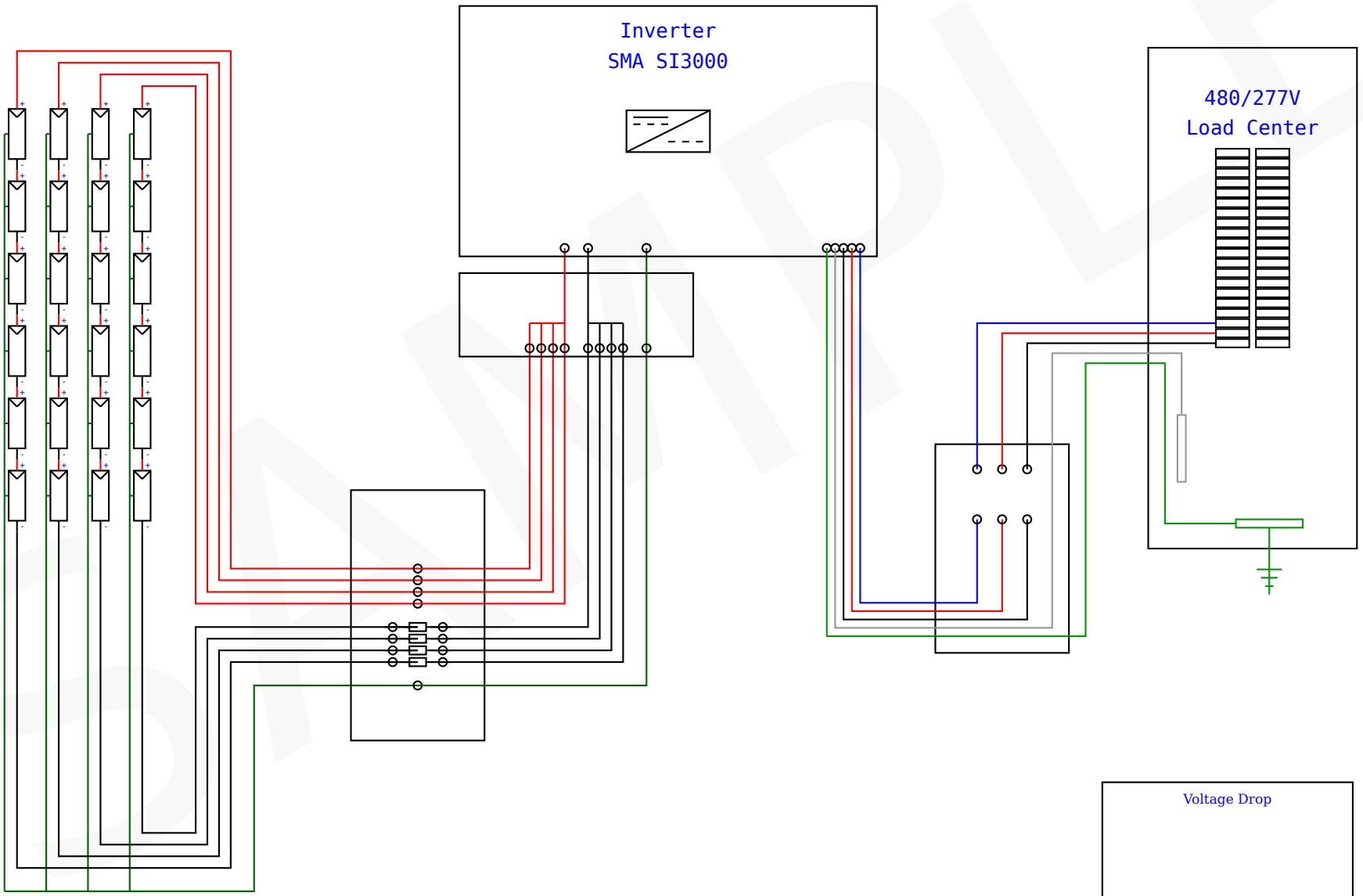
PV System Design

1679 Clearlake Road
Cocoa, Brevard, FL, 32922

Contents

General Notes

		Wire		Conduit	
		AWG	Type	Size	Type
1	Ground				
2	Neutral				
3	L1				
4	L2				
5	L3				



Voltage Drop

PV System Design
1679 Clearlake Road
Cocoa, Brevard, FL, 32922

PV
01

Location

County	Brevard
Address	1679 Clearlake Road
City	Cocoa
Zip	32922.00

Roof

Width	60.00
Length	25.00
Slope	6:12
Type	Gable
Height	11.18

Module

Make	Suniva
Model	255-60-4-1B0
Orientation	Portrait
Pmp	255.00
Isc	8.96
Voc	38.10
Imp	8.45
Vmp	30.20
Width	30.42
Length	60.42

Array

Modules Per String	6.00
Num Strings	4.00
Isc	35.84
Voc	228.60
Imp	33.80
Vmp	181.20
Pmp	6124.56
Number Of Modules	24.00

DC

Home Run Length	50.00
Wire Size	-Undefined-

Inverter

Make	SMA
Model	SI3000
Location	Inside

AC

Loadcenter Types	480/277V
Type	480V Wye
Distance To Loadcenter	50.00
Conductors	ground,neutral,L1,L2,L3
Num Conductors	5.00
Wire Size	-Undefined-

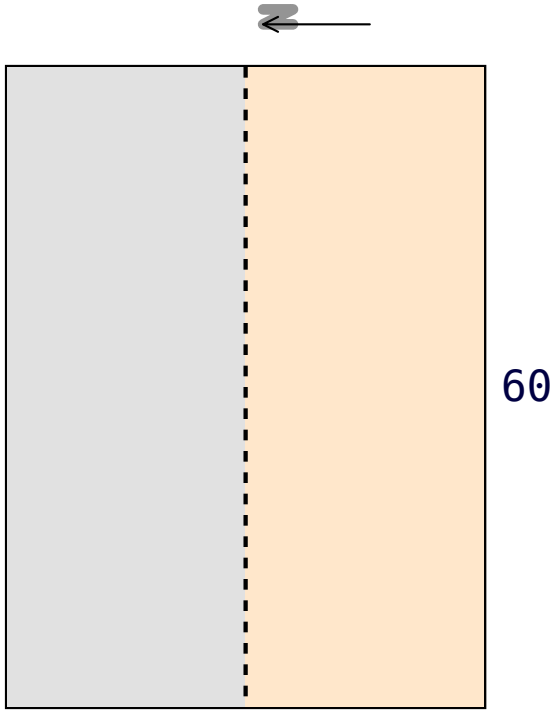
Attachment System

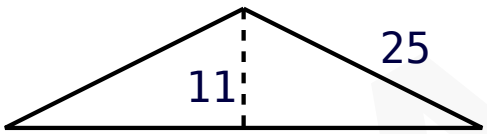
Make	UNIRAC
Model	SOLARMOUNT

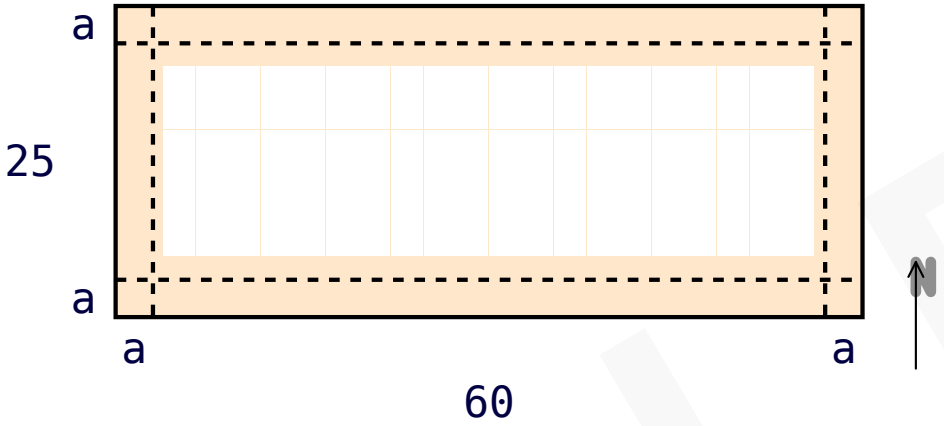
Calculation Sheet

PV System Design
1679 Clearlake Road
Cocoa, Brevard, FL, 32922

PV
02







Selected modules: 0

Calculated modules: 24

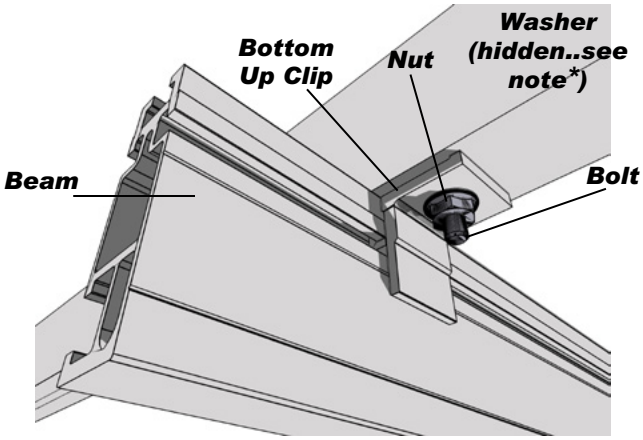
PV System Design
1679 Clearlake Road
Cocoa, Brevard, FL, 32922

SOLARMOUNT Technical Datasheet

Pub 130817

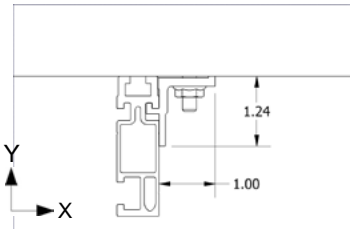
SOLARMOUNT Module Connection Hardware

SOLARMOUNT Bottom Up Module Clip
Part No. 302000C



- **Bottom Up Clip material:** One of the following extruded aluminum alloys: 6005-T5, 6105-T5, 6061-T6
- **Ultimate tensile:** 38ksi, Yield: 35 ksi
- **Finish:** Clear Anodized
- **Bottom Up Clip weight:** ~0.031 lbs (14g)
- Allowable and design loads are valid when components are assembled with SOLARMOUNT series beams according to authorized UNIRAC documents
- Assemble with one ¼"-20 ASTM F593 bolt, one ¼"-20 ASTM F594 serrated flange nut, and one ¼" flat washer
- Use anti-seize and tighten to 10 ft-lbs of torque
- Resistance factors and safety factors are determined according to part 1 section 9 of the 2005 Aluminum Design Manual and third-party test results from an IAS accredited laboratory
- Module edge must be fully supported by the beam

* **NOTE ON WASHER:** Install washer on bolt head side of assembly. **DO NOT** install washer under serrated flange nut

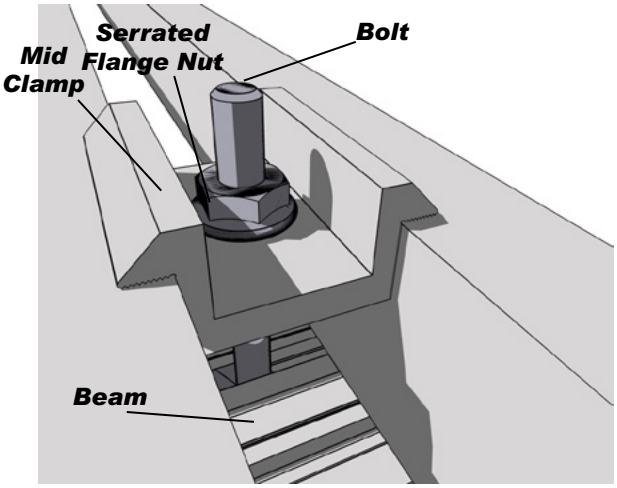


Applied Load Direction	Average Ultimate lbs (N)	Allowable Load lbs (N)	Safety Factor, FS	Design Load lbs (N)	Resistance Factor, Φ
Tension, Y+	1566 (6967)	686 (3052)	2.28	1038 (4615)	0.662
Transverse, X±	1128 (5019)	329 (1463)	3.43	497 (2213)	0.441
Sliding, Z±	66 (292)	27 (119)	2.44	41 (181)	0.619

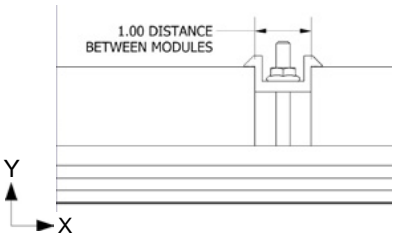
Dimensions specified in inches unless noted

SOLARMOUNT Mid Clamp

Part No. 302101C, 302101D, 302103C, 302104D, 302105D, 302106D



- **Mid clamp material:** One of the following extruded aluminum alloys: 6005-T5, 6105-T5, 6061-T6
- **Ultimate tensile:** 38ksi, Yield: 35 ksi
- **Finish:** Clear or Dark Anodized
- **Mid clamp weight:** 0.050 lbs (23g)
- Allowable and design loads are valid when components are assembled according to authorized UNIRAC documents
- Values represent the allowable and design load capacity of a single mid clamp assembly when used with a SOLARMOUNT series beam to retain a module in the direction indicated
- Assemble mid clamp with one Unirac ¼”-20 T-bolt and one ¼”-20 ASTM F594 serrated flange nut
- Use anti-seize and tighten to 10 ft-lbs of torque
- Resistance factors and safety factors are determined according to part 1 section 9 of the 2005 Aluminum Design Manual and third-party test results from an IAS accredited laboratory

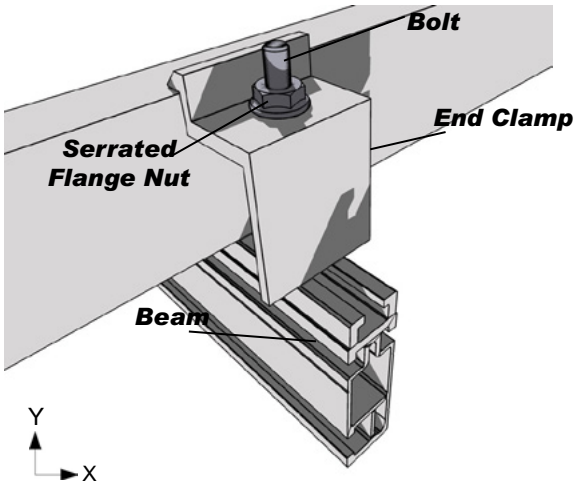


Applied Load Direction	Average Ultimate lbs (N)	Allowable Load lbs (N)	Safety Factor, FS	Design Load lbs (N)	Resistance Factor, Φ
Tension, Y+	2020 (8987)	891 (3963)	2.27	1348 (5994)	0.667
Transverse, Z±	520 (2313)	229 (1017)	2.27	346 (1539)	0.665
Sliding, X±	1194 (5312)	490 (2179)	2.44	741 (3295)	0.620

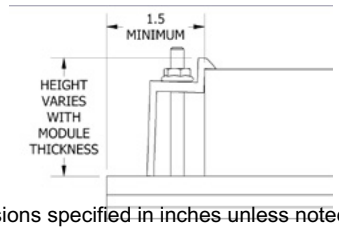
Dimensions specified in inches unless noted

SOLARMOUNT End Clamp

Part No. 302001C, 302002C, 302002D, 302003C, 302003D, 302004C, 302004D, 302005C, 302005D, 302006C, 302006D, 302007D, 302008C, 302008D, 302009C, 302009D, 302010C, 302011C, 302012C



- **End clamp material:** One of the following extruded aluminum alloys: 6005-T5, 6105-T5, 6061-T6
- **Ultimate tensile:** 38ksi, Yield: 35 ksi
- **Finish:** Clear or Dark Anodized
- **End clamp weight:** varies based on height: ~0.058 lbs (26g)
- Allowable and design loads are valid when components are assembled according to authorized UNIRAC documents
- Values represent the allowable and design load capacity of a single end clamp assembly when used with a SOLARMOUNT series beam to retain a module in the direction indicated
- Assemble with one Unirac ¼”-20 T-bolt and one ¼”-20 ASTM F594 serrated flange nut
- Use anti-seize and tighten to 10 ft-lbs of torque
- Resistance factors and safety factors are determined according to part 1 section 9 of the 2005 Aluminum Design Manual and third-party test results from an IAS accredited laboratory
- Modules must be installed at least 1.5 in from either end of a beam

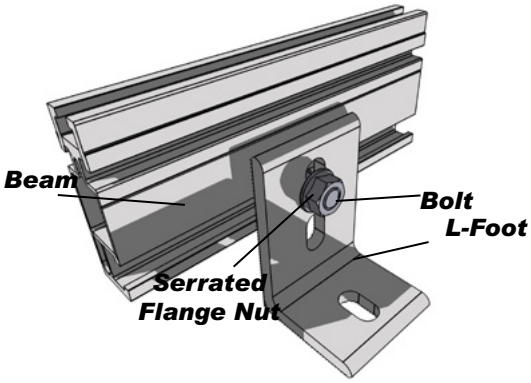


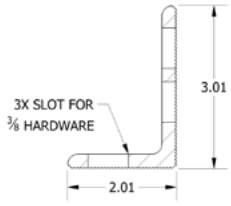
Applied Load Direction	Average Ultimate lbs (N)	Allowable Load lbs (N)	Safety Factor, FS	Design Loads lbs (N)	Resistance Factor, Φ
Tension, Y+	1321 (5876)	529 (2352)	2.50	800 (3557)	0.605
Transverse, Z±	63 (279)	14 (61)	4.58	21 (92)	0.330
Sliding, X±	142 (630)	52 (231)	2.72	79 (349)	0.555

Dimensions specified in inches unless noted

SOLARMOUNT Beam Connection Hardware

SOLARMOUNT L-Foot
Part No. 304000C, 304000D





Dimensions specified in inches unless noted

- **L-Foot material:** One of the following extruded aluminum alloys: 6005-T5, 6105-T5, 6061-T6
- **Ultimate tensile:** 38ksi, Yield: 35 ksi
- **Finish:** Clear or Dark Anodized
- **L-Foot weight:** 0.215 lbs (98g)
- Allowable and design loads are valid when components are assembled with SOLARMOUNT series beams according to authorized UNIRAC documents
- **For the beam to L-Foot connection:**
  - Assemble with one ASTM F593 ⅜"-16 hex head screw and one ASTM F594 ⅜"serrated flange nut
  - Use anti-seize and tighten to 30 ft-lbs of torque
- Resistance factors and safety factors are determined according to part 1 section 9 of the 2005 Aluminum Design Manual and third-party test results from an IAS accredited laboratory

NOTE: Loads are given for the L-Foot to beam connection only; be sure to check load limits for standoff, lag screw, or other attachment method

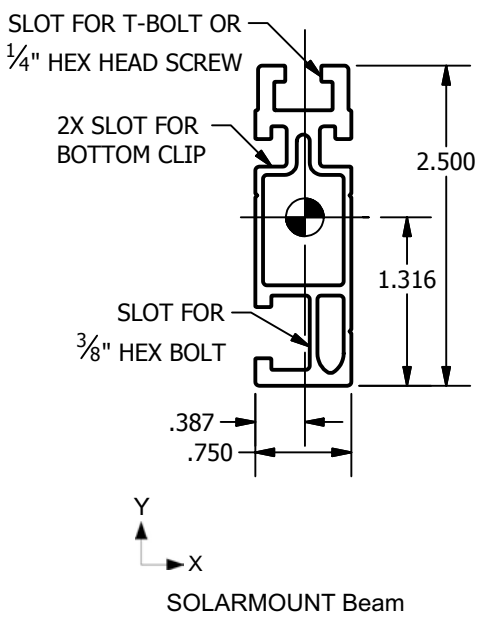
Applied Load Direction	Average Ultimate lbs (N)	Allowable Load lbs (N)	Safety Factor, FS	Design Load lbs (N)	Resistance Factor, Φ
Sliding, Z±	1766 (7856)	755 (3356)	2.34	1141 (5077)	0.646
Tension, Y+	1859 (8269)	707 (3144)	2.63	1069 (4755)	0.575
Compression, Y-	3258 (14492)	1325 (5893)	2.46	2004 (8913)	0.615
Traverse, X±	486 (2162)	213 (949)	2.28	323 (1436)	0.664

SOLARMOUNT Beams

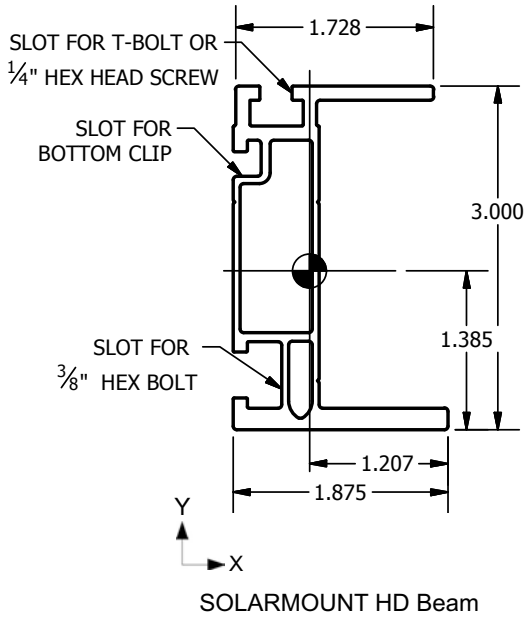
Part No. 310132C, 310132C-B, 310168C, 310168C-B, 310168D 310208C, 310208C-B, 310240C, 310240C-B, 310240D, 410144M, 410168M, 410204M, 410240M

Properties	Units	SOLARMOUNT	SOLARMOUNT HD
Beam Height	in	2.5	3.0
Approximate Weight (per linear ft)	plf	0.811	1.271
Total Cross Sectional Area	in^2	0.676	1.059
Section Modulus (X-Axis)	in^3	0.353	0.898
Section Modulus (Y-Axis)	in^3	0.113	0.221
Moment of Inertia (X-Axis)	in^4	0.464	1.450
Moment of Inertia (Y-Axis)	in^4	0.044	0.267
Radius of Gyration (X-Axis)	in	0.289	1.170
Radius of Gyration (Y-Axis)	in	0.254	0.502

** Rails are extruded using these aluminum alloys: 6005-T5, 6105-T5, 6061-T6*



SOLARMOUNT Beam



SOLARMOUNT HD Beam

Dimensions specified in inches unless noted

Sunmodule® Plus SW 270 mono

TUV Power controlled:
Lowest measuring tolerance in industry

Every component is tested to meet
3 times IEC requirements

Designed to withstand heavy
accumulations of snow and ice

Sunmodule Plus:
Positive performance tolerance

25-year linear performance warranty
and 10-year product warranty

Glass with anti-reflective coating

World-class quality
Fully-automated production lines and seamless monitoring of the process and material ensure the quality that the company sets as its benchmark for its sites worldwide.

SolarWorld Plus-Sorting
Plus-Sorting guarantees highest system efficiency. SolarWorld only delivers modules that have greater than or equal to the nameplate rated power.

25 years linear performance guarantee and extension of product warranty to 10 years
SolarWorld guarantees a maximum performance degression of 0.7% p.a. in the course of 25 years, a significant added value compared to the two-phase warranties common in the industry. In addition, SolarWorld is offering a product warranty, which has been extended to 10 years.*

*in accordance with the applicable SolarWorld Limited Warranty at purchase.
www.solarworld.com/warranty

• Qualified, IEC 61215
• Safety tested, IEC 61730
• Periodic Inspection
• Blowing sand resistant

• Ammonia resistance tested
• Periodic Inspection
• Power Controlled

PERFORMANCE TESTED
SALT MIST RESISTANT
PHOTOVOLTAIC PRODUCT

UL 1703

ISO 9001
ISO 14001
Certified

SOLARWORLD

We turn sunlight into power.

Sunmodule® Plus SW 270 mono

PERFORMANCE UNDER STANDARD TEST CONDITIONS (STC)*

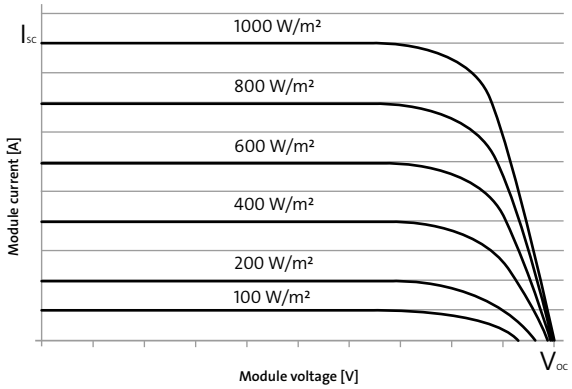
Maximum power	P_{max}	270 Wp
Open circuit voltage	V_{oc}	39.2 V
Maximum power point voltage	V_{mpp}	30.9 V
Short circuit current	I_{sc}	9.44 A
Maximum power point current	I_{mpp}	8.81 A

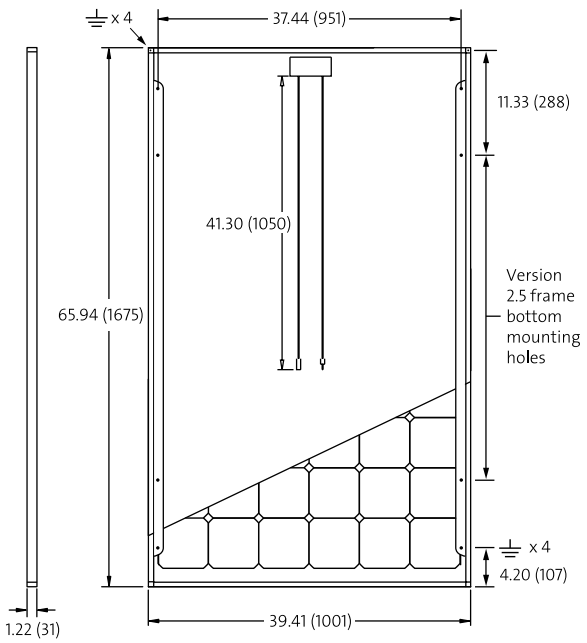
*STC: 1000 W/m², 25°C, AM 1.5

1) Measuring tolerance (P_{max}) traceable to TUV Rheinland: +/- 2% (TUV Power Controlled).

THERMAL CHARACTERISTICS

NOCT	46 °C
TC I_{sc}	0.04 %/°C
TC V_{oc}	-0.30 %/°C
TC P_{mpp}	-0.45 %/°C
Operating temperature	-40°C to 85°C





PERFORMANCE AT 800 W/m², NOCT, AM 1.5

Maximum power	P_{max}	201.3 Wp
Open circuit voltage	V_{oc}	35.9 V
Maximum power point voltage	V_{mpp}	28.3 V
Short circuit current	I_{sc}	7.63 A
Maximum power point current	I_{mpp}	7.12 A

Minor reduction in efficiency under partial load conditions at 25°C: at 200 W/m², 100% (+/-2%) of the STC efficiency (1000 W/m²) is achieved.

COMPONENT MATERIALS

Cells per module	60
Cell type	Mono crystalline
Cell dimensions	6.14 in x 6.14 in (156 mm x 156 mm)
Front	Tempered glass (EN 12150)
Frame	Clear anodized aluminum
Weight	46.7 lbs (21.2 kg)

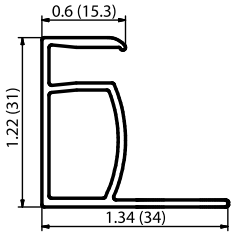
SYSTEM INTEGRATION PARAMETERS

Maximum system voltage SC II		1000 V
Max. system voltage USA NEC		1000 V
Maximum reverse current		16 A
Number of bypass diodes		3
UL Design Loads*	***Two rail system***	113 psf downward 64 psf upward
UL Design Loads*	***Three rail system***	170 psf downward 64 psf upward
IEC Design Loads*	***Two rail system***	113 psf downward 50 psf upward

* Please refer to the Sunmodule installation instructions for the details associated with these load cases.

ADDITIONAL DATA

Power sorting[1]	-0 Wp / +5 Wp
J-Box	IP65
Module leads	PV wire per UL4703 with H4 connectors
Module efficiency	16.10 %
Fire rating (UL 790)	Class C
Glass	Low iron tempered with ARC



VERSION 2.5 FRAME

- Compatible with both "Top-Down" and "Bottom" mounting methods
- ⏚ Grounding Locations:
  - 4 corners of the frame
  - 4 locations along the length of the module in the extended flange†

NEW! Independently created PAN files now available. Ask your account manager for more information.

All units provided are imperial. SI units provided in parentheses.
SolarWorld AG reserves the right to make specification changes without notice.

UL Certified

- For countries that require UL certification (UL 1741/IEEE 1547)
- Optional integrated AFCI functionality meets the requirements of NEC 2011 690.11

Efficient

- 96.8% peak efficiency
- OptiCool™ active temperature management system

Safe

- Galvanic isolation
- Integrated GFDI

Simple

- Patented automatic grid voltage detection*
- Integrated DC disconnect switch

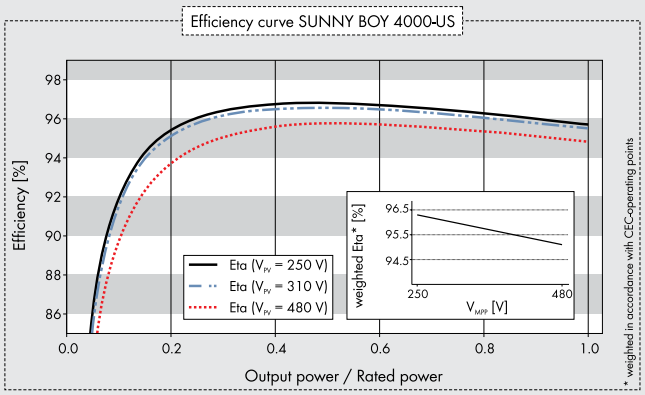
SUNNY BOY 3000-US / 3800-US / 4000-US

UL certified, reliable system managers

The Sunny Boy 3000-US, 3800-US and 4000-US inverters are specially designed for countries that require UL certification. Automatic grid voltage detection* and an integrated DC disconnect switch simplifies installation, ensuring safety as well as saving time. These models feature galvanic isolation and can be used with all types of modules – crystalline as well as thin-film. The die-cast aluminum enclosure, with the OptiCool active temperature management system, guarantees the highest yields possible and a long service life, even under extreme conditions. The Sunny Boy 3800-US is designed for projects with a current limit of 16A.

MADE IN THE USA OF U.S. AND IMPORTED PARTS

* US Patent US7352549B1



Accessories

RS485 interface
485USPB-NR

Bluetooth Piggy-Back
BTPBINV-NR
with External Antenna
BTPB-EXTANT-NR

Combi-Switch
DC disconnect and PV array combiner box
COMBO-SWITCH

Combiner Box
Simplify wiring for added convenience and safety
SBCB-6-3R or SBCB-6-4

Technical data	Sunny Boy 3000-US		Sunny Boy 3800-US	Sunny Boy 4000-US	
	208 V AC	240 V AC	240 V AC	208 V AC	240 V AC
Input (DC)					
Max. usable PV power (@ module STC)	3750 W		4750 W	4375 W	5000 W
Max. DC power (@ cos φ = 1)	3200 W		4200 W	4200 W	
Max. DC voltage	500 V		600 V	600 V	
DC nominal voltage	250 V		310 V	310 V	
MPP voltage range	175 – 400 V	200 – 400 V	250 – 480 V	220 – 480 V	250 – 480 V
Min. DC voltage / start voltage	175 / 228 V	200 / 228 V	250 / 285 V	220 / 285 V	250 / 285 V
Max. input current / per string (at DC disconnect)	17 A / 17 A, 36 A @ combined terminal		18 A / 18 A, 36 A @ combined terminal	18 A / 18 A, 36 A @ combined terminal	
Number of MPP trackers / fused strings per MPP tracker	1 / 4 (DC disconnect)				
Output (AC)					
AC nominal power	3000 W		3800 W	3500 W	4000 W
Max. AC apparent power	3000 VA		3800 VA	3500 VA	4000 VA
Nominal AC voltage / adjustable	208 V / ●	240 V / ●	240 V / –	208 V / ●	240 V / ●
AC voltage range	183 – 229 V	211 – 264 V	211 – 264 V	183 – 229 V	211 – 264 V
AC grid frequency; range	60 Hz; 59.3 – 60.5 Hz		60 Hz; 59.3 – 60.5 Hz	60 Hz; 59.3 – 60.5 Hz	
Max. output current	15 A	13 A	16 A	17 A	
Power factor (cos φ)	1		1	1	
Phase conductors / connection phases	1 / 2		1 / 2	1 / 2	
Harmonics	< 4%		< 4%	< 4%	
Efficiency					
Max. efficiency	96.00%	96.50%	96.80%	96.50%	96.80%
CEC efficiency	95.00%	95.50%	96.00%	95.50%	96.00%
Protection devices					
DC reverse-polarity protection	●		●	●	
Integrated AFCI*	o		o	o	
AC short circuit protection	●		●	●	
Galvanically isolated / all-pole sensitive monitoring unit	●/–		●/–	●/–	
Protection class / overvoltage category	I / III		I / III	I / III	
General data					
Dimensions (W / H / D) in mm (in)	450 / 350 / 235 (18 / 14 / 9)				
DC Disconnect dimensions (W / H / D) in mm (in)	187 / 297 / 190 (7 / 12 / 7.5)				
Packing dimensions (W / H / D) in mm (in)	390 / 580 / 470 (15 / 23 / 18.5)				
DC Disconnect packing dimensions (W / H / D) in mm (in)	370 / 240 / 280 (15 / 9 / 11)				
Weight / DC Disconnect weight	38 kg (84 lb) / 3.5 kg (8 lb)				
Packing weight / DC Disconnect packing weight	44 kg (97 lb) / 4 kg (9 lb)				
Operating temperature range (full power)*	-25 °C ... +45 °C (-13 °F ... +113 °F)				
Noise emission (typical)	40 dB(A)		37 dB(A)	37 dB(A)	
Internal consumption at night	0.1 W		0.1 W	0.1 W	
Topology	LF transformer		LF transformer	LF transformer	
Cooling concept	OptiCool		OptiCool	OptiCool	
Electronics protection rating / connection area	NEMA 3R / NEMA 3R		NEMA 3R / NEMA 3R	NEMA 3R / NEMA 3R	
Features					
Display: text line / graphic	●/–		●/–	●/–	
Interfaces: RS485 / Bluetooth®	o/o		o/o	o/o	
Warranty: 10 / 15 / 20 years	●/o/o		●/o/o	●/o/o	
Certificates and permits (more available on request)	UL1741 (Second Ed.), UL1998, UL1699B, IEEE 1547, FCC Part 15 (Class A & B), CSA C22.2 No. 107.1-2001				
Integrated GFDI	●		●	●	
*For AFCI functionality or extended operating temperature range to -40 °C specify SBXXXXUS-12 when ordering.					
● Standard features o Optional features – Not available Data at nominal conditions NOTE: US inverters ship with gray lids.					
Type designation	SB 3000US		SB 3800-US-10	SB 4000US	

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