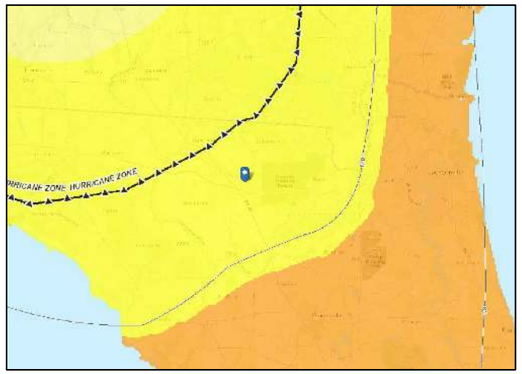
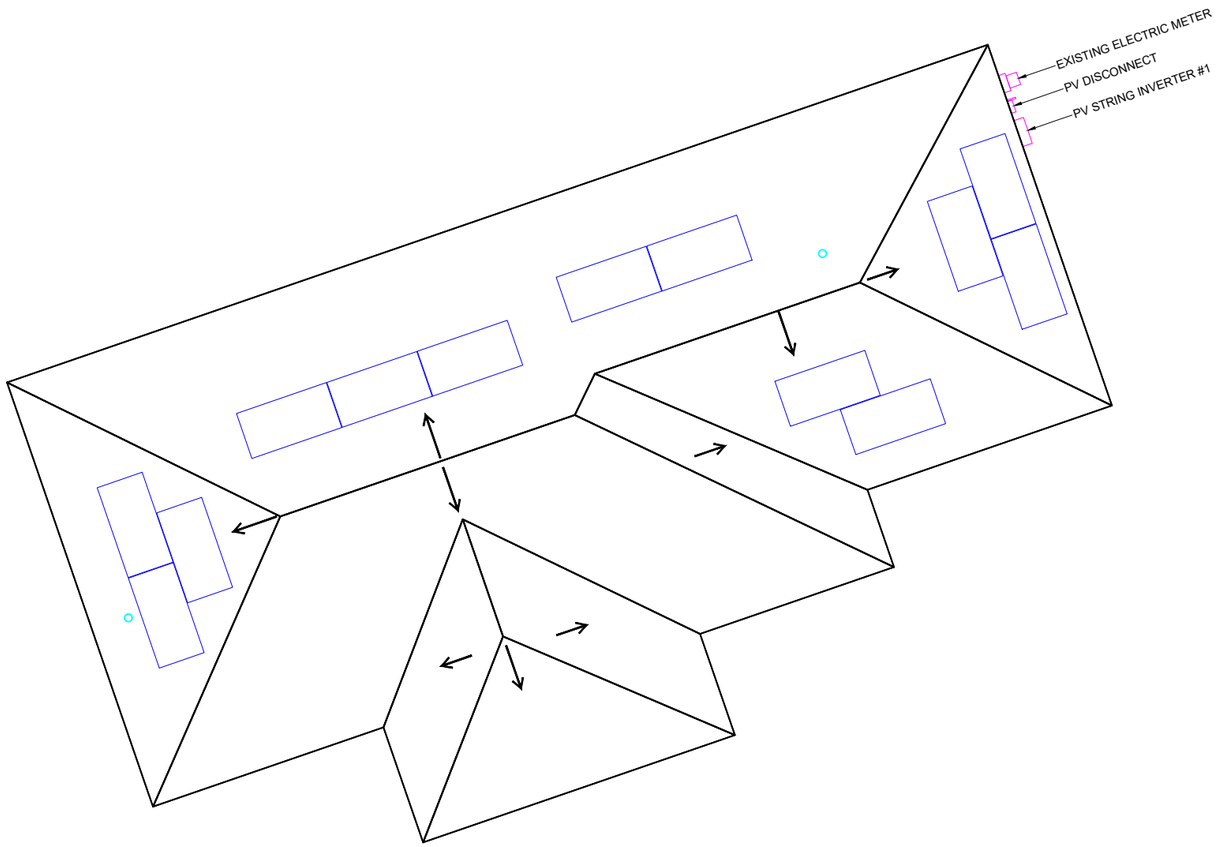


2 LOCATION MAP / WIND ZONES
N.T.S.

3 IRRADIANCE MAP
N.T.S.

4 3D RENDERING
N.T.S.

NORTH



"PROPERTY SIDE FACING STREET"

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

PROJECT DESCRIPTION

SYSTEM CAPACITY: 5.1 KW DC / 3.8 KW AC

PV PANELS: (13) Q.PEAK DUO BLK ML-G10+ 395W BY Q CELL

OPTIMIZERS: (13) P505 BY SOLAREDGE

INVERTER: (1) SE3800H-US BY SOLAREDGE

RACKING SYSTEM: CROSS RAIL SYSTEM 44-X BY K2 SYSTEMS

PROJECT INFORMATION

PROJECT LATITUDE	30.296604	MIN AMBIENT TEMP	-7 ° C
PROJECT LONGITUDE	-82.708187	MAX AMBIENT TEMP	37 ° C
AHJ	COLUMBIA CITY	WIND EXPOSURE	C
		DESIGN WIND SPEED	117 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
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.

DOCUMENT CONTROL	DATE	CAD	QC
ISSUED FOR PERMIT	12-27-2021	BW	JG

REV	DESCRIPTION	DATE	CAD	QC

ENGINEER CONTACT INFORMATION

ENGIPARTNERS LLC
C.A. 32661
255 GIRALDA AVE
CORAL GABLES, FL 33134

DESIGN@ENGIPARTNERS.COM

833 - 888 - 3644

ENGINEERING STAMP

RAFAEL A. GONZALEZ SOTO LICENSE NO. 83104 STATE OF FLORIDA PROFESSIONAL ENGINEER

Digitally signed by Rafael A Gonzalez Soto
Date: 2021.12.29 17:40:45 -04'00'

CONTRACTOR CONTACT INFORMATION

TITAN SOLAR POWER FL
12221 N US HIGHWAY 301

THONOTASASSA, FL 33592

(813) 982 -9001

#EC13008093

CONTRACTOR LOGO

TITAN SOLAR POWER

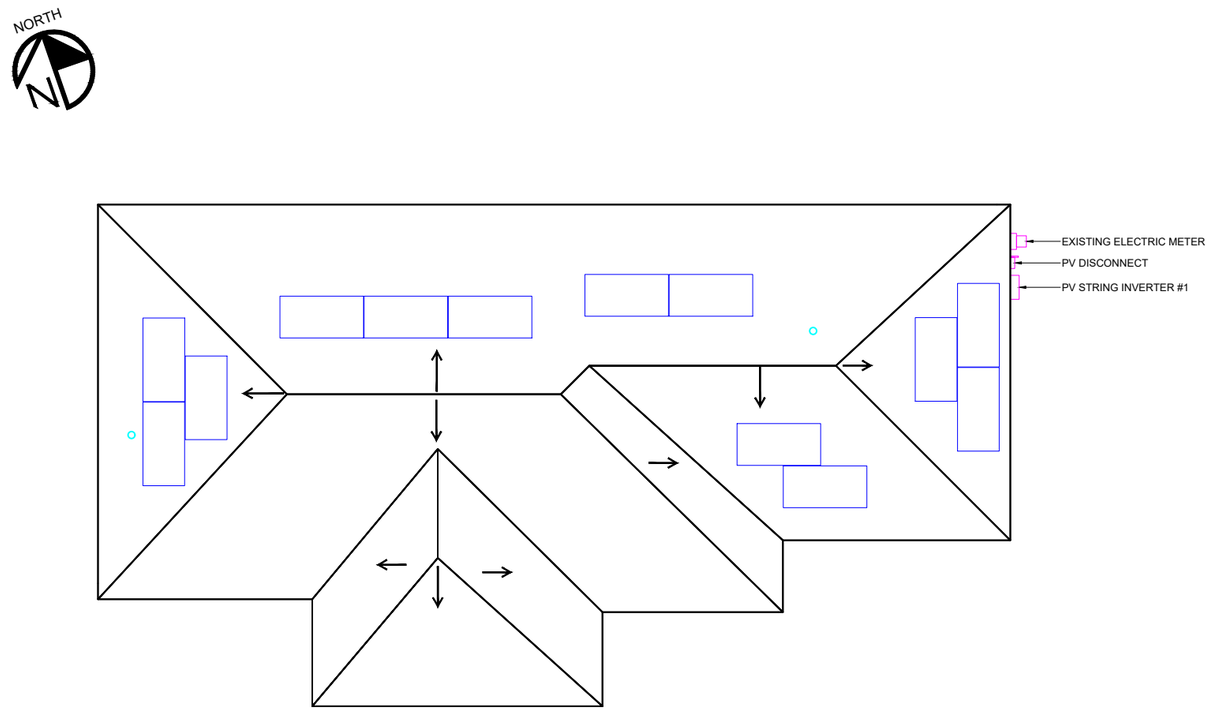
CUSTOMER: SANDY FIROOZ

PROJECT ADDRESS: 161 NORTHWEST SPARR LANE, LAKE CITY FL 32055

PARCEL NUMBER: 22-2S-16-01716-002

SHEET NAME: COVER SHEET

PROJECT ID:	ENGINEER OF RECORD:	SHEET TITLE:
TSP110728	ENG. RAFAEL A. GONZALEZ SOTO, PE	C-1
	DATE: 12-27-2021	SHEETS: 1 OF 9



"PROPERTY SIDE FACING STREET"

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	CAD	QC
ISSUED FOR PERMIT	12-27-2021	BW	JG

REV	DESCRIPTION	DATE	CAD	QC

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12221 N US HIGHWAY 301

THONOTASASSA, FL 33592

(813) 982 -9001

#EC13008093

CONTRACTOR LOGO

TITAN SOLAR POWER

CUSTOMER: SANDY FIROOZ

PROJECT ADDRESS: 161 NORTHWEST SPARR LANE
LAKE CITY FL 32055

PARCEL NUMBER: 22-2S-16-01716-002

SHEET NAME: SAFETY PLAN

PROJECT ID: TSP110728

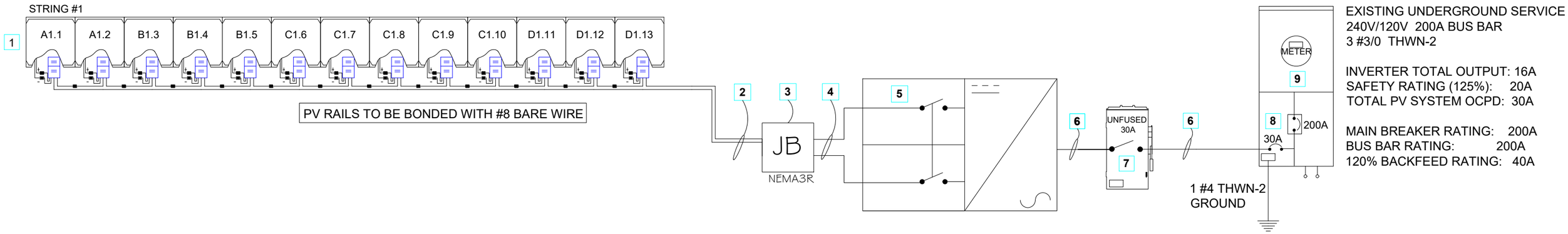
ENGINEER OF RECORD: ENG. RAFAEL A. GONZALEZ SOTO, PE

DATE: 12-27-2021

SHEET TITLE: C-2

SHEETS: 2 OF 9

	WIRE SIZES, QUANTITY & TYPE			RACEWAY SIZE, TYPE, LOCATION & INFO.			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 TEMP	# OF COND.	FINAL 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 X 0.76 X 1 = 30.4 A				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 X 0.76 X 0.8 = 24.3 A				20 FT.	350V	0.21%	8.1%
AC (INVERTER TO METER)	(2) #10 AWG THWN-2	(1)#10AWG THWN-2	(1) #8 AWG THWN-2	3/4" EMT CONDUIT	EXTERIOR WALL	"N/A"	16A	20.0A	20A	40A X 0.76 X 1 = 30.4 A				5 FT.	240V	0.1%	7.7%



1 ONE LINE RISER DIAGRAM

N.T.S.

LEGEND:

1	(13) Q.PEAK DUO BLK ML-G10+395W BY Q CELL REFER TO D-1 SHEET	2	2 #10 PV WIRE PER STRING 1 #8 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	SE3800H-US BY SOLAREDGE REFER TO D-3 SHEET	6	2 #10 L1,L2 THWN-2 1 #8 THWN-2 GROUND 1 #10 THWN-2 NEUTRAL 3/4" EMT CONDUIT
7	PV SYSTEM DISCONNECT - 30A RATED	8	PV INTERCONNECTION POINT - PV BREAKER	9	UTILITY ELECTRICAL SERVICE
10	NOT USED	11	NOT USED	12	NOT USED

DOCUMENT CONTROL	DATE	CAD	QC
ISSUED FOR PERMIT	12-27-2021	BW	JG

REV	DESCRIPTION	DATE	CAD	QC

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12221 N US HIGHWAY 301

THONOTASASSA, FL 33592

(813) 982 -9001

#EC13008093

CONTRACTOR LOGO

TITAN SOLAR POWER

CUSTOMER: SANDY FIROOZ

PROJECT ADDRESS: 161 NORTHWEST SPARR LANE, LAKE CITY FL 32055

PARCEL NUMBER: 22-2S-16-01716-002

SHEET NAME: ONE LINE RISER DIAGRAM

PROJECT ID: TSP110728

ENGINEER OF RECORD: ENG. RAFAEL A. GONZALEZ SOTO, PE

DATE: 12-27-2021

SHEET TITLE: E-1

SHEETS: 3 OF 9

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)

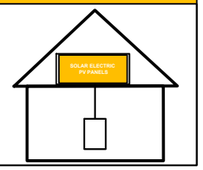
WARNING

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.



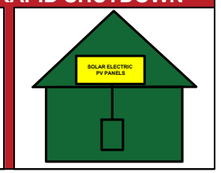
LABEL LOCATION:
AC DISCONNECT, MAIN PANEL
PER CODE: NEC 690.56(C)(3)

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.



INVERTER #1

NOMINAL OPERATING AC VOLTAGE	240 V
NOMINAL OPERATING AC FREQUENCY	60 HZ
MAXIMUM AC POWER	3.8 KW
MAXIMUM AC CURRENT	16 A
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	10.5 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:	16 A
NOMINAL OPERATING AC VOLTAGE:	240V

LABEL LOCATION:
AC DISCONNECT
PER CODE: NEC 690.54

MAIN PHOTOVOLTAIC SYSTEM DISCONNECT

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

WARNING: PHOTOVOLTAIC POWER SOURCE

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

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

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

TITAN SOLAR POWER FLORIDA
901 ARMSTRONG BLVD, KISSIMMEE, FL 34741
1-855-SAY-SOLAR

1 PV SAFETY LABELS DATA
N.T.S.

DOCUMENT CONTROL	DATE	CAD	QC
ISSUED FOR PERMIT	12-27-2021	BW	JG

REV	DESCRIPTION	DATE	CAD	QC

ENGINEER CONTACT INFORMATION
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833 - 888 - 3644

ENGINEERING STAMP
RAFAEL A. GONZALEZ SOTO LICENSE No. 83104 STATE OF FLORIDA PROFESSIONAL ENGINEER
Digitally signed by Rafael A Gonzalez Soto
Date: 2021.12.29 17:41:15 -04'00'

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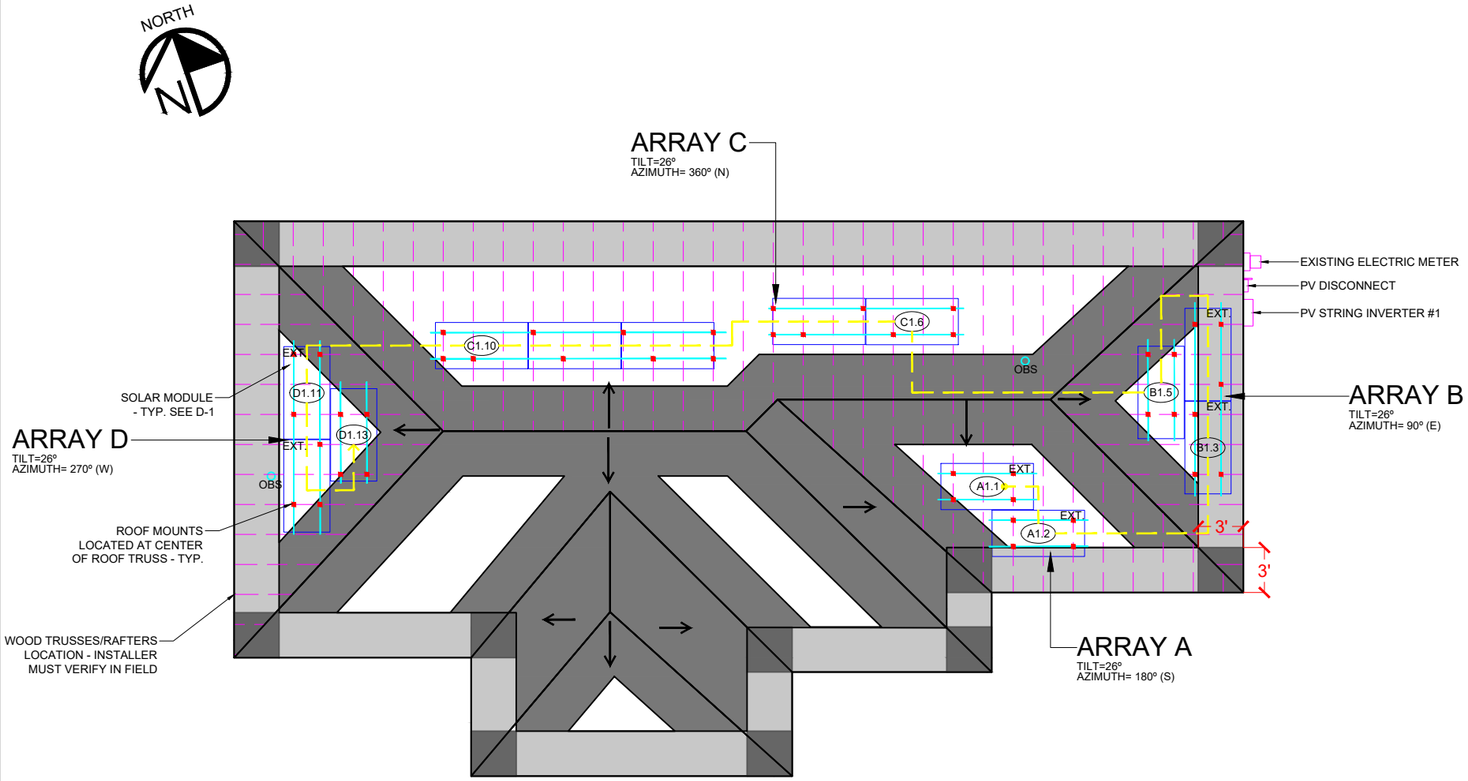
TITAN SOLAR POWER FL
12221 N US HIGHWAY 301
THONOTASASSA, FL 33592
(813) 982 -9001
#EC13008093

CONTRACTOR LOGO
TITAN SOLAR POWER

CUSTOMER: SANDY FIROOZ
PROJECT ADDRESS: 161 NORTHWEST SPARR LANE, LAKE CITY FL 32055
PARCEL NUMBER: 22-2S-16-01716-002

SHEET NAME: SAFETY LABELS

PROJECT ID: TSP110728
ENGINEER OF RECORD: ENG. RAFAEL A. GONZALEZ SOTO, PE
DATE: 12-27-2021
SHEET TITLE: E-2
SHEETS: 4 OF 9



1 STRUCTURAL ROOF PLAN & PV MODULES LAYOUT

N.T.S.

LEGEND & SYMBOLS

OBS	ROOF OBSTRUCTIONS
XX.X	ARRAY # / MODULE # / STRING #
	PV MODULES
	TRUSSES OR RAFTERS
	ROOF MOUNTS & RAIL
	ROOF SLOPE
EXT.	EXTERIOR PV MODULE

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.

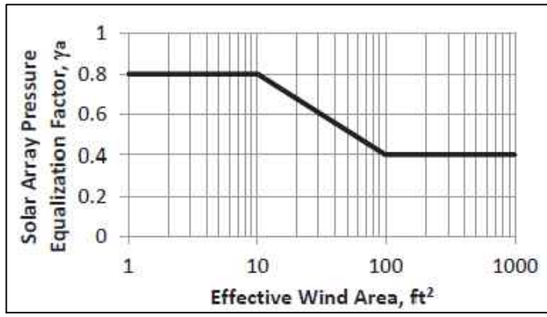
ROOF INSPECTION NOTE:

PV MODULE IN LAYOUT IS CONSIDERED NON-EXPOSED AFTER COMPLYING WITH THE FOLLOWING STATEMENTS BASED ON ASCE7-16:
-NO INDIVIDUAL PV MODULE IS MORE THAN 0.5(MEAN ROOF HEIGHT) AWAY FROM ROOF EDGE OR ANOTHER MODULE.
-NO INDIVIDUAL PV MODULE IS MORE THAN 4 FT AWAY FROM ROOF EDGE OR ANOTHER MODULE.
-INDIVIDUAL PV MODULE IS MORE THAN 1.5(MODULE LENGTH) AWAY FROM CLOSEST EXPOSED EDGE

ASCE 7.16 - 29.4-7

DESIGNED WIND PRESSURES:

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



SOLAR MODULE

UL 1703 CERTIFIED
MAX. DESIGN LOAD: 83.54 psf
APPLIED WIND LOAD : 34.12 psf

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.

WEIGHTED AVERAGE

WORST CASE MODULE:
ZONE 1: 21%
ZONE 2e: 64%
ZONE 2r: 15%
-25.49(0.21) + -36.41(0.64) + -36.41(0.15) = -34.12psf

ULTIMATE WIND SPEED	120	mph
DESIGN WIND SPEED	117	mph
RISK CATEGORY	II	
EXPOSURE CATEGORY	C	
ROOF SLOPE (°)	26	
ROOF TYPE	HIPPED	
MATERIAL ROOF TYPE	ASPHALT SHINGLES	
PRESSURE ZONE:	1&2	
MEAN ROOF HEIGHT:	13.73	
PERIMETER WIDTH:	3.0	
K_D	0.85	
K_{ZT}	1.00	
K_H	0.850	
VELOCITY PRESSURE (q) = $0.60*0.00256* K_H K_{ZT} K_D V^2$		
VELOCITY PRESSURE (ASD)	15.17	

INTERIOR EDGE FACTOR: γ_E = 1.0	EXTERIOR EDGE FACTOR: γ_E = 1.5	ARRAY EQUALIZATION FACTOR: γ_a = 0.8

EXTERNAL PRESSURE COEFFICIENT Z1	0.7	-1.4
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)	INTERIOR PRESSURES (PSF)	EXTERIOR PRESSURES (PSF)	MAX SPAN (FT)	MAX CANTI-LEVER (IN)
1	- 23.97	-16.99	-25.49	6 '	24"
2e	- 33.07	-24.27	-36.41	6 '	24"
2r	- 33.07	-24.27	-36.41	4 '	16"
3	- 33.07	-24.27	-36.41	4 '	16"

TOTAL ROOF AREA	1961.57 sq.-ft
TOTAL MODULES:	13
TOTAL PHOTOVOLTAIC AREA:	274.69 sq.-ft
WIND LOAD (PSF):	34.12
TOTAL WIND LOAD (LBS):	9,372.42
TOTAL ROOF MOUNTS:	44
TENSION FORCE PER MOUNT (LBS):	213.01

DOCUMENT CONTROL	DATE	CAD	QC
ISSUED FOR PERMIT	12-27-2021	BW	JG

REV	DESCRIPTION	DATE	CAD	QC

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CONTRACTOR LOGO
TITAN SOLAR POWER

CUSTOMER: SANDY FIROOZ

PROJECT ADDRESS:
161 NORTHWEST SPARR LANE
LAKE CITY FL 32055

PARCEL NUMBER: 22-2S-16-01716-002

SHEET NAME: STRUCTURAL PLAN

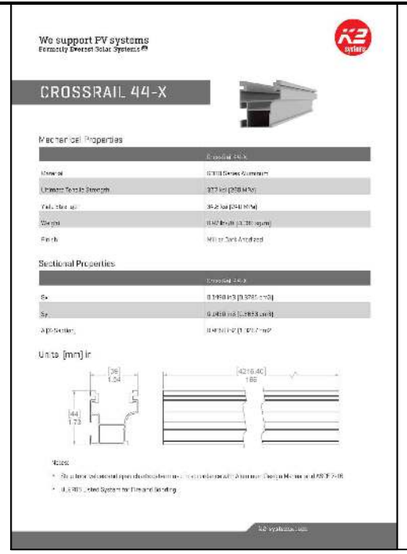
PROJECT ID: TSP110728

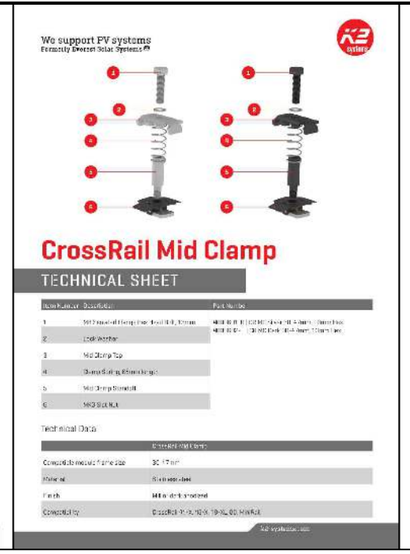
ENGINEER OF RECORD: ENG. RAFAEL A. GONZALEZ SOTO, PE

DATE: 12-27-2021

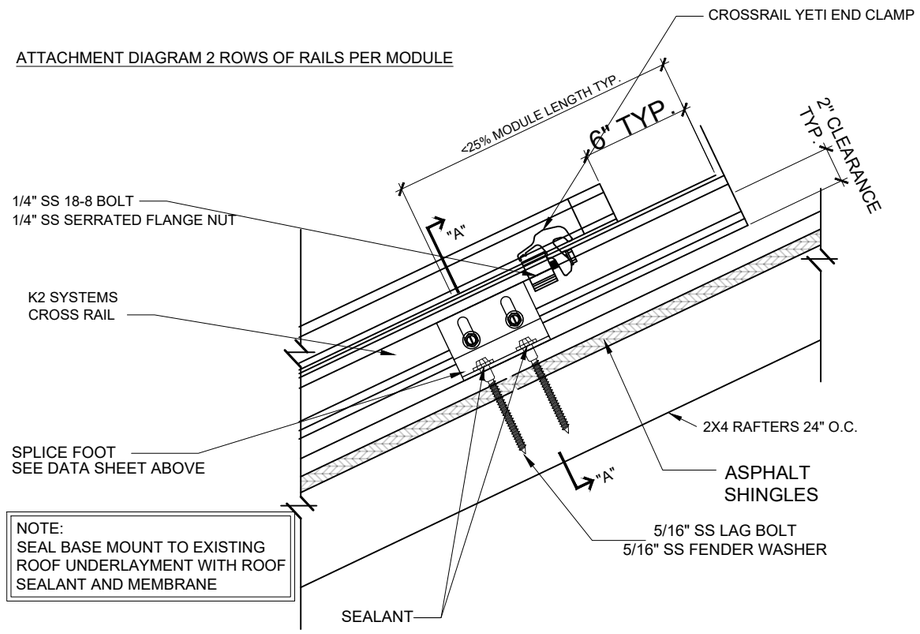
SHEET TITLE: S-1

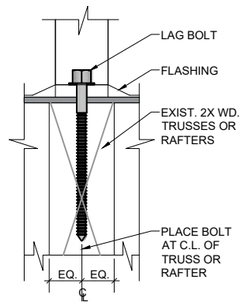
SHEETS: 5 OF 9





ATTACHMENT DIAGRAM 2 ROWS OF RAILS PER MODULE





SECTION "A-A"
N.T.S.

LAG BOLT PULL OUT CALCULATIONS

Spruce, Pine,	Per inch Thread Depth	266lbs
SS Lag Bolt 5/16" x 4"	Min. Thread Depth	0'-3"
Wood Strength x Thread Depth = Pull Out Strength		
266 lbs. x 3 in = 798 lbs.		
Allowable Pull Out Strength per Lag Bolt		798 lbs.
Max. Pull Out Strength Required per Lag Bolt		213.01
Lag Bolt Pull Out Strength Safety Factor		3.75

K2 SYSTEM 44-X Landscape 60-Cell								
Ground Snow Load	Exposure Category	Panel Angle	Wind Speed	120 mph				
			Roof Zone	1'	1	2e	2r	2n	3e	3r
0 psf	C	20 to 27	Array Interior	88	88	88	74	74	74	72
			Array Edge	76	76	76	64	64	64	62

DISTRIBUTED LOAD CALCULATIONS

PV MODULES & RACKING WEIGHT = (INDIVIDUAL MODULE WEIGHT + 3.5 LBS) * (MODULE QTY) = (52 LBS) * (13) = 676 LBS

PER SQUARE FEET (PSF) ARRAY LOAD = PV MODULES & RACKING WEIGHT / TOTAL ARRAY AREA = 676 LBS / 274 SQFT = 2.46 PSF

HENCE, ROOF WILL CARRY THE ADDITIONAL SOLAR SYSTEM LOAD

Notes: (1) Thread must be embedded in the side grain of a Trusses or other structural member integral with the building structure.
(2) Lag Bolts must be located in the middle third of the structural member.
(3) These values are not valid for wet services.
(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 nor over-torque.
(6) Withdrawal design values for lag screw connections shall be multiplied by applicable adjustment factors if necessary. See table 10.3.1 in the American Wood Council NDS for Wood Construction.

Lag Screw Installation Guidelines

1. Determine location for the Mount on roof by drilling through the center of truss from bottom with 5/32" drill bit.
2. Mark mounting holes for Mount on underlayment. Mounting holes should be centered on the trusses.
3. Drill 15/64" pilot hole.
4. Apply sealant to bottom of Mount.
5. Place Mount over roof underlayment with holes in roof.
6. Apply sealant to bottom of Mount, apply sealant to lag screws and fasten Mount securely to trusses.
7. Apply additional sealant to top assembly to be sure all penetrations are sealed.

ASCE 7-16 Velocity Pressure

qz10 = 0.00256Kz Kzt Kd V2

Where:

qz10 = ASCE 7-16 velocity pressure evaluated at mean roof height (psf)
Kz = velocity pressure exposure coefficient
Kzt = topographic factor
Kd = wind directionality factor
V = basic wind speed (mph) from ASCE 7-16 maps referred to as ultimate wind speed maps in 2020 FBC.

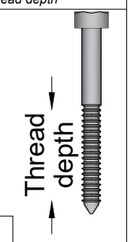
As an example, for an array having an area of 158.04 sq.-ft., the total uplifting (resultant) force acting on the array would be -39.1 psf x 158.04 sq. ft. = -6,179.364 lb. Knowing this resultant force, the design engineer can now determine the number of attachment points and the size of the mounting hardware necessary to safely carry this load.

Live Loads:

Live loads associated with photovoltaic systems are usually assumed to be distributed uniformly and are small, on the order of 4 psf or less.

Lag pull-out (withdrawal) capacities (lbs) in typical roof lumber (ASD)

	STAINLESS STEEL Lag screw specifications	
	Specific gravity	*5/16" shaft, * per inch thread depth*
Douglas Fir, Larch	0.50	266
Douglas Fir, South	0.46	235
Engelman Spruce, Lodgepole Pine (MSR 1650 f & higher)	0.46	235
Hem, Fir, Redwood (close grain)	0.43	212
Hem, Fir (North)	0.46	235
Southern Pine	0.55	307
Spruce, Pine, Fir	0.42	205
Spruce, Pine, Fir (E of 2 million psi and higher grades of MSR and MEL)	0.50	266



Sources: American Wood Council, NDS 2005, Table 11.2A, 11.3A.

1 SHINGLE ROOF MOUNT DETAIL & DATA

N.T.S.

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REV	DESCRIPTION	DATE	CAD	QC

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CONTRACTOR LOGO
TITAN SOLAR POWER

CUSTOMER: SANDY FIROOZ
PROJECT ADDRESS: 161 NORTHWEST SPARR LANE, LAKE CITY FL 32055
PARCEL NUMBER: 22-2S-16-01716-002

SHEET NAME: RACKING PLAN

PROJECT ID:	ENGINEER OF RECORD:	SHEET TITLE:
TSP110728	ENG. RAFAEL A. GONZALEZ SOTO, PE	S-2
	DATE: 12-27-2021	SHEETS: 6 OF 9

powered by Q.ANTUM DUO Z

Q.PEAK DUO BLK ML-G10+

385-410

ENDURING HIGH PERFORMANCE

EUPD RESEARCH TOP BRAND PV MODULES AUSTRALIA 2017 2018 2021 2020 2019

25 YR Warranty Product & Performance

Q CELLS Yield Security

BREAKING THE 20% EFFICIENCY BARRIER

Q.ANTUM DUO Z Technology with zero gap cell layout boosts module efficiency up to 21.1%.

THE MOST THOROUGH TESTING PROGRAMME IN THE INDUSTRY

Q CELLS is the first solar module manufacturer to pass the most comprehensive quality programme in the industry: The new "Quality Controlled PV" of the independent certification institute TÜV Rheinland.

INNOVATIVE ALL-WEATHER TECHNOLOGY

Optimal yields, whatever the weather with excellent low-light and temperature behaviour.

ENDURING HIGH PERFORMANCE

Long-term yield security with Anti LID Technology, Hot-Spot Protect and Traceable Quality Tra.Q™.

EXTREME WEATHER RATING

High-tech aluminium alloy frame, certified for high snow (5400 Pa) and wind loads (4000 Pa).

A RELIABLE INVESTMENT

Inclusive 25-year product warranty and 25-year linear performance warranty.

1 See data sheet on rear for further information.

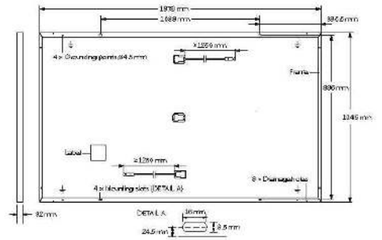
THE IDEAL SOLUTION FOR:

Rooftop arrays on residential buildings

Engineered in Germany

MECHANICAL SPECIFICATION

Format	1879 mm × 1045 mm × 32 mm (including frame)
Weight	22.0 kg
Front Cover	3.2 mm thermally pre-stressed glass with anti-reflection technology
Back Cover	Composite film
Frame	Black anodised aluminium
Cell	6 × 22 monocrystalline Q.ANTUM solar half cells
Junction box	53–101 mm × 32–60 mm × 15–18 mm Protection class IP67, with bypass diodes
Cable	4 mm² Solar cable; (+) ≥1250 mm, (–) ≥1250 mm
Connector	Stäubli MC4; IP68



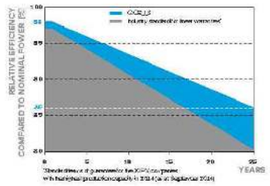
ELECTRICAL CHARACTERISTICS

POWER CLASS			385	390	395	400	405	410
MINIMUM PERFORMANCE AT STANDARD TEST CONDITIONS, STC[1] (POWER TOLERANCE +5 W / −0 W)								
Minimum	Power at MPP[1]	P_{MPP} [W]	385	390	395	400	405	410
	Short Circuit Current[1]	I_{SC} [A]	11.04	11.07	11.10	11.14	11.17	11.20
	Open Circuit Voltage[1]	V_{OC} [V]	45.19	45.23	45.27	45.30	45.34	45.37
	Current at MPP	I_{MPP} [A]	10.59	10.65	10.71	10.77	10.83	10.89
	Voltage at MPP	V_{MPP} [V]	36.36	36.62	36.88	37.13	37.39	37.64
	Efficiency[1]	η [%]	≥19.6	≥19.9	≥20.1	≥20.4	≥20.6	20.9
MINIMUM PERFORMANCE AT NORMAL OPERATING CONDITIONS, NMOT[2]								
Minimum	Power at MPP	P_{MPP} [W]	288.8	292.6	296.3	300.1	303.8	307.6
	Short Circuit Current	I_{SC} [A]	8.90	8.92	8.95	8.97	9.00	9.03
	Open Circuit Voltage	V_{OC} [V]	42.62	42.65	42.69	42.72	42.76	42.79
	Current at MPP	I_{MPP} [A]	8.35	8.41	8.46	8.51	8.57	8.62
	Voltage at MPP	V_{MPP} [V]	34.59	34.81	35.03	35.25	35.46	35.68

[1] Measurement tolerances P_{STC} ±3%; I_{SC}; V_{OC} ±5% at STC: 1000 W/m², 25±2 °C, AM 1.5 according to IEC 60904-3 • [2] 800 W/m², NMOT, spectrum AM 1.5

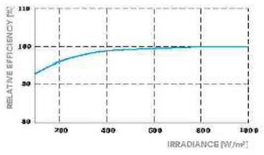
Q CELLS PERFORMANCE WARRANTY

PERFORMANCE AT LOW IRRADIANCE



At least 98% of nominal power during first year. Thereafter max. 0.5% degradation per year. At least 93.5% of nominal power up to 10 years. At least 86% of nominal power up to 25 years.

All data within measurement tolerances. Full warranties in accordance with the warranty terms of the Q CELLS sales organisation of your respective country.



Typical module performance under low irradiance conditions in comparison to STC conditions (25 °C, 1000 W/m²).

TEMPERATURE COEFFICIENTS							
Temperature Coefficient of I_{SC}	α	[%/K]	+0.04	Temperature Coefficient of V_{OC}	β	[%/K]	−0.27
Temperature Coefficient of P_{MPP}	γ	[%/K]	−0.34	Nominal Module Operating Temperature	NMOT	[°C]	43±3

PROPERTIES FOR SYSTEM DESIGN

Maximum System Voltage	V_{SYS}	[V]	1000	PV module classification		Class II
Maximum Reverse Current	I_R	[A]	20	Fire Rating based on ANSI / UL 61730		C / TYPE 2
Max. Design Load, Push / Pull		[Pa]	3600 / 2660	Permitted Module Temperature on Continuous Duty		−40 °C – +85 °C
Max. Test Load, Push / Pull		[Pa]	5400 / 4000			

QUALIFICATIONS AND CERTIFICATES

Quality Controlled PV - TÜV Rheinland; IEC 61215:2016; IEC 61730:2016. This data sheet complies with DIN EN 50380. QCPV Certification ongoing. Certification holder: Hanwha Q CELLS GmbH

PACKAGING INFORMATION

Horizontal packaging	1940 mm	1100 mm	1220 mm	751 kg	28 pallets	24 pallets	32 modules

Note: Installation instructions must be followed. See the installation and operating manual or contact our technical service department for further information on approved installation and use of this product.

Made in Korea

Hanwha Q CELLS Australia Pty Ltd
Suite 1, Level 1, 15 Blue Street, North Sydney, NSW 2060, Australia | TEL +61 (0)2 9016 3033 | FAX +61 (0)2 9016 3032 | EMAIL q-cells-australia@q-cells.com | WEB www.q-cells.com/au

Specifications subject to technical changes © Q CELLS Q.PEAK DUO BLK ML-G10+ 385-410 2021-06_Rev01_AU

Engineered in Germany

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CONTRACTOR LOGO

TITAN SOLAR POWER

CUSTOMER: SANDY FIROOZ

PROJECT ADDRESS: 161 NORTHWEST SPARR LANE, LAKE CITY FL 32055

PARCEL NUMBER: 22-2S-16-01716-002

SHEET NAME: PV MODULES DATA SHEET

PROJECT ID:	ENGINEER OF RECORD:	SHEET TITLE:
TSP110728	ENG. RAFAEL A. GONZALEZ SOTO, PE	D-1
	DATE: 12-27-2021	SHEETS: 7 OF 9

Power Optimizer

For North America

P320 / P340 / P370 / P400 / P401 / P405 / P485 / P505

POWER OPTIMIZER

PV power optimization at the module-level

- Specifically designed to work with SolarEdge inverters
- Up to 25% more energy
- Superior efficiency (99.5%)
- Mitigates all types of module mismatch losses, from manufacturing tolerance to partial shading
- Flexible system design for maximum space utilization
- Fast installation with a single bolt
- Next generation maintenance with module-level monitoring
- Meets NEC requirements for arc fault protection (AFCI) and Photovoltaic Rapid Shutdown System (PVRSS)
- Module-level voltage shutdown for installer and firefighter safety

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Power Optimizer

For North America

P320 / P340 / P370 / P400 / P401 / P405 / P485 / P505

Optimizer model (typical module compatibility)	P320 (for 60-cell modules)	P340 (for high-power 60-cell modules)	P370 (for higher-power 60 and 72-cell modules)	P400 (for 72 & 96-cell modules)	P401 (for high power 60 and 72 cell modules)	P405 (for high-voltage modules)	P485 (for high-voltage modules)	P505 (for higher current modules)	
INPUT									
Rated Input DC Power(1)	320	350	370	400	405		485	505	W
Absolute Maximum Input Voltage (Voc at lowest temperature)	48		60	80	60	125(2)		83(2)	Vdc
MPPT Operating Range	8 - 48		8 - 60	8 - 80	8-60	12.5 - 105		12.5 - 83	Vdc
Maximum Short Circuit Current (Isc)	11	11.02	11	10.1	11.75	11		14	Adc
Maximum DC Input Current	13.75			12.5	14.65	12.5		17.5	Adc
Maximum Efficiency	99.5								%
Weighted Efficiency	98.8							98.6	%
Overvoltage Category	II								
OUTPUT DURING OPERATION (POWER OPTIMIZER CONNECTED TO OPERATING SOLAREDGE INVERTER)									
Maximum Output Current	15								Adc
Maximum Output Voltage	60					85			Vdc
OUTPUT DURING STANDBY (POWER OPTIMIZER DISCONNECTED FROM SOLAREDGE INVERTER OR SOLAREDGE INVERTER OFF)									
Safety Output Voltage per Power Optimizer	1 ± 0.1								Vdc
STANDARD COMPLIANCE									
EMC	FCC Part15 Class B, IEC61000-6-2, IEC61000-6-3								
Safety	IEC62109-1 (class II safety), UL1741								
Material	UL94 V-0, UV Resistant								
RoHS	Yes								
INSTALLATION SPECIFICATIONS									
Maximum Allowed System Voltage	1000								Vdc
Compatible inverters	All SolarEdge Single Phase and Three Phase inverters								
Dimensions (W x L x H)	129 x 153 x 27.5 / 5.1 x 6 x 1.1		129 x 153 x 33.5 / 5.1 x 6 x 1.3	129 x 153 x 29.5 / 5.1 x 6 x 1.16	129 x 159 x 49.5 / 5.1 x 6.3 x 1.9			129 x 162 x 59 / 5.1 x 6.4 x 2.3	mm / in
Weight (including cables)	630 / 1.4		750 / 1.7	655 / 1.5	845 / 1.9			1064 / 2.3	gr / lb
Input Connector	MC4(4)						Single or dual MC4(4)(5)	MC4(4)	
Input Wire Length	0.16 / 0.52			0.16 or 0.9 /0.52 or 2.95(5)	0.16 / 0.52				m / ft
Output Wire Type / Connector	Double Insulated / MC4								
Output Wire Length	0.9 / 2.95	1.2 / 3.9							m / ft
Operating Temperature Range(6)	-40 to +85 / -40 to +185								°C / °F
Protection Rating	IP68 / NEMA6P								
Relative Humidity	0 - 100								%

(1) Rated power of the module at STC will not exceed the optimizer "Rated Input DC Power". Modules with up to +5% power tolerance are allowed
(2) NEC 2017 requires max input voltage be not more than 80V
(3) For other connector types please contact SolarEdge
(4) For dual version for parallel connection of two modules use P485-4NMDMRM. In the case of an odd number of PV modules in one string, installing one P485 dual version power optimizer connected to one PV module. When connecting a single module seal the unused input connectors with the supplied pair of seals
(5) Longer inputs wire length are available for use. For 0.9m input wire length order P401-xxxLxxx
(6) For ambient temperature above +85°C / +185°F power de-rating is applied. Refer to Power Optimizers Temperature De-Rating Technical Note for more details

PV System Design Using a SolarEdge Inverter(7)(8)		Single Phase HD-Wave	Single phase	Three Phase for 208V grid	Three Phase for 277/480V grid	
Minimum String Length (Power Optimizers)	P320, P340, P370, P400, P401	8		10	18	
	P405, P485, P505	6		8	14	
Maximum String Length (Power Optimizers)		25		25	50(9)	
Maximum Power per String		5700 (6000 with SE7600-US - SE11400-US)	5250	6000(10)	12750(11)	W
Parallel Strings of Different Lengths or Orientations		Yes				

(7) For detailed string sizing information refer to: http://www.solaredge.com/sites/default/files/string_sizing_na.pdf
(8) It is not allowed to mix P485/P505 with P320/P340/P370/P400/P401 in one string
(9) A string with more than 30 optimizers does not meet NEC rapid shutdown requirements; safety voltage will be above the 30V requirement
(10) For 208V grid: it is allowed to install up to 6,500W per string when the maximum power difference between each string is 1,000W
(11) For 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

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Intertek RoHS

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PARCEL NUMBER: 22-2S-16-01716-002

SHEET NAME: SMART MONITORING DATA SHEET

PROJECT ID: TSP110728

ENGINEER OF RECORD: ENG. RAFAEL A. GONZALEZ SOTO, PE

DATE: 12-27-2021

SHEET TITLE: D-2

SHEETS: 8 OF 9

Single Phase Inverter with HD-Wave Technology

for North America

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

INVERTERS

12-25 YEAR WARRANTY

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 and 2017, 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)

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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

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PARCEL NUMBER: 22-2S-16-01716-002

SHEET NAME: INVERTER DATA SHEET

PROJECT ID:	ENGINEER OF RECORD:	SHEET TITLE:
TSP110728	ENG. RAFAEL A. GONZALEZ SOTO, PE	D-3
	DATE: 12-27-2021	SHEETS: 9 OF 9