ROOF MOUNT SOLAR PERMIT PACKAGE

CUSTOMER NAME

8.000KW DC GRID TIED PHOTOVOLTAIC SYSTEM

9375 TRINANA CIR, WINTER GARDEN, FL 34787

BUILDING INFORMATION

2 STORY HOUSE
CONSTRUCTION TYPE: V-B
ROOF: METAL ROOF

SINGLE FAMILY RESIDENCE
OCCUPANCY: R3/U
APN: 272404755000110

PV SYSTEM SUMMARY:

SYSTEM SIZE (DC)	:	STC: 400 x 20 = 8.000kW DC	SYSTEM SIZE (DC) :	STC: 327 x 28 = 9.156kW DC
	:	PTC: 370.7 x 20 = 7.4140kW DC		
SYSTEM SIZE (AC)	:	6.500kW AC @ 240V	SYSTEM SIZE (AC) :	8.8kW AC @ 240V
MODULES	:	(20) VSUN VSUN400-108BMH	MODULES :	(28) SUN POWER SPR-E20-327
MICRO-INVERTERS	:	ENPHASE: IQ8M-72-2-US & (E) SUNNY BOY SB 3800TL-US-22 + SB 5000TL-US-22		
MICRO-INVERTERS QTY	:	20		
TILT	:	30°, 30°		
AZIMUTH	:	169°, 259°		
ROOF	:	METAL ROOF		
RAFTER/TRUSS SIZE	:	2" X 4" TRUSS @ 24" O.C.		
ATTACHMENT TYPE	:	SNAPNRACKSPEEDSEAL WITH SNAPNRACK ULTRA RAIL UR-60		
BATTERY	:	TESLA POWERWALL		
BATTERY QTY.	:	2		
MAIN SERVICE PANEL	:	200 AMPS MSP WITH (E) 200 AMPS MAIN BREAKER ON TOP FED		
INTERCONNECTION	:	PV BREAKER AT IQ SYSTEM CONTROLLER		
OCPD RATING	:	80AMPS		
UTILITY	:	GAINESVILLE REGIONAL UTILITIES		

GENERAL NOTES:

1. LOCAL UTILITY PROVIDER SHALL BE NOTIFIED PRIOR TO USE AND ACTIVATION OF ANY SOLAR PHOTOVOLTAIC INSTALLATION ·
2. THIS PROJECT SHALL COMPLY WITH LOCAL ORDINANCES ·
3. PROPER ACCESS AND WORKING CLEARANCE WILL BE PROVIDED ·
4. ALL ELECTRICAL WORK SHOWN ON THESE PLANS WILL BE COMPLETED BY THE UNDERSIGNED ·
5. ALL APPLICABLE PV EQUIPMENT LISTED AND COMPLIANT WITH UL2703, UL1741 AND UL1703
6. ALL ROOF PENETRATIONS TO BE SEALED WITH A HIGH PERFORMANCE ROOF SEALANT SUCH AS GeoCel 2300 CLEAR SEALANT ·
7. THE SYSTEM WILL NOT BE INTERCONNECTED UNTIL APPROVAL FROM THE LOCAL JURISDICTION AND THE UTILITY IS OBTAINED ·
8. THE SOLAR PHOTOVOLTAIC INSTALLATION SHALL NOT OBSTRUCT ANY PLUMBING, MECHANICAL, OR BUILDING ROOF VENTS ·
9. IF THE EXISTING MAIN PANEL DOES NOT HAVE VERIFIABLE GROUNDING ELECTRODE, IT IS THE NECESSARY TO INSTALL A SUPPLEMENTAL GROUNDING ELECTRODE ·
10. EACH MODULE WILL BE GROUNDED UL 2703 OR UL 1703 APPROVED USING THE SUPPLIED CONNECTION POINTS IDENTIFIED ON THE MODULE AND THE MANUFACTURER'S INSTALLATION INSTRUCTIONS" ·
11. A LADDER SHALL BE IN PLACE FOR THE INSPECTION IN COMPLIANCE WITH OSHA REGULATIONS ·
12. MAX HEIGHT OF MODULES OFF OF ROOF FACE : <6" ·
13. PHOTOVOLTAIC SYSTEM WILL COMPLY WITH 2017 CEC. ·
14. PHOTOVOLTAIC SYSTEM INVERTER IS UNGROUNDED. NO CONDUCTORS ARE SOLIDLY GROUNDED IN THE INVERTER, AND SYSTEM COMPLIES WITH 690.35. ·
15. MODULES CONFORM TO AND ARE LISTED UNDER UL 1703. ·
16. INVERTER CONFORMS TO AND IS LISTED UNDER UL 1741. ·
17. ELECTRICAL EQUIPMENT AND MATERIAL TO BE LISTED, LABELED, AND INSTALLED PER THE CEC, THE INSTALLATION STANDARDS/MANUFACTURER'S RECOMMENDATIONS AND IF REQUIRED A RECOGNIZED ELECTRICAL TESTING LABORATORY. ·
18. CONDUITS EXPOSED TO SUNLIGHT ON ROOF SHALL BE LOCATED NOT LESS THAN 7/8" ABOVE ROOF SURFACE.
19. IN EXPOSED LOCATIONS, WIRING AND CABLING SHALL BE IN CONDUIT OR CABLE SHALL BE RATED FOR EXPOSURE; TYPE NM CABLE ALLOWED IN PROTECTED LOCATIONS. WITHIN ATTIC SPACES, ALLOWED TO RUN TYPE NM (ROMEX) 10/3 OR 12/3 CONDUCTORS THROUGH OPEN SPACE OR TYPE THHN IN MINIMUM 3/4" ALUMINUM CONDUIT
20. MATERIALS, EQUIPMENT AND INSTALLATION SHALL COMPLY WITH THE REQUIREMENTS, STANDARDS, RULES AND REGULATIONS OF THE FOLLOWING AND BE MOST SUITABLE TO THE PURPOSE INTENDED:

CODE INFORMATION

THE INSTALLATION OF SOLAR ARRAYS AND PHOTOVOLTAIC POWER SYSTEMS SHALL COMPLY WITH THE FOLLOWING CODES:

2018 INTERNATIONAL BUILDING CODE WITH STATE AMENDMENTS
2018 INTERNATIONAL ENERGY CONSERVATION CODE WITH STATE AMENDMENTS
2017 NATIONAL ELECTRIC CODE
2018 INTERNATIONAL EXISTING BUILDING CODE WITH STATE AMENDMENTS
2018 INTERNATIONAL FUEL GAS CODE WITH STATE AMENDMENTS
2018 INTERNATIONAL MECHANICAL CODE WITH STATE AMENDMENTS
2018 INTERNATIONAL PLUMBING CODE WITH STATE AMENDMENTS
2018 INTERNATIONAL RESIDENTIAL CODE WITH STATE AMENDMENTS

AHJ: ORANGE COUNTY

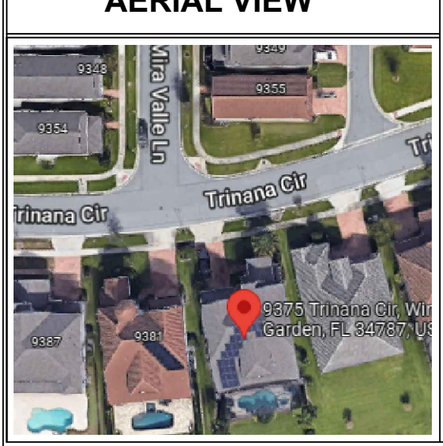
NEW EXPANSION ESTIMATED ANNUAL PRODUCTION : 23725 KWH AC

EXISTING SYSTEM ESTIMATED ANNUAL PRODUCTION : 32120 KWH AC

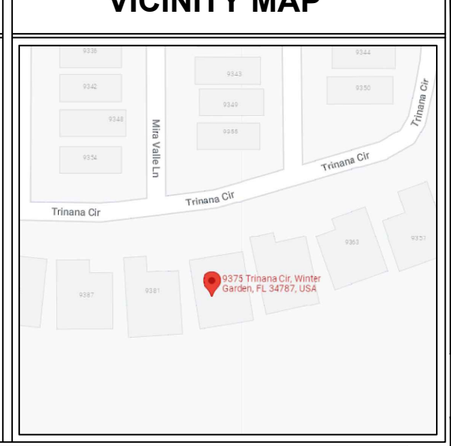
TOTAL SYSTEM ESTIMATED ANNUAL PRODUCTION : 55845 KWH AC

WIND SPEED	:	135
SNOW LOAD	:	0
EXPOSURE CATEGORY	:	C

AERIAL VIEW



VICINITY MAP



SHEET INDEX

CONTRACTOR INFO

Solar Individual Permit Package

CUSTOMER NAME

8.000KW Grid Tied Photovoltaic System

9375 TRINANA CIR, WINTER GARDEN, FL 34787

Rev	Description	Date
A	INITIAL DESIGN	11/23/2022

OPPORTUNITY	
PROJECT #	N/A
DATE DRAWN	11/23/2022
DRAWN BY	E.R
SHEET #	PV-1.0

TITLE

COVER PAGE

R324.6.1 PATHWAYS:
NOT LESS THAN TWO MINIMUM 36-INCH WIDE PATHWAYS ON SEPARATE ROOF PLANES,
FROM LOWEST ROOF EDGE TO RIDGE, SHALL BE PROVIDED ON ALL BUILDINGS.
AT LEAST ONE PATHWAY SHALL BE PROVIDED ON THE STREET OR DRIVEWAY SIDE OF THE ROOF.
FOR EACH ROOF PLANE WITH A PHOTOVOLTAIC ARRAY,A MINIMUM 36 INCH-WIDE PATHWAY FROM THE LOWEST ROOF EDGE TO RIDGE SHALL BE PROVIDED ON THE SAME ROOF PLANE OR STRADDLING THE SAME AND ADJACENT ROOF PLANES.PATHWAYS SHALL BE OVER AREAS CAPABLE OF SUPPORTING FIRE FIGHTERS ACCESSING THE ROOF.PATHWAYS SHALL BE LOCATED IN AREAS WITH MINIMAL OBSTRUCTIONS SUCH AS VENT PIPES,CONDUIT , OR MECHANICAL EQUIPMENT.

R324.6.2 SETBACK AT RIDGE:
FOR PHOTOVOLTAIC ARRAYS OCCUPYING NOT MORE THAN 33 PERCENT OF THE PLAN VIEW TOTAL ROOF AREA,NOT LESS THAN AN 18 INCH CLEAR SET BACK IS REQUIRED ON BOTH SIDES OF A HORIZONTAL RIDGE.
FOR PHOTOVOLTAIC ARRAYS OCCUPYING MORE THAN 33 PERCENT OF THE PLAN VIEW TOTAL ROOF AREA,NOT LESS THAN A 36-INCH CLEAR SET BACK IS REQUIRED ON BOTH SIDES OF A HORIZONTAL RIDGE.

R324.6.4 EMERGENCY ESCAPE AND RESCUE OPENING: PANELS AND MODULES INSTALLED ON DWELLINGS SHALL NOT BE PLACED THE PORTION OF A ROOF THAT IS BELOW AN EMERGENCY ESCAPE AND RESCUE OPENING. A 36-INCH-WIDE PATHWAY SHALL BE PROVIDED TO THE EMERGENCY ESCAPE AND RESCUE OPENING.

A - PATHWAY ON STREET OR DRIVEWAY SIDE OF ROOF
B - FIRE ACCESS POINT

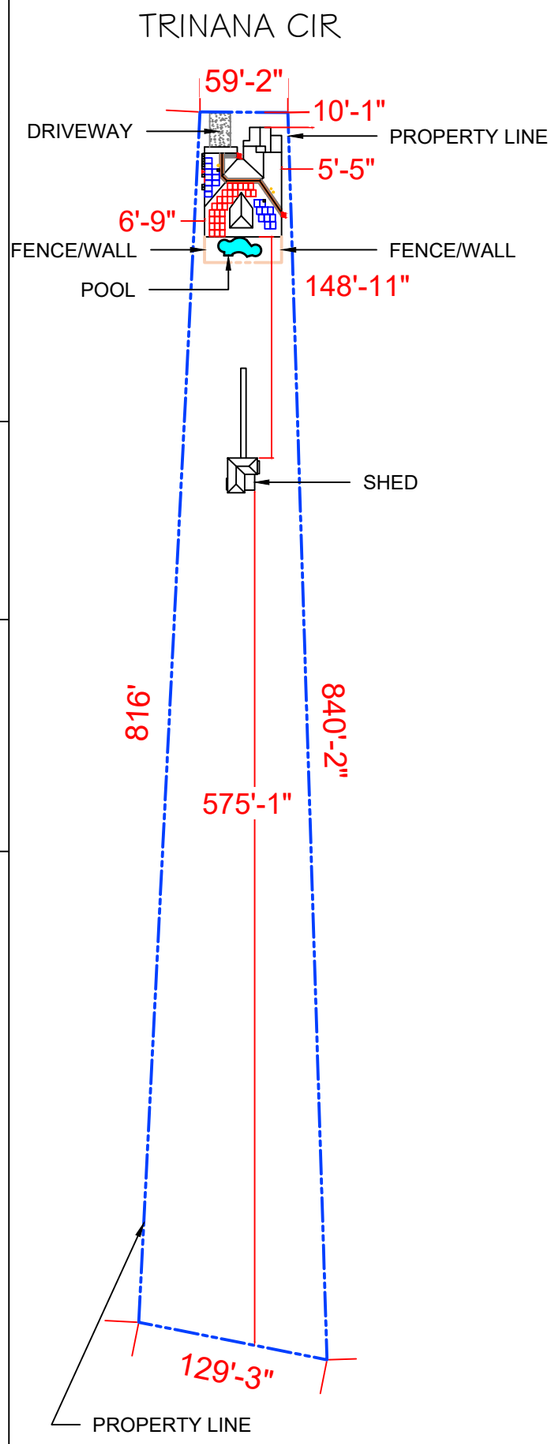
36" ACCESS PATHWAYS

18" ACCESS PATHWAYS

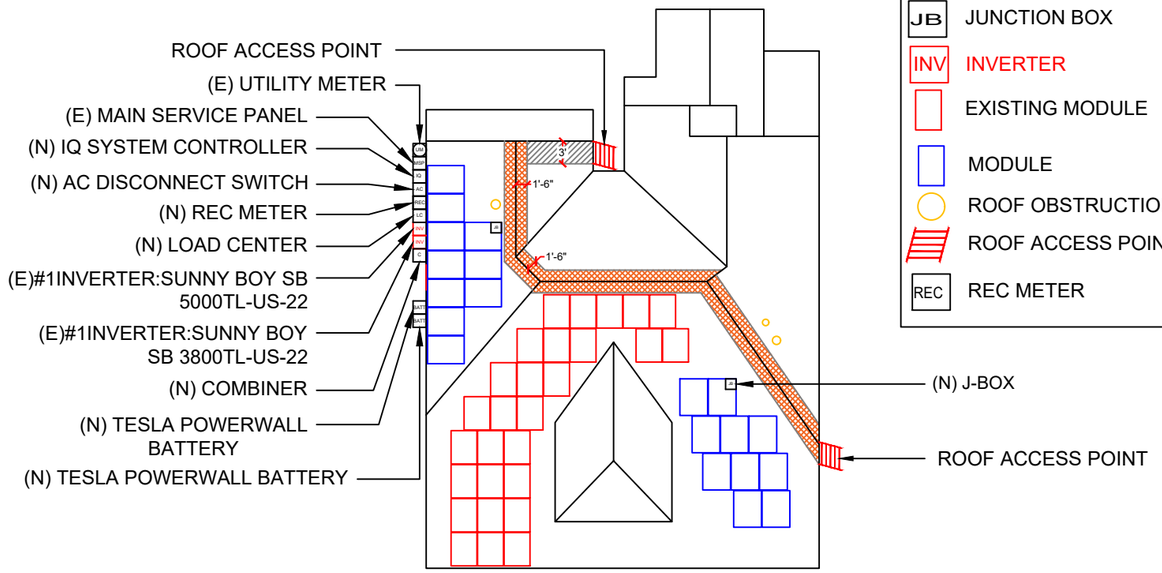
NOTES:
1. MINOR FIELD ADJUSTMENTS ALLOWED BASED ON ACTUAL SITE CONDITION AND MEASUREMENTS.
2. CONDUIT SHALL BE PAINTED TO MACH EXTERIOR WALL.
3. THE 30 SECOND SHUTDOWN REQUIREMENT IS INCORPORATED INTO THE 2017 NEC AND UL STANDARD 1741.
4. 4. EXISTING ROOF VENT SHOULD NOT BE COVERED.

1 **SITE PLAN**
SCALE: 3/256" = 1'-0"

WIND SPEED	:	135
SNOW LOAD	:	0
EXPOSURE CATEGORY	:	C



ENLARGE VIEW



LEGEND

UM	UTILITY METER
MSP	MAIN SERVICE PANEL
AC	AC DISCONNECT
C	COMBINER
IQ	IQ SYSTEM CONTROLLER
BATT	BATTERY
LC	LOAD CENTER
JB	JUNCTION BOX
INV	INVERTER
	EXISTING MODULE
	MODULE
	ROOF OBSTRUCTIONS
	ROOF ACCESS POINT
REC	REC METER

SYSTEM SIZE (DC)	:	STC: 400 x 20 = 8.000kW : PTC: 370.7 x 20 = 7.4140kW
SYSTEM SIZE (AC)	:	6.500kW @ 240V
MODULES	:	(20) VSUN VSUN400-108BMH
SYSTEM SIZE (DC)	:	STC: 327 x 28 = 9.156kW
SYSTEM SIZE (AC)	:	8.8kW @ 240V
MODULES	:	(28) SUN POWER SPR-E20-327

CONTRACTOR INFO

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SHEET #	PV-2.0

TITLE
SITE PLAN

ARRAY AREA

ROOF	ROOF TYPE	AZIMUTH	# OF MODULES	EAVE TO RIDGE DIMENSION (Ft.)	ARRAY AREA (Sq. Ft.)	ROOF AREA (Sq. Ft.)	ROOF AREA COVERED BY ARRAY (%)	TOTAL AREA COVERED BY ARRAY (%)
#1	METAL ROOF	169	10	37.83	210.10	3086	6.81	13.62
#2	METAL ROOF	259	10	11.83	210.10	3086	6.81	

SYSTEM SIZE (DC) : STC: 400 x 20 = 8.000kW
: PTC: 370.7 x 20 = 7.4140kW
SYSTEM SIZE (AC) : 6.500kW @ 240V
MODULES : (20) VSUN VSUN400-108BMH

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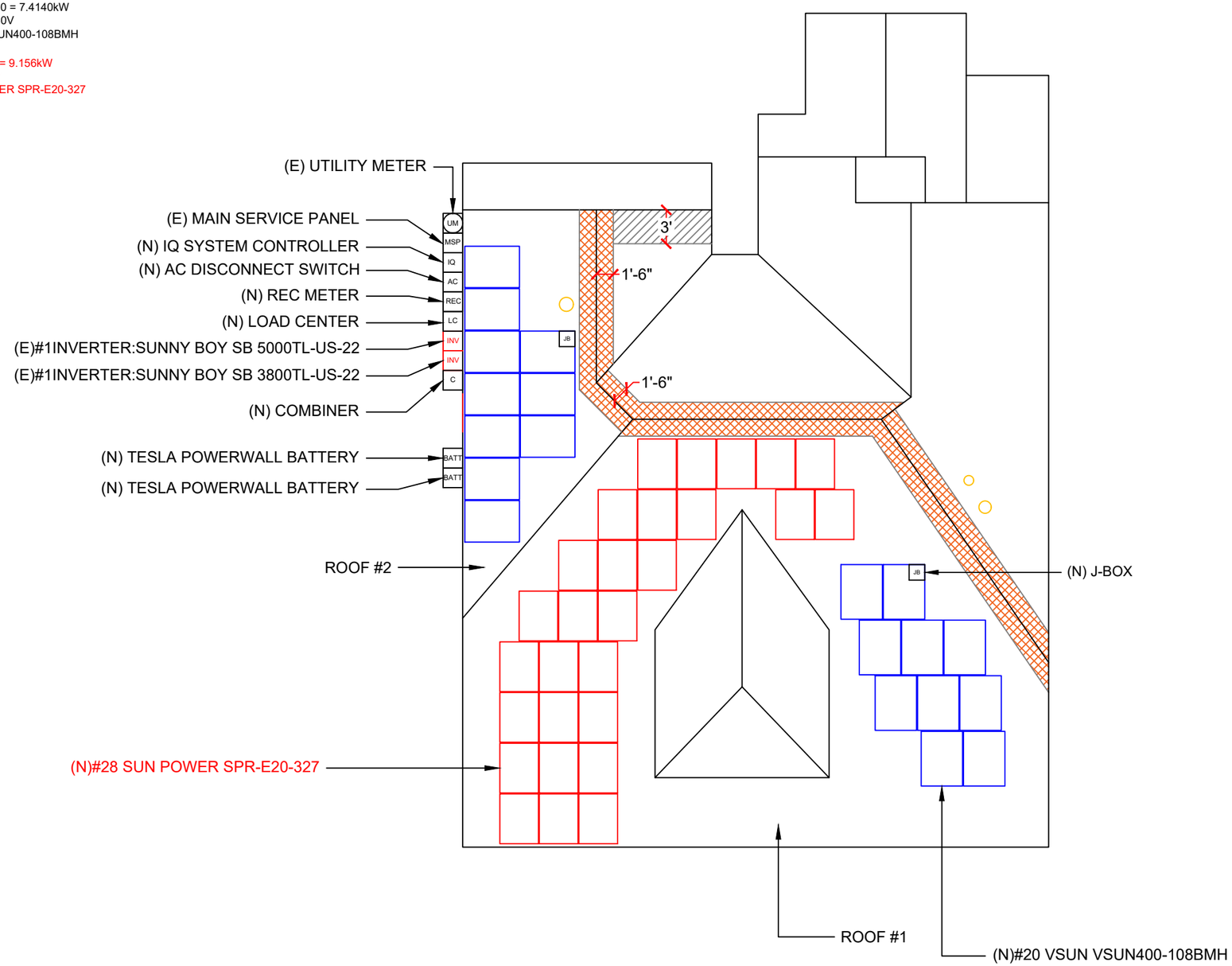
TRINANA CIR



LEGEND

- UM — UTILITY METER
- MSP — MAIN SERVICE PANEL
- AC — AC DISCONNECT
- C — COMBINER
- IQ — IQ SYSTEM CONTROLLER
- BATT — BATTERY
- LC — LOAD CENTER
- JB — JUNCTION BOX
- INV — INVERTER
- EXISTING MODULE
- MODULE
- ROOF OBSTRUCTIONS
- REC — REC METER

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TITLE

ROOF PLAN

1 **ROOF PLAN**

SCALE: 3/32" = 1'-0"

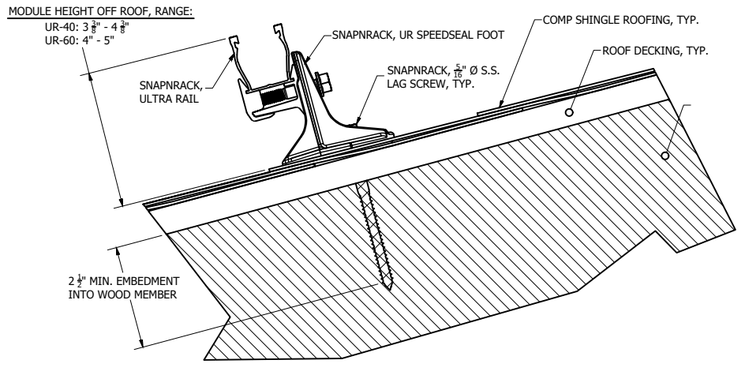
ROOF NO	ROOF TILT	ROOFING TYPE	ATTACHMENT TYPE	NO. OF STORIES	FRAMING TYPE	FRAMING SIZE	OC SPACING	PENETRATION PATTERN	MAX PENETRATION SPACING	MAX OVERHANG
ROOF 1	30	METAL ROOF	SNAPNRACKSPEEDSEAL	2	TRUSS	2" X 4"	24"	STAGGERED	48"	24"
ROOF 2	30	METAL ROOF	SNAPNRACKSPEEDSEAL	2	TRUSS	2" X 4"	24"	STAGGERED	48"	

SNAPNRACK UR SPEEDSEAL FOOT
FOR COMPOSITION ROOF MOUNTING

REFER TO SNAPNRACK ENGINEERING CHARTS FOR APPLICABLE RAIL SPANS.

5/16" Ø S.S LAG SCREW MUST EMBED A MIN. OF 2 1/2" INTO STRUCTURAL MEMBER

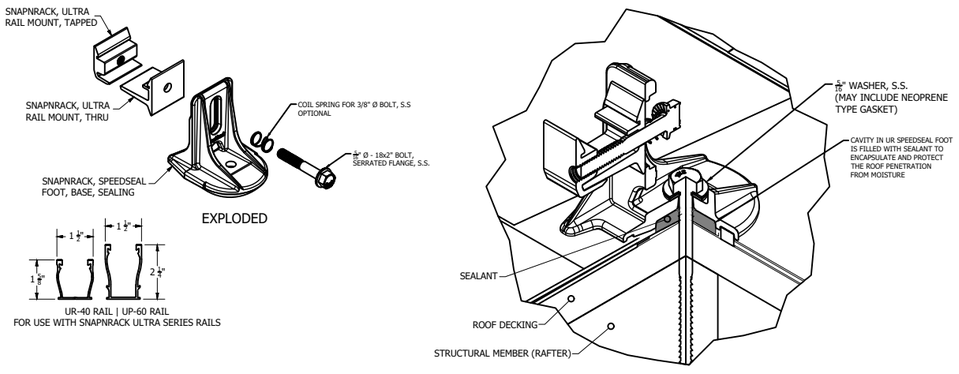
REFER TO SNAPNRACK INSTALLATION MANUAL FOR 5/16" Ø HARDWARE TORQUE SPECIFICATIONS



PENETRATION DETAIL

1 ENLARGED VIEW

SCALE: NTS

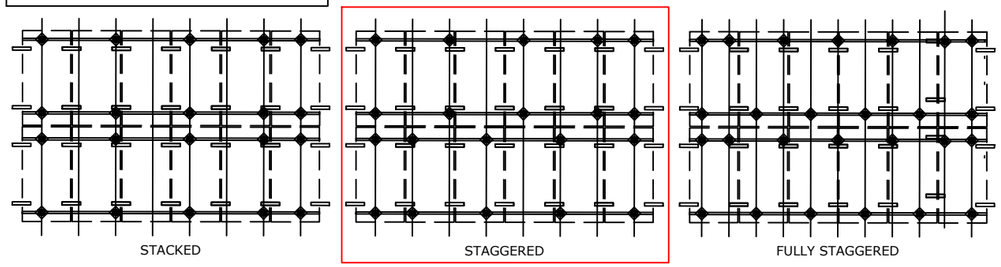


2 ATTACHMENT DETAIL (SIDE VIEW)

SCALE: NTS

TABLE 2: PENETRATION GUIDE FOR INSTALL

TWO OR MORE ROW OF PANELS



ONE ROW OF PANELS

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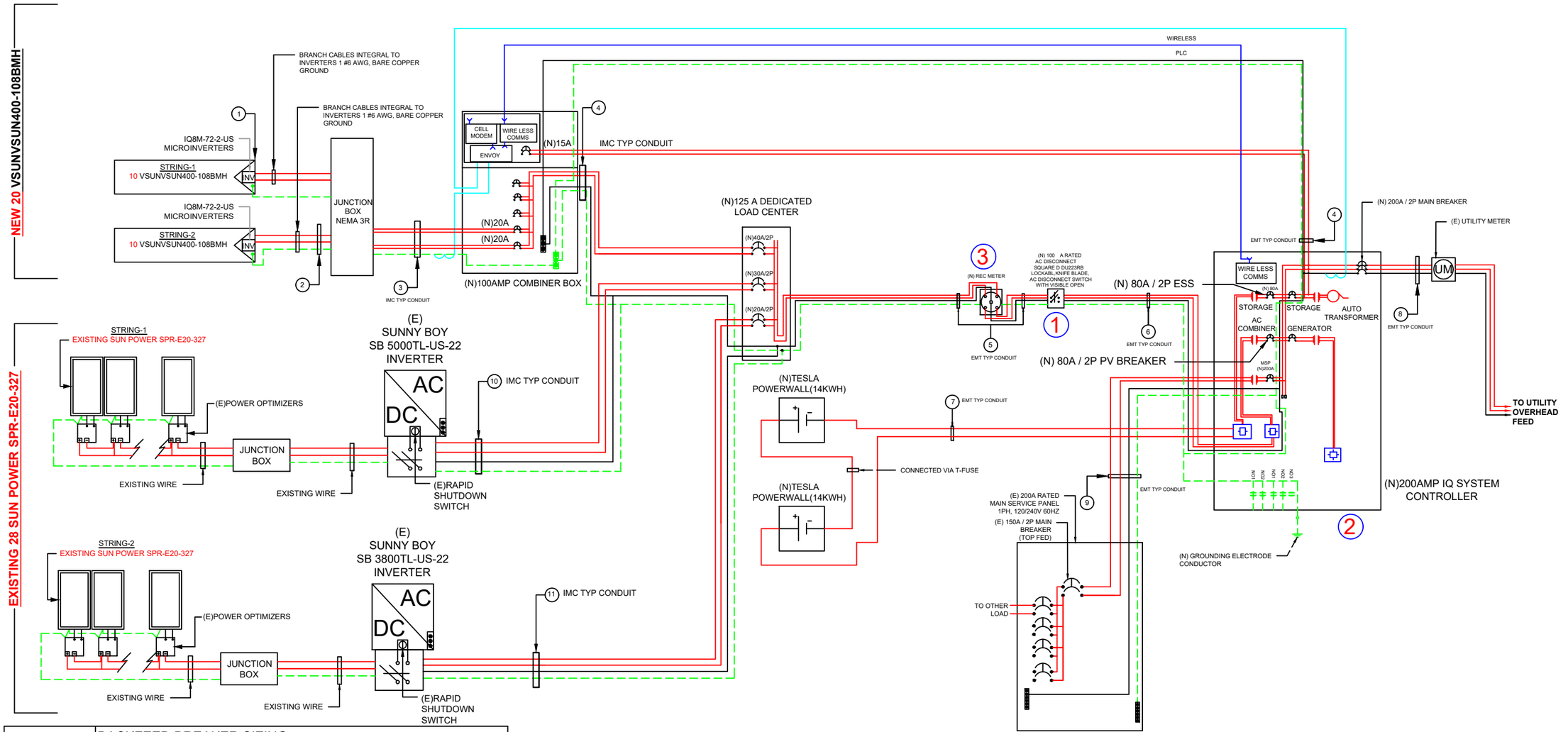
TITLE

STRUCTURAL

MODULE INFO	
MAKE/MODEL	VSUN VSUN400-108BMH
VOC	37.2V
VMP	31.17V
ISC	13.68A
IMP	12.84A
STC RATING	400 W
PTC RATING	370.7 W



	BACKFEED BREAKER SIZING					
	(TOTAL) MAX. CONTINUOUS OUTPUT 80A @ 240V					
COMBINER#1	27.0000	X	1.25	=	33.75AMPS	40A BREAKER - OK
INVERTER#2	22	X	1.25		27.5AMPS	30A BREAKER - OK
INVERTER#3	15	X	1.25	=	18.75AMPS	20A BREAKER - OK
TOTAL	33.75	+	46.25	=	80.00AMPS	80A BREAKER - OK
	SEE 705.12 OF 2017 CEC					
	200	X	1.20	=	240	
	240	-	150	=	90A ALLOWABLE BACKFEED	

NOTE:
1)CONDUIT AND CONDUCTORS SPECIFICATIONS ARE BASED ON MINIMUM CODE REQUIREMENTS AND ARE NOT MEANT TO LIMIT UP-SIZING AS REQUIRED BY FIELD CONDITIONS.
2)ALL CONDUCTORS NOT UNDER ARRAY ARE TO BE IN CONDUIT MINIMUM 7/8" ABOVE ROOF WITH PROPER JUNCTION BOX AT EACH END PER 690.31A

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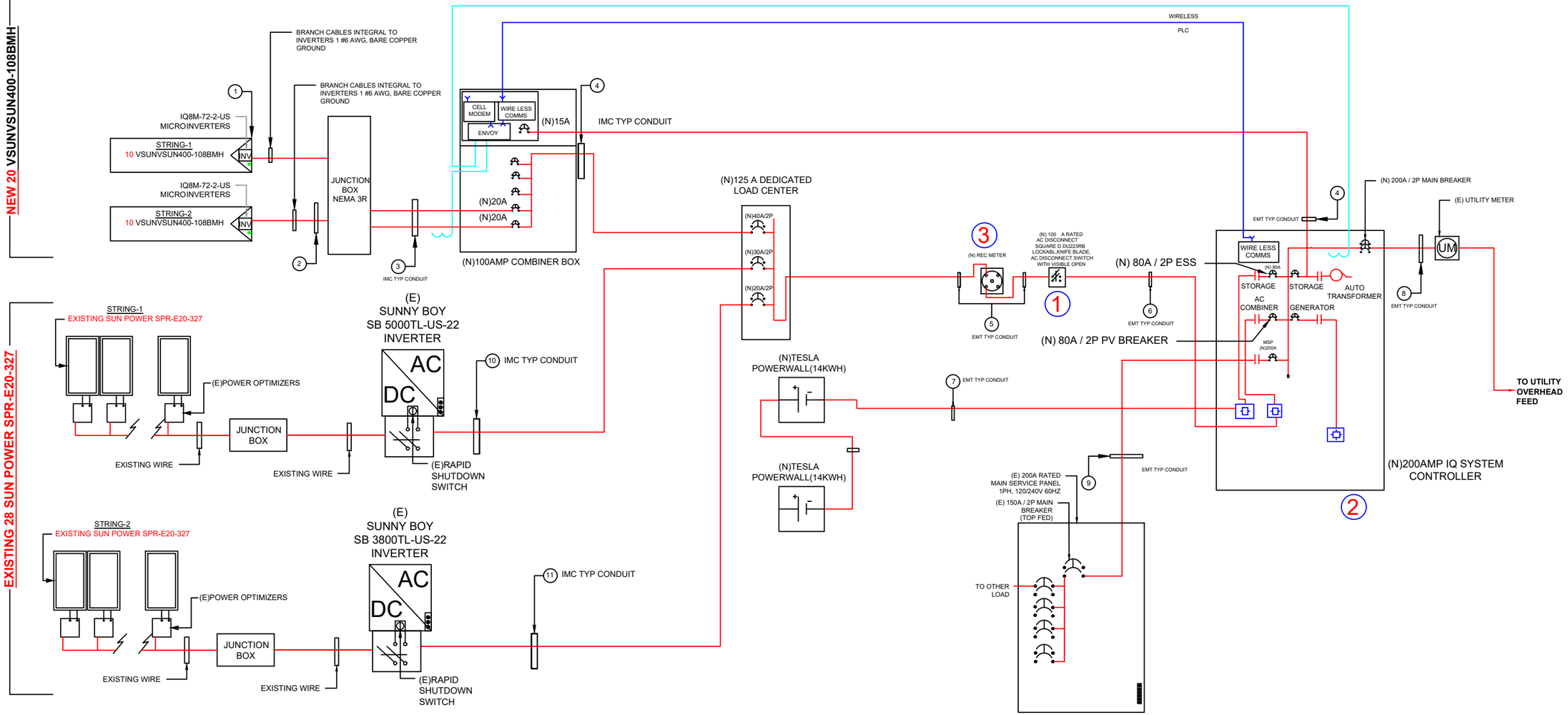
TITLE

ELECTRICAL 3LD

MODULE INFO	
MAKE/MODEL	VSUN VSUN400-108BMH
VOC	37.2V
VMP	31.17V
ISC	13.68A
IMP	12.84A
STC RATING	400 W
PTC RATING	370.7 W



	BACKFEED BREAKER SIZING					
	(TOTAL) MAX. CONTINUOUS OUTPUT 80A @ 240V					
COMBINER#1	27.0000	X	1.25	=	33.75AMPS	40A BREAKER - OK
INVERTER#2	22	X	1.25		27.5AMPS	30A BREAKER - OK
INVERTER#3	15	X	1.25	=	18.75AMPS	20A BREAKER - OK
TOTAL	33.75	+	46.25	=	80.00AMPS	80A BREAKER - OK
	SEE 705.12 OF 2017 CEC					
	200	X	1.20	=	240	
	240	-	150	=	90A ALLOWABLE BACKFEED	

NOTE:
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TITLE

ELECTRICAL SLD

	BACKFEED BREAKER SIZING						
	(TOTAL) MAX. CONTINUOUS OUTPUT 80A @ 240V						
COMBINER#1	27.0000	X	1.25	=	33.75AMPS	40A BREAKER - OK	
INVERTER#2	22	X	1.25		27.5AMPS	30A BREAKER - OK	
INVERTER#3	15	X	1.25	=	18.75AMPS	20A BREAKER - OK	
TOTAL	33.75	+	46.25	=	80.00AMPS	80A BREAKER - OK	
	SEE 705.12 OF 2017 CEC						
	200	X	1.20	=	240		
	240	-	150	=	90A ALLOWABLE BACKFEED		

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WIRE SCHEDULE

RACEWAY #	EQUIPMENT				WIRE LOCATION	CONDUCTOR QTY.	AWG WIRE SIZE	STARTING ALLOWABLE AMPACITY 310.15(B)(16)	TEMPERATURE RATING (°C)	STARTING CURRENT APPLIED TO CONDUCTORS IN RACEWAY	TEMPERATURE CORRECTION FACTOR 310.15(B)(2)(a)	ADJUSTMENT FACTOR FOR MORE THAN 3 CONDUCTORS 310.15(B)(3)(a)	ADJUSTED CONDUCTOR AMPACITY	MAXIMUM CURRENT APPLIED TO CONDUCTORS IN RACEWAY
1	DC	MODULE	TO	MICROINVERTER	ROOF/FREE-AIR	2	10	40	90°	13.68	0.96	1	38.40	17.10
2	AC	MICROINVERTER	TO	JUNCTION BOX	ROOF/FREE-AIR	2	10	40	90°	13.50	0.96	1	38.40	16.88
3	AC	JUNCTION BOX	TO	COMBINER	EXTERIOR WALL	4	10	40	90°	13.50	0.96	0.8	30.72	16.88
4	AC	COMBINER	TO	LOAD CENTER	EXTERIOR WALL	3	8	50	75°	27.00	0.96	1	48.00	33.75
5	AC	LOAD CENTER	TO	AC DISCONNECT	EXTERIOR WALL	3	4	85	75°	64	0.96	1	81.60	80.00
6	AC	AC DISCONNECT	TO	IQ SYSTEM CONTROLLER	EXTERIOR WALL	3	4	85	75°	64	0.96	1	81.60	80.00
7	AC	BATTERY	TO	IQ SYSTEM CONTROLLER	EXTERIOR WALL	2	4	85	75°	64	0.96	1	81.60	80.00
8	AC	IQ SYSTEM CONTROLLER	TO	METER	EXTERIOR WALL	3	4/0	230	75°	160	0.96	1	220.80	200.00
9	AC	MSP	TO	IQ SYSTEM CONTROLLER	EXTERIOR WALL	3	4/0	230	75°	160	0.96	1	220.80	200.00
10	AC	(E)INVERTER 5K	TO	LOAD CENTER	EXTERIOR WALL	3	10	35	75°	22	0.96	1	33.60	27.50
11	AC	(E)INVERTER 3K	TO	LOAD CENTER	EXTERIOR WALL	3	10	35	75°	15	0.96	1	33.60	18.75

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TITLE

WIRE CALCULATION

MATERIAL LIST

ELECTRICAL EQUIPMENTS

QTY.	PART	PART #	DESCRIPTION
20	MODULE	VSUN400-108BMH	VSUN VSUN400-108BMH
2	JUNCTION BOX	480-276	600VDC NEMA 3R UL LISTED JUNCTION BOX
20	MICROINVERTER	IQ8M-72-2-US	ENPHASE IQ8M-72-2-US 240V
1	AC DISCONNECT	DU223RB	100A RATED 240VAC NEMA 3R UL LISTED
1	IQ SYSTEM CONTROLLER	XA-E3-PCBA-ENS	ENPHASE IQ SYSTEM CONTROLLER, NEMA 3R RATED
2	BATTERY	N/A	TESLA POWERWALL BATTERY, 14KWH
1	REC METER	N/A	REC METER
1	LOAD CENTER	125A LOAD CENTER	125A DEDICATED LOAD CENTER

BREAKER AND FUSES

QTY.	PART	PART #	DESCRIPTION
1	BREAKER	80A 2-POLE BREAKER(S)	GENERAL 80A 2-POLE BREAKER(S)
1	COMBINER BREAKER	20A 2-POLE BREAKER(S)	GENERAL 20A 2-POLE BREAKER(S)
1	BATTERY BREAKER	80A 2-POLE BREAKER(S)	GENERAL 40A 2-POLE BREAKER(S)
1	MAIN IQ BREAKER	150A 2-POLE BREAKER(S)	GENERAL 150A 2-POLE BREAKER(S)
2	COMBINER BREAKER	40A 2-POLE BREAKER(S)	GENERAL 40A 2-POLE BREAKER(S)

RACKING

QTY.	PART	PART #	DESCRIPTION
14	RAIL 1	232-02540	SNAPNRACK, UR-60 RAIL, 172IN, SILVER
2	SPLICE	242-01270	SNAPNRACK, UR-60 SPLICE, SILVER
28	MID CLAMP	242-02071	SNAPNRACK, ULTRA RAIL MID CLAMP, BLACK
24	END CLAMP	242-02215	SNAPNRACK, UNIVERSAL END CLAMP
21	SKIRT	242-02215	UNIVERSAL DOUBLE PORTRAIT SKIRT, 83IN, BLACK
24	SKIRT FRAME	242-10006	UNIVERSAL SKIRT FRAME MOUNT
14	CAP	232-10019	UNIVERSAL SKIRT CAP
24	END CAP	232-02484	SNAPNRACK, UR-60 END CAP
40	FOOT BLACK	232-02484	SNAPNRACK, SEALING WASHER LAG, 4-1/2IN, SS
40	SEALING WASHER	242-02168	SNAPNRACK, GROUND LUG ASSEMBLY, 6-12 AWG
6	LUG	242-02101	

CONTRACTOR INFO

Solar Individual Permit Package

CUSTOMER NAME

8.000KW Grid Tied Photovoltaic System

9375 TRINANA CIR, WINTER GARDEN, FL 34787

Rev	Description	Date
A	INITIAL DESIGN	11/23/2022

OPPORTUNITY	
PROJECT #	N/A
DATE DRAWN	11/23/2022
DRAWN BY	E.R
SHEET #	PV-8.0

TITLE

BOM

EXISTING SERVICE PANEL PHOTOS

CONTRACTOR INFO

Solar Individual Permit Package

CUSTOMER NAME

8.000KW Grid Tied Photovoltaic System

9375 TRINANA CIR, WINTER GARDEN, FL 34787

Rev	Description	Date
A	INITIAL DESIGN	11/23/2022

OPPORTUNITY	
PROJECT #	N/A
DATE DRAWN	11/23/2022
DRAWN BY	E.R
SHEET #	PV-9.0

TITLE

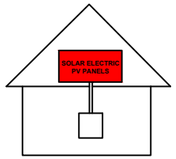
BOM

PHOTOVOLTAIC SYSTEM,
EQUIPPED WITH RAPID SHUTDOWN

690.12

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



690.56(C)(1)(B)

3

REC METER

M

AC

REC

"WARNING"
ELECTRIC SHOCK HAZARD. DO NOT TOUCH TERMINALS. TERMINALS ON BOTH THE LINE AND LOAD SIZE MAY BE ENERGIZED IN THE OPEN POSITION

2

PV SYSTEM AC DISCONNECT
RATED AC OUTPUT CURRENT - **27.00** AMPS
AC NORMAL OPERATING VOLTAGE - 240 VOLTS

690.14, 690.15, 690.54

AUXILIARY GENERATION DISCONNECT

1

"WARNING"
DUAL POWER SOURCES
SECOND SOURCE IS PHOTO- VOLTAIC SYSTEM
RATED AC OUTPUT CURRENT - **27.00** AMPS
AC NORMAL OPERATING VOLTAGE - 240 VOLTS

690.54

OPTIONAL SOLAR LOAD CENTER

ARRAY

J/B

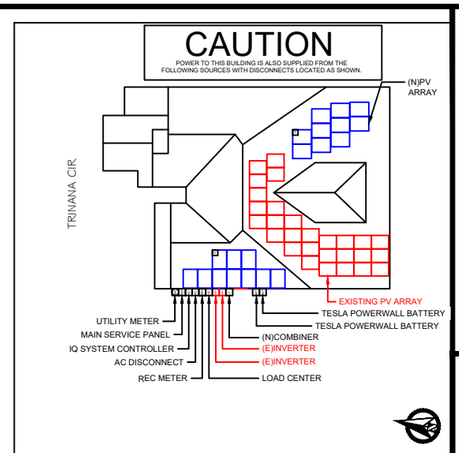
"WARNING"
INVERTER OUTPUT CONNECTION
DO NOT RELOCATE THIS
OVERCURRENT DEVICE

(UNLESS BUSBAR IS FULLY RATED)
705.12(D)(2)

NEC 690.31(G)(3) & (4), CRC R324.7

"WARNING"
PHOTOVOLTAIC POWER SOURCE

EVERY 10' ON CONDUIT AND ENCLOSURES



PHOTOVOLTAIC BACK-FED CIRCUIT BREAKER IN MAIN ELECTRICAL PANEL IS AC DISCONNECT PER CEC690.17

NOTES:

1. CEC ARTICLES 690 AND 705 AND CEC SECTION R324 MARKINGS SHOWN HEREON.
2. ALL MARKING SHALL CONSIST OF THE FOLLOWING:
   A. UV RESISTANT SIGN MATERIAL WITH ENGRAVED OR MACHINE PRINTED LETTERS OR ELECTRO-PLATING.
   B. RED BACKGROUND COLOR WHITE TEXT AND LINE WORK.
   C. AERIAL FONT.
3. ALL SIGNS SHALL BE SIZED APPROPRIATELY AND PLACED IN THE LOCATIONS SPECIFIED. SIGNAGE CANNOT BE HAND-WRITTEN.
3. SIGNS SHALL BE ATTACHED TO THE SERVICE EQUIPMENT WITH POP-RIVETS OR SCREWS.

CONTRACTOR INFO

Solar Individual Permit Package

CUSTOMER NAME

8.000KW Grid Tied Photovoltaic System

9375 TRINANA CIR, WINTER GARDEN, FL 34787

Rev	Description	Date
A	INITIAL DESIGN	11/23/2022

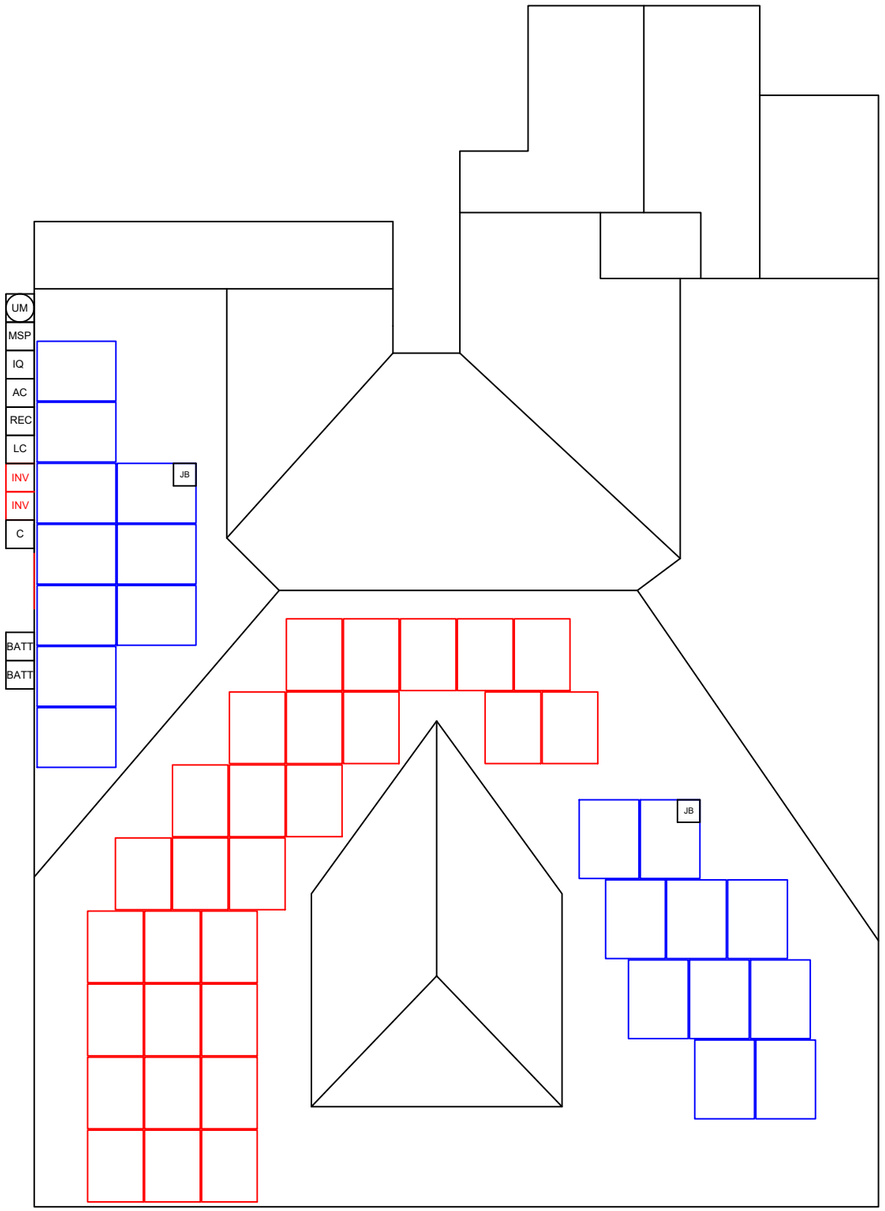
OPPORTUNITY	
PROJECT #	N/A
DATE DRAWN	11/23/2022
DRAWN BY	E.R
SHEET #	PV-10.0

TITLE

SIGNAGE

MICROINVERTER CHART

	1-10	11-20	21-30	31-40	41-50	51-60
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						



CONTRACTOR INFO

Solar Individual Permit Package

CUSTOMER NAME

8.000KW Grid Tied Photovoltaic System

9375 TRINANA CIR, WINTER GARDEN, FL 34787

Rev	Description	Date
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OPPORTUNITY	
PROJECT #	N/A
DATE DRAWN	11/23/2022
DRAWN BY	E.R
SHEET #	PV-11.0

TITLE

MICROINVERTER CHART

SAFETY PLAN

INSTRUCTIONS:

1. USE SYMBOLS IN KEY TO MARK UP THIS SHEET.
2. SAFETY PLAN MUST BE MARKED BEFORE JOB STARTS AS PART OF THE PRE-PLAN
3. DOCUMENT ALL ADDITIONAL HAZARDS ON THIS PAGE & MAKE NOTES ON THE JHA SHEET

IN CASE OF EMERGENCY

NEAREST HOSPITAL OR OCCUPATIONAL/INDUSTRIAL CLINIC

NAME: _____

ADDRESS: _____

SAFETY COACH CONTACT INFORMATION

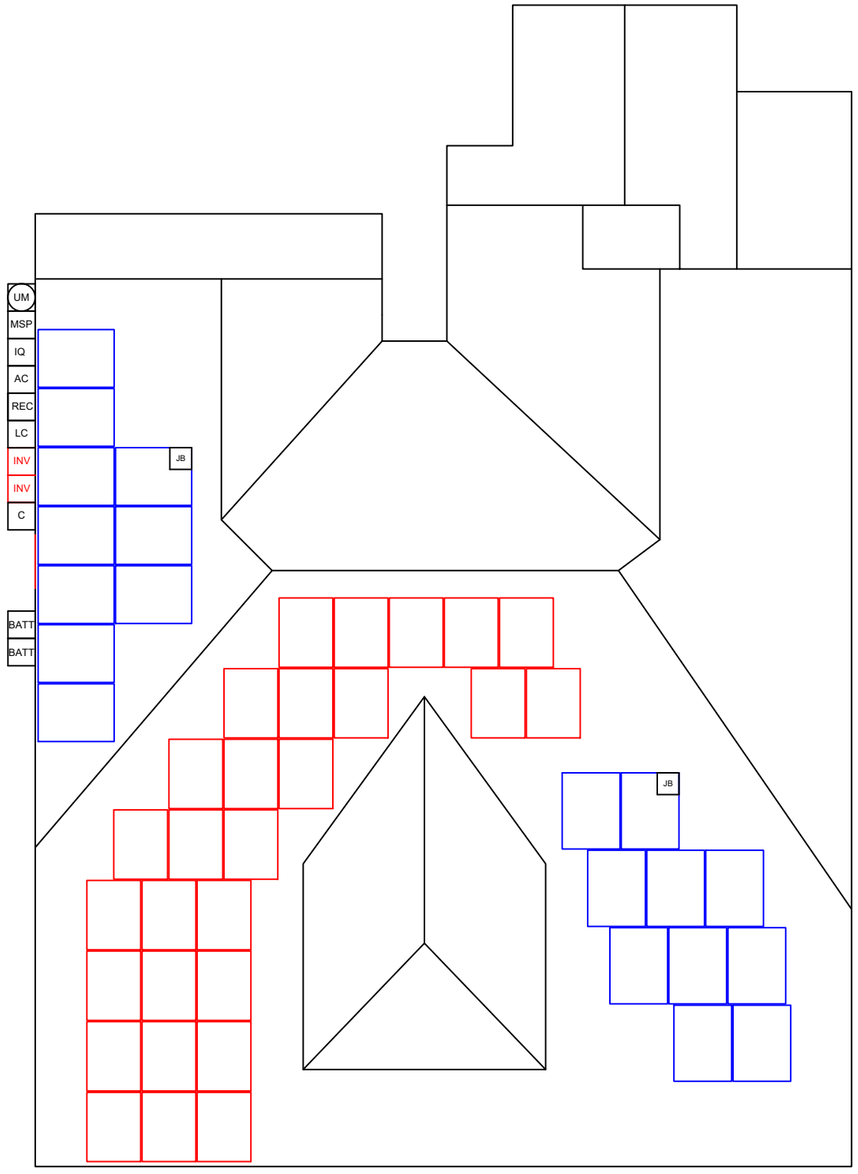
NAME: _____

ADDRESS: _____

ALL EMPLOYEES ON SITE SHALL BE MADE AWARE OF THE SAFETY PLAN AND SIGN INDICATING THAT THEY ARE AWARE OF THE HAZARDS ON-SITE AND THE PLAN FOR WORKING SAFELY.

NAME	SIGNATURE

DATE: _____ TIME:_____



MARK UP KEY

- COMBINER
- AC — AC DISCONNECT
- MSP — MAIN SERVICE PANEL
- UM — UTILITY METER
- IQ — IQ SYSTEM CONTROLLER
- BATT — TESLA POWERWALL BATTERY
- JB — JUNCTION BOX
- LC — LOAD CENTER
- INV — INVERTER
- EXISTING MODULE
- REC — REC METER
- SKYLIGHT
- NO LADDER ACCESS (STEEP GRADE OR GROUND LEVEL OBSTRUCTIONS)
- RESTRICTED ACCESS
- CONDUIT
- GAS — GAS SHUT OFF
- H2O — WATER SHUT OFF
- 7 — SERVICE DROP
- Z — POWER LINES

CONTRACTOR INFO

Solar Individual Permit Package

CUSTOMER NAME

8.000KW Grid Tied Photovoltaic System

9375 TRINANA CIR, WINTER GARDEN, FL 34787

Rev	Description	Date
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OPPORTUNITY	
PROJECT #	N/A
DATE DRAWN	11/23/2022
DRAWN BY	E.R
SHEET #	PV-12.0

TITLE

SAFETY PLAN

JOB HAZARD ANALYSIS

Crew leader to fill out all sections below, hold a pre-job safety meeting with all personnel, and upload this completed document and the Safety Plan to Site Capture

Ladder Access

· Ladders must be inspected before each use.

· Extension ladders must be set up on a firm and level surface at a 4-to-1 rise to run angle (or 75 degrees) and the top must be secured to the structure. Extension style ladders placed on uneven, loose or slippery surfaces must additionally have the base firmly anchored or lashed so the base will not slip out.

- Extension ladders must be used with walk-through devices or the ladder must extend 36" above the stepping off point.
- A-frame ladders must only be climbed with the ladder spreader bars locked in the open position; A-frame ladders shall not be climbed while in the closed position (ex, closed and used while leaned against a structure).

- Additional notes:

Mobile Equipment

- Only Qualified operators will operate equipment; operators must maintain a certification on their person for the equipment being operated.
- Type(s) of mobile equipment (Type/Make/Model):
- Qualified operator(s):

Material Handling and Storage

- Materials will be staged/stored in a way that does not present a hazard to client, personnel or public. Materials stored on the roof will be physically protect from failing or sliding off.

Fall Protection

- A site-specific plan for fall prevention and protection is required prior to starting work and must remain onsite at all times until work is complete; a fall rescue plan must be outlined and discussed among the crew prior to work start.
- First-person-Up (FPU) must install their anchor and connect before any other task, including installing other anchors. The Last-Person-Down (LPD) must be the only person on a roof uninstalling fall protection.

- FPCP (name and title):

· FPU and LPD (name and title):

Electrical Safety

- The Electrical Qualified Person (EQP) is required onsite to perform electrical work.
- All electrical work will be performed with equipment in an electrically safe condition (de-energized) unless approval has been granted prior to work.
- Service drops and overhead electrical hazards will be indentified and protected from contact, as neccessary.

· EQP (name and tile):

Public Protection

- The safety of the Client and the Public must be maintained at all times.
- The Client and the Public shall be prevented from entering the work zone through the use of barriers and/or signage, as required.
- Company, Client and Public property shall be protect from falling objects.
- Pets (including dogs) shall be secured by their owners prior to work start.
- The client should not leave pets, family members, or others in the charge or care of Employees, Contractors, or Temporary Workers.

- Crew leader responsible for communication with the client:

- Client and public is excluded from work area by barricades (N/A, Yes, No):

Training and Pre-Job Safety Briefing

- All employees onsite shall be made aware of the specific hazards of this project and review this HJA during a pre-job briefing, and their signature indicates awareness of site conditions and the plan to eliminate any hazards identified prior to and during the project.

- Crew leader (name/title):
- Crew member (name/title):
- Crew member (name/title):
- Crew member (name/title):
- Crew member (name/title):
- Crew member (name/title):

Airborne Contaminants:

- Asbestos-containing (Transite) piping (ACP) - Do not disturb (move, drill, cut fracture, etc.)
- Asbestos-containing thermal insulation (ACI) and Asbestos-containing duct wrapping (ACW) - do not disturb, no attic or crawlspace access is allowed if work to be performed could cause exposure to personnel, client or public.

- If yes, list specific tasks and protection in place:

Weather and Environment

- The site supervisor shall forecast the weather conditions at the job site, prior to crew arrival, in order to mitigate any hazards associated with inclement weather (heat, cold, wind, rain, etc.)
- The site supervisor will utilized a portable wind meter (anemometer) to verify actual onsite wind conditions, by checking at the ground and on any elevated work surface (ex, rooftop) prior to work start, at midday and prior to solar panel staging on a roof.
- Elevated work involving the moving or maneuvering of solar panels shall cease at 25mph (sustained wind) until wind subsides.

· Forecasted weather maximum temp (degrees F):

Heat Related Illness Prevention

- Employees shall have access to potable drinking water that is fresh, pure, and suitably cool. The water shall be located as close as practicable to the areas where employees are working. Water shall be supplied in sufficient quantity at the beginning of the work shift to provide at least one quart per employee per hour for drinking for the entire shift. Employees may begin the shift with smaller quantities of water if they identify the location and have effective means for replenishment during the shift to allow employees to drink on quart or more per hour. The frequent drinking of water shall be encouraged.

· Shade shall be present when temperature exceeds 80 degrees Fahrenheit. When the outdoor temperature in the work exceeds 80 degrees Fahrenheit, employees shall have and maintain one or more areas with shade at all times.

· New employees must be acclimatized. New employees will be monitored by their Crew Leader (site supervisor) for the first two (2) weeks of employment or longer when necessary.

· Employees will be allowed and encouraged to implement scheduled breaks during each shift. Employees must take cool-down breaks in the shade any time they feel the need to do so to protect them from overheating. Supervisors are REQUIRED to allow employees any break period they need during high heat conditions.

- Cool Vests are encouraged for all employees at all times during periods of high heat.
- Identify the location of the closet Occupational/Industrial Clinic or Hospital in case a crew member becomes ill.

What is the specific plan to provide and replenish sufficient water for all employees on site?

- If offsite replenish is necessary, where will you go to replenish water (location/address):

- Who will replenish the drinking water (name):

Restroom facilities

- Employees shall have access to restroom facilities with hand-washing stations. Use of onsite restroom is at the client's discretion (location is annotated below). If client does not give permission, location of suitable restroom facilities with hand-washing stations offsite will be provided. The onsite supervisor will identify location and make arrangements to ensure all employees have access at any point.

- Restroom facilities will be (circle one): Onsite - Offsite
- If Offsite, add location name and address:

Incident Reporting Procedure

- Contact your Site Supervisor

  Name:

  Phone:

- Contact your Manager

  Name:

  Phone:

- Contact your Site Supervisor

  Name:

  Phone:

With: Your full name, phone number, office location, brief description of what happen and when.

NOTE ADDITIONAL HAZARDS NOT ADDRESSED ABOVE
(add as many as necessary by using additional sheets)

Define the Hazard:	Method/steps to prevent incident:
Define the Hazard:	Method/steps to prevent incident:
Define the Hazard:	Method/steps to prevent incident:
Define the Hazard:	Method/steps to prevent incident:

CONTRACTOR INFO

Solar Individual Permit Package

CUSTOMER NAME

8.000KW Grid Tied Photovoltaic System

9375 TRINANA CIR, WINTER GARDEN, FL 34787

Rev	Description	Date
A	INITIAL DESIGN	11/23/2022

OPPORTUNITY	
PROJECT #	N/A
DATE DRAWN	11/23/2022
DRAWN BY	E.R
SHEET #	PV-13.0

TITLE

SAFETY PLAN

VSUN
Innovative & Smart

VSUN405-108BMH

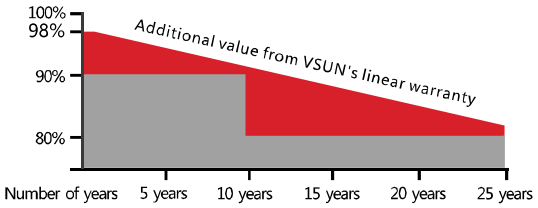
405W
Highest power output

20.75%
Module efficiency

12years
Material & Workmanship warranty

25years
Linear power output warranty

VSUN405-108BMH **VSUN400-108BMH**
VSUN395-108BMH **VSUN390-108BMH**



- MBB technology with Circular Ribbon
- Higher output power
- Half-cell Technology
- Positive tolerance offer
- Micro Gap
- Up to 30% extra power generation yield from the back side
- Certified for salt/ammonia corrosion resistance
- Load certificates: wind to 2400Pa and snow to 5400Pa
- Lower LCOE

VSUN, a BNEF Tier-1 PV module manufacturer invested by Fuji Solar, has been committed to providing greener, cleaner and more intelligent renewable energy solutions. VSUN is dedicated to bringing reliable, customized and high-efficient products into various markets and customers worldwide

Engineered in Japan
www.vsun-solar.com

Electrical Characteristics at Standard Test Conditions(STC)

Module Type	VSUN405-108BMH	VSUN400-108BMH	VSUN395-108BMH	VSUN390-108BMH
Maximum Power - Pmax (W)	405	400	395	390
Open Circuit Voltage - Voc (V)	37.36	37.2	37.03	36.84
Short Circuit Current - Isc (A)	13.78	13.68	13.59	13.5
Maximum Power Voltage - Vmpp (V)	31.36	31.17	31	30.82
Maximum Power Current - Impp (A)	12.92	12.84	12.75	12.66
Module Efficiency	20.75%	20.49%	20.23%	19.98%

Standard Test Conditions (STC): irradiance 1,000 W/m²; AM 1,5; module temperature 25°C. Pmax Sorting : 0~5W. Measuring Tolerance: ±3%.

Remark: Electrical data do not refer to a single module and they are not part of the offer. They only serve for comparison among different module types.

Electrical Characteristics with different rear side power gain(reference to 400 front)

Pmax (W)	Voc (V)	Isc (A)	Vmpp (V)	Impp (A)	Pmax gain
420	37.1	14.36	31.17	13.48	5%
440	37.1	15.05	31.17	14.12	10%
479	37.2	16.42	31.12	15.41	20%
499	37.2	17.10	31.12	16.05	25%

Temperature Characteristics

NOCT	45°C(±2°C)
Voltage Temperature Coefficient	-0.27%/°C
Current Temperature Coefficient	+0.048%/°C
Power Temperature Coefficient	-0.32%/°C

Maximum Ratings

Maximum System Voltage [V]	1500
Series Fuse Rating [A]	30
Bifaciality	70%±10%

Material Characteristics

Dimensions	1723×1133×30mm (L×W×H)
Weight	21.8kg
Frame	Anodized aluminum profile
Front Glass	White toughened safety glass, 3.2 mm
Cell Encapsulation	EVA (Ethylene-Vinyl-Acetate) or POE
Back Sheet	Transparent backsheet
Cells	12×9 pieces monocrystalline solar cells series strings
Junction Box	IP68, 3 diodes
Cable&Connector	Potrait: 500 mm (cable length can be customized) , 1×4 mm2, compatible with MC4

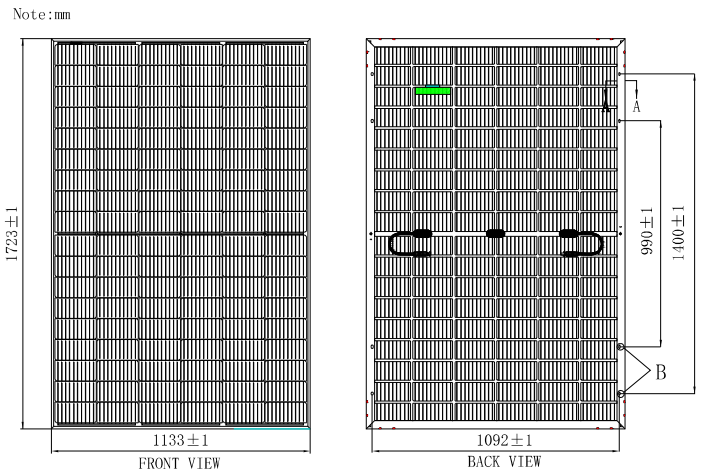
Packaging

Dimensions(L×W×H)	1760×1125×1253mm
Container 20'	186
Container 40'	403
Container 40'HC	806

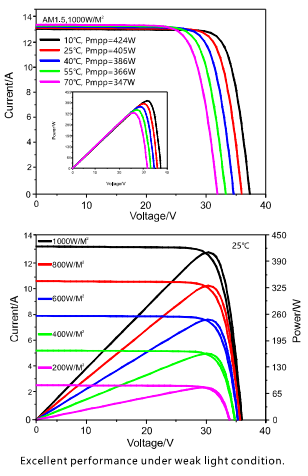
System Design

Temperature Range	-40 °C to + 85 °C
Withstanding Hail	Maximum diameter of 25 mm with impact speed of 23 m/s
Maximum Surface Load	5,400 Pa
Application class	class A

Dimensions



IV-Curves



Excellent performance under weak light condition.

ENPHASE

DATA SHEET

IQ8M and IQ8A Microinverters

Our newest IQ8 Microinverters are the industry's first microgrid-forming, software-defined microinverters with split-phase power conversion capability to convert DC power to AC power efficiently. The brain of the semiconductor-based microinverter is our proprietary application-specific integrated circuit (ASIC) which enables the microinverter to operate in grid-tied or off-grid modes. This chip is built in advanced 55nm technology with high speed digital logic and has super-fast response times to changing loads and grid events, alleviating constraints on battery sizing for home energy systems.

Part of the Enphase Energy System, IQ8 Series Microinverters integrate with the Enphase IQ Battery, Enphase IQ Gateway, and the Enphase App monitoring and analysis software.

Enphase 25 year limited warranty

IQ8 Series Microinverters redefine reliability standards with more than one million cumulative hours of power-on testing, enabling an industry-leading limited warranty of up to 25 years.

Connect PV modules quickly and easily to IQ8 Series Microinverters using the included Q-DCC-2 adapter cable with plug-n-play MC4 connectors.

UL CERTIFIED SAFETY

IQ8 Series Microinverters are UL Listed as PV Rapid Shut Down Equipment and conform with various regulations, when installed according to manufacturer's instructions.

Easy to install

- Lightweight and compact with plug-n-play connectors
- Power Line Communication (PLC) between components
- Faster installation with simple two-wire cabling

High productivity and reliability

- Produce power even when the grid is down*
- More than one million cumulative hours of testing
- Class II double-insulated enclosure
- Optimized for the latest high-powered PV modules

Microgrid-forming

- Complies with the latest advanced grid support**
- Remote automatic updates for the latest grid requirements
- Configurable to support a wide range of grid profiles
- Meets CA Rule 21 (UL 1741-SB) requirements

IQ8MA-DS-0003-01-EN-US-2022-08-10

* Only when installed with IQ System Controller 2, meets UL 1741.

** IQ8M and IQ8A supports split phase, 240V installations only.

IQ8M and IQ8A Microinverters

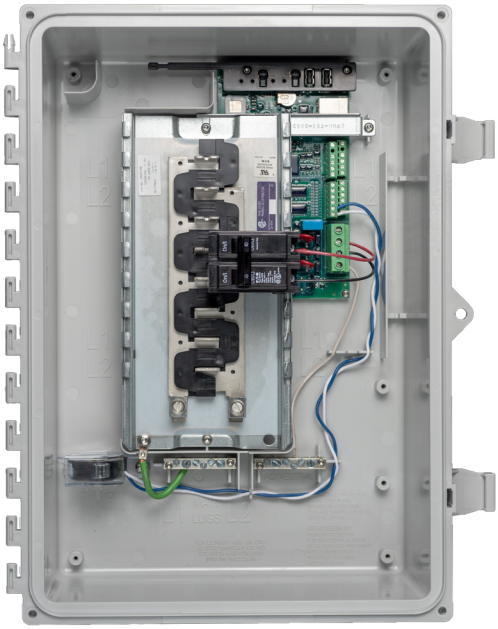
INPUT DATA (DC)		IQ8M-72-2-US	IQ8A-72-2-US
Commonly used module pairings[1]	W	260 – 460	295 – 500
Module compatibility		60-cell/120 half-cell, 66-cell/132 half-cell and 72-cell/144 half-cell	
MPPT voltage range	V	33 – 45	36 – 45
Operating range	V	25 – 58	
Min/max start voltage	V	30 / 58	
Max input DC voltage	V	60	
Max DC current[2] [module Isc]	A	15	
Overvoltage class DC port		II	
DC port backfeed current	mA	0	
PV array configuration		1x1 Ungrounded array; No additional DC side protection required; AC side protection requires max 20A per branch circuit	
OUTPUT DATA (AC)		**IQ8M-72-2-US**	**IQ8A-72-2-US**
Peak output power	VA	330	366
Max continuous output power	VA	325	349
Nominal (L-L) voltage/range[3]	V	240 / 211 – 264	
Max continuous output current	A	1.35	1.45
Nominal frequency	Hz	60	
Extended frequency range	Hz	50 – 68	
AC short circuit fault current over 3 cycles	Arms	2	
Max units per 20 A (L-L) branch circuit[4]		11	
Total harmonic distortion		<5%	
Overvoltage class AC port		III	
AC port backfeed current	mA	30	
Power factor setting		1.0	
Grid-tied power factor (adjustable)		0.85 leading – 0.85 lagging	
Peak efficiency	%	97.6	97.6
CEC weighted efficiency	%	97	97.5
Night-time power consumption	mW	60	
MECHANICAL DATA			
Ambient temperature range		-40°C to +60°C (-40°F to +140°F)	
Relative humidity range		4% to 100% (condensing)	
DC Connector type		MC4	
Dimensions (HxWxD)		212 mm (8.3”) x 175 mm (6.9”) x 30.2 mm (1.2”)	
Weight		1.08 kg (2.38 lbs)	
Cooling		Natural convection – no fans	
Approved for wet locations		Yes	
Pollution degree		PD3	
Enclosure		Class II double-insulated, corrosion resistant polymeric enclosure	
Environ. category / UV exposure rating		NEMA Type 6 / outdoor	
COMPLIANCE			
Certifications		CA Rule 21 (UL 1741-SB), UL 62109-1, UL1741/IEEE1547, FCC Part 15 Class B, ICES-0003 Class B, CAN/CSA-C22.2 NO. 107.1-01 This product is UL Listed as PV Rapid Shut Down Equipment and conforms with NEC 2014, NEC 2017, and NEC 2020 section 690.12 and C22.1-2018 Rule 64-218 Rapid Shutdown of PV Systems, for AC and DC conductors, when installed according to manufacturer’s instructions.	

(1) No enforced DC/AC ratio. See the compatibility calculator at https://link.enphase.com/module-compatibility
(2) Maximum continuous input DC current is 10.6A (3) Nominal voltage range can be extended beyond nominal if required by the utility. (4) Limits may vary. Refer to local requirements to define the number of microinverters per branch in your area.

Enphase IQ Combiner 3

(X-IQ-AM1-240-3)

The **Enphase IQ Combiner 3™** with Enphase IQ Envoy™ consolidates interconnection equipment into a single enclosure and streamlines PV and storage installations by providing a consistent, pre-wired solution for residential applications. It offers up to four 2-pole input circuits and Eaton BR series busbar assembly.



Smart

- Includes IQ Envoy for communication and control
- Flexible networking supports Wi-Fi, Ethernet, or cellular
- Optional AC receptacle available for PLC bridge
- Provides production metering and optional consumption monitoring

Simple

- Reduced size from previous combiner
- Centered mounting brackets support single stud mounting
- Supports back and side conduit entry
- Up to four 2-pole branch circuits for 240 VAC plug-in breakers (not included)
- 80 A total PV or storage branch circuits

Reliable

- Durable NRTL-certified NEMA type 3R enclosure
- Five-year warranty
- UL listed

UL LISTED

To learn more about Enphase offerings, visit **enphase.com**

ENPHASE.

Enphase IQ Combiner 3

MODEL NUMBER	
IQ Combiner 3 X-IQ-AM1-240-3	IQ Combiner 3 with Enphase IQ Envoy™ printed circuit board for integrated revenue grade PV production metering (ANSI C12.20 +/- 0.5%) and optional* consumption monitoring (+/- 2.5%).
ACCESSORIES and **REPLACEMENT PARTS** (not included, order separately)	
Enphase Mobile Connect™ CELLMODEM-03 (4G / 12-year data plan) CELLMODEM-01 (3G / 5-year data plan) CELLMODEM-M1 (4G based LTE-M / 5-year data plan)	Plug and play industrial grade cellular modem with data plan for systems up to 60 microinverters. (Available in the US, Canada, Mexico, Puerto Rico, and the US Virgin Islands, where there is adequate cellular service in the installation area.)
Consumption Monitoring* CT CT-200-SPLIT	Split core current transformers enable whole home consumption metering (+/- 2.5%).
Circuit Breakers BRK-10A-2-240 BRK-15A-2-240 BRK-20A-2P-240	Supports Eaton BR210, BR215, BR220, BR230, BR240, BR250, and BR260 circuit breakers. Circuit breaker, 2 pole, 10A, Eaton BR210 Circuit breaker, 2 pole, 15A, Eaton BR215 Circuit breaker, 2 pole, 20A, Eaton BR220
EPLC-01	Power line carrier (communication bridge pair), quantity 2
XA-PLUG-120-3	Accessory receptacle for Power Line Carrier in IQ Combiner 3 (required for EPLC-01)
XA-ENV-PCBA-3	Replacement IQ Envoy printed circuit board (PCB) for Combiner 3
ELECTRICAL SPECIFICATIONS	
Rating	Continuous duty
System voltage	120/240 VAC, 60 Hz
Eaton BR series busbar rating	125 A
Max. continuous current rating (output to grid)	65 A
Max. fuse/circuit rating (output)	90 A
Branch circuits (solar and/or storage)	Up to four 2-pole Eaton BR series Distributed Generation (DG) breakers only (not included)
Max. continuous current rating (input from PV)	64 A
Max. total branch circuit breaker rating (input)	80A of distributed generation / 90A with IQ Envoy breaker included
Production Metering CT	200 A solid core pre-installed and wired to IQ Envoy
MECHANICAL DATA	
Dimensions (WxHxD)	49.5 x 37.5 x 16.8 cm (19.5” x 14.75” x 6.63”). Height is 21.06" (53.5 cm with mounting brackets).
Weight	7.5 kg (16.5 lbs)
Ambient temperature range	-40° C to +46° C (-40° to 115° F)
Cooling	Natural convection, plus heat shield
Enclosure environmental rating	Outdoor, NRTL-certified, NEMA type 3R, polycarbonate construction
Wire sizes	• 20 A to 50 A breaker inputs: 14 to 4 AWG copper conductors • 60 A breaker branch input: 4 to 1/0 AWG copper conductors • Main lug combined output: 10 to 2/0 AWG copper conductors • Neutral and ground: 14 to 1/0 copper conductors Always follow local code requirements for conductor sizing.
Altitude	To 2000 meters (6,560 feet)
INTERNET CONNECTION OPTIONS	
Integrated Wi-Fi	802.11b/g/n
Ethernet	Optional, 802.3, Cat5E (or Cat 6) UTP Ethernet cable (not included)
Cellular	Optional, CELLMODEM-01 (3G) or CELLMODEM-03 (4G) or CELLMODEM-M1 (4G based LTE-M) (not included)
COMPLIANCE	
Compliance, Combiner	UL 1741 CAN/CSA C22.2 No. 107.1 47 CFR, Part 15, Class B, ICES 003 Production metering: ANSI C12.20 accuracy class 0.5 (PV production)
Compliance, IQ Envoy	UL 60601-1/CANCSA 22.2 No. 61010-1

* Consumption monitoring is required for Enphase Storage Systems.

To learn more about Enphase offerings, visit **enphase.com**

2018-09-13

ENPHASE.

Enphase IQ System Controller

The **Enphase IQ System Controller** connects the home to grid power, the IQ Battery system, and solar PV. It provides microgrid interconnection device (MID) functionality by automatically detecting and seamlessly transitioning the home energy system from grid power to backup power in the event of a grid failure. It consolidates interconnection equipment into a single enclosure and streamlines grid independent capabilities of PV and storage installations by providing a consistent, pre-wired solution for residential applications.

Reliable

- Durable NEMA type 3R enclosure
- Ten-year limited warranty

Smart

- Controls safe connectivity to the grid
- Automatically detects grid outages
- Provides seamless transition to backup

Simple

- Connects to the load or service equipment[1] side of the main load panel
- Centered mounting brackets support single stud mounting
- Supports conduit entry from the bottom, bottom left side, and bottom right side
- Supports whole home and partial home backup and subpanel backup
- Up to 200A main breaker support
- Includes neutral-forming transformer for split phase 120/240V backup operation

1. IQ™ System Controller is not suitable for use as service equipment in Canada.

Enphase IQ System Controller

MODEL NUMBER		
EP200G101-M240US00	Enphase IQ System Controller smart switch with neutral-forming transformer (NFT), Microgrid Interconnect Device (MID), breakers, and screws. Streamlines grid-independent capabilities of PV and storage installations.	

ACCESSORIES and REPLACEMENT PARTS		
XA-E3-PCBA-ENS	Replacement IQ System Controller printed circuit board	
EP200G-NA-HD-200A	Eaton type BR circuit breaker hold-down screw kit, BRHDK125	
EP200G-HNDL-R1	IQ System Controller installation handle kit (order separately)	
Circuit breakers (as needed)[2, 3]	Not included, must order separately:	
BRK-100A-2P-240V	• Main breaker, 2 pole, 100A, 25kAIC, CSR2100	
BRK-125A-2P-240V	• Main breaker, 2 pole, 125A, 25kAIC, CSR2125N	
BRK-150A-2P-240V	• Main breaker, 2 pole, 150A, 25kAIC, CSR2150N	
BRK-175A-2P-240V	• Main breaker, 2 pole, 175A, 25kAIC, CSR2175N	
BRK-200A-2P-240V	• Main breaker, 2 pole, 200A, 25kAIC, CSR2200N	
BRK-20A-2P-240V-B	• Circuit breaker, 2 pole, 20A, 10kAIC, BR220B	
BRK-30A-2P-240V	• Circuit breaker, 2 pole, 30A, 10kAIC, BR230B	
BRK-40A-2P-240V	• Circuit breaker, 2 pole, 40A, 10kAIC, BR240B	
BRK-60A-2P-240V	• Circuit breaker, 2 pole, 60A, 10kAIC, BR260	
BRK-80A-2P-240V	• Circuit breaker, 2 pole, 80A, 10kAIC, BR280	

ELECTRICAL SPECIFICATIONS	
Assembly rating	Continuous operation at 100% of its rating
Nominal voltage / range (L-L)	240 VAC / 100 - 310 VAC
Voltage measurement accuracy	±1% V nominal (±1.2V L-N and ±2.4V L-L)
Auxiliary contact for load control and excess PV control	24V, 1A
Nominal frequency / range	60 Hz / 56 - 63 Hz
Frequency measurement accuracy	±0.1 Hz
Maximum continuous current rating	160A
Maximum input overcurrent protection device	200A
Maximum output overcurrent protection device	200A
Maximum overcurrent protection device rating for storage branch circuit[4]	80A
Maximum overcurrent protection device rating for PV combiner branch circuit[4]	80A
Neutral Forming Transformer (NFT)	• Breaker rating (pre-installed): 40A between L1 and Neutral; 40A between L2 and Neutral • Continuous rated power: 3600VA • Maximum continuous unbalance current: 30A @ 120V • Peak rated power: 8800VA for 30 seconds • Peak unbalanced current: 80A @ 120V for 30 seconds

MECHANICAL DATA		
Dimensions (WxHxD)	50cm x 91.6cm x 24.6cm (19.7 in x 36 in x 9.7 in)	
Weight	38.5 kg (85 lbs)	
Ambient temperature range	-40° C to +50° C (-40° F to 122° F)	
Cooling	Natural convection, plus heat shield	
Enclosure environmental rating	Outdoor, NEMA type 3R, polycarbonate construction	
Altitude	To 2500 meters (8200 feet)	

WIRE SIZES		
Connections (All lugs are rated to 90C)	• Main lugs and backup load lugs • CSR breakers • BR breakers (wire provided) • AC combiner lugs, IQ Battery lugs, and generator lugs • Neutral (large lugs)	Cu/Al: 1 AWG – 300 KCMIL Cu/Al: 2 AWG – 300 KCMIL 6 AWG 14 AWG – 2 AWG Cu/Al: 6 AWG - 300 KCMIL
Neutral and ground bars	Large holes (5/16-24 UNF) Small holes (10-32 UNF)	14 AWG – 1/0 AWG 14 AWG – 6 AWG

COMPLIANCE	
Compliance	UL 1741, UL 1741 SA, UL 1741 PCS, UL1998, UL869A[5], UL67[5], UL508[5], UL50E[5] CSA 22.2 No. 107.1, 47 CFR, Part 15, Class B, ICES 003, AC156. IFETEL homologation number: RCPENEP22-2078

2. Compatible with BRHDK125 Hold-Down Kit to comply with 2017 NEC 710.15E for back-fed circuit breakers.
3. The IQ™ System Controller is rated 22 kAIC
4. Not included. Installer must provide properly rated breaker per circuit breaker list above.
5. Sections from these standards were used during the safety evaluation and included in the UL 1741 listing.

To learn more about Enphase offerings, visit **enphase.com**

ENPHASE.

POWERWALL

Tesla Powerwall is a fully-integrated AC battery system for residential or light commercial use. Its rechargeable lithium-ion battery pack provides energy storage for solar self-consumption, time-based control, and backup.

Powerwall's electrical interface provides a simple connection to any home or building. Its revolutionary compact design achieves market-leading energy density and is easy to install, enabling owners to quickly realize the benefits of reliable, clean power.

PERFORMANCE SPECIFICATIONS

AC Voltage (Nominal)	120/240 V
Feed-In Type	Split Phase
Grid Frequency	60 Hz
Total Energy	14 kWh
Usable Energy	13.5 kWh
Real Power, max continuous	5 kW (charge and discharge)
Real Power, peak (10 s, off-grid/backup)	7 kW (charge and discharge)
Apparent Power, max continuous	5.8 kVA (charge and discharge)
Apparent Power, peak (10 s, off-grid/backup)	7.2 kVA (charge and discharge)
Maximum Supply Fault Current	10 kA
Maximum Output Fault Current	32 A
Overcurrent Protection Device	30 A
Imbalance for Split-Phase Loads	100%
Power Factor Output Range	+/– 1.0 adjustable
Power Factor Range (full-rated power)	+/– 0.85
Internal Battery DC Voltage	50 V
Round Trip Efficiency[1,3]	90%
Warranty	10 years

[1]Values provided for 25°C (77°F), 3.3 kW charge/discharge power.
[2]In Backup mode, grid charge power is limited to 3.3 kW.
[3]AC to battery to AC, at beginning of life.

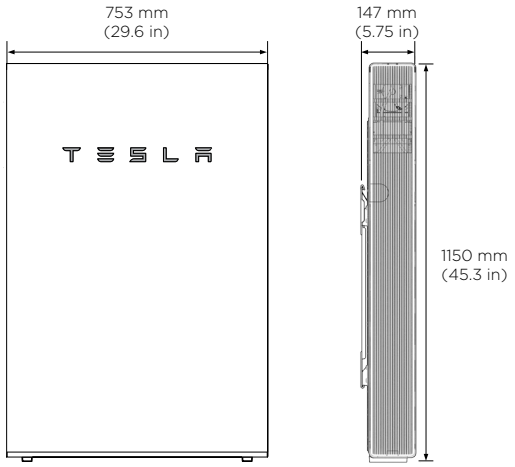
COMPLIANCE INFORMATION

Certifications	UL 1642, UL 1741, UL 1973, UL 9540, IEEE 1547, UN 38.3
Grid Connection	Worldwide Compatibility
Emissions	FCC Part 15 Class B, ICES 003
Environmental	RoHS Directive 2011/65/EU
Seismic	AC156, IEEE 693-2005 (high)

MECHANICAL SPECIFICATIONS

Dimensions[1]	1150 mm x 755 mm x 147 mm (45.3 in x 29.6 in x 5.75 in)
Weight[1]	114 kg (251.3 lbs)
Mounting options	Floor or wall mount

[1]Dimensions and weight differ slightly if manufactured before March 2019. Contact Tesla for additional information.

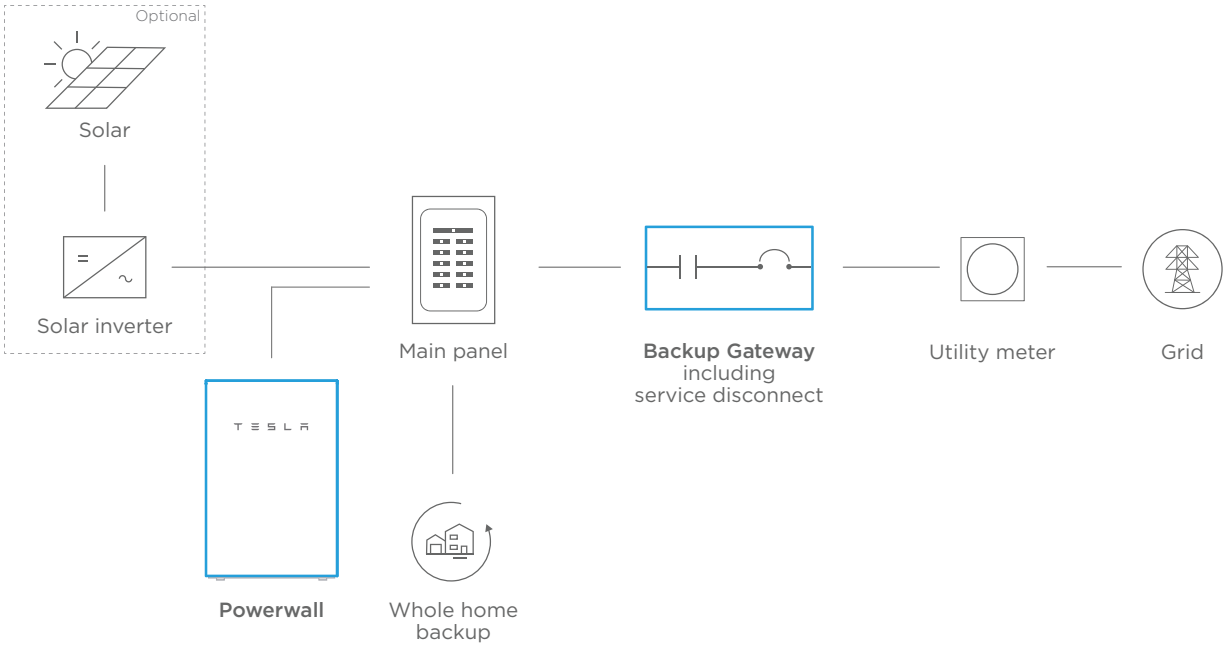


ENVIRONMENTAL SPECIFICATIONS

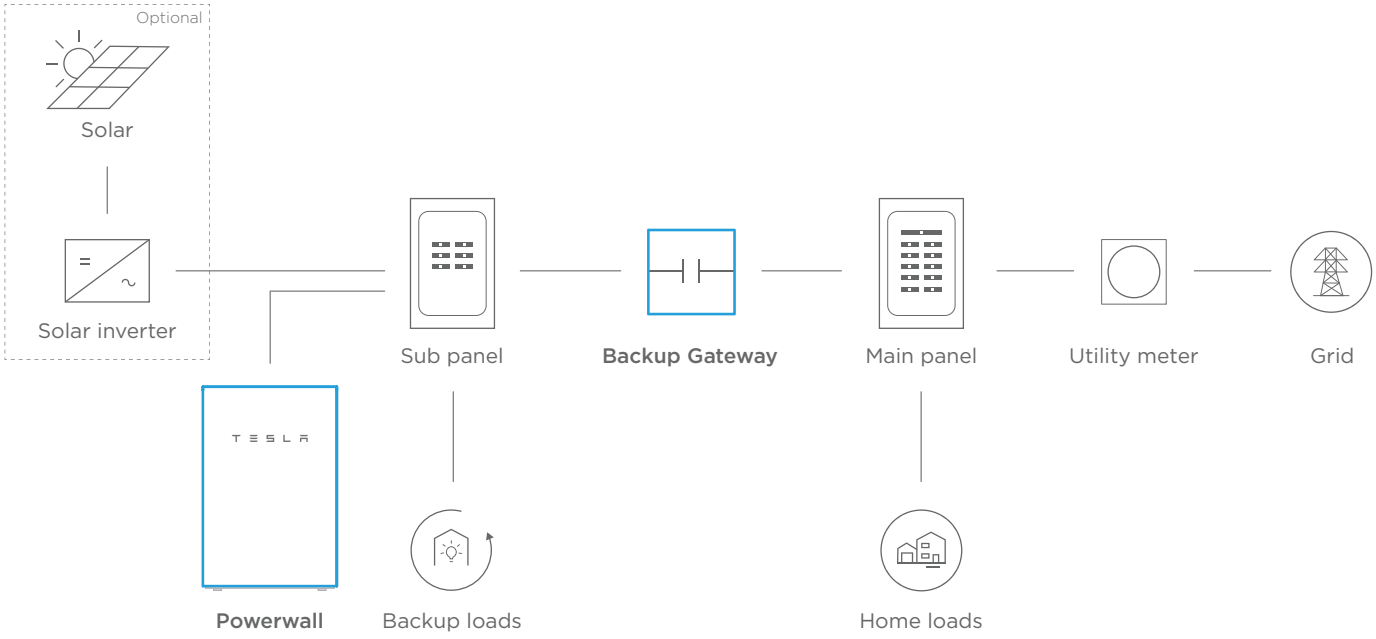
Operating Temperature	–20°C to 50°C (–4°F to 122°F)
Recommended Temperature	0°C to 30°C (32°F to 86°F)
Operating Humidity (RH)	Up to 100%, condensing
Storage Conditions	–20°C to 30°C (–4°F to 86°F) Up to 95% RH, non-condensing State of Energy (SoE): 25% initial
Maximum Elevation	3000 m (9843 ft)
Environment	Indoor and outdoor rated
Enclosure Type	NEMA 3R
Ingress Rating	IP67 (Battery & Power Electronics) IP56 (Wiring Compartment)
Wet Location Rating	Yes
Noise Level @ 1m	< 40 dBA at 30°C (86°F)

TYPICAL SYSTEM LAYOUTS

WHOLE HOME BACKUP



PARTIAL HOME BACKUP



SNAPNRACK UR SPEEDSEAL FOOT ON METAL PURLINS

REFER TO SNAPNRACK ENGINEERING CHARTS FOR APPLICABLE RAIL SPANS. "BIN" NUMBER ON CHART SHOULD MATCH "BIN" NUMBER ON THIS DRAWING

#14 TEK S.S., OR EQUIVALENT SELF TAPPING FASTENER, WITH MINIMUM 3 THREADS PROJECTING THROUGH PURLIN. REFER TO FASTENER MANUFACTURER FOR TORQUE SPECIFICATIONS

*IF MINIMUM 16GA PURLIN THICKNESS IS NOT MET, OR SPANS ARE NOT SUFFICIENT, CONTACT SNAPNRACK FOR RE-EVALUATION

REFER TO SNAPNRACK INSTALLATION MANUAL FOR 5/16"Ø HARDWARE TORQUE SPECIFICATIONS

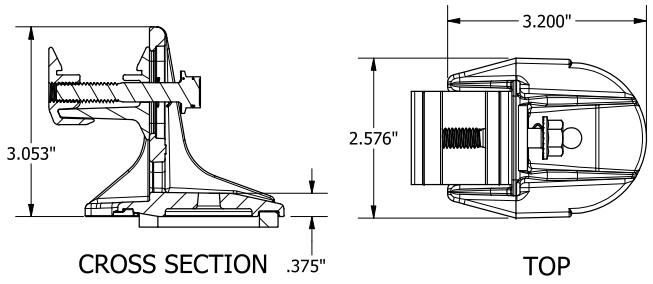
UR SPEEDSEAL FOOT CAN BE MOUNTED UP, DOWN, OR ACROSS THE ROOF SLOPE

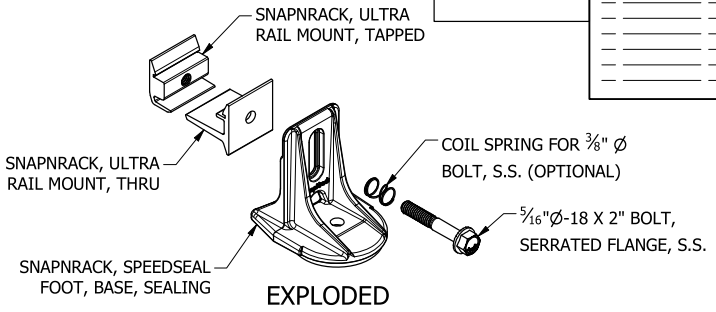
FOR LEVELING DETAILS, REFER TO SNAPNRACK DETAIL DRAWING "SNR-DC-00447 ULTRA RAIL, COMPONENT DETAIL, ULTRA RAIL LEVELING SPACER"

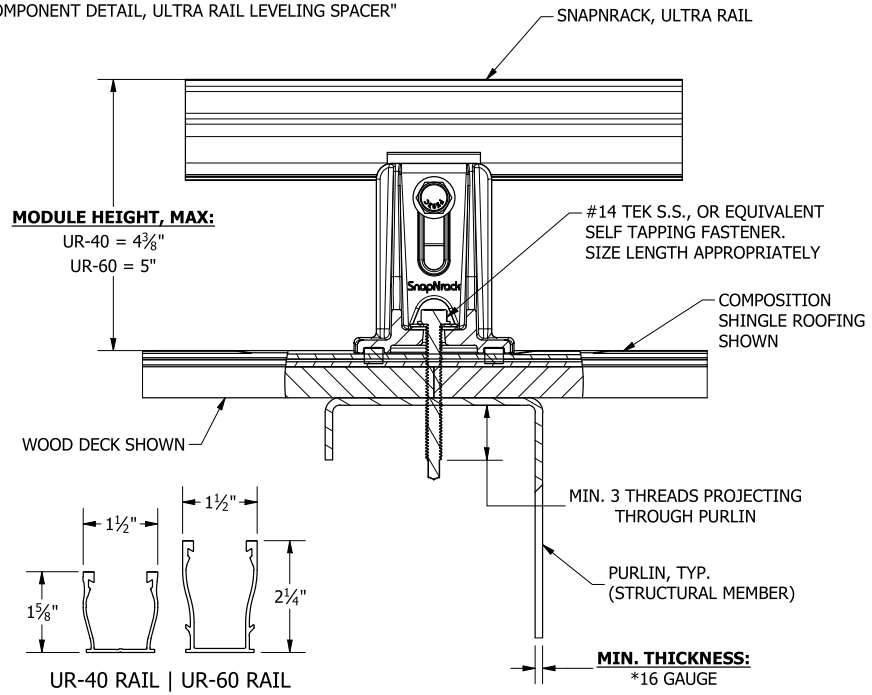
BIN: 3

REVISION:

1	10/15/2020	NEW DETAIL	MJA

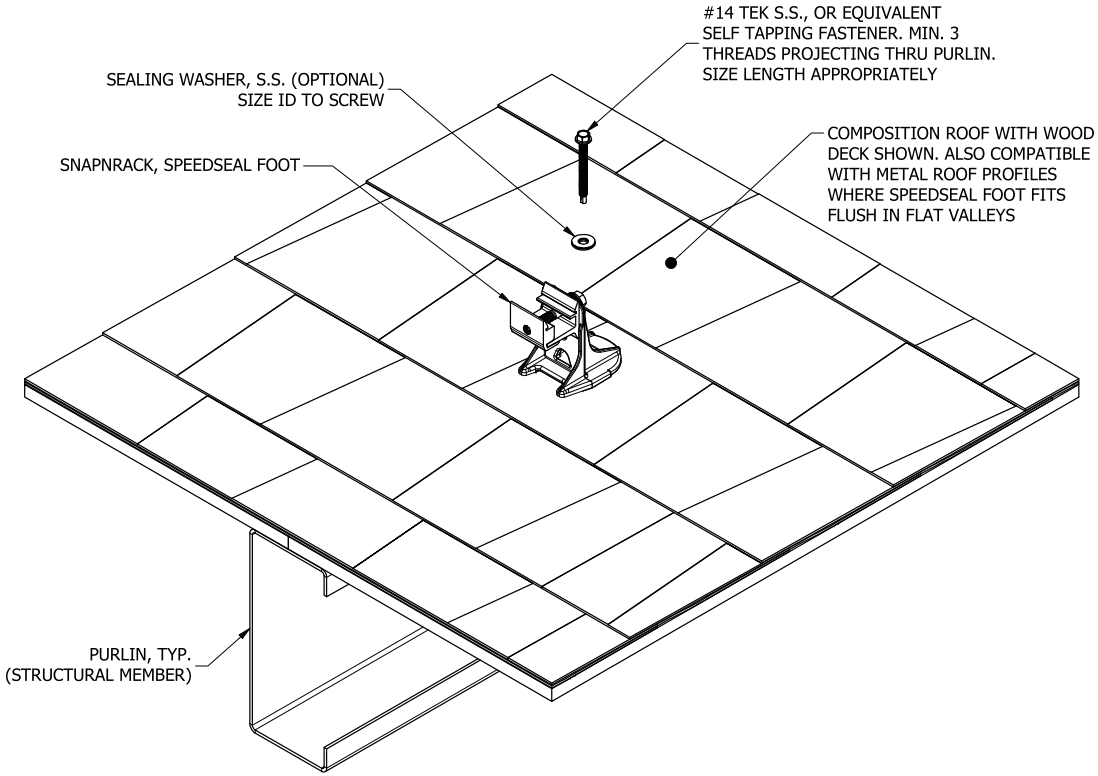






UR-40 RAIL | UR-60 RAIL

FOR USE WITH SNAPNRACK ULTRA SERIES RAILS



SnapNrack™ Solar Mounting Solutions

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

DESIGNER: M.AFFENTRANGER DRAFTER: M.AFFENTRANGER APPROVED BY: B.PETERSON	SCALE: DNS DATE: 10/15/2020	DRAWING NUMBER: SNR-DC-00456	DESCRIPTION: ULTRA RAIL, ATTACHMENT DETAIL, UR SPEEDSEAL FOOT TO PURLIN	REV: 1

SNAPNRACK UR-60 RAIL AND SPLICE DETAILS

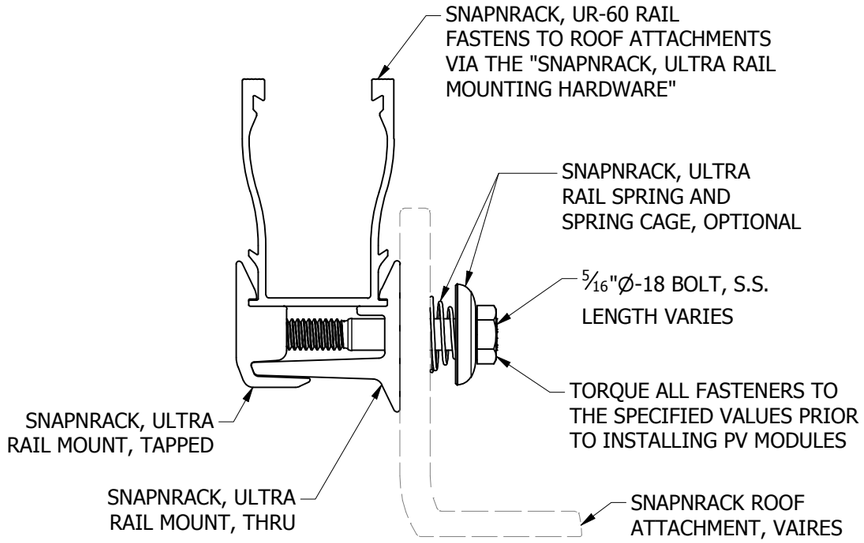
REFER TO SNAPNRACK INSTALLATION MANUAL FOR
5/16"Ø HARDWARE TORQUE SPECIFICATIONS

SPLICE POSITIONING:
- APPROVED - ANYWHERE ALONG RAIL SPAN BETWEEN **TWO** ROOF ATTACHMENTS
- NOT APPROVED - RAIL OVERHANGS / CANTILEVERS

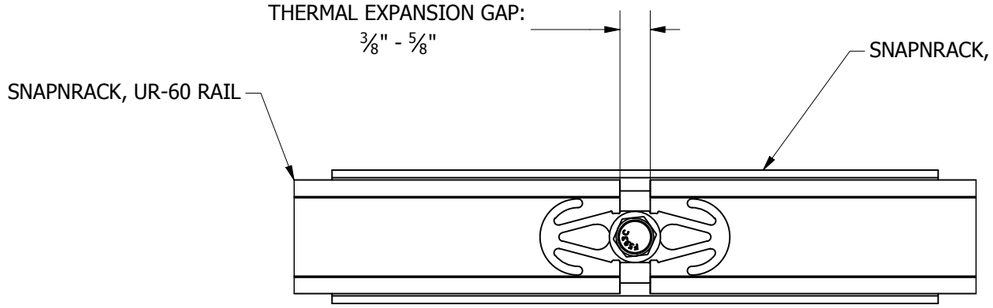
BIN: N/A

REVISION:

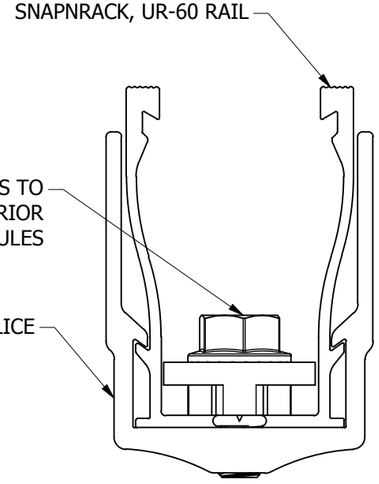
1	5/7/2019	NEW DETAIL	MJA
2	7/17/2019	DRO-00138	MJA



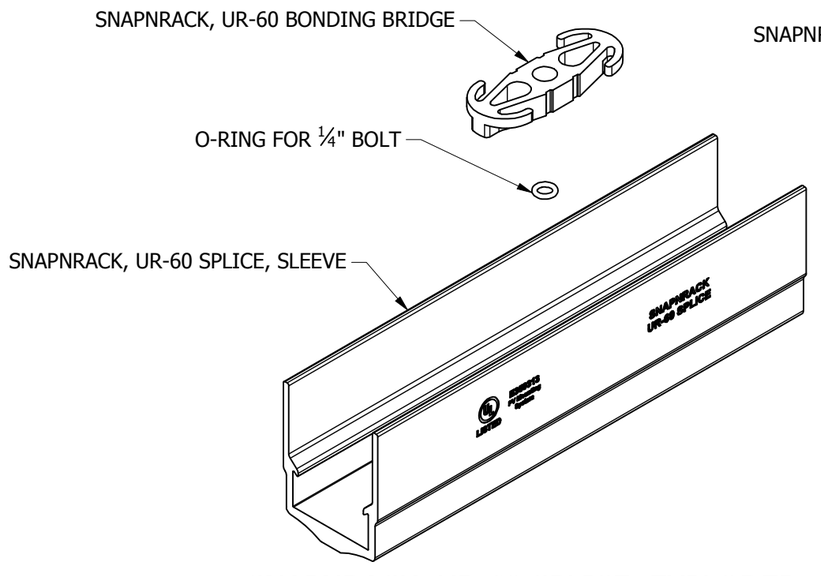
SNAPNRACK, ULTRA RAIL MOUNTING HARDWARE



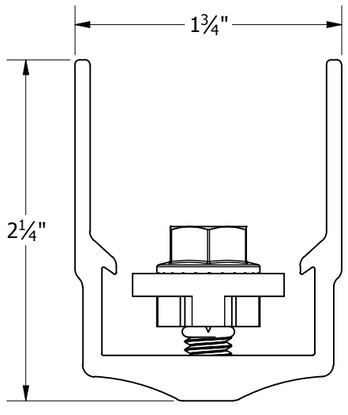
SNAPNRACK, UR-60 SPLICE INSTALLED, TOP



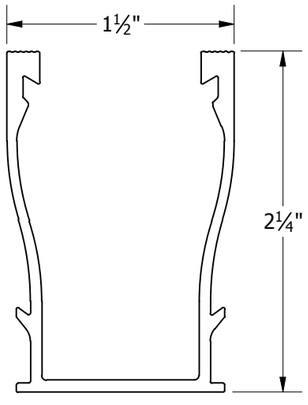
SNAPNRACK, UR-60 SPLICE INSTALLED, FRONT



SNAPNRACK, UR-60 SPLICE, EXPLODED



SNAPNRACK, UR-60 SPLICE



SNAPNRACK, UR-60 RAIL

SnapNrack™ Solar Mounting Solutions	Sunrun South LLC 595 MARKET STREET, 29TH FLOOR • SAN FRANCISCO, CA 94105 USA PHONE (415) 580-6900 • FAX (415) 580-6902 THE INFORMATION IN THIS DRAWING IS CONFIDENTIAL AND PROPRIETARY. ANY REPRODUCTION, DISCLOSURE, OR USE THEREOF IS PROHIBITED WITHOUT THE WRITTEN CONSENT OF SUNRUN SOUTH LLC.	DESIGNER: M.AFFENTRANGER DRAFTER: M.AFFENTRANGER APPROVED BY: B.PETERSON	SCALE: DNS DATE: 5/7/2019	DRAWING NUMBER: SNR-DC-00331	DESCRIPTION: ULTRA RAIL, COMPONENT DETAIL, UR-60 RAIL AND SPLICE REV: 2

Product data sheet

Specifications

Safety switch, double throw, non fusible, 100A, 240 VAC/250 VDC, 2 poles, 20 hp, NEMA 3R, bolt on provision

DTU223RB

Product availability : Stock - Normally stocked in distribution facility

Price* : 1,347.00 USD

Main

Product	Double Throw Safety Switch
Duty Rating	Heavy duty
Disconnect Type	Non-fusible disconnect switch
Factory Installed Neutral	None
Number of Poles	2
Current Rating	100 A
Voltage Rating	240 V AC 250 V DC
Enclosure Rating	NEMA 3
Maximum Horse Power Rating	15 hp 240 V at AC 50-60 Hz for 1 phase conforming to NEC 430.52 20 hp 250 V at DC

Complementary

Short-circuit current	10 kA H or K 200 kA R, J or T
Fuse type	H or K R, J or T
Mounting Type	Surface
Wire Size	AWG 12...AWG 1/0 aluminium AWG 14...AWG 1/0 copper
Tightening torque	35 lbf.in (3.95 N.m) 0.00…0.01 in² (2.06…5.26 mm²) (AWG 14...AWG 1/0) 40 lbf.in (4.52 N.m) 0.01 in² (8.37 mm²) (AWG 8) 45 lbf.in (5.08 N.m) 0.02…0.08 in² (13.30…53.48 mm²) (AWG 8) 50 lbf.in (5.65 N.m) 0.04…0.08 in² (26.67…53.48 mm²) (AWG 6...AWG 4)
Depth	6.93 in (176.02 mm)
Width	11.96 in (303.78 mm)
Height	30.5 in (774.70 mm)
Net Weight	40.50 lb(US) (18.37 kg)

Environment

Certifications	UL Listed

* Price is “List Price” and may be subject to a trade discount – check with your local distributor or retailer for actual price.

Ordering and shipping details

Category	00133-DT SWITCH,NEMA3R
Discount Schedule	DE1
GTIN	785901308492
Number of Units in Package 1	1
Package 1 Weight	37.31 lb(US) (16.924 kg)
Returnability	Yes
Country of origin	US

Packing Units

Unit Type of Package 1	PCE
Package 1 Height	10.30 in (26.162 cm)
Package 1 Width	12.50 in (31.75 cm)
Package 1 Length	33.00 in (83.82 cm)

Offer Sustainability

Sustainable offer status	Green Premium product
California proposition 65	WARNING: This product can expose you to chemicals including: Lead and lead compounds, which is known to the State of California to cause cancer and birth defects or other reproductive harm. For more information go to www.P65Warnings.ca.gov
REACh Regulation	REACh Declaration
REACh free of SVHC	Yes
EU RoHS Directive	Compliant EU RoHS Declaration
Toxic heavy metal free	Yes
Mercury free	Yes
RoHS exemption information	Yes
China RoHS Regulation	China RoHS declaration Pro-active China RoHS declaration (out of China RoHS legal scope)
Environmental Disclosure	Product Environmental Profile

Contractual warranty

Warranty	18 months