

PROJECT DESCRIPTION

SYSTEM CAPACITY: 8.00 KW DC / 5.00 KW AC

PV MODULES: (20) T X110-400108BB BY MSOLAR

OPTIMIZERS: (20) S440 BY SOLAREEDGE

INVERTER: (1) SE5000H-US BY SOLAREEDGE

RACKING SYSTEM: NXT UMount BY UNIRAC

PROJECT INFORMATION

PROJECT LATITUDE	30.166211787578938	MIN AMBIENT TEMP	-5 ° C
PROJECT LONGITUDE	-82.70451006347383	MAX AMBIENT TEMP	35 ° C
AHJ	COLUMBIA COUNTY	WIND EXPOSURE	C
		DESIGN WIND SPEED	118 MPH

DRAWINGS INDEX

C-1	COVER SHEET
C-2	SAFETY PLANS
E-1	ONE LINE RISER DIAGRAM
E-2	SAFETY LABELS
S-1	STRUCTURAL PLAN
S-2	RACKING PLAN
S-3	RACKING PLAN
D-1	PV MODULES DATA SHEET
D-2	SMART MONITORING DATA SHEET
D-3	INVERTER DATA SHEET

GENERAL NOTES

PER FL. STATUTE 377.705 (REVISED 7/1/2017), I RAFAEL A. GONZALEZ SOTO, P.E. 83104 AN ENGINEER LICENSED PURSUANT TO CHAPTER 471, CERTIFY THAT THE PV ELECTRICAL SYSTEM AND ELECTRICAL COMPONENTS ARE DESIGNED AND APPROVED USING THE STANDARDS CONTAINED IN THE MOST RECENT VERSION OF THE FLORIDA BUILDING CODE.

APPLICABLE CODES: 2020 FLORIDA BUILDING CODE 7TH EDITION, ASCE 7-16 MINIMUM DESIGN LOADS FOR BUILDING AND OTHER STRUCTURES, FFPC 7TH EDITION, NFPA 2018, NFPA 70 AND NEC 2017.

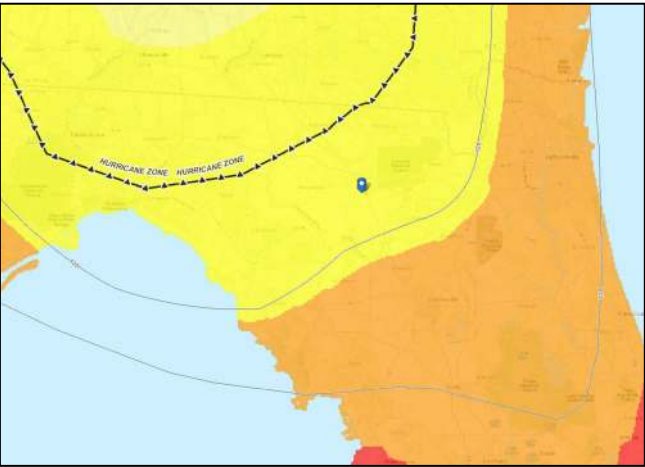
CONTRACTOR SHALL ENSURE ALL ROOF PENETRATIONS TO BE INSTALLED AND SEALED PER 2020 FLORIDA BUILDING CODE 7TH EDITION OR LOCAL GOVERNING CODE.

ALL WIRING METHODS AND INSTALLATION PRACTICES SHALL CONFORM TO THE NATIONAL ELECTRICAL CODE (NEC) 2017, LOCAL STATE CODES, AND OTHER APPLICABLE LOCAL CODES. MEANS SHALL BE PROVIDED TO DISCONNECT ALL CURRENT CARRYING CONDUCTORS OF THE PHOTOVOLTAIC POWER SOURCE FROM ALL OTHER CONDUCTORS IN THE BUILDING. CONNECTORS TO BE TORQUED PER DEVICE LISTING, OR MANUFACTURERS RECOMMENDATIONS. NON-CURRENT CARRYING METAL PARTS SHALL BE CHECKED FOR PROPER GROUNDING.

REQUIRED SAFETY SIGNS AND LABELS SHALL BE PERMANENTLY ATTACHED BY ADHESIVE, OR OTHER MECHANICAL MEANS. LABELS SHALL COMPLY WITH ARTICLE 690 VI OF THE NEC 2017 OR OTHER APPLICABLE STATE AND LOCAL CODES. SEE LABELS AND MARKING PAGE FOR MORE INFORMATION.

RACKING ROOF MOUNT SYSTEM SHALL BE INSTALLED FOLLOWING MANUFACTURERS INSTRUCTION SPEC'S, INCLUDING ALL GROUNDING WEEB CLIPS, GROUND LUGS, AND RAIL SPLICE KITS FOR ELECTRICAL CONTINUITY.

MECAWIND TOOL IS BASED ON THE C&C WIND LOADS FOR ENCLOSED BUILDINGS. DESIGN WIND PRESSURES ARE CALCULATED USING ASCE 7-16 EQUATION 30.6-1. ALL NOTES IN FIGURES ASCE 7-16 30.4-1 AND 30.4-2(A,B AND /67C) HAVE BEEN INCORPORATED. MEAN ROOF HEIGHT MUST BE LESS THAN 60 FEET.



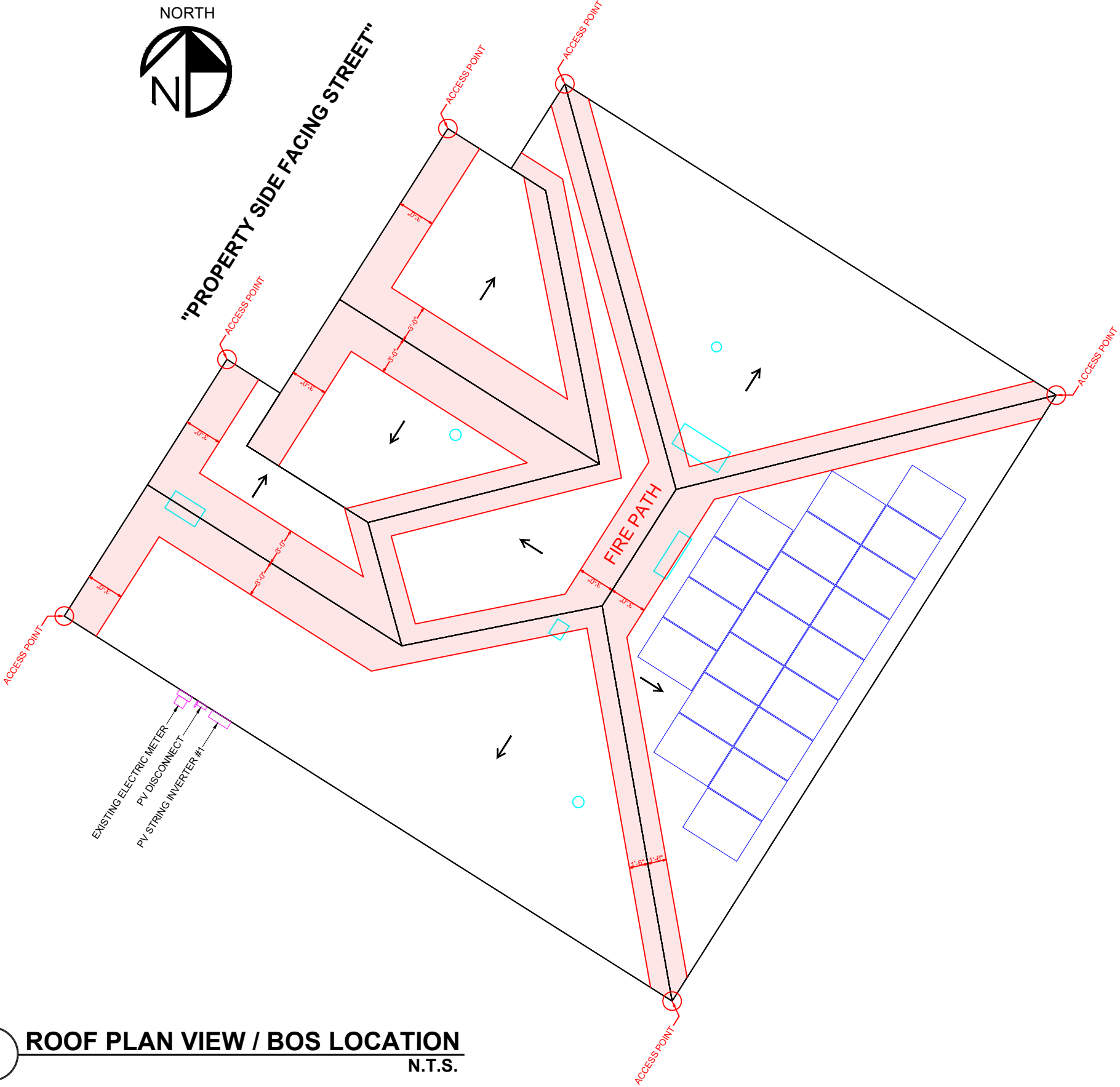
2 LOCATION MAP / WIND ZONES
N.T.S.



3 IRRADIANCE MAP
N.T.S.



4 3D RENDERING
N.T.S.



1 ROOF PLAN VIEW / BOS LOCATION
N.T.S.

DOCUMENT CONTROL		DATE	sCAD	eCAD
ISSUED FOR PERMIT		10-04-23	EF	DM
REV	DESCRIPTION	DATE	sCAD	eCAD

ENGINEER CONTACT INFORMATION	
ENGIPARTNERS LLC	
C.A. 32661	
1825 PONCE DE LEON BLVD #114	
CORAL GABLES, FL 33134	
DESIGN@ENGIPARTNERS.COM	
833 - 888 - 3644	

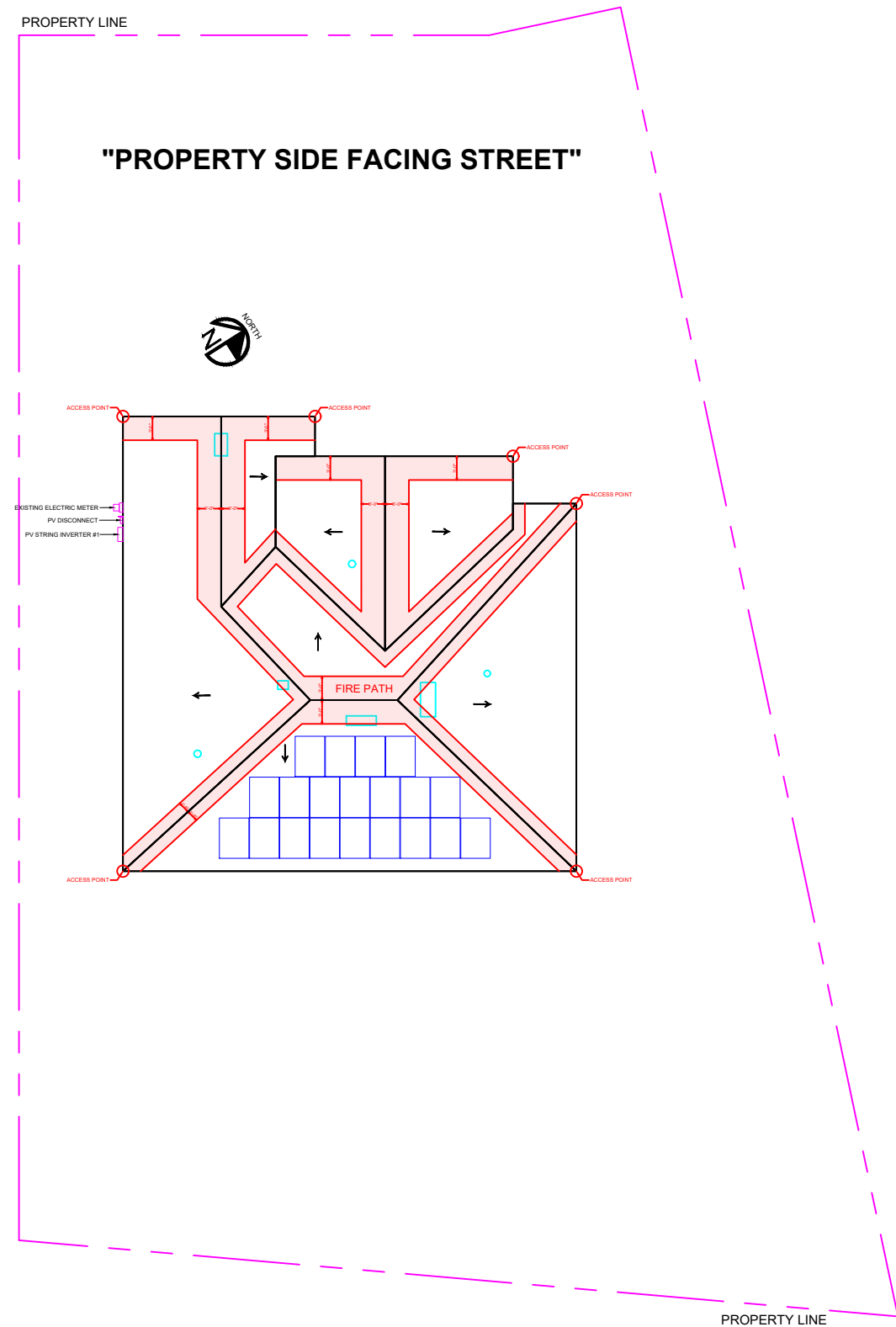
ENGINEERING STAMP	
	Rafael A Gonzalez Soto 2023.10.06 10:04:06 -04'00'

CONTRACTOR CONTACT INFORMATION	
TITAN SOLAR POWER FL	
901 ARMSTRONG BLVD,	
KISSIMMEE, FL 34741	
(813) 982 -9001	
#EC13009924	

CONTRACTOR LOGO	
	TITAN SOLAR POWER

CUSTOMER:	MICHAEL ALLEN
PROJECT ADDRESS:	227 SW BELLFLOWER DR LAKE CITY FL 32024
PARCEL NUMBER:	03-4S-16-02731-021

SHEET NAME:		
COVER SHEET		
PROJECT ID:	ENGINEER OF RECORD:	SHEET TITLE:
TSP165401	ENG. RAFAEL A. GONZALEZ SOTO, PE	
	DATE:	
	10-03-23	
		C-1

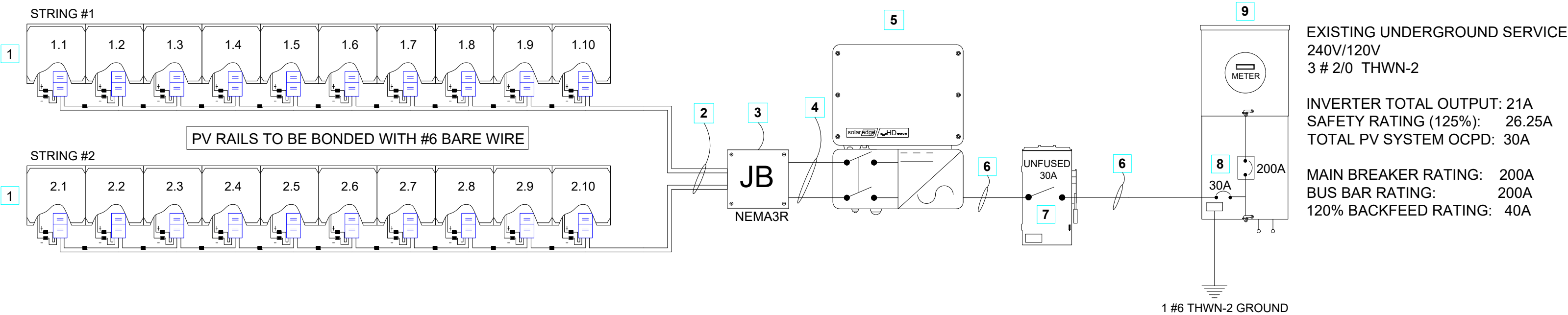


LOCATION OF NEAREST URGENT CARE FACILITY	
NAME:	
ADDRESS:	
PHONE NUMBER:	
NOTES:	
1. INSTALLERS SHALL DRAW IN DESIGNATED SAFETY AREA AROUND HOME	
2. INSTALLERS SHALL UPDATE NAME ADDRESS AND PHONE NUMBER OF NEAREST URGENT CAR FACILITY RELATIVE TO THE SITE BEFORE STARTING WORK	

1 SAFETY PLAN
N.T.S.

DOCUMENT CONTROL				DATE		sCAD	eCAD	ENGINEER CONTACT INFORMATION				ENGINEERING STAMP		CONTRACTOR CONTACT INFORMATION		CONTRACTOR LOGO		CUSTOMER:		SHEET NAME:			
ISSUED FOR PERMIT				10-04-23		EF	DM	ENGIPARTNERS LLC						TITAN SOLAR POWER FL				MICHAEL ALLEN		SAFETY PLAN			
REV				DATE		sCAD	eCAD	C.A. 32661						901 ARMSTRONG BLVD,				227 SW BELLFLOWER DR					
								1825 PONCE DE LEON BLVD #114						KISSIMMEE, FL 34741				LAKE CITY FL 32024		PROJECT ID:			
								CORAL GABLES, FL 33134						(813) 982 -9001				PARCEL NUMBER:		TSP165401			
								DESIGN@ENGIPARTNERS.COM						#EC13009924				10-03-23		ENGINEER OF RECORD:			
								833 - 888 - 3644										ENG. RAFAEL A. GONZALEZ SOTO, PE		SHEET TITLE:			
																		DATE:					
																		10-03-23		C-2			

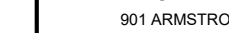
WIRE SIZES, QUANTITY & TYPE				RACEWAY SIZE, TYPE & LOCATION			WIRE AMPACITY CALCULATIONS							ADDITIONAL INFORMATION			
WIRE TAG	CONDUCTOR QTY. SIZE & TYPE	NEUTRAL QTY. SIZE & TYPE	GROUND QTY. SIZE & TYPE	RACEWAY SIZE & TYPE	RACEWAY LOCATION	RACEWAY HEIGHT ABOVE ROOF	OUTPUT CURRENT	125% OF OUTPUT CURRRENT	MIN OCPD	WIRE DE-RATED CALCULATION				DIST.	VOLTAGE	VOLTAGE DROP %	CONDUIT FILL %
										WIRE RATING	AMBIENT TEMPERATURE COEFFICIENT	# OF CONDUCTORS COEFFICIENT	DE-RATES AMPACITY				
DC (BEFORE JB)	(4) #10 AWG PV WIRE	N/A	(1) #8 AWG BARE COPPER	NOT APPLICABLE	UNDER ARRAY	1/2" TO 3-1/2"	15A	18.8A	20A	40A	0.76	1	30A	10 FT.	350V	0.11%	6.4%
DC (AFTER JB)	(4) #10 AWG THWN-2	N/A	(1) #8 AWG THWN-2	3/4" EMT CONDUIT	ABOVE ROOF	1/2" TO 3-1/2"	15A	18.8A	20A	40A	0.76	0.8	24.3A	20 FT.	350V	0.21%	8.1%
AC (INVERTER TO METER)	(2) #8 AWG THWN-2	(1) #8 AWG THWN-2	(1) #8 AWG THWN-2	3/4" EMT CONDUIT	EXTERIOR WALL	"N/A"	21A	26.25A	30A	55A	1	1	55A	5 FT.	240V	0.1%	7.7%



1 ONE LINE RISER DIAGRAM
N.T.S.

LEGEND:

1	(20) T XI10-400108BB BY MSOLAR REFER TO D-1 SHEET	2	2 #10 PV WIRE PER STRING 1 #6 BARE WIRE GROUND 3/4" EMT CONDUIT	3	NEMA3R JUNCTION BOX
4	2 #10 THWN-2 PER STRING 1 #8 THWN-2 GROUND 3/4" EMT CONDUIT	5	SE5000H-US BY SOLAREEDGE REFER TO D-3 SHEET	6	2 #8 L1,L2 THWN-2 1 #8 THWN-2 NEUTRAL 1 #8 THWN-2 GROUND 3/4" EMT CONDUIT
7	PV SYSTEM DISCONNECT - 30A RATED	8	PV INTERCONNECTION POINT - PV BREAKER RATED 30A	9	UTILITY ELECTRICAL SERVICE

DOCUMENT CONTROL				ENGINEER CONTACT INFORMATION		ENGINEERING STAMP		CONTRACTOR CONTACT INFORMATION		CONTRACTOR LOGO		CUSTOMER:		SHEET NAME:									
ISSUED FOR PERMIT				10-04-23	EF	DM			Rafael A Gonzalez Soto 2023.10.06 10:04:30 -04'00'				MICHAEL ALLEN		ONE LINE RISER DIAGRAM								
REV				DESCRIPTION		PROJECT ADDRESS:																	
						227 SW BELLFLOWER DR LAKE CITY FL 32024																	
													(813) 982 - 9001		TITAN S O L A R P O W E R		PROJECT ID:		ENGINEER OF RECORD:		E-1		
													#EC13009924				TSP165401		ENG. RAFAEL A. GONZALEZ SOTO, PE				
																	PARCEL NUMBER:		DATE:				
																	03-4S-16-02731-021		10-03-23				

**WARNING**

ELECTRICAL SHOCK HAZARD

TERMINALS ON BOTH LINE AND LOAD SIDES MAY BE ENERGIZED IN THE OPEN POSITION

LABEL LOCATION:
AC DISCONNECT,
POINT OF INTERCONNECTION
PER CODE: NEC 690.13 (B)

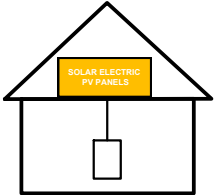
**WARNING**

TURN OFF PHOTOVOLTAIC AC DISCONNECT PRIOR TO WORKING INSIDE PANEL

LABEL LOCATION:
AC DISCONNECT, MAIN PANEL
PER CODE: NEC 110.27 (C)
OSHA 1910.145(f)(7)

SOLAR PV SYSTEM EQUIPPED WITH RAPID SHUTDOWN

TURN RAPID SHUTDOWN SWITCH TO THE "OFF" POSITION TO SHUT DOWN PV SYSTEM AND REDUCE SHOCK HAZARD IN THE ARRAY.



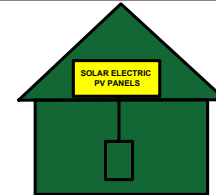
LABEL LOCATION:
AC DISCONNECT, MAIN PANEL
PER CODE: NEC 690.56(C)(1)(a)

PHOTOVOLTAIC SYSTEM EQUIPPED WITH RAPID SYSTEM SHUTDOWN

LABEL LOCATION:
AC DISCONNECT
POINT OF INTERCONNECTION
PER CODE: NEC 690.56(C)

EMERGENCY RESPONDER
THIS SOLAR PV SYSTEM IS
EQUIPPED WITH RAPID SHUTDOWN

TURN RAPID SHUTDOWN SWITCH TO THE "OFF" POSITION TO SHUT DOWN THE ENTIRE PV SYSTEM.



LABEL LOCATION:
AC DISCONNECT, MAIN PANEL
PER CODE: FFPC 7TH EDITION: 11.12.2.1.1.1.1

INVERTER #1

NOMINAL OPERATING AC VOLTAGE

240 V

NOMINAL OPERATING AC FREQUENCY

60 HZ

MAXIMUM AC POWER

5.00 KW

MAXIMUM AC CURRENT

21A

MAX OVERCURRENT DEVICE RATING FOR AC MODULE PROTECTION

N/A

LABEL LOCATION:
INVERTER
PER CODE: NEC 690.52

MAXIMUM VOLTAGE

480 VDC

MAXIMUM CIRCUIT CURRENT

13.50 A

MAX RATED OUTPUT CURRENT OF THE CHARGE CONTROLLER OR DC-TO-DC CONVERTER (IF INSTALLED)

15 A

LABEL LOCATION:
INVERTER
PER CODE: NEC 690.53

PHOTOVOLTAIC AC DISCONNECT

RATED AC OUTPUT CURRENT:

21 A

NOMINAL OPERATING AC VOLTAGE:

240V

LABEL LOCATION:
AC DISCONNECT
PER CODE: NEC 690.54

MAIN PHOTOVOLTAIC SYSTEM DISCONNECT

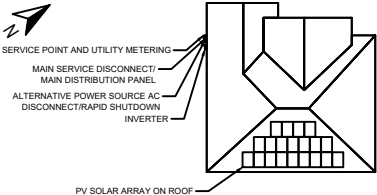
WARNING: PHOTOVOLTAIC POWER SOURCE

LABEL LOCATION:
AC DISCONNECT
PER CODE: NEC 690.13 (B)

LABEL LOCATION:
MAIN SERVICES
DISCONNECT, DC CONDUIT
PER CODE: NEC 690.31 (G) (3)

**CAUTION**

POWER TO THIS BUILDING IS ALSO SUPPLIED FROM THE FOLLOWING SOURCES WITH DISCONNECTS LOCATED AS SHOWN:



PER CODE: NEC 690.56 (B) , NEC705.10

**WARNING**

DUAL POWER SOURCE
SECOND SOURCE IS PHOTOVOLTAIC SYSTEM

LABEL LOCATION:
POINT OF
INTERCONNECTION
PER CODE: NEC 705.12 (B)(3)

**WARNING**

POWER SOURCE OUTPUT CONNECTION. DO NOT RELOCATE THIS OVERCURRENT DEVICE

LABEL LOCATION:
POINT OF
INTERCONNECTION
PER CODE: NEC 705.12(B)(2)(3)(b)

**CAUTION**

PHOTOVOLTAIC SYSTEM CIRCUIT IS BACKFED

LABEL LOCATION:
MAIN SERVICE PANEL
PER CODE: NEC 690.45(B)(5)

DO NOT DISCONNECT UNDER LOAD

LABEL LOCATION:
POINT OF
INTERCONNECTION
PER CODE:
NEC 690.33(E)(2) & NEC 690.15 (C)

CAUTION: SOLAR ELECTRIC SYSTEM CONNECTED

LABEL LOCATION: POINT OF INTERCONNECTION
PER CODE: NEC 690.15, NEC 690.13(B)

LABEL LOCATION: ADJACENT TO MAIN DISCONNECT



GENERAL NOTE:

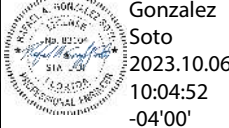
ADHESIVE FASTENED SIGNS:

- THE LABEL SHALL BE VISIBLE, REFLECTIVE AND SUITABLE FOR THE ENVIRONMENT WHERE IT IS INSTALLED [NFPA 1, 11.12.2.1]
- WHERE REQUIRED ELSEWHERE IN THIS CODE, ALL FIELD APPLIED LABELS, WARNINGS, AND MARKINGS SHOULD COMPLY WITH ANSI Z535.4 [NEC 110.21(B) FIELD MARKING].
- ADHESIVE FASTENED SIGNS MAY BE ACCEPTABLE IF PROPERLY ADHERED. VINYL SIGNS SHALL BE WEATHER RESISTANT [IFC 605.11.1.3]

1

PV SAFETY LABELS DATA

N.T.S.

DOCUMENT CONTROL				DATE	sCAD	eCAD	ENGINEER CONTACT INFORMATION		ENGINEERING STAMP		CONTRACTOR CONTACT INFORMATION		CONTRACTOR LOGO		CUSTOMER:		SHEET NAME:					
ISSUED FOR PERMIT				10-04-23	EF	DM	ENGIPARTNERS LLC C.A. 32661 1825 PONCE DE LEON BLVD #114 CORAL GABLES, FL 33134 DESIGN@ENGIPARTNERS.COM 833 - 888 - 3644				Rafael A Gonzalez Soto 2023.10.06 10:04:52 -04'00'		TITAN SOLAR POWER FL 901 ARMSTRONG BLVD, KISSIMMEE, FL 34741 (813) 982 -9001 #EC13009924				MICHAEL ALLEN		SAFETY LABELS			
REV	DESCRIPTION			DATE	sCAD	eCAD											PROJECT ADDRESS:					
															227 SW BELLFLOWER DR LAKE CITY FL 32024		PROJECT ID:		ENGINEER OF RECORD:		SHEET TITLE:	
															PARCEL NUMBER:		TSP165401		ENG. RAFAEL A. GONZALEZ SOTO, PE			
															03-4S-16-02731-021				DATE:		E-2	
																	10-03-23					

UL 1703 CERTIFIED

MAX. DESIGN LOAD: 50.13 psf

APPLIED WIND LOAD : -30.05 psf

T X110-400108BB

67.80"

44.65"

NOTES:

-INSTALL MID CLAMPS BETWEEN MODULES AND ENDS CLAMPS AT THE END OF EACH ROW OF MODULES.

-ALUMINUM RAILS SHOULD ALWAYS BE SUPPORTED BY MORE THAN ONE FOOTING ON BOTH SIDES OF THE SPLICE.

WORST CASE MODULE:

ZONE 1: 25%

ZONE 2E: 60%

ZONE 2R: 15%

-22.74(0.25) + -32.49(0.60) + -32.49(0.15) =-30.05psf

ULTIMATE WIND SPEED	120	mph			
DESIGN WIND SPEED	118	mph			
RISK CATEGORY	II				
EXPOSURE CATEGORY	C				
ROOF SLOPE (°)	25				
ROOF TYPE	HIPPED				
MATERIAL ROOF TYPE	ASPHALT SHINGLES				
PRESSURE ZONE:	1&2				
MEAN ROOF HEIGHT:	15.198'				
0.5 MEAN ROOF HEIGHT	7.60'				
2H ₂	14'				
PERIMETER WIDTH:	4.63'				
K _D	0.85				
K _{ZT}	1.0				
K _H	0.851				
VELOCITY PRESSURE (q) = 0.60*0.00256* K _H K _{ZT} K _D V ²					
VELOCITY PRESSURE (ASD)	15.47				
NON EXPOSED EDGE FACTOR: γ _E = 1.0	EXPOSED EDGE FACTOR: γ _E = 1.5	ARRAY EQUALIZATION FACTOR: γ _a = 0.7			
EXTERNAL PRESSURE COEFFICIENT Z1	0.7	-1.40			
EXTERNAL PRESSURE COEFFICIENT Z2e	0.7	-2.0			
EXTERNAL PRESSURE COEFFICIENT Z2r	0.7	-2.0			
EXTERNAL PRESSURE COEFFICIENT Z3	0.7	-2.0			
INTERNAL PRESSURE COEFFICIENT		0.18			
ZONES	PRESSURES (PSF)	NON EXPOSED PRESSURES (PSF)	EXPOSED PRESSURES (PSF)	MAX SPAN (FT)	MAX CANTI-LEVER (IN)
1	-24.45	-15.16	-22.74	2'	8"
2e	-33.73	-21.66	-32.49	2'	8"
2r	-33.73	-21.66	-32.49	2'	8"
3	-33.73	-21.66	-32.49	2'	8"
TOTAL ROOF AREA	3361.13	sq.-ft			
TOTAL MODULES:	20				
TOTAL PHOTOVOLTAIC AREA:	420.38	sq.-ft			
TOTAL PERCENTAGE AREA OF PV SYSTEM:	12.51	%			
WIND LOAD (PSF):	-30.05				
TOTAL WIND LOAD (LBS):	-12,632.42				
TOTAL ROOF MOUNTS:	78				
TENSION FORCE PER MOUNT (LBS):	-161.95				

OBS

ROOF OBSTRUCTIONS

NON-EXPOSED MODULES

EXPOSED MODULES

EDGE MODULES

TRUSSES OR RAFTERS

ROOF MOUNTS & RAIL

ROOF SLOPE

ROOF'S GENERAL NOTES:

1- CONTRACTOR/INSTALLER TO VERIFY ROOF CONDITIONS FOR PROPER INSTALLATION OF THE PV SYSTEM.

2- CONTRACTOR/INSTALLER TO NOTIFY THE OWNER IMMEDIATELY OF ANY ROOF DEFICIENCIES AND/OR REPAIR REQUIRED TO INSTALL THE PV SYSTEM.

3- EOR DOES NOT ASSUME ANY RESPONSIBILITY FOR THE INSTALLATION OF ANY PV SYSTEM ON DEFICIENT ROOFS.

4-CONTRACTOR/INSTALLER ASSUMES ALL RESPONSIBILITY TO INSTALL AS PER MANUFACTURER STANDARDS.

ROOF INSPECTION NOTE:

A PANEL IS DEFINED AS EXPOSED IF D1 TO THE ROOF EDGE >0.5H AND ONE OF THE FOLLOWING APPLIES:

1. D1 TO THE ADJACENT ARRAY > 4 FT (1.2 M) OR

2. D2 TO THE NEXT ADJACENT PANEL> 4 FT. (1.2 M)

ASCE 7.16 - 29.4-7

DESIGNED WIND PRESSURES:

$$p = q_h (GC_p)(\gamma_E)(\gamma_a)$$

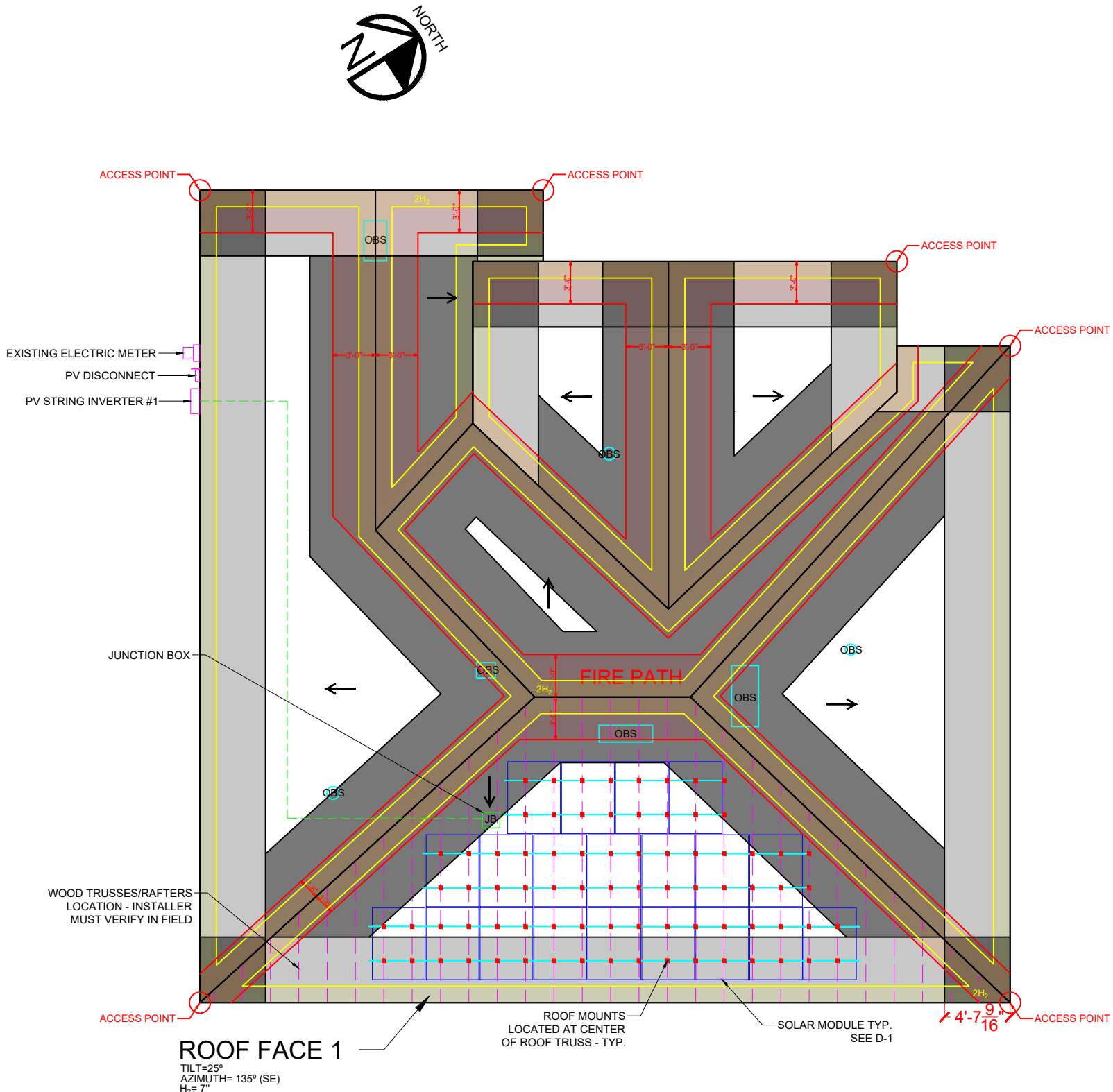
Solar Array Pressure Equalization Factor, γ_a

Effective Wind Area, ft²

1

STRUCTURAL ROOF PLAN & PV MODULES LAYOUT

N.T.S.



DOCUMENT CONTROL				DATE	sCAD	eCAD	ENGINEER CONTACT INFORMATION		ENGINEERING STAMP		CONTRACTOR CONTACT INFORMATION		CONTRACTOR LOGO		CUSTOMER:		SHEET NAME:				
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REV		DESCRIPTION		DATE	sCAD	eCAD															

(2) Lag Bolts must be located in the middle third of the structural member.

(4) This table does not include shear capacities. If necessary, contact a local engineer to specify lag bolt size with regard to shear forces.

(5) Install lag bolts with head ad washer flush to surface (no gap). Do not over-torque.

STRONGHOLD™ | BUTYL



UNIRAC
BETTER SOLAR STARTS HERE

Unirac's STRONGHOLD™ Butyl is efficient, dependable, and optimized for UNIRAC's NXT MOUNT™ system.

The pre-applied butyl pad removes the need for additional flashing. Just peel the liner, place the attachment, and fasten it to the roof. In addition, the butyl, used throughout the roofing and solar industries for its reliability, conforms to the screws and roof for a robust, dependable seal with no extra work! Couple this with the NXT MOUNT™ system, and you have a highly reliable, easy-to-install system with integrated wire management.



KITTED WITH

- ONE (1) STRONGHOLD™ Butyl direct-to-deck attachment with pre-applied butyl patch (Extra patches for ordering available)
- TWO (2) screws for rafter installation (Additional screws for direct-to-deck applications available)
- ONE (1) NXT Rail Clamp

FOR QUESTIONS OR CUSTOMER SERVICE CONTACT: 805-242-6411 | SALES@UNIRAC.COM | WWW.UNIRAC.COM

STRONGHOLD™ | BUTYL

#UNIRAC BETTER SOLAR STARTS HERE

SIMPLIFIED FLASHLESS SOLUTION

- One-step Butyl application
- Reliable waterproofing without messy sealant
- Eliminate most disbursements
- Minimize labor

OPTIMIZED FOR NEXT MOUNT, UNIRAC'S OPEN CHANNEL RAIL SYSTEM

- Open slot design for ease of rail connectivity with included STRONGHOLD® NXT rail clamp
- STRONGHOLD® Butyl combined with the NXT UNIRAC system makes installation and wire management a breeze
- UL Certified with NXT UNIRAC

DUAL MOUNTING OPTIONS

- Pre-attached butyl pad. Simply print, stick, and fasten with the two (2) included screws for either mount!
- For direct-to-deck applications, additional decking screws are available

ADDITIONAL BENEFITS

- Mild and Dark Fasteners
- Option for extra cross-coke-butyl patches
- Competitively priced with standard roof tie attachments

UNIRAC CUSTOMER SERVICE MEETS THE HIGHEST LEVEL OF PRODUCT SUPPORT

UNMATCHED EXPERIENCE

TECHNICAL SUPPORT

UNIRAC's technical support team is dedicated to answering questions & addressing issues in real time. An entire library of documents including engineering reports, stamped letters and technical data sheets greatly simplify your permitting and product planning process.

CRAFTED QUALITY

CENTRED QUALITY PROVIDER

UNIRAC's rich track record working with ESE manufacturers from 1980, 2016, 1400, 2017 and 2018AS, 1000+ S&P, solid names we deliver the highest standards for its, teams, and brands. These connections derived into our excellence and cemented us to first class business practices.

BANKABLE WARRANTY

UNIRAC's 25-year Nxt PV mounting system with ESE waterproofing has been tested by the National Renewable Energy Laboratory (NREL) to show how it meets or exceeds all major codes. It also passes all wind tunnel tests on mounting products of equal panel quality. 25-YEAR/250,000 hours and extended life expectancy (the 25-year limited product warranty).

DESIGN TABLES

BANKABLE WARRANTY

Open frame solar arrays can be installed on any surface. UNIRAC's best financial strength to back new products and make no part risk. Three pieces at most spanning up to mounting products of equal panel quality. 25-YEAR/250,000 hours and extended life expectancy (the 25-year limited product warranty).

PERMIT DOCUMENTATION

BANKABLE WARRANTY

UNIRAC's 25-year Nxt PV mounting system with ESE waterproofing has been tested by the National Renewable Energy Laboratory (NREL) to show how it meets or exceeds all major codes. It also passes all wind tunnel tests on mounting products of equal panel quality. 25-YEAR/250,000 hours and extended life expectancy (the 25-year limited product warranty).

PROTECT YOUR REPUTATION WITH QUALITY RACKING SOLUTIONS BACKED BY ENGINEERING EXCELLENCE AND A SUPERIOR SUPPLY CHAIN

PH.BR2020.02.02



Engineering Alliance, Inc

<https://www.eng-alliance.com>

02-May-2023

Unirac
1411 Broadway Blvd. NE
Albuquerque, NM 87101
Tel: 505 242 6411

Attn.: Engineering Department

Subject: Engineering Certification for the Unirac NXT UMount System to Support Photovoltaic Panels.

The Unirac NXT UMount Flush-to-Roof is an extruded aluminum rail system that is engineered to hold most framed solar modules to a roof structure and installed parallel to the roof surface.

We have reviewed the NXT UMount system, a proprietary mounting system for rooftop solar photovoltaic (PV) panels installation, and the U-Bulder 2.0 Online tool. This U-Bulder 2.0 software includes analysis for the NXT UMount rail and NXT UMount hardware. All information, data, and analysis are in compliance with the following codes, city ordinances, and typical specifications:

Codes:

- 2014-2020 Florida Building Code.
- ASCE/SEI 7-10 & 7-16 Minimum Design Loads for Buildings and Other Structures.
- International Building Code, 2012-2018 Edition w/ Provisions from SEACQ PV-2 2017.
- International Residential Code, 2012-2018 Edition w/ Provisions from SEACQ PV-2 2017.
- ACQ28, Acceptance Criteria for Modular Framing Systems (Used to Support Photovoltaic (PV) Panels, November 1, 2012 by ICC-ES.
- Aluminum Design Manual 2015 & 2020 Edition.

The following are typical specifications to meet the above code requirements:

Design Criteria:

Ground Snow Load = 0 - 100 (psf)
Basic Wind Speed = 95 - 130 (mph)
Roof Mean Height = 0 - 60 (ft)
Roof Pitch = 0°-45°
Exposure Category = B, C & D

Attachment Spacing: Per U-Bulder 2.0 Engineering report.

Cantilever: The maximum rail cantilever length is 1/3 of the adjacent span.

Clearance: 2" to 10" clear from the top of the roof to the top of the PV panel.

Tolerance(s): 1.0" tolerance for any specified dimension in this report is allowed for installation.

Installation Orientation: See NXT UMount Installation Guide:
Landscape - PV Panel long dimension is parallel to ridge/eave line of the roof and the PV panel is mounted on the long side.

Portrait - PV Panel short dimension is parallel to ridge/eave line of the roof and the PV panel is mounted on the short side.

4603 April Meadow Way, Sugar Land, TX 77479. Ph: 832 865 4757

Engineering Alliance, Inc

<http://www.eng-alliance.com>

Components and Cladding Roof Zones:

The Components and Cladding Roof Zones shall be determined based on ASCE 7-10 & 7-16 Component and Cladding design.

Notes:

1. U-Builder 2.0 Online tool analysis is only for Unirac NXT UMOUNT systems and do not include roof capacity check.
2. Risk Category II per ASCE 7-16.
3. Topographic factor, K_{zt} is 1.0.
4. Array Edge Factor $F_e = 1.5$
5. Average parapet height is 0.0 ft.
6. Wind speeds are LRFD values.
7. Attachment spacing apply to a seismic design category E or less.

Design Responsibility:

The U-Builder 2.0 design software is intended to be used under the responsible charge of a registered design professional where permitted by the authority having jurisdiction. In all cases, this U-Builder 2.0 software should be used under the direction of a design professional with sufficient structural engineering knowledge and experience to be able to:

- Evaluate whether the U-Builder 2.0 Software is applicable to the project, and
- Understand and determine the appropriate values for all input parameters of the U-Builder 2.0 software.

This letter certifies that the Unirac NXT UMOUNT system, when installed according to the Unirac 2.0 engineering report and the manufacturer specifications, is in compliance with the above codes and loading criteria.

This certification excludes evaluation of the following components:

- 1) The structure to support the loads imposed on the building by the array; including, but not limited to: strength and deflection of structural framing members, fastening and/or strength of roofing materials, and/or the effects of snow accumulation on the structure.
- 2) The attachment of the NXT UMOUNT Rails to the existing structure.
- 3) The capacity of the solar module frame to resist the loads.

This requires additional knowledge of the building and is outside the scope of this certification of this racking system.

Please feel free to call for any questions or clarifications.

Prepared By

Engineering Alliance, Inc
Sugar Land, TX

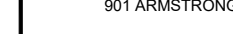
Saddam
Ahmad

Digitally signed by
Saddam Ahmad
DN: cn=Saddam Ahmad,
ou=Engineering Alliance, c=US
Date: 2023.04.06 16:09:40 -0500

This document has been electronically signed and sealed by the Professional Engineer. The signature and date. Printed copies of this document are not considered signed and sealed and the signature must be verified on any electronic copies.

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DOCUMENT CONTROL		DATE	sCAD	eCAD	ENGINEER CONTACT INFORMATION
FOR PERMIT		10-04-23	EF	DM	ENGIPARTNERS LLC C.A. 32661 1825 PONCE DE LEON BLVD #114 CORAL GABLES, FL 33134 DESIGN@ENGIPARTNERS.COM 833 - 888 - 3644
DESCRIPTION		DATE	sCAD	eCAD	

DOCUMENT CONTROL				DATE	sCAD	eCAD	ENGINEER CONTACT INFORMATION		ENGINEERING STAMP		CONTRACTOR CONTACT INFORMATION		CONTRACTOR LOGO		CUSTOMER:		SHEET NAME:					
ISSUED FOR PERMIT				10-04-23	EF	DM	ENGIPARTNERS LLC C.A. 32661 1825 PONCE DE LEON BLVD #114 CORAL GABLES, FL 33134 DESIGN@ENGIPARTNERS.COM 833 - 888 - 3644		 Rafael A Gonzalez Soto 2023.10.06 10:05:25 -04'00'		TITAN SOLAR POWER FL 901 ARMSTRONG BLVD, KISSIMMEE, FL 34741 (813) 982 -9001 #EC13009924				MICHAEL ALLEN		RACKING PLAN					
REV				DATE	sCAD	eCAD									PROJECT ADDRESS:							
															227 SW BELLFLOWER DR LAKE CITY FL 32024							
															PARCEL NUMBER:		PROJECT ID:		ENGINEER OF RECORD:		SHEET TITLE:	
															03-4S-16-02731-021		TSP165401		ENG. RAFAEL A. GONZALEZ SOTO, PE			
													DATE:		S-3							
													10-03-23									



108BB 400W HC Series

Titan Solar Panel Half-Cell Black
Monocrystalline PERC PV Module



Excellent efficiency

10 busbar technology increases power by decreasing the distance between busbars and the finger grid line



Improved weak illumination response

More power output even in lower light conditions such as overcast days or off-peak sunlight hours.



Anti PID

Panels rigorously tested to limit power degradation caused by 'stray' currents



High wind and snow resistance

5,400 Pa Snow Load
2,400 Pa Wind Load



25-year warranty

Titan Solar panel modules are guaranteed to retain at least 84.3% of the initial power output



Appealing Aesthetics

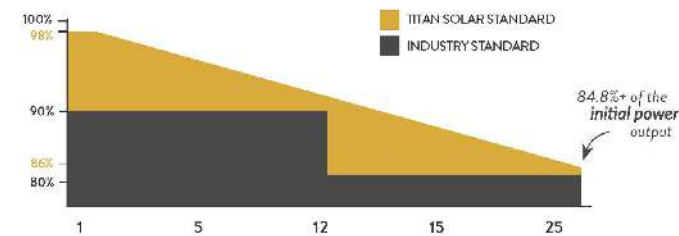
Fully black module creates a sleek, uniform array



25-year product
warranty, 25-year
output warranty



0.5% annual
degradation
over 25 years



CEC



UL 61730 | IEC 61215 | IEC 61730
ISO9001, ISO14001, ISO45001

titansolarpower.com

108BB 400W HC Series

Titan Solar Panel Half-Cell, All-Black
Monocrystalline PERC PV Module

Electrical Characteristics | STC*

Module Type	TX110-395108BB	TX110-400108BB	TX110-405108BB
Nominal Power Watt Pmax (W)*	395	400	405
Power Output Tolerance Pmax (W)	0~+5	0~+5	0~+5
Maximum Power Voltage Vmp (V)	30.84	31.01	31.21
Maximum Power Current Imp (A)	12.81	12.90	12.98
Open Circuit Voltage (V)	36.98	37.07	37.23
Short Circuit Current Isc (A)	13.70	13.97	13.87
Module Efficiency (%)	20.23	20.48	20.74

*STC (Standard Test Condition): Irradiance 1000W/m², Module Temperature 25°C, AM 1.5, AM 1.5
*Measuring tolerance: ±1%

Electrical Characteristics | NMOT*

Maximum Power Watt Pmax (Wp)	298	270	274
Maximum Power Voltage Vmpp (V)	29.08	29.26	29.47
Maximum Power Current Imp (A)	10.25	10.32	10.38
Open Circuit Voltage Voc (V)	34.75	34.88	35.12
Short Circuit Current Isc (A)	10.96	11.03	11.10

*NMOT (Nominal module operating temperature): Irradiance 800W/m², Ambient Temperature 23°C, AM 1.5, Wind Speed 1m/s

Mechanical Data

Solar Cells	Mono PERC, 182mm half cells
Cells orientation	108 (6x9+6x9)
Module dimension	67.80x44.65x1.38 in. (1,722x1,134x35 mm)
Weight	46.30 lb (21.00 kg)
Glass	3.2mm, High Transmission, Low Iron & Semi-Tempered Glass
Junction box	IP68, 3 Diodes
Cables	1,200 mm
Connectors	MC4 EVO2

Temperature Ratings

NOCT	42°C±2°C	Maximum System Voltage	1500VDC
Temperature coefficient of Pmax	-0.350%/°C	Operating Temperature	-40°C~+85°C
Temperature coefficient of Voc	-0.275%/°C	Maximum Series Fuse	25A
Temperature coefficient of Isc	+0.045%/°C	Maximum Load (Snow/Wind)	5,400Pa / 2,400Pa

Fire Rating

UL Type I**

two in one strings (in parallel connection)

*Remarks: Electrical data in this catalog do not represent a single module load and they are not meant

to be used as such. They only serve for comparison

among different module types.

**Please note, the "Fire Class" Rating is

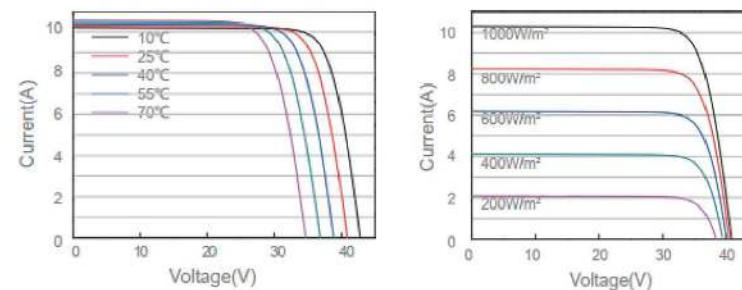
designed for the full installed PV system,

which includes, but is not limited to, the

modules, the types of mounting rails, post and

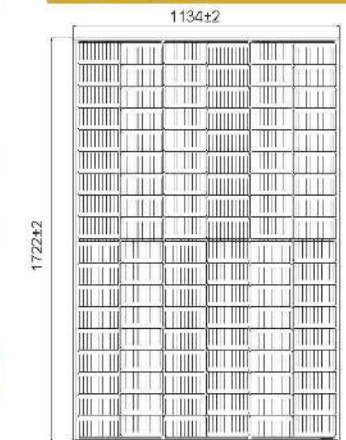
roof connection.

I-V Curves of PV Module (405W)

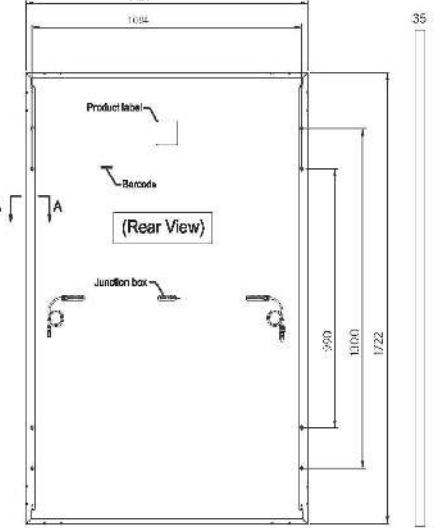


Note: please read safety and installation instructions before using this product. Subject to change without prior notice.

Dimensions (MM)



Front



Back

Side

Section A-A

35

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Packaging Details

31 Panels per pallet	Pallet Stack Weight 2,934 lbs. (1341.98 kg)	Truck Weight 38,461.2 lbs. (17,445.7 kg)
26 Pallets per truck		



Powered by mSolar.

DOCUMENT CONTROL				ENGINEER CONTACT INFORMATION		ENGINEERING STAMP		CONTRACTOR CONTACT INFORMATION		CONTRACTOR LOGO		CUSTOMER:		SHEET NAME:			
ISSUED FOR PERMIT				10-04-23		EF		DM				MICHAEL ALLEN		PV MODULES DATA SHEET			
REV				DATE		sCAD		eCAD				PROJECT ADDRESS:					
												227 SW BELLFLOWER DR LAKE CITY FL 32024					
												PARCEL NUMBER:					
												03-4S-16-02731-021					
												PROJECT ID:		ENGINEER OF RECORD:		SHEET TITLE:	
												TSP165401		ENG. RAFAEL A. GONZALEZ SOTO, PE			
														DATE:		D-1	
												10-03-23					

Power Optimizer
For North America

S440



POWER OPTIMIZER

PV power optimization at the module level

- Specifically designed to work with SolarEdge residential inverters
- Detects abnormal PV connector behavior, preventing potential safety issues*
- Module-level voltage shutdown for installer and firefighter safety
- Superior efficiency (99.5%)
- Mitigates all types of module mismatch loss, from manufacturing tolerance to partial shading
- Faster installations with simplified cable management and easy assembly using a single bolt
- Flexible system design for maximum space utilization
- Compatible with bifacial PV modules
- Meets NEC requirements for arc fault protection (AFCI) and Photovoltaic Rapid Shutdown System (PVRSS)

* Functionality subject to inverter model and firmware version

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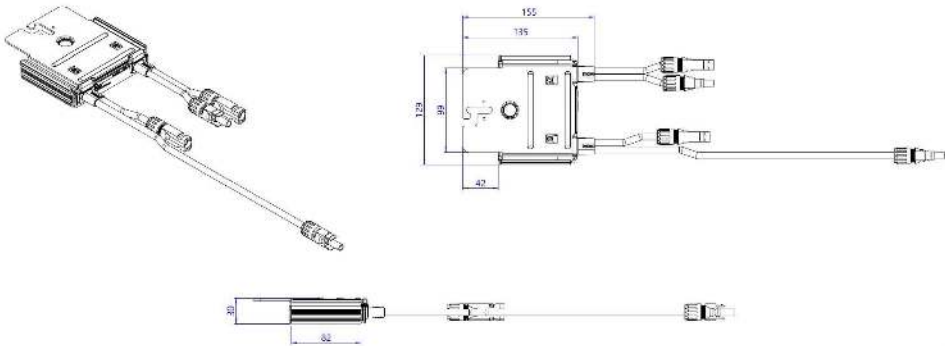
Power Optimizer
For North America
S440

S440		Unit
INPUT		
Rated Input DC Power ⁽¹⁾	440	W
Absolute Maximum Input Voltage (V _{oc})	60	V _{oc}
MPPT Operating Range	8 - 60	V _{oc}
Maximum Short Circuit Current (I _{sc}) of Connected PV Module	14.5	A _{sc}
Maximum Efficiency	99.5	%
Weighted Efficiency	98.6	%
Overvoltage Category	I	
OUTPUT DURING OPERATION		
Maximum Output Current	15	A _{dc}
Maximum Output Voltage	60	V _{oc}
OUTPUT DURING STANDBY (POWER OPTIMIZER DISCONNECTED FROM INVERTER OR INVERTER OFF)		
Safety Output Voltage per Power Optimizer	1	V _{oc}
STANDARD COMPLIANCE		
Photovoltaic Rapid Shutdown System	NEC 2014, 2017 & 2020	
EMC	FCC Part 15 Class B, IEC 61000-6-2, IEC 61000-6-3	
Safety	UL 62109-1 (class safety), UL1741	
Material	UL 94 V-0, UV Resistant	
RoHS	Yes	
Fire Safety	VDE-AR-E 2100-712:2013-05	
INSTALLATION SPECIFICATIONS		
Maximum Allowed System Voltage	1000	V _{oc}
Dimensions (W x L x H)	129 x 155 x 30 / 5.07 x 6.10 x 1.18	mm / in
Weight (including cables)	655 / 1.5	gr / lb
Input Connector	MC4 ⁽⁴⁾	
Input Wire Length	0.1 / 0.32	m / ft
Output Connector	MC4	
Output Wire Length	(-) 2.3, (-) 0.10 / (+) 7.54, (-) 0.32	m / ft
Operating Temperature Range ⁽²⁾	-40 to +85	°C
Protection Rating	IP68 / NEMA6P	
Relative Humidity	0 - 100	%

(1) Rated power of the module at STC will not exceed the Power Optimizer Rated Input DC Power. Modules with up to +5% power tolerance are allowed.
(2) For other connector types please contact SolarEdge.
(3) For ambient temperature above +70°C / +158°F, power derating is applied. Refer to Power Optimizers Temperature Derating Technical Note for more details.

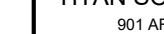
PV System Design Using a SolarEdge Inverter		Single Phase HD-Wave	Three Phase 208V Grid	Three Phase for 277/480V Grid	
Minimum String Length (Power Optimizers)	S440	8	10	18	
Maximum String Length (Power Optimizers)		25		50*	
Maximum Nominal Power per String ⁽³⁾		5700 (6000 with SF7600-LS - SF1400-LS)	6000*	12750*	W
Parallel Strings of Different Lengths or Orientations		Yes			

(4) A string with more than 50 optimizers does not meet NEC rapid shutdown requirements; safety voltage will be above the 30V requirement.
(5) If the inverter's rated AC power is maximum nominal power per string, then the maximum power per string will be able to reach up to the inverter's maximum input DC power.
(6) Refer to <https://www.solaredge.com/sites/default/files/se-power-optimizer-single-string-design-application-note.pdf>.
(7) For the 208V grid, it is a good practice to use 7,000W per string, two minimum string count are required and up to 7,200W without minimum string count. The maximum power difference between each string is 1,000W.
(8) For the 277/480V grid, it is allowed to install up to 15,000W per string when the maximum power difference between each string is 2,000W.
(9) It is not allowed to mix S-series and P-series Power Optimizers in new installations.



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ISSUED FOR PERMIT				10-04-23	EF	DM	ENGIPARTNERS LLC C.A. 32661 1825 PONCE DE LEON BLVD #114 CORAL GABLES, FL 33134 DESIGN@ENGIPARTNERS.COM 833 - 888 - 3644		 Rafael A Gonzalez Soto 2023.10.06 10:05:46 -04'00'		TITAN SOLAR POWER FL 901 ARMSTRONG BLVD, KISSIMMEE, FL 34741 (813) 982 -9001 #EC13009924				MICHAEL ALLEN		SMART MONITORING DATA SHEET								
REV				DATE		sCAD									eCAD				PROJECT ADDRESS:						
																	227 SW BELLFLOWER DR LAKE CITY FL 32024		PROJECT ID:		ENGINEER OF RECORD:		SHEET TITLE:		
																	PARCEL NUMBER:		TSP165401		ENG. RAFAEL A. GONZALEZ SOTO, PE				
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														10-03-23											

Single Phase Inverter with HD-Wave Technology for North America

SE3000H-US / SE3800H-US / SE5000H-US / SE6000H-US / SE7600H-US / SE10000H-US / SE11400H-US



12-25
YEAR
WARRANTY

INVERTERS

Optimized installation with HD-Wave technology

- Specifically designed to work with power optimizers
- Record-breaking 99% weighted efficiency
- Quick and easy inverter commissioning directly from a smartphone using the SolarEdge SetApp
- Fixed voltage inverter for longer strings
- Integrated arc fault protection and rapid shutdown for NEC 2014, NEC 2017 and NEC 2020 per article 690.11 and 690.12
- UL1741 SA certified, for CPUC Rule 21 grid compliance
- Small, lightweight, and easy to install both outdoors or indoors
- Built-in module-level monitoring
- Optional: Faster installations with built-in consumption metering (1% accuracy) and production revenue grade metering (0.5% accuracy, ANSI C12.20)

solaredge.com



Single Phase Inverter with HD-Wave Technology for North America

SE3000H-US / SE3800H-US / SE5000H-US / SE6000H-US / SE7600H-US / SE10000H-US / SE11400H-US

MODEL NUMBER	SE3000H-US	SE3800H-US	SE5000H-US	SE6000H-US	SE7600H-US	SE10000H-US	SE11400H-US		
APPLICABLE TO INVERTERS WITH PART NUMBER	SEXXXXH-XXXXXBXX4								
OUTPUT									
Rated AC Power Output:	3000	3800 @ 240V 3300 @ 208V	5000	6000 @ 240V 5000 @ 208V	7600	10000	11400 @ 240V 10000 @ 208V	VA	
Maximum AC Power Output:	3000	3800 @ 240V 3300 @ 208V	5000	6000 @ 240V 5000 @ 208V	7600	10000	11400 @ 240V 10000 @ 208V	VA	
AC Output Voltage Min.-Nom.-Max. (211 - 240 - 264)	✓	✓	✓	✓	✓	✓	✓	Vac	
AC Output Voltage Min.-Nom.-Max. (183 - 208 - 229)	-	✓	-	✓	-	-	✓	Vac	
AC Frequency (Nominal)	59.3 - 60 - 60.5 ⁽¹⁾							Hz	
Maximum Continuous Output Current @240V	12.5	16	21	25	32	42	47.5	A	
Maximum Continuous Output Current @208V	-	16	-	24	-	-	48.5	A	
Power Factor	1, Adjustable - 0.85 to 0.85								
GFDI Threshold	1							A	
Utility Monitoring, Islanding Protection, Country Configurable Thresholds	Yes								
INPUT									
Maximum DC Power @240V	4650	5900	7750	9300	11800	15500	17650	W	
Maximum DC Power @208V	-	5100	-	7750	-	-	15500	W	
Transformer-less, Ungrounded	Yes								
Maximum Input Voltage	480							Vdc	
Nominal DC Input Voltage	380				400			Vdc	
Maximum Input Current @240V ⁽²⁾	8.5	10.5	13.5	16.5	20	27	30.5	Adc	
Maximum Input Current @208V ⁽²⁾	-	9	-	13.5	-	-	27	Adc	
Max. Input Short Circuit Current	45							Adc	
Reverse-Polarity Protection	Yes								
Ground-Fault Isolation Detection	600kΩ Sensitivity								
Maximum Inverter Efficiency	99					99.2		%	
CEC Weighted Efficiency:	99							99 @ 240V 98.5 @ 208V	%
Nighttime Power Consumption					< 2.5			W	

(1) For other regional settings please contact SolarEdge support
(2) A higher current source may be used; the inverter will limit its input current to the values stated

Single Phase Inverter with HD-Wave Technology for North America

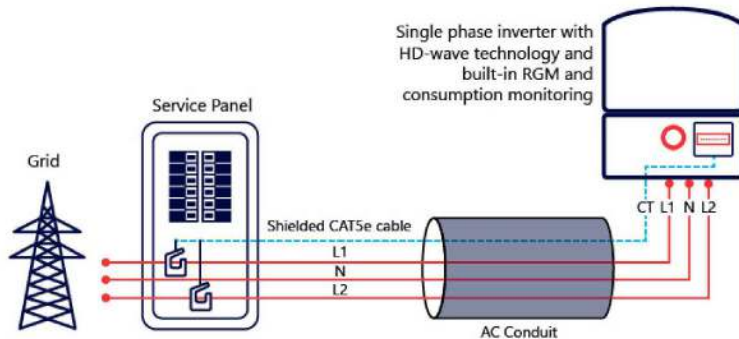
SE3000H-US / SE3800H-US / SE5000H-US / SE6000H-US / SE7600H-US / SE10000H-US / SE11400H-US

MODEL NUMBER	SE3000H-US	SE3800H-US	SE5000H-US	SE6000H-US	SE7600H-US	SE10000H-US	SE11400H-US
ADDITIONAL FEATURES							
Supported Communication Interfaces	RS485, Ethernet, ZigBee (optional), Cellular (optional)						
Revenue Grade Metering, ANSI C12.20	Optional ³						
Consumption metering							
Inverter Commissioning	With the SetApp mobile application using Built-in Wi-Fi Access Point for Local Connection						
Rapid Shutdown - NEC 2014, NEC 2017 and NEC 2020, 690.12	Automatic Rapid Shutdown upon AC Grid Disconnect						
STANDARD COMPLIANCE							
Safety	UL1741, UL1741 SA, UL1699B, CSA C22.2, Canadian AFCI according to T.L.L. M-07						
Grid Connection Standards	IEEE1547, Rule 21, Rule 14 (H-I)						
Emissions	FCC Part 15 Class B						
INSTALLATION SPECIFICATIONS							
AC Output Conduit Size / AWG Range	1" Maximum / 14-6 AWG				1" Maximum /14-4 AWG		
DC Input Conduit Size / # of Strings / AWG Range	1" Maximum / 1-2 strings / 14-6 AWG				1" Maximum / 1-3 strings / 14-6 AWG		
Dimensions with Safety Switch (HxWxD)	17.7 x 14.6 x 6.8 / 450 x 370 x 174				21.3 x 14.6 x 7.3 / 540 x 370 x 185		
Weight with Safety Switch	22 / 10	25.1 / 11.4	26.2 / 11.9		38.8 / 17.6		
Noise	< 25				<50		
Cooling	Natural Convection						
Operating Temperature Range	-40 to +140 / -40 to +60 ⁴						
Protection Rating	NEMA 4X (Inverter with Safety Switch)						

(3) Inverter with Revenue Grade Meter P/N: SExxxxH-US000BNCA; Inverter with Revenue Grade Production and Consumption Meter P/N: SExxxxH-US000BN4. For consumption metering, current transformers should be ordered separately: SEACT0750-200NA-20 or SEACT0750-400NA-20, 20 units per box
(4) Full power up to at least 50°C / 122°F; for power de-rating information refer to: <https://www.solaredge.com/sites/default/files/ie-temperature-derating-note-na.pdf>

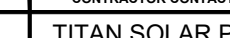
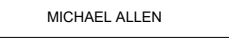
How to Enable Consumption Monitoring

By simply wiring current transformers through the inverter's existing AC conduits and connecting them to the service panel, homeowners will gain full insight into their household energy usage helping them to avoid high electricity bills



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RoHS

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