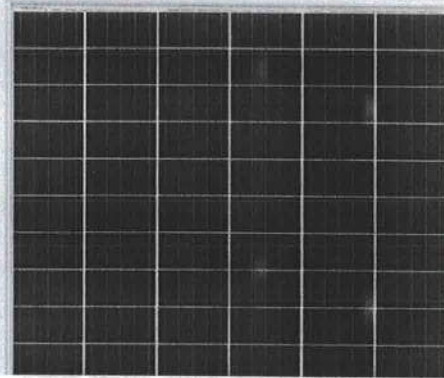
MONO PERC HALF CELL MODULE

Positive power tolerance of 0~+3%

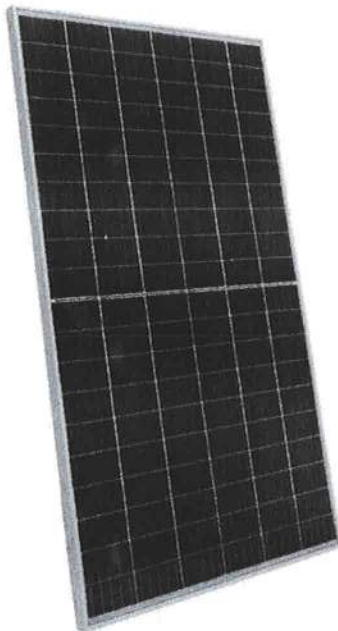
- Half Cell
- Mono PERC 60 Cell



PERC



KEY FEATURES



5 Busbar Solar Cell

5 busbar solar cell adopts new technology to improve the efficiency of modules, offers a better aesthetic appearance, making it perfect for rooftop installation.



High Efficiency

Higher module conversion efficiency (up to 20.45%) benefit from half cell structure (low resistance characteristic).



PID Resistance

Excellent Anti-PID performance guarantee limited power degradation for mass production.



Low-light Performance

Advanced glass and cell surface textured design ensure excellent performance in low-light environment.



Severe Weather Resilience

Certified to withstand: wind load (2400 Pascal) and snow load (5400 Pascal).



Durability Against Extreme Environmental Conditions

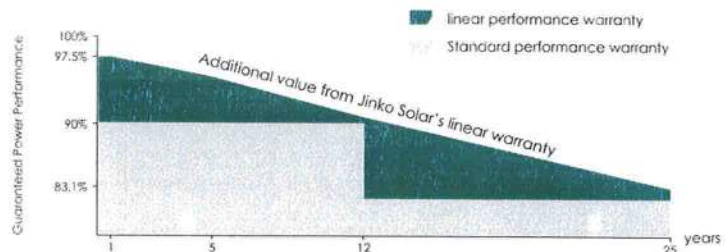
High salt mist and ammonia resistance certified by TUV NORD.

LINEAR PERFORMANCE WARRANTY

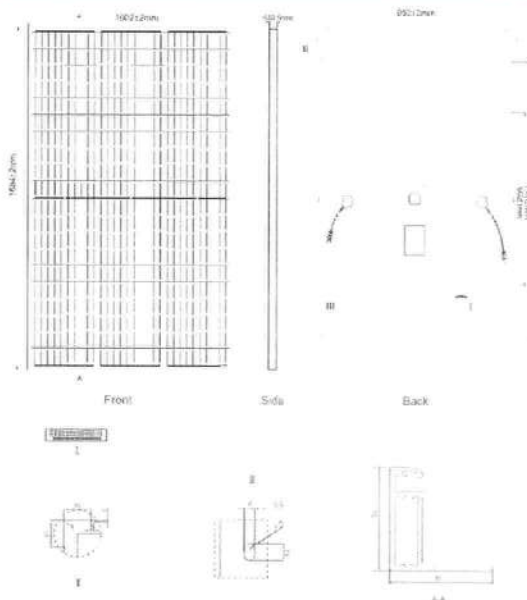
12 Year Product Warranty • 25 Year Linear Power Warranty



- ISO9001:2008, ISO14001:2004, OHSAS18001 certified factory
- IEC61215, IEC61730, UL1703 certified product



Engineering Drawings



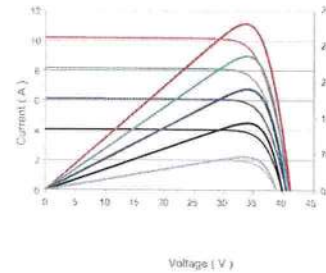
Packaging Configuration

(Two pallets = One stack)

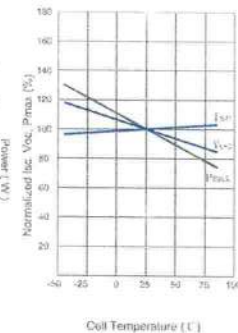
31pcs/pallet, 62pcs/stack, 806pcs/40'HQ Container

Electrical Performance & Temperature Dependence

Current-Voltage & Power-Voltage Curves (325W)



Temperature Dependence of Isc, Voc, Pmax



Mechanical Characteristics

Cell Type	Mono PERC 158.75×158.75mm
No. of Half-cells	120 (6×20)
Dimensions	1684×1002×35mm (66.30×39.45×1.38 inch)
Weight	19.0 kg (41.9 lbs)
Front Glass	3.2mm, Anti-Reflection Coating, High Transmission, Low Iron, Tempered Glass
Frame	Anodized Aluminium Alloy
Junction Box	IP67 Rated
Output Cables	TUV 1×4.0mm ² , (+) 290mm, (-) 145mm or Customized Length

SPECIFICATIONS

Module Type	JKM325M-60H		JKM330M-60H		JKM335M-60H		JKM340M-60H		JKM345M-60H	
	STC	NOCT	STC	NOCT	STC	NOCT	STC	NOCT	STC	NOCT
Maximum Power (Pmax)	325Wp	242Wp	330Wp	246Wp	335Wp	250Wp	340Wp	253Wp	345Wp	257Wp
Maximum Power Voltage (Vmp)	33.6V	31.6V	33.8V	31.8V	34.0V	32.0V	34.2V	32.2V	34.4V	32.4V
Maximum Power Current (Imp)	9.68A	7.66A	9.77A	7.74A	9.87A	7.82A	9.96A	7.86A	10.04A	7.94A
Open-circuit Voltage (Voc)	41.1V	38.0V	41.3V	38.2V	41.5V	38.4V	41.7V	38.6V	41.9V	38.8V
Short-circuit Current (Isc)	10.20A	8.54A	10.31A	8.65A	10.36A	8.74A	10.55A	8.86A	10.64A	8.97A
Module Efficiency STC (%)	19.26%		19.56%		19.85%		20.15%		20.45%	
Operating Temperature (°C)	-40°C~+85°C									
Maximum System Voltage	1000VDC (IEC)									
Maximum Series Fuse Rating	20A									
Power Tolerance	0~+3%									
Temperature Coefficients of Pmax	-0.36%/°C									
Temperature Coefficients of Voc	-0.28%/°C									
Temperature Coefficients of Isc	0.048%/°C									
Nominal Operating Cell Temperature (NOCT)	45±2°C									

STC: Irradiance 1000W/m² Cell Temperature 25°C AM=1.5

NOCT: Irradiance 800W/m² Ambient Temperature 20°C AM=1.5 Wind Speed 1m/s

* Power measurement tolerance: ± 3%

**Efficient**

- CEC efficiency of 94%
- State of charge calculation
- Intelligent battery management for maximum battery life
- Now supports external BMS and lithium-ion technology

Simple

- Easy commissioning with the "Quick Configuration Guide"
- Complete off-grid management
- Excellent for grid-tied battery back up
- Easy monitoring via ennexOS Portal

Durable

- Extreme overload capability
- OptiCool™ active temperature management system
- Now with 10-year standard warranty

Flexible

- For systems from 6 to 69 kW
- Single, split-phase and three-phase operation, connectable in parallel and modularly expandable
- AC and DC coupling
- Compatible with lithium ion battery systems

SUNNY ISLAND 6048-US

The proven micro-grid manager

The SMA Sunny Island 6048-US inverter is ideal for off-grid or battery backup operation, scaling up to 23 kW of split-phase continuous power. Easy integration of and robust control features for PV inverters and generators provide for optimal operation with or without grid support. High efficiency provides maximum production and support of external battery management systems provides additional battery flexibility. Usable in split-phase with 2 or 4 inverters (up to 23kW load) or in 208V Wye three-phase systems with 3 inverters (up to 17.3 kW load). Also ideal for larger three-phase loads using the Multicluseter Box US (3, 6, 9, or 12 inverters) for up to 69 kW individual loads.

Technical data

AC output (loads)

Rated grid voltage / AC voltage range
 Rated frequency / frequency range (adjustable)
 AC power (at 25 °C / at 40 °C) for 3 hours
 Rated power (@ U_{nom} / f_{nom} and 25 °C and $\cos \phi = 1$)
 AC power at 25 °C for 30 min / 1 min / 3 s
 Rated current / max. output current (peak)
 Total harmonic factor output voltage / power factor with rated power

AC input (Genset and/or grid)

Rated input voltage / AC input voltage range
 Rated input frequency / allowable input frequency range
 AC input current

Battery DC input

Rated input voltage / DC voltage range
 Max. battery charging current / DC rated charging current
 Battery type / battery capacity range
 External BMS compatible
 Charge control

Efficiency / self-consumption

Max. efficiency / CEC efficiency
 Self-consumption without load / standby

Protective devices

DC reverse polarity protection / DC fuse
 AC short-circuit / AC overload
 Overtemperature / battery deep discharge

General data

Dimensions (W / H / D)

Weight

Operating temperature range

Features / function

Operation and display / multi-function relay
 Degree of protection (according to IEC 60529)
 State of charge calculation / full charge / equalization charge
 Integrated soft start / generator support
 Battery temperature sensor / data cable
 Warranty
 Certificates and approvals

Sunny Island 6048-US

120 V/105 V - 132 V
 60 Hz/55 Hz ... 65 Hz
 6000 W/5000 W
 5750 W
 7000 W / 8400 W / 11000 W
 48 A/180 A for approx. 60 ms
 3 % / -1 ... +1

120 V/80 V - 150 V
 60 Hz/54 Hz ... 66 Hz
 Adjustable between 0 A - 56 A

48 V/41 V - 63 V
 130 A / 110 A
 Lead, NiCd, Li-ion / 100 Ah ... 10000 Ah
 Fully automatic charge control

25 W/4 W
 96 % / 94 %
 2 x (25 W/4 W)

• / •
 • / •
 • / •

467 / 612 / 235 mm
 18.4 / 24.1 / 9.3 inch
 63 kg / 139 lb
 -25 °C ... +60 °C / -13 °F ... +140 °F

Internal / 2
 Internal / 2 x 2

Indoors (NEMA 1)

• / • / •
 • / •
 • / •
 10 years

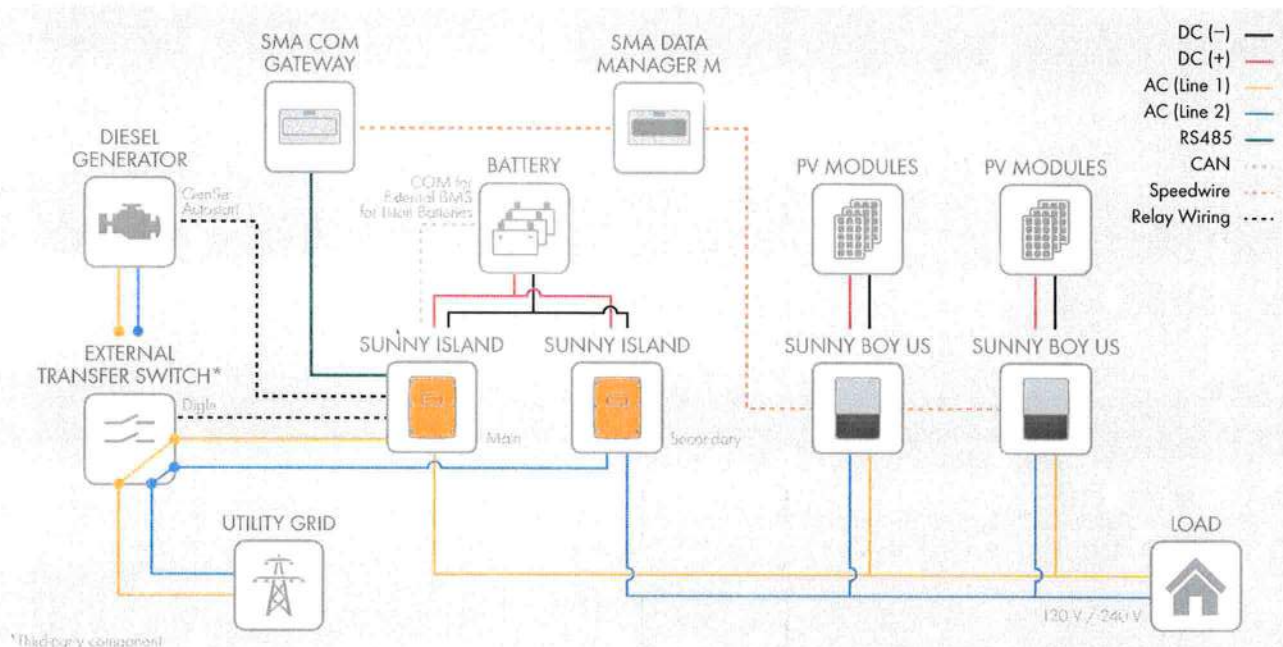
www.SMA-America.com

• Standard feature □ Optional feature — Not available

Type designation

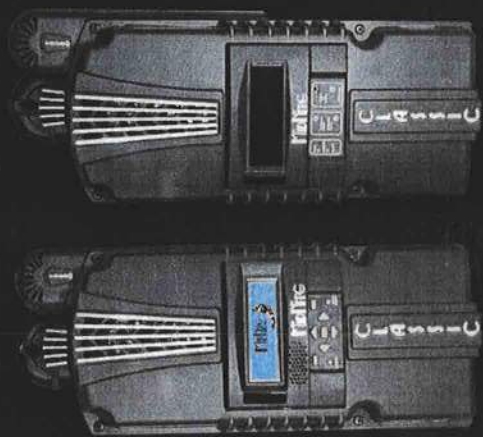
SI6048-US-10

2 x SI6048-US-10



Toll Free +1 888 4 SMA USA
 www.SMA-America.com

SMA America, LLC



CLASSIC MPPT CHARGE CONTROLLERS

The worlds most sophisticated MPPT charge controller

BAR NONE!!!



THE CLASSICS

The Classic line of MPPT charge controllers are one of the most powerful in the RE industry. The Classics substantially increases the flexibility, features and range currently found on MPPT controllers at an incredible price. With all Classics you receive reliability, functionality and an incredibly powerful MPPT charge controller.



CLASSIC 150, 200 & 250

FEATURES

- 150, 200, 250 Operating Voltage
- 12-72V battery charging standard
- DC-GFP and Arc Fault Protection
- Solar, Wind and Hydro modes
- Exclusive HyperVOC extends VOC limits
- Manual and Auto EQ
- Full Internet Capable

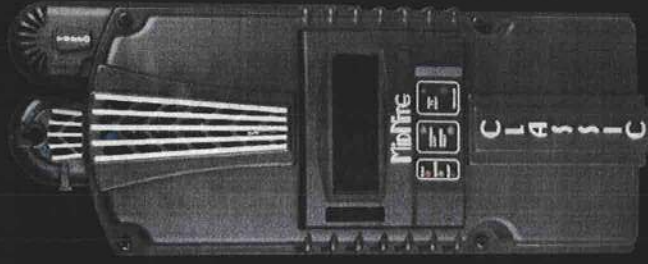
- Remote and local displays possible
- 380 days of daily history, 24 hours of data a 5 minute intervals
- Communications – Ethernet, Modbus and RS232
- Parallel operation for multiple Classic systems
- ETL listed for the USA and Canada
- Made in America



THE CLASSIC LITE

The Classic Lite line of MPPT charge controllers has all the power of the Classics have but at a reduced price. The Classic Lite, like the Classic, can charge from 12 to 72 volt batteries with output up to 96 amps. Why would you choose a lesser controller for your system?

All Classics have free upgradeable firmware, making sure these units never are out dated.



CLASSIC LITE 150, 200, 250 & 250KS

FEATURES

- 150, 200 & 250 Operating Voltage
- Dip switch programming
- 12-72V battery charging standard
- Solar, Wind and Hydro modes
- Exclusive HyperVOC extends VOC limits
- Manual and Auto EQ
- Full Internet Capable



- Works with the Classic MNGP remote display
- LED indicators for charge state (Bulk, Absorb and Float)
- 380 days of daily history, 24 hours of data a 5 minute intervals
- Communications – Ethernet, Modbus and RS232
- Parallel operation for multiple Classic systems
- ETL listed for the USA and Canada
- Made in America

SOLAR, WIND & HYDRO

All Classics are Solar, Wind and Hydro capable. The Classic has several different tracking algorithms. This allows it to work with Solar, Wind and Hydro. Each mode is fully adjustable to allow the user to fine tune to their input source.



SOLAR, WIND & HYDRO



ETHERNET MODBUS & RS232

The Classic uses a published Modbus Protocol allowing users to interface with the Classic. Modbus allows you to tailor your own software to communicate with your Classic.



COMMUNICATIONS

MidNite also offers software for communicating with the Classic.



DC-GFP & ARC FAULT

The Classic's DC-GFP and Arc Fault capabilities are at the fore front of the industry saving you time, space and money. The Classic is the worlds only Arc Fault detecting controller and comes standard in all models except the Classic Lite.

Ground fault protection is a built-in feature on the Classic.



DC-GFP & ARC FAULT PROTECTION

The Classic is made to work in conjunction with our new GFP breaker assembly. Arc Fault detection is required by NEC code.



AUTO OR MANUAL EQ MODES

The Classic has 2 modes you can use to Equalize the battery in either manual or auto.

Auto EQ has a user adjustable interval between EQ charges as well as a "Days" function to retry if the EQ did not complete on the first day.



AUTO OR MANUAL EQ



CLASSIC LED MODES

The Classic has several LED indicators that can be programmed to display a variety of information.



LED MODES

- OFF : No LED activity
- Rick Mode: Displays errors only
- LED Mode1 - Aux 1 and 2 indicators: Displays errors and warnings as well as a Float indicator
- Blinky Mode: LEDs cycle around in a loop (good for discos and parties)



UPGRADEABLE FIRMWARE

All Classics have free upgradeable firmware, making sure these units never are out dated.

The Classic's built in USB port allows the user to upload firmware updates. USB cable included.



FIRMWARE UPDATES

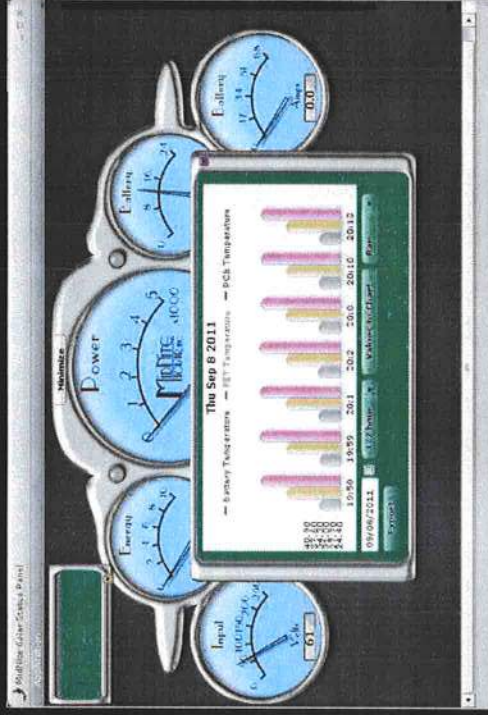
New features are easily added to the Classics in the field by doing a simple firmware upgrade. Firmware upgrades will always be available on our website for no cost to every Classic owner for life.



MONITORING YOU CLASSICS

Graphs and data are displayed on your PC using the "Local App".

Graphs can be displayed by Line, Bar, Round and Sketch.



LOCAL APP

VALUES THAT CAN BE CHARTED

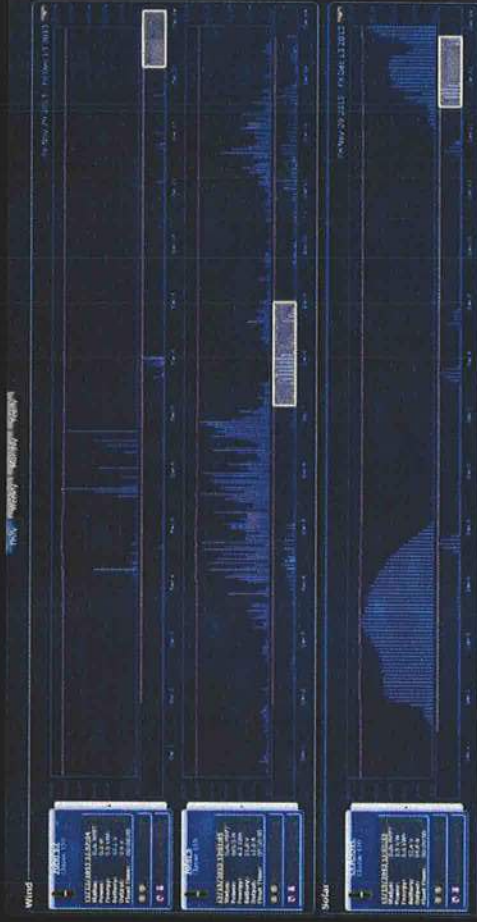
- Battery Voltage
- kWh
- Total kWh
- FET Temperature
- Input Voltages
- Watts
- Total Amp Hours

- PCB Temperature
- Battery Current
- Input Current
- Battery Temperature



INTERNET MONITORING

My MidNite is a free web based monitoring solution that MidNite Solar offers to its customers. It allows you to monitor your charge controller from anywhere you have Internet access. You simply plug the Classic into the Internet, go to My MidNite and register for an account.



MYMIDNITE.COM

My MidNite allows you to chart values, download data and much more. In the very near future My MidNite will allow for email and SMS alerts and system status reports. It will also allow for guest accounts as well as installer accounts.



ALL THE DATA

All Classics log 380 days of data in its daily logs.



DATA LOGGING AND GRAPHING

The Classic and Classic lite log data every 5 minutes in its Recent logs. The Classics also have graphing capabilities on screen as well.



Auxiliary 1 and 2.

Auxiliary 1 can be configured as a 12VDC signal out or as a relay contact. Auxiliary 2 can be used as an output or as an input.

Auxiliaries can be used as On/Off signals or PWM signals.



AUXILIARY OUTPUTS

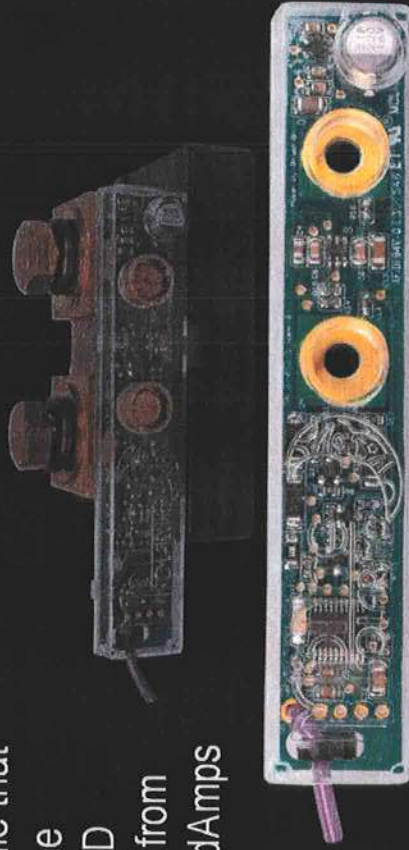
AUXILIARY FUNCTIONS AVAILABLE

- Vent Fan low and Vent Fan high
- Float low and Float high
- Clipper Control
- Day Light
- Nite Light
- Toggle Test
- PV Voltage on low
- PV Voltage on high
- Waste Not low
- Waste Not high
- Low battery disconnect
- Diversion



WHIZBANG JUNIOR

The Whizbang Junior is a current sense module that attaches to a standard 50mv / 500A Shunt. The Whizbang Junior wires into the Classic and KID charge controllers to give Amperage readings from the shunt. The Whizbang Junior allows for EndAmps to function based on system amps or Classic amps.

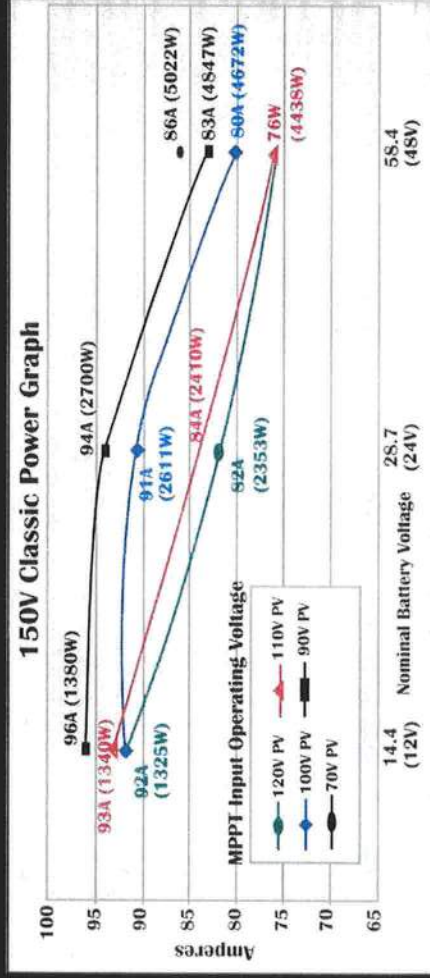


BATTERY MONITORING

For our customers that already own similar products, the Whizbang Junior has been designed for cooperative attachment.



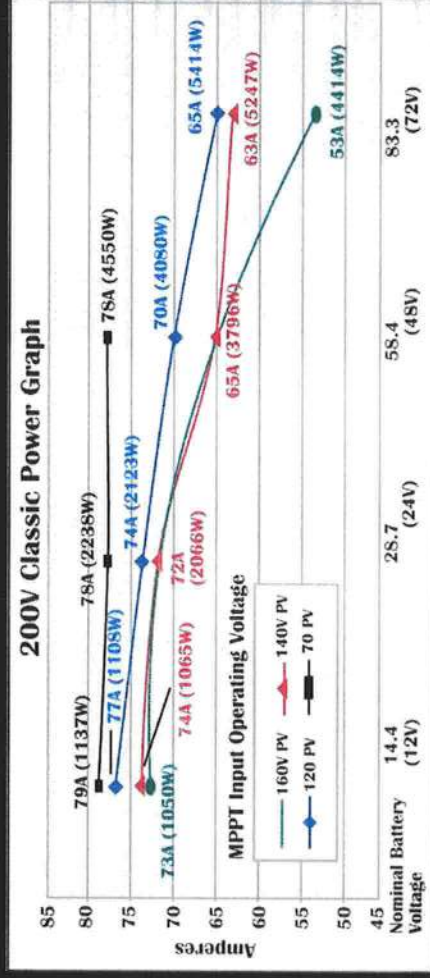
Classic 150 & Classic Lite 150 Power Graph



150 POWER GRAPH

The Power Graphs on this slide and the following display the relation between input voltage, battery voltage and output current. Using and understanding these graphs will help when designing the most efficient system and choosing the correct Classic for the task at hand.

Classic 200 & Classic Lite 200 Power Graph

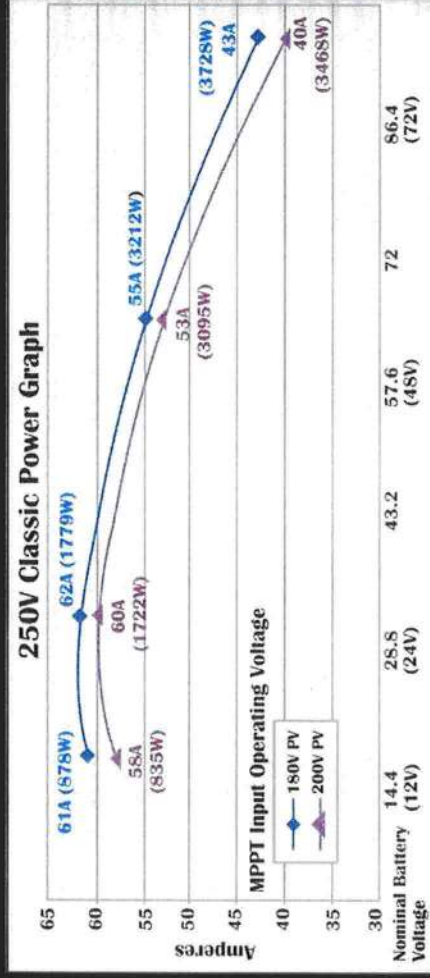


200 POWER GRAPH

These graphs display efficiency differences between lower input voltages compared to higher levels along with the balance between wire length and input voltage.



Classic 250 & Classic Lite 250 Power Graph



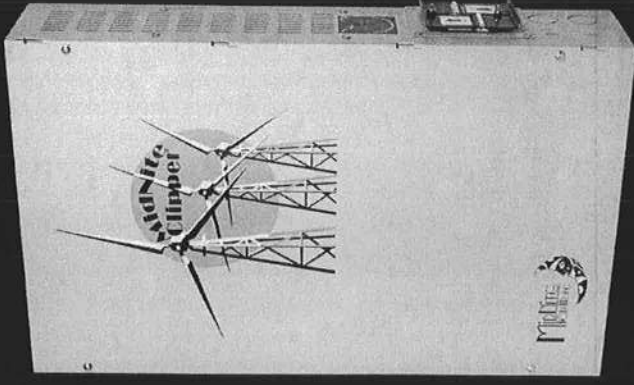
250 POWER GRAPH

For example, typically a 0 – 150ft wire run from an array will require the Classic 150. For a 150-250ft length the Classic 200 should be used and over 250ft the Classic 250 is the optimal choice.



The MidNite Clipper will reduce wear, tear and noise on your turbine.

The MidNite Clipper was designed to work in conjunction with the Classic MPPT controller to offer safe and reliable control of your turbine may it be wind or hydro.



MIDNITE CLIPPER

The Clipper assures safe operating voltages for the Classic as well as keeping the turbine loaded so it will not free wheel.

The Clipper allows 3 stage charging and will reduce wear and tear on your turbine.



The Classic String Sizing Tool helps design the array.



PRINT RESULTS

PV Array

Rated PV Array Power: 3520 Watts

Adjusted Array Power @ 40C: 3282 Watts

Rated PV Array Current: 31.45 Amps

Battery Charging Current @ 57.6 V: 91.1 Amps

VMP (Maximum Power Point Voltage): 122.4 Volts

VOC (Open Circuit Voltage): 150.4 Volts

VMP @ -30 C*: 152.8 Volts

VOC @ -30 C*: 177.6 Volts

Charge Controller Selection

Classic1500 Lite Classic2000 Lite Classic2500Ks

Max Operating Voltage: 150 200 250

Max Non Operating VOC (HyperVOC) @ 48V Nominal Battery Voltage: 198 243 298

Maximum Number Of Modules In Series: 3 4 5

Max Number Of Modules In Series (Using HyperVOC): 4 5 6

Max Allowable Output Current Per Classic Based On This Current Configuration: 76 65 55

Max Allowable Voltage Per Classic Based On This Current Configuration: 44.28 37.66 32.12

Present PV Array Voltage Of This Configuration: 3520 3520 3520

Design Check

Max VOC: MARGINAL OK OK

Temperature The Classic Will Enter HyperVOC: ALWAYS -75 C* -178 C* -178 C*

Array Power (watts): OK OK EXCESSIVE

Chapters Required: 0.8 1 1.1

NOTE: MidNite Solar recommends a second controller be added after 1.2 chapters are required. This tool uses data provided by other parties such as PV module labels and makes calculations based on assumptions which may or may not prove to be valid.

[Create PDF](#)

Submit Parameters

Environmental Data

Coldest Ambient Temp C*: -30

Hottest Ambient Temp C*: 40

Nominal Battery Voltage (Volts): 48

PV Array

Number Of Modules In Series: 4

Number Of Parallel Strings: 4

Total Modules: 16

[Reset](#)

Temperature

PV Module Data (STC) (If you do not have this data, use the default values)

Power (Watts): 220

VOC (Open Circuit Voltage): 37.6

VMP (Maximum Power Point Voltage): 30.6

ISC (Short Circuit Amperage): 8.22

IAP (Maximum Power Point Amperage): 7.37

VOC Temperature Coefficient C* (Default is -0.33%): -0.33

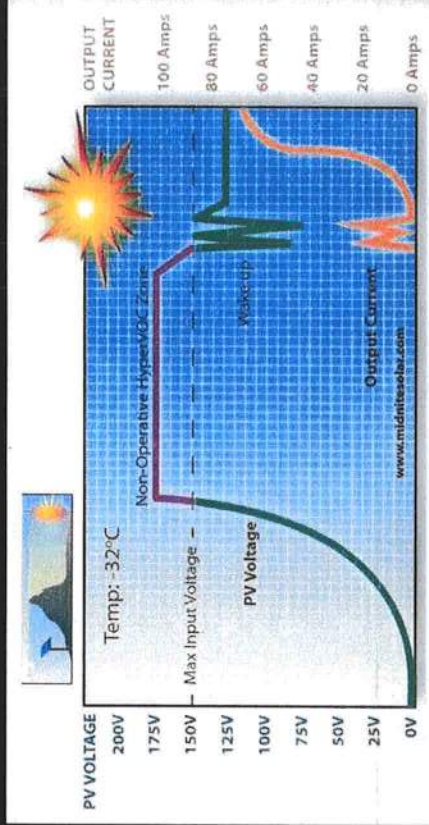
VMP Temperature Coefficient C* (Default is -0.45%): -0.45

CLASSIC STRING SIZING TOOL

The string sizing tool determines the best Classic model to use and the number Classics needed. It can be found on MidNite's website.



HyperVOC, a non-operative VOC safety zone over and above the maximum input voltage.



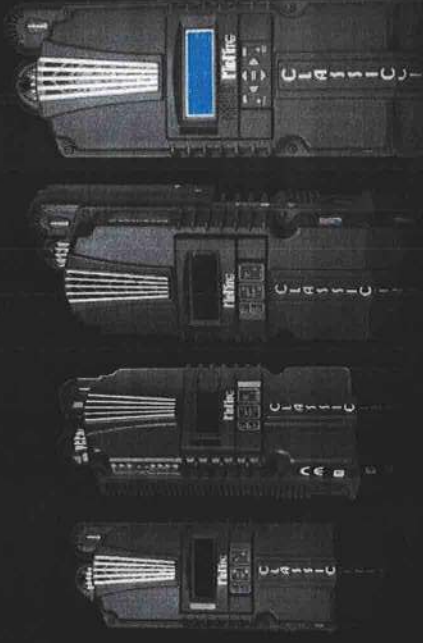
CLASSIC & CLASSIC LITE HYPERVOC

On cold mornings the PV panels will put out full voltage even before you can see the sun. Ambient light may not have much current behind it but it does have voltage exceeding the possible voltage limits that destroy the controller. The MidNite Solar controller gives you bonus headroom for those cold mornings that would potentially destroy any other controller.



Follow me allows Classics to talk to each other.

"Follow Me" allows the Classics to share charge stages, as well as battery temperature info and Ground Fault coordination. "Follow Me" also allows you to program a single Classic for Equalize charging and it will instruct all the others to Equalize as well.



CLASSIC FOLLOW ME

Any system with 2 or more charge controllers must have a coordinated charge or the batteries could be destroyed.





Charge Controller Comparison Chart

CLASSIC MPPT CHARGE CONTROLLER COMPARISON CHART						
Manufacturer	MidNite	OutBack	Blue Sky	Xantrex	Morningstar	Apollo
Model	Classic 150	FM60	3048DL	XVMPPPT60	TSMPPT60	TS80
Rated Amps	80 - 96	60	30	60	60	80
Max Operating Voltage	150	145	112	140	150	112
Max VOC	¹ 162, 175, 200	150	140	150	150	200
Max Battery Voltage	72	60	48	60	72	48
Solar	•	•	•	•	•	•
Wind	•	•	•	•	•	•
Hydro	•	•	•	•	•	•
List Price With Display	\$850	\$749	\$649	\$685	\$793	\$849
Cost Per Amp With Display	\$10.63	\$12.48	\$21.63	\$11.42	\$13.22	\$10.61
Digital Display	•	•	•	•	Option	•
Internet Ready	•	\$595 Option	•	•	•	\$398 Option
Ground Fault Detector	•	•	•	•	•	•
Arc Fault Detector	•	•	•	•	•	•
Wizard Setup	•	•	•	•	•	•
Graphical Display	•	•	•	•	•	•
Free User Upgradable Firmware	•	•	•	•	•	•
Multiple Display Support	² MNGP	⁴ MATE	⁴ MATE	XW-SCP	TS-RM-2	⁵ RD-Wired
Aux Output	2	1	1	1	1	2
Aux Input	1	•	•	•	•	•
Sealed Or Vented Configurable	•	•	•	•	•	•
Warranty (Years)	5	5	5	5	5	5
Oscilloscope Display	•	•	•	•	•	•
Battery Status Meter	•	•	•	•	•	•
Substantially Made In USA	•	?	?	?	•	•
Voice	•	•	•	•	•	•
Partial Shading Indicator	•	•	•	•	•	•
Sunrise/Sunset Map Of World	•	•	•	•	•	•
Bonus Amps Based On Voltage	•	•	•	•	•	•
ModBus Communications	•	•	•	•	•	•
External Shunt Input	•	•	•	•	•	•
HyperVOC Extended VOC Limit	•	•	•	•	•	•

¹ The Classic comes in four models, 150, 200, 250, and 250KS.

² This number is based on the max operating voltage of the unit plus nominal battery voltage.

³ The Classic MNGP display and/or a secondary display can monitor many controllers.

⁴ The MNGP display can be removed from the Classic and used remotely.

⁵ If more than one controller is used you must also add a hub 4 or hub 10.

⁶ Wireless, remote and internet available with additional purchases.

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 5 If more than one controller is used you must also add a hub 4 or hub 10.
 6 Wireless remote and Internet available with additional purchases

COMPARISONS



Classic & Classic Lite Comparison Chart

MIDNITE SOLAR'S STANDARD CLASSIC AND CLASSIC LITE COMPARISON CHART - Jan 01, 2014									
Model	Standard Classic			Classic Lite					
	150	200	250	150	200	250	150	200	250
Rated Amps	80-96	65-74	55-60	80-96	65-74	55-60	80-96	65-74	55-60
Max Operating Voltage	150	200	250	150	200	250	150	200	250
Max VOC ¹	198	248	298	198	248	298	198	248	298
Max Battery Voltage	72	72	72	72	72	72	72	72	72
Solar	•	•	•	•	•	•	•	•	•
Wind	•	•	•	•	•	•	•	•	•
Hydro	•	•	•	•	•	•	•	•	•
List Price	\$650	\$850	\$950	\$700	\$700	\$800	\$700	\$700	\$800
Cost Per Watt - 48 Nominal Battery V	\$0.19	\$0.22	\$0.30	\$0.16	\$0.18	\$0.25	\$0.16	\$0.18	\$0.25
Internet and Ethernet Ready ²	•	•	•	•	•	•	•	•	•
Ground Fault Detector	•	•	•	•	•	•	•	•	•
Arc Fault Detector	•	•	•	•	•	•	•	•	•
Graphical Display	•	•	•	•	•	•	•	•	•
Free User Upgradable Firmware	•	•	•	•	•	•	•	•	•
MNGP Multiple Display Support ³	•	•	•	•	•	•	•	•	•
Aux Output	2	2	2	2	2	2	2	2	2
Five Year Warranty	•	•	•	•	•	•	•	•	•
Oscilloscope Display	•	•	•	•	•	•	•	•	•
DIP Switches For Programming	•	•	•	•	•	•	•	•	•
Substantially Made in USA	•	•	•	•	•	•	•	•	•
Partial Shading Indicator ²	•	•	•	•	•	•	•	•	•
Bonus Amps Based On Voltage	•	•	•	•	•	•	•	•	•
ModBus Communications	•	•	•	•	•	•	•	•	•
HyperVOC Extended VOC Limit	•	•	•	•	•	•	•	•	•
Free PC & Internet Software	•	•	•	•	•	•	•	•	•
380 Days Data Logging ²	•	•	•	•	•	•	•	•	•
8 Built In Data Logging Params	•	•	•	•	•	•	•	•	•
11 Software Data Logging Params ²	•	•	•	•	•	•	•	•	•
Graphing Capabilities ²	•	•	•	•	•	•	•	•	•

¹ This number is based on the max operating voltage (MOV) of the unit plus nominal battery voltage (NBV) up to 48v. The difference between MOV and NBV = MOV is the HyperVOC Extended VOC range.
² With PC and provided software.
³ The Classic MNGP display and/or a secondary display can monitor many controllers. The MNGP display can be removed from the Classic and used remotely.

CLASSIC & CLASSIC LITE COMPARISONS

MidNite Solar Support

MidNite has superior tech support with contact information at www.midnitesolar.com. If you call you will talk to a real person.

There are videos, webinars and a variety of help documents in the "Documents" section of the website as well.

TECH SUPPORT

The Forum has many vital discussion topics that can help with your questions. Check it out on MidNite's website.

The screenshot shows the MidNite Solar Forum homepage. At the top, there's a navigation bar with the MidNite Solar logo, a search bar, and a 'Home' link. Below the navigation bar, there's a section for 'The MidNite Solar Forum' with a welcome message and a 'Login' button. The main content area is titled 'General Category' and lists several forum topics with their respective post counts and last post dates. The topics include: 'General FAQ's', 'Online Training sessions', 'MidNite Solar Power Tips', 'MidNite Solar Product Line', 'General Discussion', 'New Product Ideas and Discussion', and 'System Design and Layout'. Each topic has a corresponding icon and a brief description.

Topic	Posts	Last Post
General FAQ's	30 Posts	Last post by Technician on November 11, 2013, 09:34:23 AM
Online Training sessions	7 Topics	Last post by Technician on November 11, 2013, 09:34:23 AM
MidNite Solar Power Tips	24 Posts	Last post by Technician on November 11, 2013, 09:34:23 AM
MidNite Solar Product Line	1 Topics	Last post by Technician on November 11, 2013, 09:34:23 AM
General Discussion	15 Topics	Last post by Technician on November 11, 2013, 09:34:23 AM
New Product Ideas and Discussion	977 Posts	Last post by Technician on November 11, 2013, 09:34:23 AM
System Design and Layout	205 Posts	Last post by Technician on November 11, 2013, 09:34:23 AM



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