

PHOTOVOLTAIC SYSTEM



PV SYSTEM SUMMARY: 7.200 KW

RESIDENTIAL PHOTOVOLTAIC SYSTEM

| | |
|--------------------|---|
| SYSTEM SIZE (DC) | : STC: 18 X 400 = 7200W DC |
| | : PTC: 18 X 360 = 6480W DC |
| SYSTEM SIZE (AC) | : 5000W AC @ 240V |
| MODULES | : 18 X FREEDOM FOREVER: FF-MP-BBB-400 |
| OPTIMIZERS | : 18 X SOLAR EDGE: S440 |
| INVERTER | : SOLAR EDGE: SE5000H-USRGM [S11] |
| TILT | : 28°, 28° |
| AZIMUTH | : 193°, 13° |
| ROOF | : COMPOSITION SHINGLE |
| RAFTER/TRUSS SIZE | : 2X4 TRUSS @ 24" O.C. |
| ATTACHMENT TYPE | : ECOFASTEN: ROCKIT MICRORAIL WITH ROCKIT SMART SLIDE RAIL-LESS |
| MAIN SERVICE PANEL | : EXISTING 200 AMPS MSP WITH (E) 200 AMPS MAIN BREAKER ON HOT FED |
| INTERCONNECTION | : HOT BUS TIES IN MSP |
| OCPD RATING | : 30 AMPS |
| UTILITY | : DUKE ENERGY |

CITY NOTES:

THIS PROJECT COMPLIES WITH THE FOLLOWING:
 2018 NORTH CAROLINA BUILDING CODE
 2018 NORTH CAROLINA RESIDENTIAL CODE
 2018 NORTH CAROLINA PLUMBING CODE
 2018 NORTH CAROLINA MECHANICAL CODE
 2018 NORTH CAROLINA FUEL GAS CODE
 2017 NATIONAL ELECTRICAL CODE
 AS ADOPTED BY **HARNETT COUNTY**

CONDUIT AND CONDUCTOR SPECIFICATIONS ARE BASED ON MINIMUM CODE REQUIREMENTS AND ARE NOT MEANT TO LIMIT UP-SIZING AS REQUIRED BY FIELD CONDITIONS.

ALL SOLAR ENERGY SYSTEM EQUIPMENT SHALL BE SCREENED TO THE MAXIMUM EXTENT POSSIBLE AND SHALL BE PAINTED A COLOR SIMILAR TO THE SURFACE UPON WHICH THEY ARE MOUNTED.

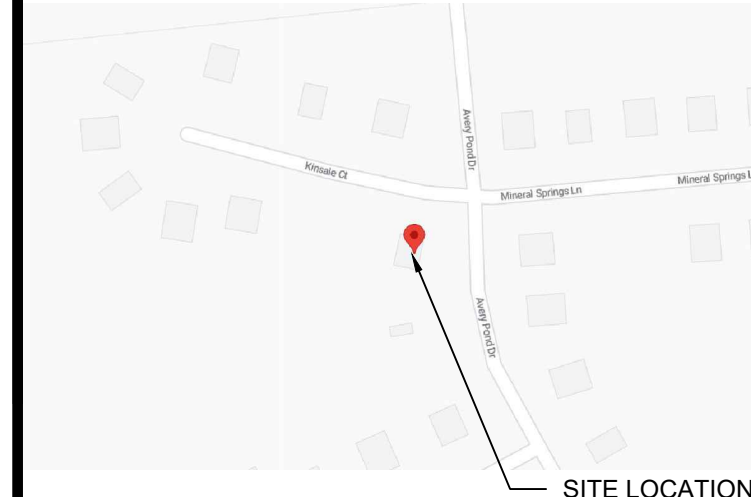
MODULES SHALL BE TESTED, LISTED AND IDENTIFIED WITH FIRE CLASSIFICATION IN ACCORDANCE WITH UL 2703. SMOKE AND CARBON MONOXIDE ALARMS ARE REQUIRED PER SECTION R314 AND 315 TO BE VERIFIED AND INSPECTED BY INSPECTOR IN THE FIELD.

INSTALLATION NOTES:

DIG ALERT (811) TO BE CONTACTED AND COMPLIANCE WITH EXCAVATION SAFETY PRIOR TO ANY EXCAVATION TAKING PLACE

INSTALL CREW TO VERIFY ROOF STRUCTURE PRIOR TO COMMENCING WORK. EMT CONDUIT ATTACHED TO THE ROOF USING CONDUIT MOUNT.

SITE LOCATION:



SITE LOCATION

HOUSE AERIAL VIEW:



MODULE LOCATION

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CLIENT:

CONNOR OLTMAN

23 KINSALE COURT,
FUQUAY-VARINA, NC 27526

REVISIONS:

| DESCRIPTION | DATE | REVISION |
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DATE: 11/03/2023

DESIGN BY: REBB

JOB NO.: 311039

TITLE:

SITE LOCATION AND
HOUSE AERIAL VIEW

SHEET:

PV-1



FREEDOM FOREVER NORTH CAROLINA
LLC

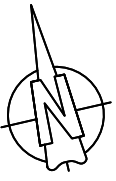
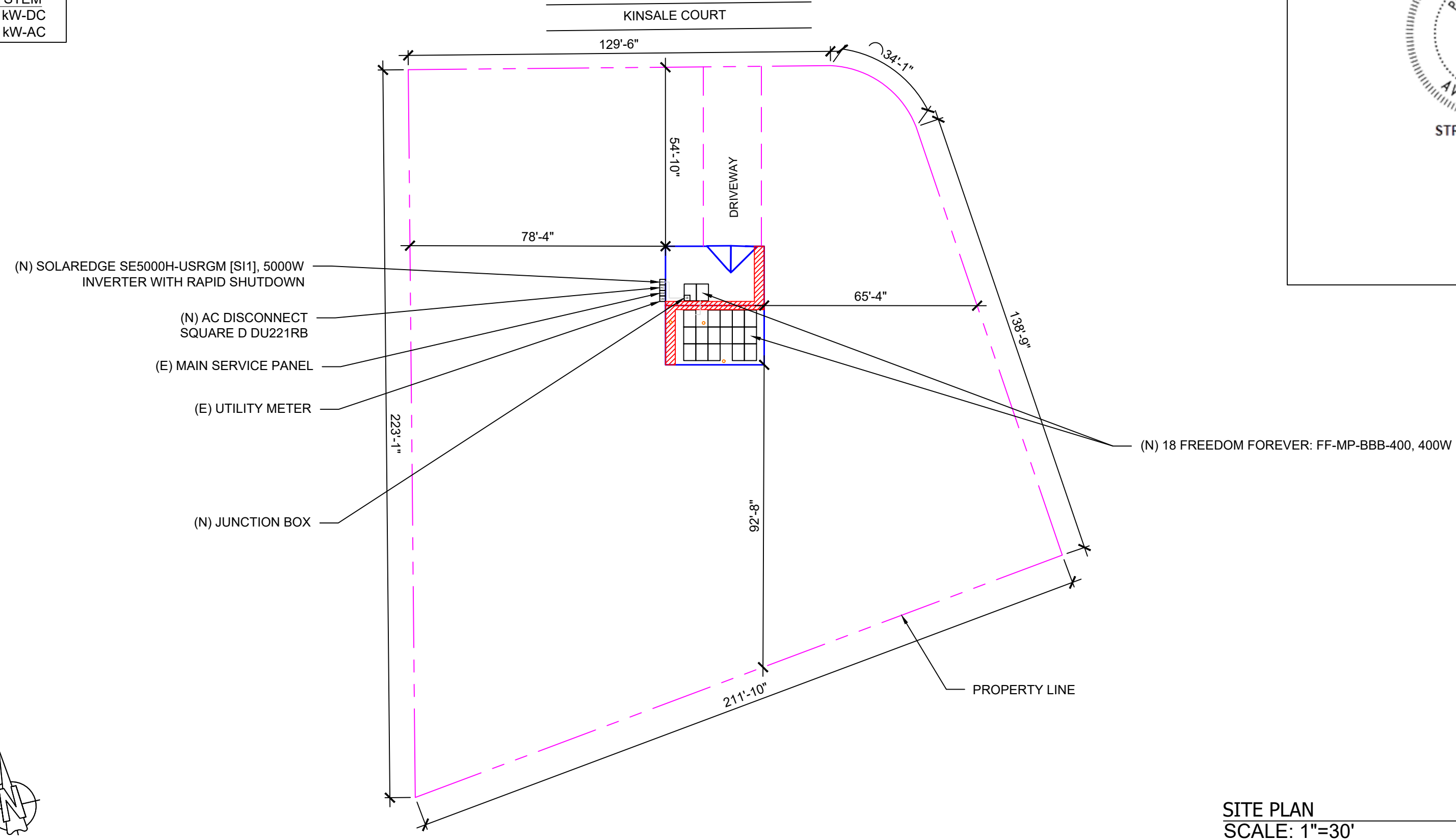
415 INDUSTRIAL CT., GREER, SC 29651
Tel: (800) 385-1075

ELECTRICAL CONTRACTOR NO. U.34043
ELECTRICAL CONTRACTOR U.34043

GREG ALBRIGHT

ROOF AREA : 1100.00 SQ FT

PV SYSTEM
 7.200 kW-DC
 5.000 kW-AC



SITE PLAN
 SCALE: 1"=30'

1

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FOREVER
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 LLC
 415 INDUSTRIAL CT., GREER, SC 29651
 Tel: (800) 385-1075

ELECTRICAL CONTRACTOR NO:
 ELECTRICAL CONTRACTOR U.34043

GREG ALBRIGHT

CLIENT:
CONNOR OLTMAN
 23 KINSALE COURT,
 FUQUAY-VARINA, NC 27526

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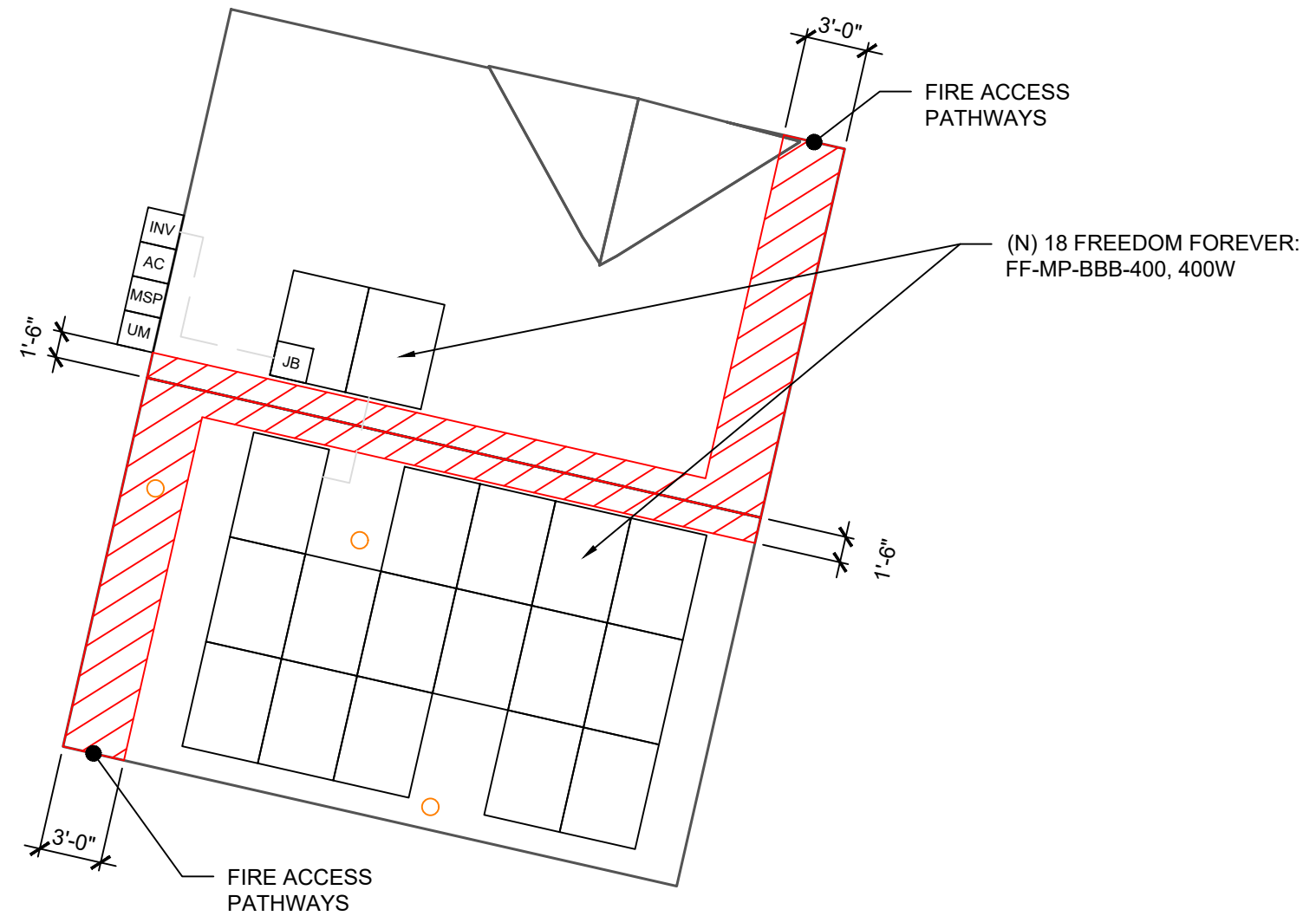
TITLE:
SITE PLAN

SHEET:
PV-2

ROOF AREA : 1100 SQ FT

PV SYSTEM
7.200 kW-DC
 5.000 kW-AC

| ROOF AREA STATEMENT | | | | | | | |
|---------------------|-------------|-------|---------|-----------|--------------|------------------|---------------------------|
| ROOF | MODULES QTY | PITCH | AZIMUTH | ROOF AREA | ARRAY AREA | ARRAY COVERAGE % | SYSTEM DISTRIBUTED WEIGHT |
| 1 | 16 | 28 | 193° | 550 SQ FT | 336.32 SQ FT | 34.40% | 2.32 PSF |
| 2 | 2 | 28 | 13° | 488 SQ FT | 42.04 SQ FT | | |



LEGEND:

| | |
|--|--------------------|
| | OBSTRUCTION |
| | PIPE VENT |
| | MODULES |
| | CONDUIT |
| | SETBACK |
| | AC DISCONNECT |
| | MAIN SERVICE PANEL |
| | JUNCTION BOX |
| | INVERTER |
| | UTILITY METER |

- NOTES:
- EMT CONDUIT ATTACHED TO THE ROOF USING CONDUIT MOUNTS
 - ATTACHED CLAMPS AT 25% FROM THE EDGE AND 50% FROM THE CENTER OF THE MODULES
 - JUNCTION BOX IS MOUNTED TO THE RAIL.



ROOF PLAN
 SCALE: 1/8" = 1'-0"

1

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GREG ALBRIGHT

CLIENT: **CONNOR OLTMAN**
 23 KINSALE COURT,
 FUQUAY-VARINA, NC 27526

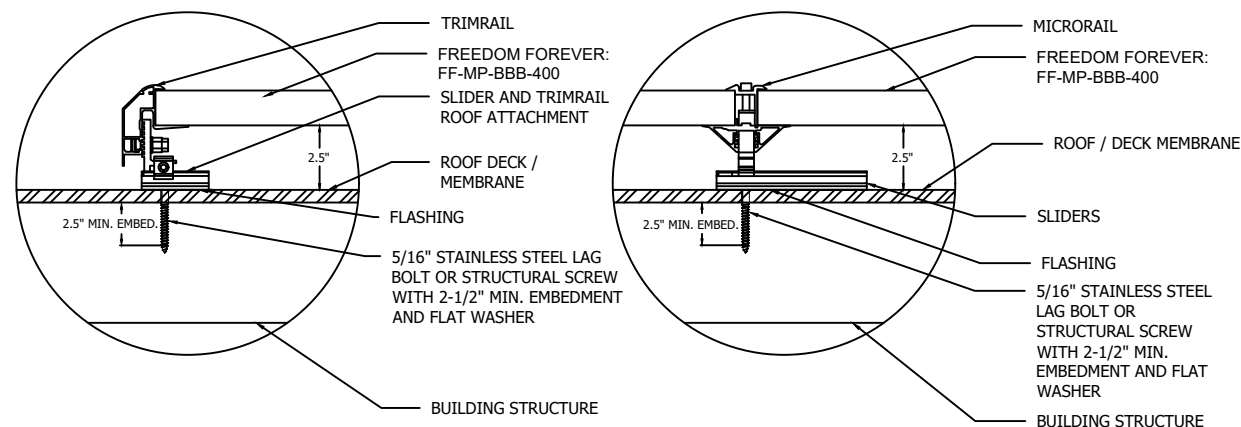
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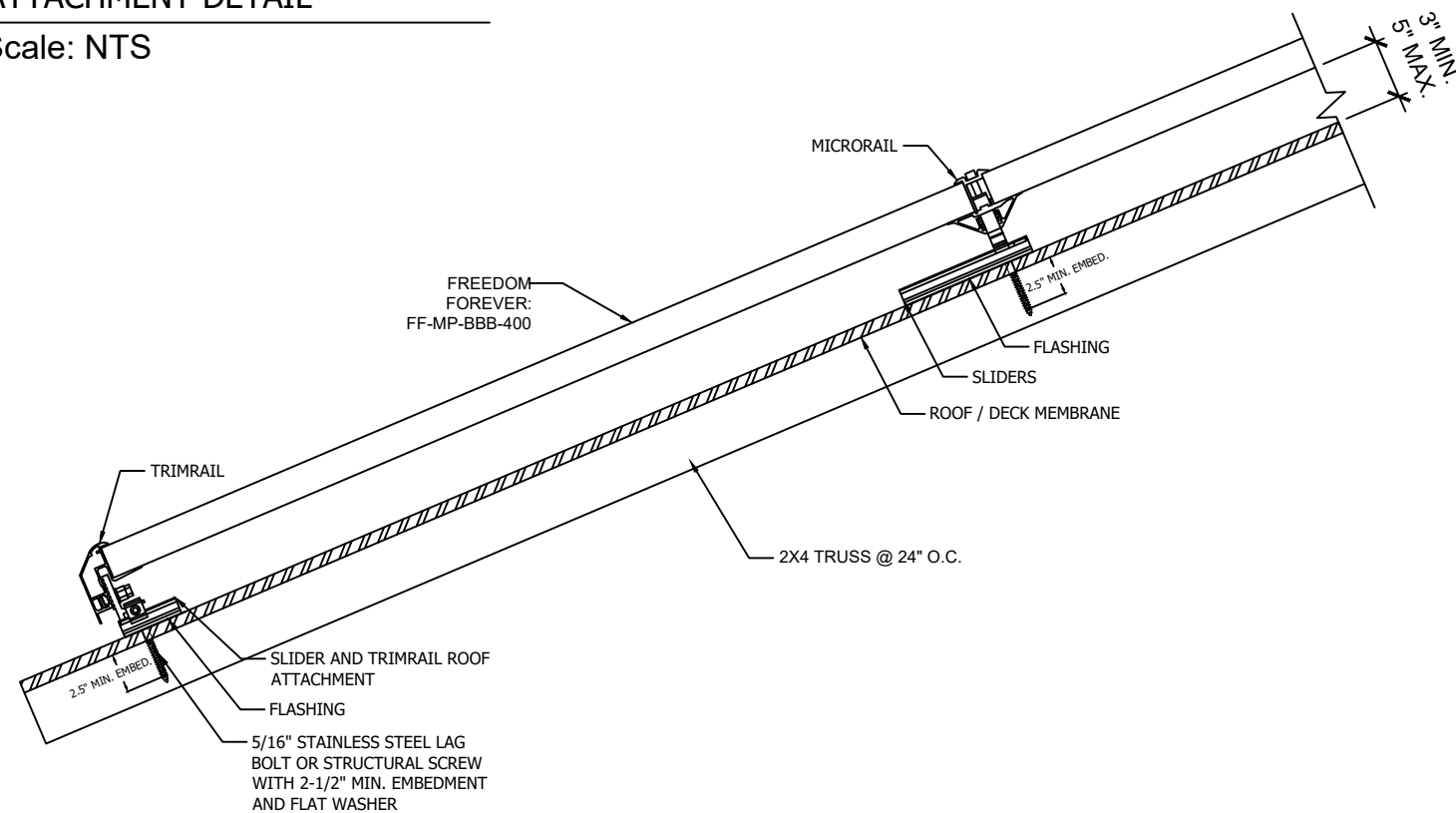
TITLE: **ROOF PLAN W/
 MODULES LAYOUT**

SHEET: **PV-2A**



ATTACHMENT DETAIL

Scale: NTS



MAX ATTACHMENT SPAN - 48" MAX STAGGERED

SOLAR PV ARRAY SECTION VIEW

Scale: NTS

PARTIAL ROOF FRAMING PLAN

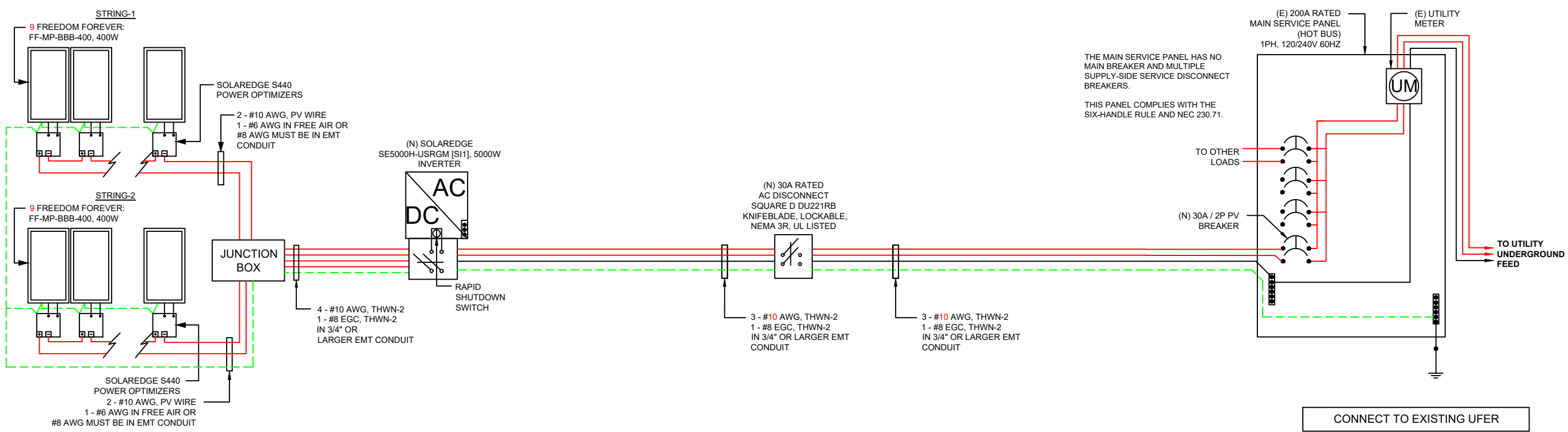
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BACKFEED BREAKER SIZING
 MAX. CONTINUOUS OUTPUT 21.00A @ 240V
 21.00 X 1.25 = 26AMPS 30A BREAKER - OK

| CONDUCTOR AMPACITY DE-RATE CALCULATION | | | | | | | | | | | |
|--|----|---------------|----|---------------|----------------|---------------|---------------------------------|-----------------------------------|------------------------------|-----------------------------------|------|
| EQUIPMENT | | | | WIRE LOCATION | CONDUCTOR QTY. | AWG WIRE SIZE | NEC FACTORS TABLE 310.15(B)(16) | NEC FACTORS TABLE 310.15(B)(2)(a) | CONDUCTOR AMPACITY @90C ADJ. | NEC FACTORS TABLE 310.15(B)(3)(a) | |
| 1 | AC | INVERTER | TO | AC DISCONNECT | EXTERIOR WALL | 3 | 10 | 35 | 1 | 35 | 1.00 |
| 2 | AC | AC DISCONNECT | TO | POI | EXTERIOR WALL | 3 | 10 | 35 | 1 | 35 | 1.00 |

PV SYSTEM
 7.200 kW-DC
 5.000 kW-AC



NOTE:
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DATE: 11/03/2023
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 JOB NO.: 311039

TITLE: **THREE LINE DIAGRAM**

SHEET: **PV-4**

2023-03-03 05:39:02 PST



2023-03-03 05:40:11 PST



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GENERAL NOTES:

18 FREEDOM FOREVER WIRED AND LISTED TO UL1703 STANDARDS

THE SOLAREEDGE INVERTER IS INTEGRATED WITH DC DISCONNECTION AND ARC FAULT PROECTION. IT IS ATTACHED WITH SYSTEM ELECTRICAL SPECIFICATIONS W/ GROUND FAULT PROTECTION & LISTED TO UL 1741 STANDARDS.

PHOTOVOLTAIC SYSTEM GROUND WILL BE TIED INTO EXISTING GROUND AT MAIN SERVICE FROM DC DISCONNECT/INVERTER AS PER 2017 NEC SEC 250.166(A).

SOLAR PHOTOVOLTAIC SYSTEM EQUIPMENT WILL BE INSTALLED IN ACCORDANCE WITH REQUIREMENTS OF ART. 690 OF THE 2017 NEC

CONDUIT ABOVE ROOF SHALL BE NO LESS THAN 1 INCH FROM TOP OF THE ROOF TO BOTTOM OF RACEWAY. TABLE NEC 310.15(B)(3)(C)

PHOTOVOLTAIC DC CONDUCTORS ENTERING THE BUILDING SHALL BE INSTALLED IN METALLIC RACEWAY AND SHALL BE IDENTIFIED EVERY 10 FEET -- AND WITHIN 1 FOOT ABOVE AND BELOW PENETRATIONS OF ROOF/CEILING ASSEMBLIES WALLS OR BARRIERS -- WITH MINIMUM 3/8-INCH-HIGH WHITE LETTERING ON RED BACKGROUND READING: WARNING: PHOTOVOLTAIC POWER SOURCE.

SYSTEM GROUNDING ELECTRODE CONDUCTOR FOR PV SYSTEM TO BE SIZED TO MEET THE REQUIREMENTS OF 2017 NEC

THE EXISTING MAIN SERVICE PANEL WILL BE EQUIPPED WITH A GROUND ROD OR UFER

UTILITY COMPANY WILL BE NOTIFIED PRIOR TO ACTIVATION OF THE SOLAR PV SYSTEM

TERMINALS OF THE DISCONNECTING MEANS MAY BE ENERGIZED IN THE OPEN POSITION

SOLAREEDGE INVERTERS ARE LISTED TO UL 1741 AND UL 1699B STANDARDS

SOLAREEDGE OPTIMIZERS ARE LISTED TO IEC 62109-1 (CLASS II SAFETY) AND UL 1741 STANDARDS

MATERIAL LIST:

| QTY. | PART | PART # | DESCRIPTION |
|------|-----------------------|---------------|--|
| 18 | MODULES | FF-MP-BBB-400 | FREEDOM FOREVER: FF-MP-BBB-400 |
| 18 | OPTIMIZERS | SOLAREEDGE | SOLAREEDGE: S440 POWER OPTIMIZER |
| 1 | JUNCTION BOX | 480-276 | 600VDC NEMA 3R UL LISTED JUNCTION BOX |
| 2 | CONNECTORS | 240-300 | STAUBLI / MULTI-CONTACT MC4 CONNECTORS (FEMALE) |
| 2 | CONNECTORS | 240-301 | STAUBLI / MULTI-CONTACT MC4 CONNECTORS (MALE) |
| 1 | INVERTER | 120-503 | SE5000H-USRGM [S11] 240V INVERTER UL1741 SA CERTIFIED INTEGRATED ARC FAULT PROTECTION AND RAPID SHUTDOWN |
| 1 | AC DISCONNECT | 323-030 | 30A RATED 240VAC NEMA 3R UL LISTED |
| 33 | ROOF ATTACHMENT 1 | 261-602 | ECOFASTEN: ROCKIT MICRORAIL |
| 32 | MICRORAIL 1 | 261-602 | ROCKIT SMART SLIDE RAIL-LESS |
| 13 | SFM TRIM 1 | 241-253 | FLASHKIT SFM TRIM COMP DARK |
| 35 | SFM SLIDER 1 | 261-603 | FLASHKIT SFM SLIDER COMP DARK |
| 10 | BONDING CLAMP 1 | 221-100 | SFM N/S BONDING CLAMP |
| 4 | BONDING CLAMP 1 | 241-404 | SFM TRIM BONDING CLAMP |
| 19 | MOUNT ASSEMBLY 1 | 241-405 | MLPE MOUNT ASSY |
| 11 | SFM SPLICE 1 | 261-604 | SFM SPLICE |
| 3 | SFM ATTACHED SPLICE 1 | 211-101 | SFM ATTACHED SPLICE 8 INCH |
| 15 | TRIMRAIL 1 | 261-606 | SFM TRIMRAIL UNIV CLIP W/ HDW |
| 5 | TRIM SPLICE 1 | 261-605 | SFM TRIM SPLICE DRK |
| 8 | TRIMRAIL 1 | 211-115 | SFM TRIMRAIL UNIV DRK |
| 18 | GROUND LUG 1 | 260-585 | ILSCO GROUND LUG |
| 18 | TRIM END CAPS 1 | 221-200 | UNIRAC SFM TRIM END CAPS |

BREAKER SIZES:

30A PV BREAKER

SERVICE:

| DESCRIPTION | DATE | REVISION |
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NOTES:

1. NEC ARTICLES 690 AND 705 AND NEC 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.

WARNING:
POWER SOURCE OUTPUT CONNECTION
DO NOT RELOCATE THIS
OVERCURRENT DEVICE.

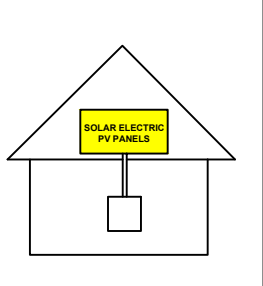
705.12(B)(2)(3)(b)

"WARNING"
DUAL POWER SOURCES
SECOND SOURCE IS PHOTOVOLTAIC SYSTEM
RATED AC OUTPUT CURRENT - 21.00 AMPS
AC NORMAL OPERATING VOLTAGE - 240 VOLTS

690.54

**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

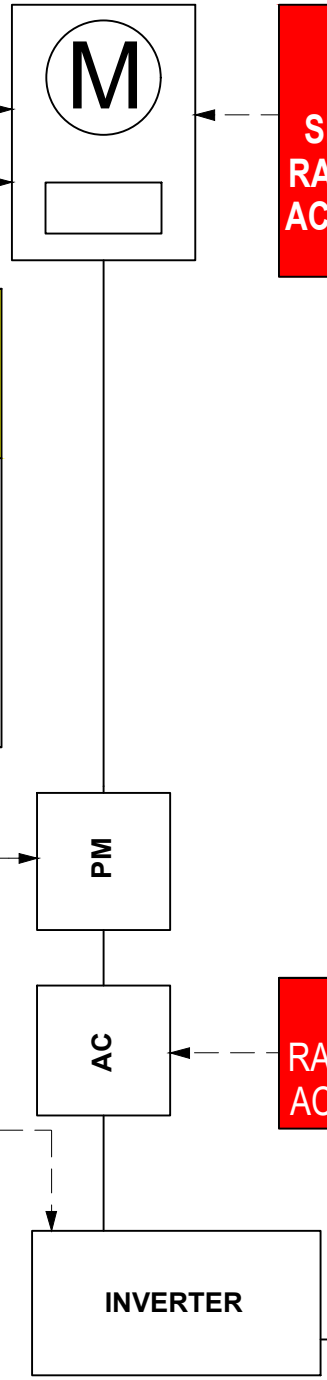


690.56(C)(1)(A)

PV METER

RAPID SHUTDOWN SWITCH FOR
SOLAR PV SYSTEM

690.56(C)(3)



"WARNING"
ELECTRICAL SHOCK HAZARD.
TERMINALS ON BOTH LINE AND LOAD SIDES
MAY BE ENERGIZED IN THE OPEN POSITION.

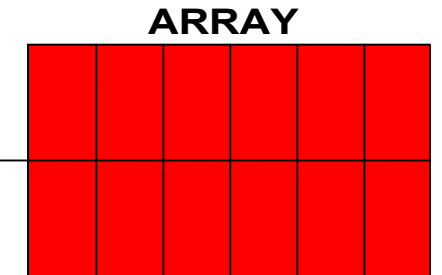
690.13 (B)

PV SYSTEM DC DISCONNECT
MAXIMUM VOLTAGE: 480V
MAXIMUM CIRCUIT CURRENT: 21A
MAX RATED OUTPUT CURRENT OF
THE CONTROLLER OR DC-TO-DC
CONVERTER: 15A

690.53

PV SYSTEM AC DISCONNECT
RATED AC OUTPUT CURRENT - 21.00 AMPS
AC NORMAL OPERATING VOLTAGE - 240 VOLTS

690.15, 690.54



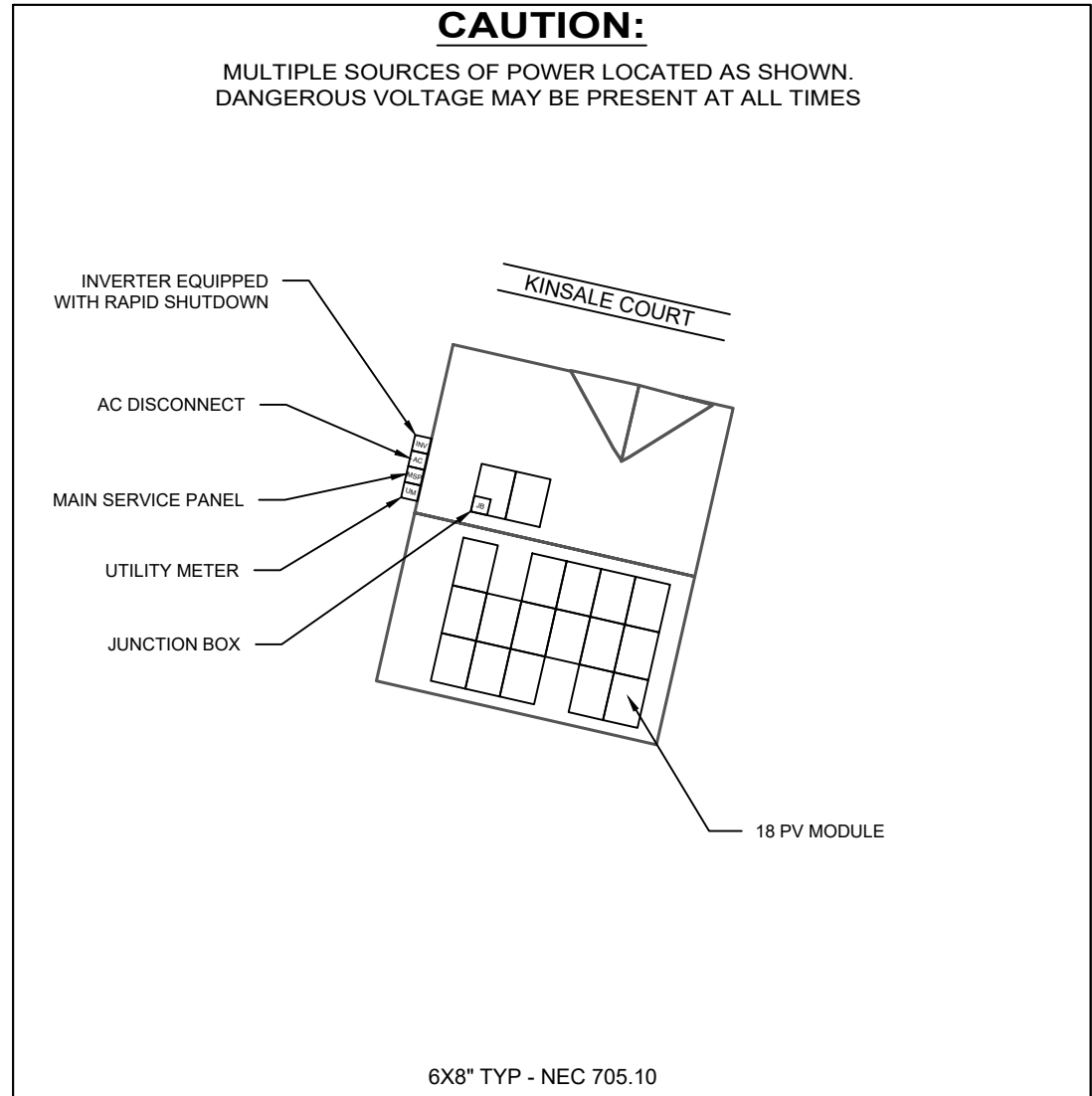
NEC 690.31(G)(3) & (4)

"WARNING"
PHOTOVOLTAIC POWER SOURCE

EVERY 10' ON CONDUIT AND ENCLOSURES

| REVISIONS: | | |
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| DATE: | 11/03/2023 |
| DESIGN BY: | REBB |
| JOB NO.: | 311039 |



NOTES:

1. NEC ARTICLES 690 AND 705 AND NEC 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.

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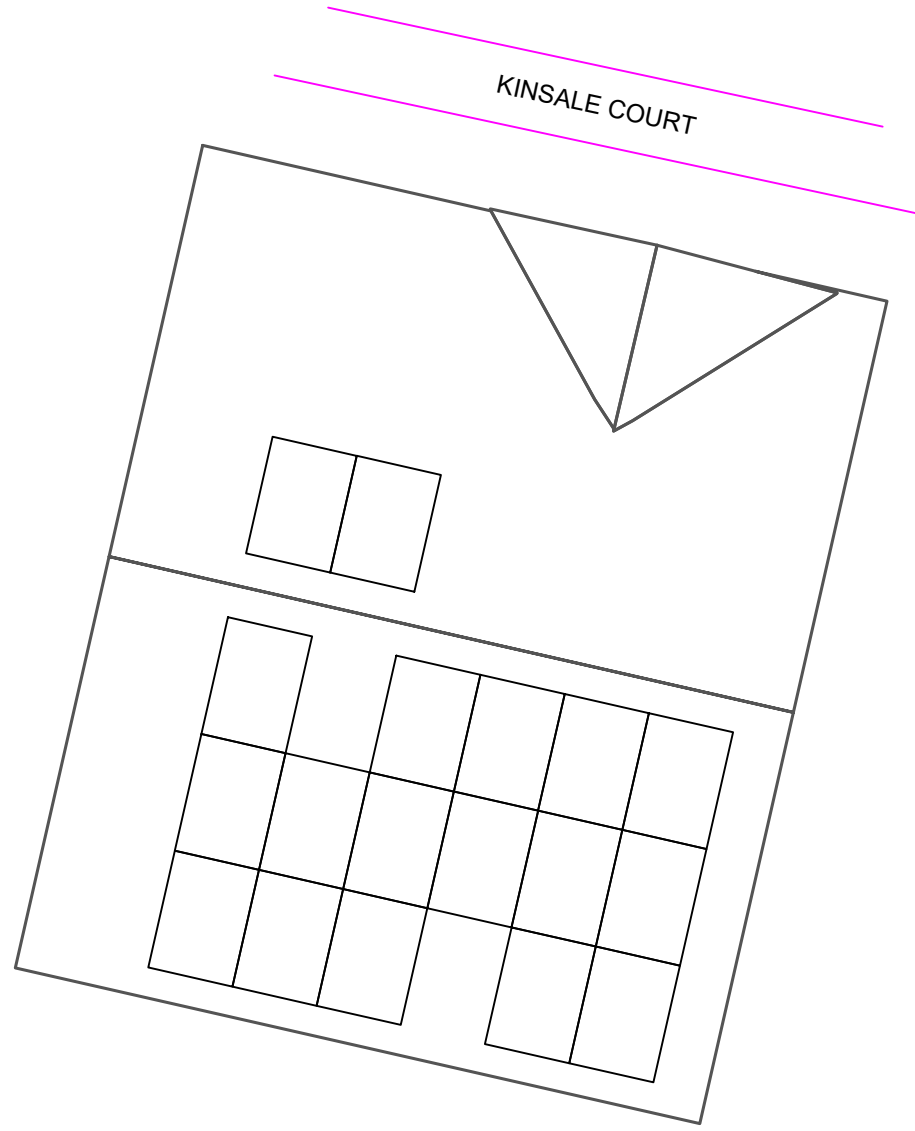
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SOLAREEDGE OPTIMIZER CHART

1-10 11-20 21-30 31-40 41-50 51-60

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SAFETY PLAN

MARK UP KEY

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: _____

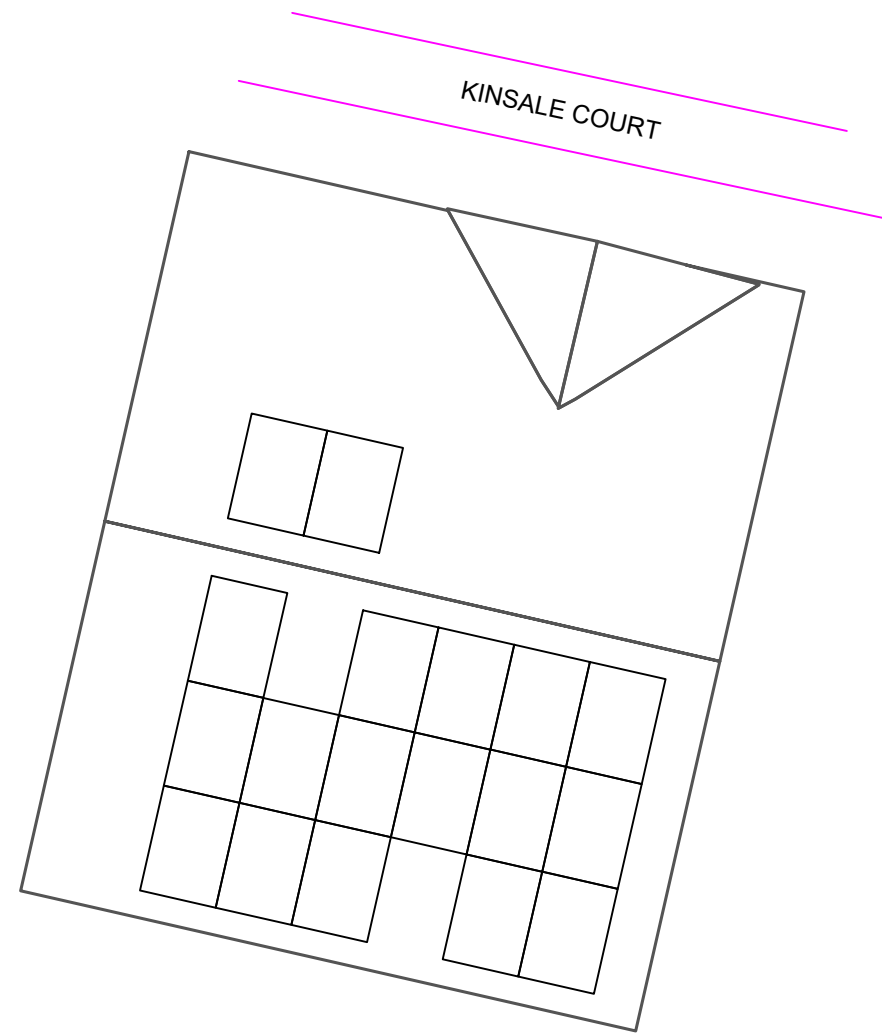
ADDRESS: _____

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.



- (P) PERMANENT ANCHOR
- (T) TEMPORARY ANCHOR
- (IL) INSTALLER LADDER
- (B) JUNCTION / COMBINER BOX
- (S) STUB-OUT
- (X) SKYLIGHT
- (Cloud) NO LADDER ACCESS (STEEP GRADE OR GROUND LEVEL OBSTRUCTIONS)
- (Square) RESTRICTED ACCESS
- (Green Line) CONDUIT
- (GAS) GAS SHUT OFF
- (H₂O) WATER SHUT OFF
- (7) SERVICE DROP
- (Z) POWER LINES

NAME SIGNATURE

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DATE: _____ TIME: _____

CLIENT: **CONNOR OLTMAN**
 23 KINSALE COURT,
 FUQUAY-VARINA, NC 27526

| REVISIONS: | | |
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DATE: 11/03/2023
 DESIGN BY: REBB
 JOB NO.: 311039

TITLE: **SAFETY PLAN**

SHEET: **PV-9**



ELECTRICAL CONTRACTOR NO. U.34043
 ELECTRICAL CONTRACTOR U.34043
 GREG ALBRIGHT

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 identified and protected from contact, as necessary.

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)

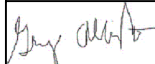
| Define the Hazard: | Method/steps to prevent incident: |
|--------------------|-----------------------------------|
| | |
| Define the Hazard: | Method/steps to prevent incident: |
| | |
| Define the Hazard: | Method/steps to prevent incident: |
| | |
| Define the Hazard: | Method/steps to prevent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



FREEDOM FOREVER NORTH CAROLINA LLC
415 INDUSTRIAL CT., GREER, SC 29651
Tel: (800) 385-1075

ELECTRICAL CONTRACTOR NO. U.34043
ELECTRICAL CONTRACTOR U.34043

GREG ALBRIGHT



CLIENT: **CONNOR OLTMAN**
23 KINSALE COURT,
FUQUAY-VARINA, NC 27526

| REVISIONS: | | |
|-------------|------|----------|
| DESCRIPTION | DATE | REVISION |
| | | |
| | | |
| | | |
| | | |

DATE: 11/03/2023

DESIGN BY: REBB

JOB NO.: 311039

TITLE: **SAFETY PLAN**

SHEET: **PV-10**



HALO 2 400W MODULE

FF-MP-BBB-400

High module conversion efficiency up to 20.48%

Excellent weak light performance

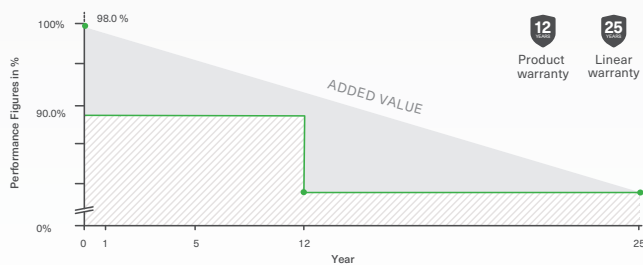
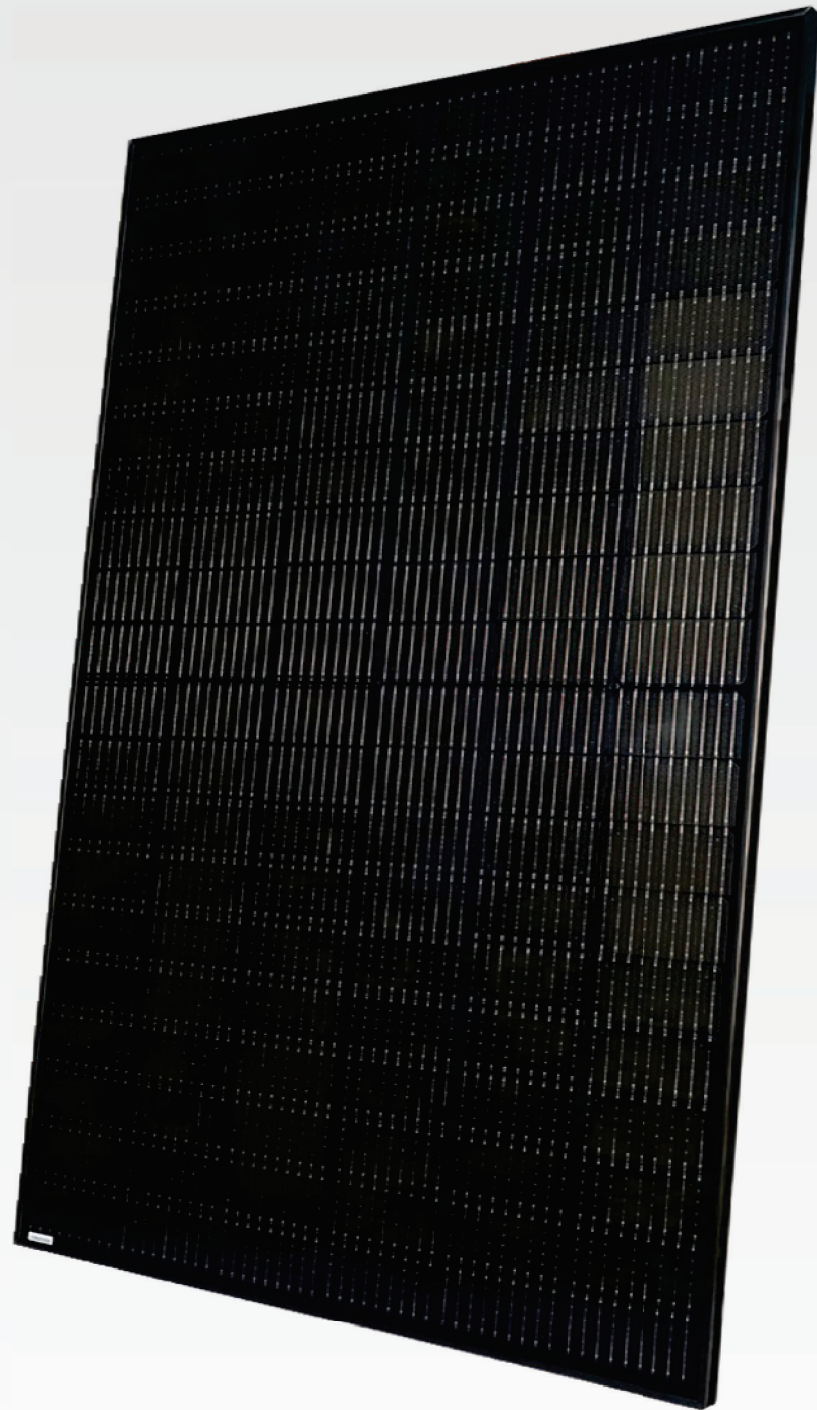
Withstanding harsh environment

Lower operating temperature

Extreme weather loading

12-year material & workmanship

25-year linear power output

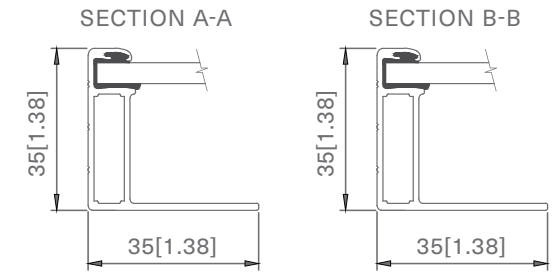


MODULE SPECIFICATIONS

ELECTRICAL CHARACTERISTICS

| Characteristics | FF-MP-BBB-400 |
|---|---|
| Maximum Power (P _{max}) | 400W |
| Maximum Power Voltage (V _{mp}) | 31.01V |
| Maximum Power Current (I _{mp})[A] | 12.90A |
| Open Circuit Voltage (V _{oc})[V] | 37.07V |
| Short Circuit Current (I _{sc})[A] | 13.79A |
| Module Efficiency | 20.48% |
| Power Tolerance | 0/+5W |
| STC | Irradiance of 1000W/m ² , AM1.5, cell Temperature 25°C |

FRAME PROFILE



MECHANICAL CHARACTERISTICS

| | |
|----------------------|--|
| Cell Type | Mono perc, 182 mm-half cells, 108 (6x9+6x9) |
| Weight | 22.1 kgs (48.7 lbs) |
| Dimension | 1722 x 1134 x 35 mm (67.80 x 44.65 x 1.38) |
| Front Glass | 3.2 mm (.13 in), High Transmission, Low Iron & Semi-Tempered Glass |
| Junction Box | IP68 (3 Bypass Diodes) |
| Output Cables | 1200 mm (47 in) |
| Connector | Staubli EVO2 |
| Frame & Installation | Anodized aluminum profile |

OPERATIONS CHARACTERISTICS

| | |
|-------------------------|------------|
| Operational Temperature | -40°C~+85° |
| Max System Voltage | 1500V |
| Max Series Fuse Rating | 25A |
| Safety Class | Class II |
| Fire Rating | Type 1 |

MECHANICAL LOADING

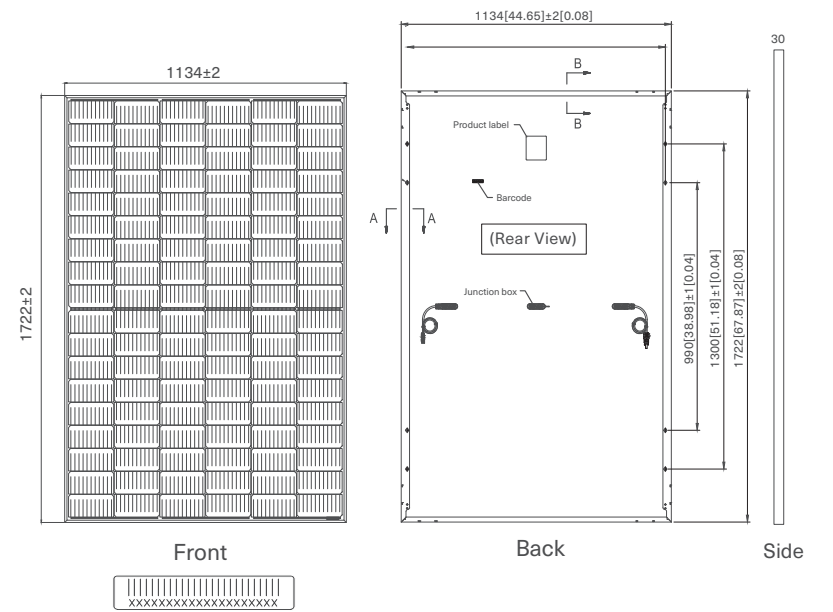
| | |
|-----------------------|---------------------|
| Snow Load | 5,400Pa (113lb/ft2) |
| Rear Side Design Load | 2,400Pa (50lb/ft2) |

PACKAGING INFORMATION

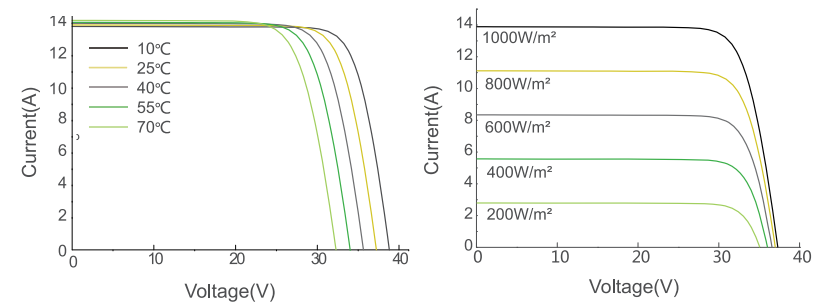
| Container | 20' GP | 40' HC |
|-----------------------|--------|--------|
| Pallets per Container | 6 | 26 |
| Panels per Container | 186 | 806 |

TEMPERATURE RATINGS

| | |
|---|------------|
| Temperature Coefficient of P _{max} | -0.350%/°C |
| Temperature Coefficient of V _{oc} | -0.275%/°C |
| Temperature Coefficient of I _{sc} | +0.045%/°C |
| Nominal Operating cell Temperature (NOCT) | 42°C±2°C |



CURRENT-VOLTAGE CURVE



CERTIFICATIONS AND STANDARDS PENDING



UL 61730 | UL 61215 | ISO 9001 | ISO 14001 | IEC 61701 | IEC 17025 | IEC61716 | DIN EN 60068-2-68



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

/ Single Phase Inverter with HD-Wave Technology for North America

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

| | SE3000H-US | SE3800H-US | SE5000H-US | SE6000H-US | SE7600H-US | SE10000H-US | SE11400H-US | | |
|---|---|----------------------------|-------------|----------------------------|-------------------------------------|-------------|------------------------------|---------|---------|
| 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 | |
| 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 | 600ka Sensitivity | | | | | | | | |
| Maximum Inverter Efficiency | 99 | 99.2 | | | | | | % | |
| CEC Weighted Efficiency | 99 | | | | | | 99 @ 240V 98.5 @ 208V | % | |
| Nighttime Power Consumption | < 2.5 | | | | | | | W | |
| ADDITIONAL FEATURES | | | | | | | | | |
| Supported Communication Interfaces | RS485, Ethernet, ZigBee (optional), Cellular (optional) | | | | | | | | |
| Revenue Grade Data, ANSI C12.20 | Optional ⁽³⁾ | | | | | | | | |
| Rapid Shutdown - NEC 2014 and 2017 690.12 | Automatic Rapid Shutdown upon AC Grid Disconnect | | | | | | | | |
| STANDARD COMPLIANCE | | | | | | | | | |
| Safety | UL1741, UL1741 SA, UL1699B, CSA C22.2, Canadian AFCI according to T.I.L. M-07 | | | | | | | | |
| Grid Connection Standards | IEEE1547, Rule 21, Rule 14 (HI) | | | | | | | | |
| 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 | | | | in / mm |
| Weight with Safety Switch | 22 / 10 | 25.1 / 11.4 | 26.2 / 11.9 | 38.8 / 17.6 | | | | lb / kg | |
| Noise | < 25 | | | | < 50 | | | | dBA |
| Cooling | Natural Convection | | | | | | | | |
| Operating Temperature Range | -13 to +140 / -25 to +60 ⁽⁴⁾ (-40°F / -40°C option) ⁽⁵⁾ | | | | | | | °F / °C | |
| Protection Rating | NEMA 4X (Inverter with Safety Switch) | | | | | | | | |

⁽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
⁽³⁾ Revenue grade inverter P/N: SExxxxH-US000NNC2
⁽⁴⁾ For power de-rating information refer to: <https://www.solaredge.com/sites/default/files/se-temperature-derating-note-na.pdf>
⁽⁵⁾ -40 version P/N: SExxxxH-US000NNU4

Optimized installation with HD-Wave technology

- / Specifically designed to work with power optimizers
- / Record-breaking efficiency
- / 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
- / Extremely small
- / Built-in module-level monitoring
- / Outdoor and indoor installation
- / Optional: Revenue grade data, ANSI C12.20 Class 0.5 (0.5% accuracy)

Power Optimizer

S440, S500



POWER OPTIMIZER

PV power optimization at the module level

- Specifically designed to work with SolarEdge residential inverters
- 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
- Detects abnormal PV connector behavior, preventing potential safety issues*
- Module-level voltage shutdown for installer and firefighter safety
- Flexible system design for maximum space utilization
- Compatible with bifacial PV modules

* Functionality subject to inverter model and firmware version

solaredge.com



/ Power Optimizer

S440, S500

| | S440 | S500 | UNIT |
|---|--|------|---------|
| INPUT | | | |
| Rated Input DC Power ⁽¹⁾ | 440 | 500 | W |
| Absolute Maximum Input Voltage (Voc) | 60 | | Vdc |
| MPPT Operating Range | 8 - 60 | | Vdc |
| Maximum Short Circuit Current (Isc) of Connected PV Module | 14.5 | | Adc |
| Maximum Efficiency | 99.5 | | % |
| Weighted Efficiency | 98.6 | | % |
| Overtoltage Category | II | | |
| OUTPUT DURING OPERATION | | | |
| Maximum Output Current | 15 | | Adc |
| Maximum Output Voltage | 60 | | Vdc |
| OUTPUT DURING STANDBY (POWER OPTIMIZER DISCONNECTED FROM INVERTER OR INVERTER OFF) | | | |
| Safety Output Voltage per Power Optimizer | 1 | | Vdc |
| STANDARD COMPLIANCE | | | |
| EMC | FCC Part 15 Class B, IEC61000-6-2, IEC61000-6-3, CISPR11, EN-55011 | | |
| Safety | IEC62109-1 (class II safety), UL1741 | | |
| Material | UL94 V-0, UV Resistant | | |
| RoHS | Yes | | |
| Fire Safety | VDE-AR-E 2100-712:2013-05 | | |
| INSTALLATION SPECIFICATIONS | | | |
| Maximum Allowed System Voltage | 1000 | | Vdc |
| Dimensions (W x L x H) | 129 x 153 x 30 | | mm |
| Weight (including cables) | 655 / 1.5 | | gr / lb |
| Input Connector | MC4 ⁽²⁾ | | |
| Input Wire Length | 0.1 | | |
| Output Connector | MC4 | | |
| Output Wire Length | (+) 2.3, (-) 0.10 | | |
| Operating Temperature Range ⁽³⁾ | -40 to +85 | | |
| 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 de-rating is applied. Refer to Power Optimizers Temperature De-Rating Technical Note for more details

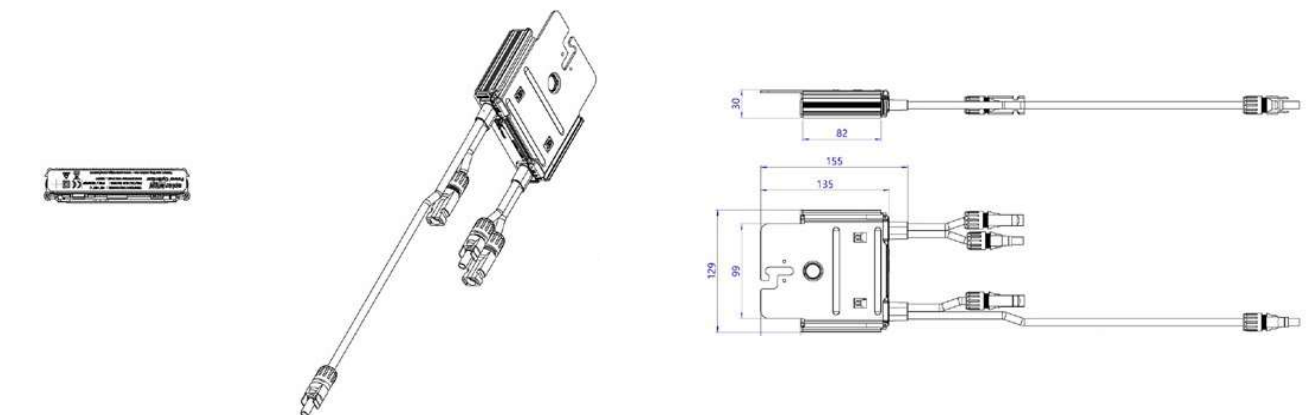
| PV System Design Using a SolarEdge Inverter | Single Phase HD-Wave | Single Phase | Three Phase | Three Phase for 277/480V grid | |
|---|----------------------|--------------|-------------|-------------------------------|----------------------|
| Minimum String Length (Power Optimizers) | S440, S500 | 8 | 16 | 18 | |
| Maximum String Length (Power Optimizers) | | 25 | 50 | | |
| Maximum Nominal Power per String ⁽⁴⁾ | | 5700 | 5250 | 11250 ⁽⁵⁾ | 12750 ⁽⁶⁾ |
| Parallel Strings of Different Lengths or Orientations | | Yes | | | |

(4) If the inverters rated AC power \leq maximum nominal power per string, then the maximum power per string will be able to reach up to the inverters maximum input DC power. Refer to: <https://www.solaredge.com/sites/default/files/se-power-optimizer-single-string-design-application-note.pdf>

(5) For the 230/400V grid: it is allowed to install up to 13,500W per string when the maximum power difference between each string is 2,000W

(6) 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

(7) It is not allowed to mix S-series and P-series power optimizers in new installations



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CE RoHS



ROCKIT[®]

COMPLETE RAIL-LESS RACKING SYSTEM

The RockIt system is the industry's premier rail-less PV racking system for composition shingle, tile, and metal roofs. Designed in conjunction with the needs of installers, RockIt quickly & easily installs with a single tool. Featuring an easy-to-position alignment slide and a top-down leveling system, RockIt is logistically intelligent with no need to ship or transport long rails. Components are available in a black finish that complements both commercial and residential applications. Conforms to UL 2703.

FEATURES & BENEFITS

- Patented watertight technology
- Fully integrated bonding
- Top-down leveling system
- North-South adjustability
- Single tool install
- Florida Product Approved for composition shingle roofs

STREAMLINED INSTALLATION WITH MINIMAL ROOF PENETRATIONS



ROCKIT

ROCKIT COUPLING

The fast installing RockIt Coupling easily attaches to the module frame to bridge the gaps between modules.

SKIRT

The sleek black Skirt installs first and acts as an alignment guide for the entire array. The Skirt End Cap does double duty as a skirt coupling device and an aesthetically-pleasing finishing touch.

ROCKIT MOUNT

Featuring integrated bonding pins, the RockIt Mount connects to the Slide and can easily be positioned for fast installation. Features top-down leveling.

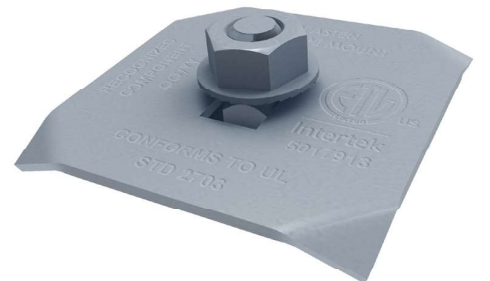


ROCKIT COMP SLIDE

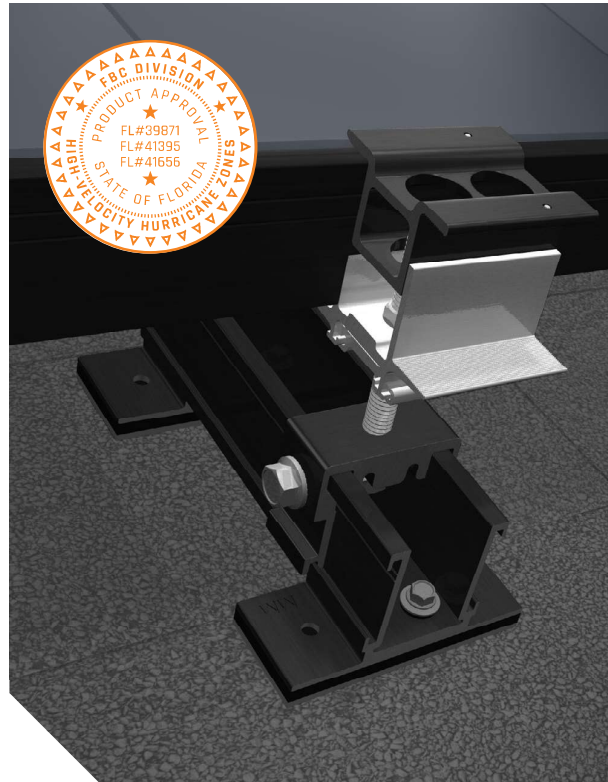
Available in four variations, the RockIt Slide allows installation on composition shingle, tile, and metal roofs.

FRAME MLPE MOUNT

Attaches and fully bonds MLPE's (Module Level Power Electronics) to the module frame with a single bolt clip.



COMPOSITION SHINGLE ROOFS



SMART SLIDE

Patent pending, fast installing simple solution for composition shingle roofs. Eliminates the need to pry up shingle courses and install a metal flashing.

- Multiple opportunities to find the rafter
- No need for additional material when architectural shingles are not level
- Longer 6.75" slide avoids overlaps in shingle courses
- Integrated flashing utilizes UltraGrip Technology™ to create a watertight seal



ROCKIT SMART SLIDE

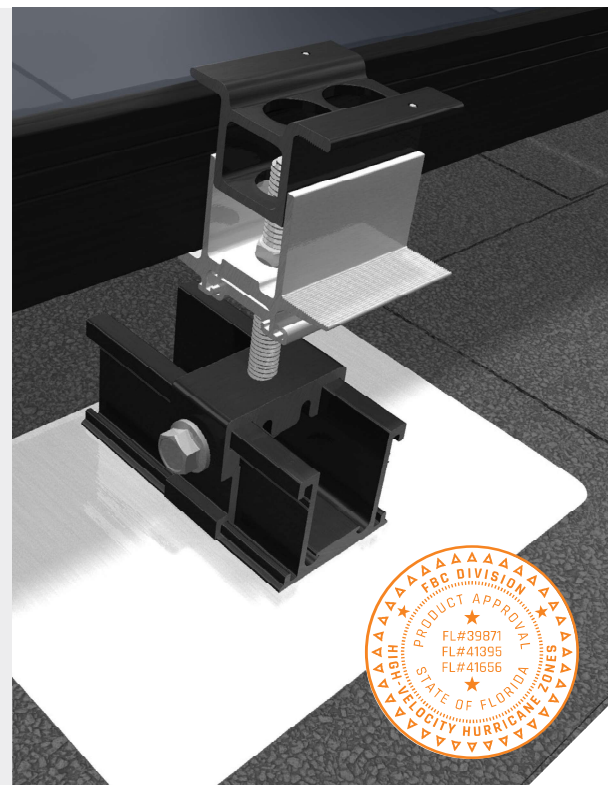
COMP SLIDE

Combine the GF-1 Flashing with the Rockit Slide for a flashed composition shingle roof application.

- Installs without removing shingles
- One lag bolt for single penetration
- Compatible with a variety of EcoFasten compression brackets



GF-1 FLASHING & ROCKIT COMP SLIDE



ECOFASTEN SOLAR

EcoFasten has established a reputation for being one of the industry's leading innovators by providing expert solutions for mounting solar PV on any type of roof. Our broad portfolio of solutions stems from the needs of, and direct inputs by solar PV installers. We take pride in providing the right solution for every application. We educate our customers, so they purchase the best, most cost-effective solutions to fit their needs, and we complement that with on-site installation training to ensure 100% satisfaction. We are honest with ourselves, our customers, and our employees, fostering a culture of idea-sharing, innovation, and creativity.

