

# ROOF MOUNT PHOTOVOLTAIC SYSTEM

## CODES:

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 (NC)

## CONSTRUCTION NOTES:

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.

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

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

THE 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

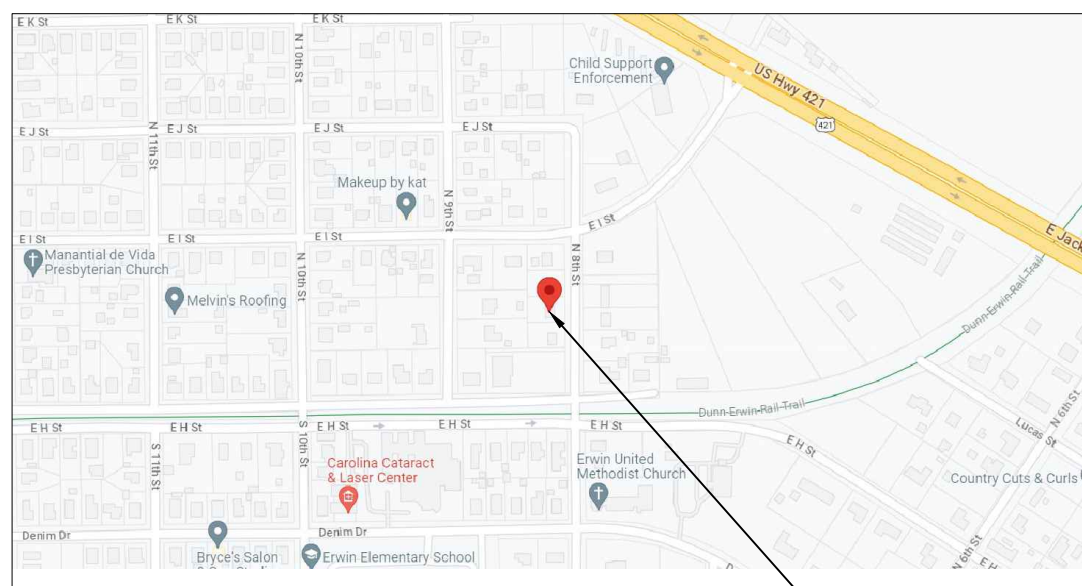
SOLAREGE OPTIMIZERS ARE LISTED TO IEC 62109-1 (CLASS II SAFETY) AND UL 1741 STANDARDS

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

### THIS SYSTEM DESIGNED WITH:

WIND SPEED: 130  
 WIND EXPOSURE: B  
 SNOW LOAD: 15

## VICINITY MAP:



SITE LOCATION

## TABLE OF CONTENTS:

PV-1	SITE LOCATION
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PV-2B	ROOF AND STRUCTURAL TABLES
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PV-4	THREE LINE DIAGRAM
PV-5	CONDUCTOR CALCULATIONS
PV-6	EQUIPMENT & SERVICE LIST
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PV-8	OPTIMIZER CHART
PV-9	SAFETY PLAN
PV-10	SAFETY PLAN
APPENDIX	MANUFACTURER SPECIFICATION SHEETS



**CLIENT:**  
 SHAKIRAH GHAFUR  
 106 NORTH 8TH STREET, ERWIN, NC 28339  
**AHJ:** HARNETT COUNTY (NC)  
**UTILITY:** DUKE ENERGY  
**METER:** 332303350  
**PHONE:** (609) 665-6817  
**EMAIL:** SHAKIRAHG1017@GMAIL.COM  
**FINANCE:** OTHER

**SYSTEM:**  
 SYSTEM SIZE (DC): 19 X 410 = 7.790 kW  
 SYSTEM SIZE (AC): 6.000 kW @ 240V  
 MODULES: 19 X REC SOLAR: REC410AA PURE-R  
 OPTIMIZERS: 19 X SOLAREGE S440  
 INVERTER: SOLAREGE SE6000H-USRGM [S11]

REVISIONS		
NO.	REVISED BY	DATE
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**FREEDOM FOREVER LLC**  
 415 INDUSTRIAL CT., GREER, SC 29651  
 Tel: (800) 385-1075











**GREG ALBRIGHT**

**CONTRACTOR LICENSE:**  
 ELECTRICAL CONTRACTOR U.34043

### SITE LOCATION

JOB NO:	DATE:	DESIGNED BY:	SHEET:
333019	5/18/2023	A.N.	PV-1

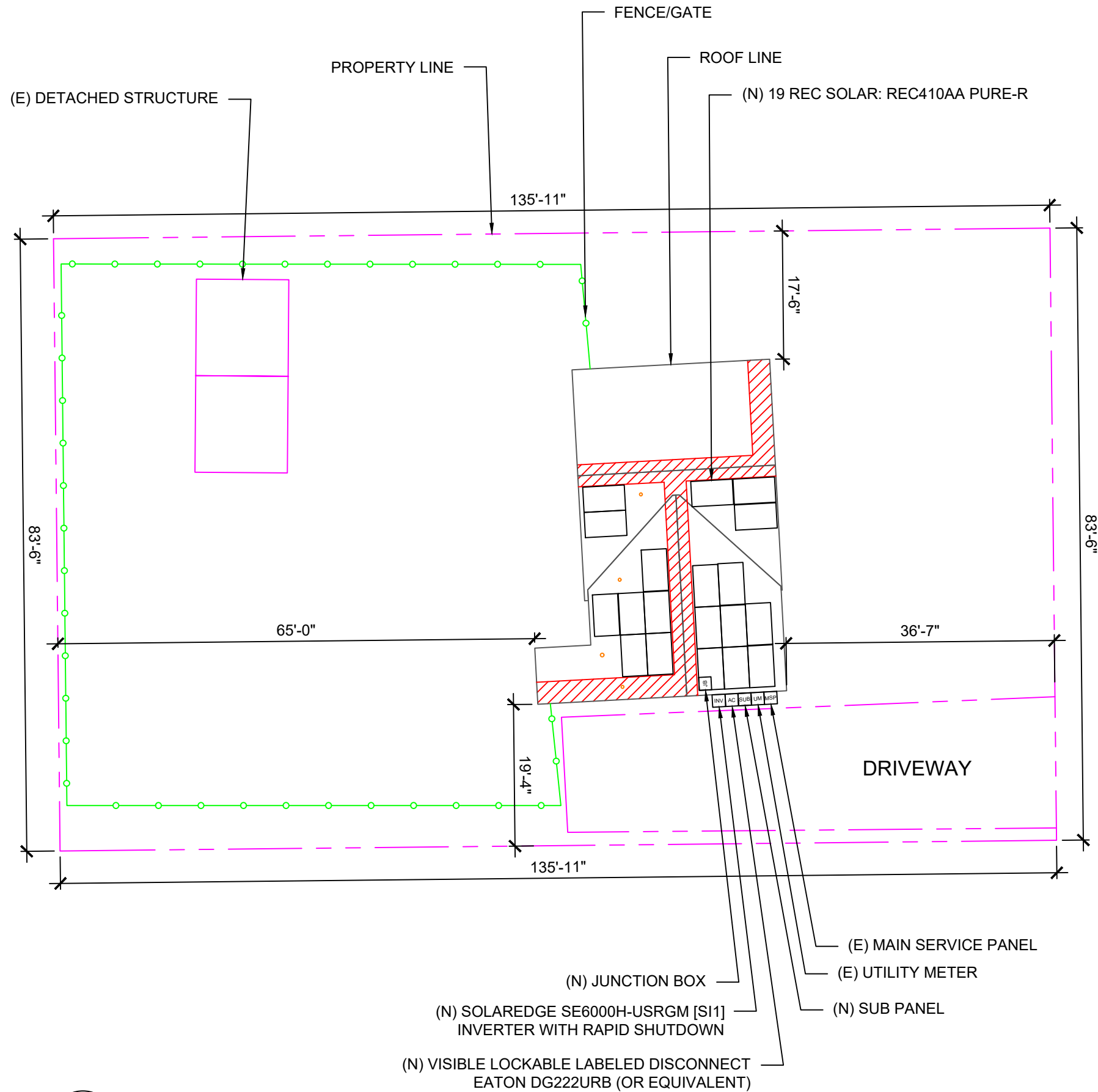
**LEGEND:**

-  CHIMNEY
-  PIPE VENT
-  MODULES
-  CONDUIT
-  SETBACK
-  AC DISCONNECT
-  JUNCTION BOX
-  INVERTER
-  SUBPANEL
-  MAIN SERVICE PANEL

**PV SYSTEM**  
 7.790 kW-DC  
 6.000 kW-AC

**TOTAL ROOF AREA RIDGE SETBACK CALCS:**  
 TOTAL ROOF AREA: 1352.78 SQ FT  
 SINGLE MODULE AREA: 20.81908296 SQ FT  
 TOTAL NUMBER OF MODULES: 19  
 TOTAL AREA OF MODULES: 395.56 SQ FT  
 ROOF COVERAGE: 29.24%  
 FIRE SPRINKLERS : NO

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ROOF AREA: 1352.78 SQ FT

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 CONTRACTOR LICENSE:  
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SITE PLAN			
JOB NO:	DATE:	DESIGNED BY:	SHEET:
333019	5/18/2023	A.N.	PV-2













**SITE PLAN**  
 SCALE: 1/16" = 1'-0"

1

NORTH 8TH STREET

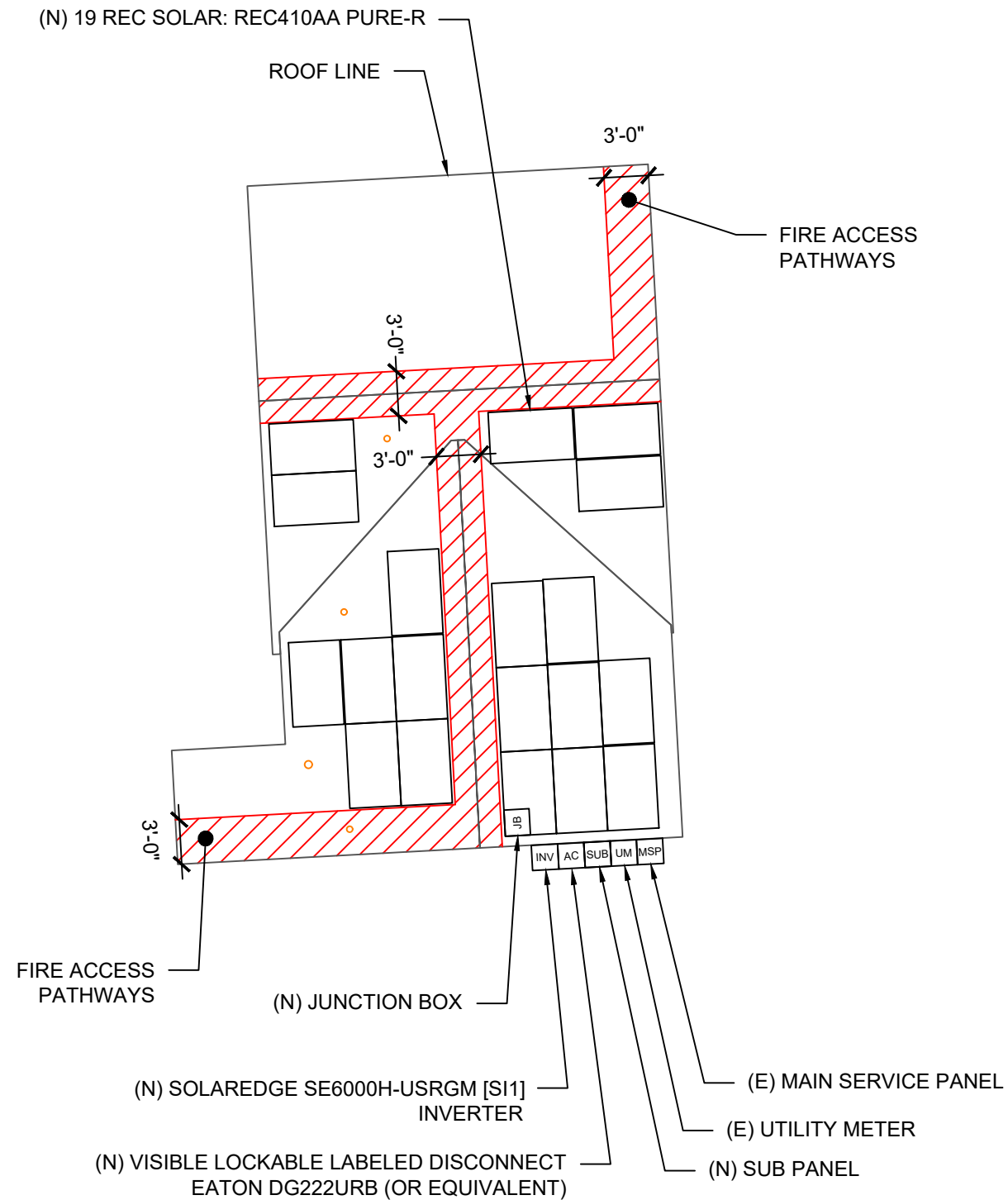
LEGEND:

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-  MODULES
-  CONDUIT
-  SETBACK
-  AC DISCONNECT
-  JUNCTION BOX
-  INVERTER
-  SUBPANEL
-  MAIN SERVICE PANEL

**PV SYSTEM**  
**7.790 kW-DC**  
**6.000 kW-AC**

THIS SYSTEM DESIGNED WITH:  
 WIND SPEED: 130  
 WIND EXPOSURE: B  
 SNOW LOAD: 15

TOTAL ROOF AREA: 1352.78 SQ FT  
 TOTAL ARRAY AREA: 395.56 SQ FT  
 ARRAY COVERAGE: 29.24%  
 SYSTEM DISTRIBUTED WEIGHT: 2.28 LBS  
 ROCKIT SMART SLIDE POINT-LOAD: 20.95 LBS



ROOF AREA: 1352.78 SQ FT

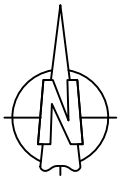
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ROOF PLAN WITH MODULES LAYOUT			
JOB NO: 333019	DATE: 5/18/2023	DESIGNED BY: A.N.	SHEET: PV-2A



**ROOF PLAN**  
**SCALE: 3/32" = 1'-0"**

1

NOTES:

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

# ROOF DETAILS:

TOTAL ROOF AREA: 1352.78 SQ FT  
 TOTAL ARRAY AREA: 395.56 SQFT  
 ARRAY COVERAGE: 29.24%  
 SYSTEM DISTRIBUTED WEIGHT: 2.28 LBS  
 ROCKIT SMART SLIDE POINT-LOAD: 20.95 LBS



ROOF AREA STATEMENT						
ROOF	MODULE QUANTITY	ROOF PITCH	ARRAY PITCH	AZIMUTH	ROOF AREA	ARRAY AREA
ROOF 1	6	20	20	257	353.56 SQ FT	124.91 SQ FT
ROOF 2	5	20	20	177	277.75 SQ FT	104.1 SQ FT
ROOF 3	8	20	20	87	166.55 SQ FT	166.55 SQ FT
----	----	----	----	----	SQ FT	SQ FT
----	----	----	----	----	SQ FT	SQ FT
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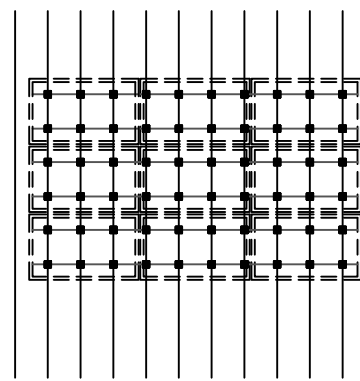
**CONTRACTOR LICENSE:**  
 ELECTRICAL CONTRACTOR U.34043

ROOF DETAILS			
JOB NO:	DATE:	DESIGNED BY:	SHEET:
333019	5/18/2023	A.N.	PV-2B

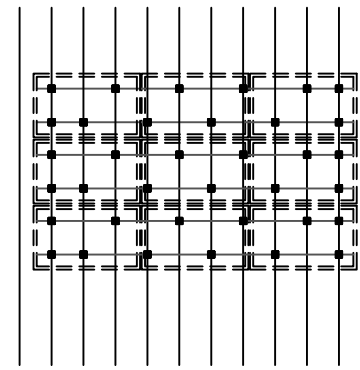
**TABLE 1 - ARRAY INSTALLATION**

	ROOF PITCH	ROOFING TYPE	ATTACHMENT TYPE	FRAMING TYPE <sup>1</sup>	MAX UNBRACED LENGTH(FT.) <sup>1</sup>	RAFTER/TRUSS SISTERING	PENETRATION PATTERN <sup>2</sup>	MAX ATTACHMENT SPACING (IN.) <sup>2</sup>	MAX RAIL OVERHANG(I N.) <sup>3</sup>
ROOF 1	20	COMP SHINGLE	ECOFASTEN ROCKIT SMART SLIDE	2X6 RAFTER @ 16" OC	9.00'	NOT REQ'D	STAGGERED	48" OC	16"
ROOF 2	20	COMP SHINGLE	ECOFASTEN ROCKIT SMART SLIDE	2X6 RAFTER @ 16" OC	9.00'	NOT REQ'D	STAGGERED	48" OC	16"
ROOF 3	20	COMP SHINGLE	ECOFASTEN ROCKIT SMART SLIDE	2X6 RAFTER @ 16" OC	9.00'	NOT REQ'D	STAGGERED	48" OC	16"

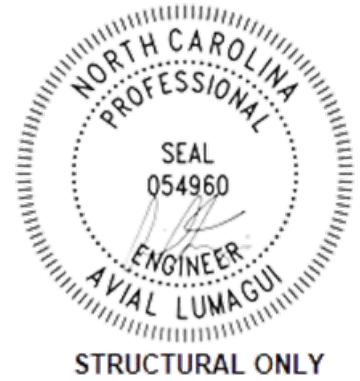
1. CONTRACTOR TO VERIFY FRAMING TYPE AND MAX UNBRACED LENGTH PRIOR TO INSTALLATION. IF THE ABOVE INFORMATION DOES NOT MATCH FIELD CONDITIONS, NOTIFY ENGINEER OF RECORD IMMEDIATELY.
2. WHERE COLLAR TIES OR RAFTER SUPPORTS EXIST, CONTRACTOR SHALL USE RAFTERS WITH COLLAR TIES AS ATTACHMENT POINTS.
3. WHERE APPLICABLE FOR RAILED ATTACHMENT INSTALLATIONS.



**STACKED DETAIL**  
For Illustration purposes only



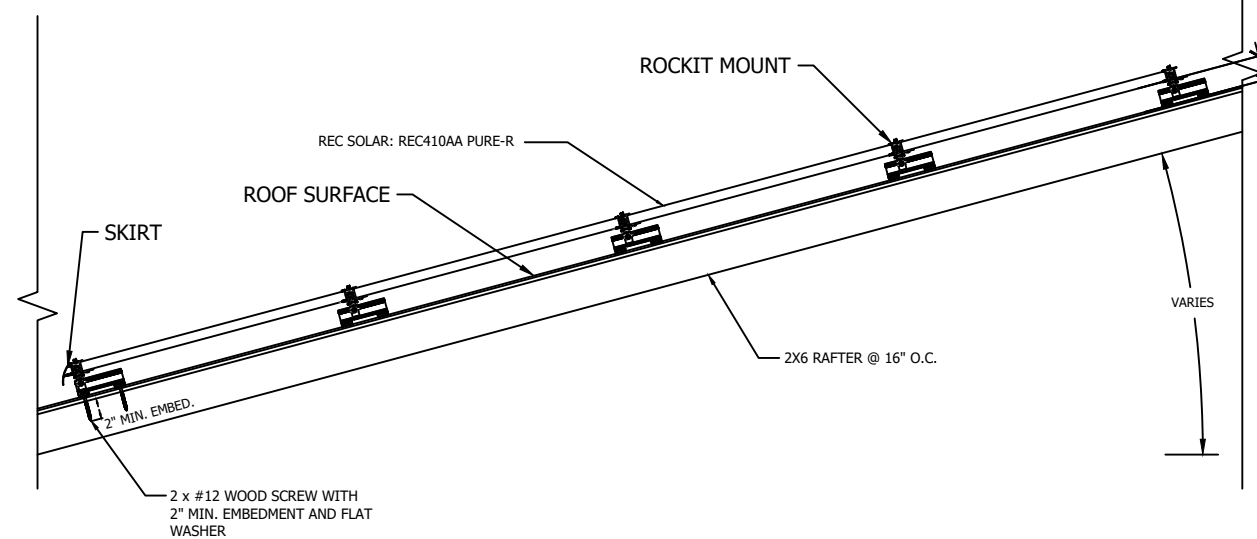
**STAGGERED DETAIL**  
For Illustration purposes only



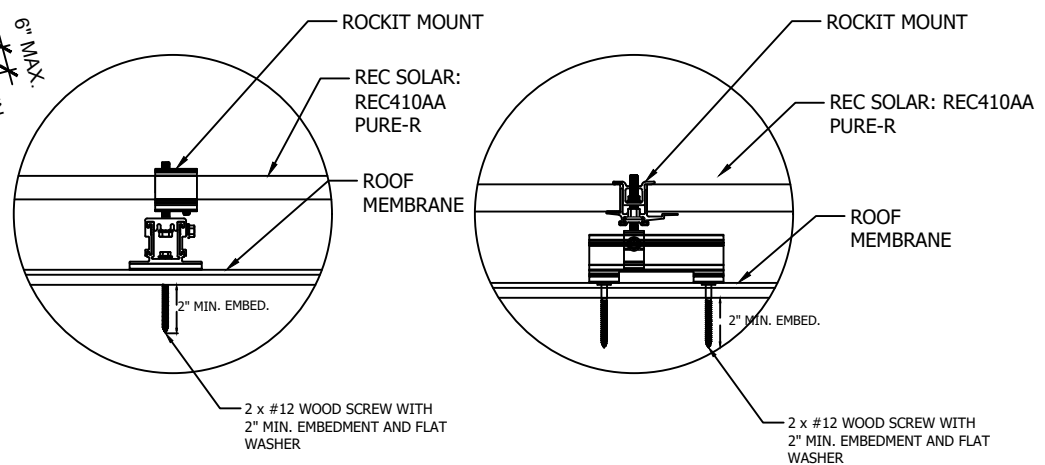
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**SOLAR PV ARRAY SECTION VIEW**  
Scale: NTS



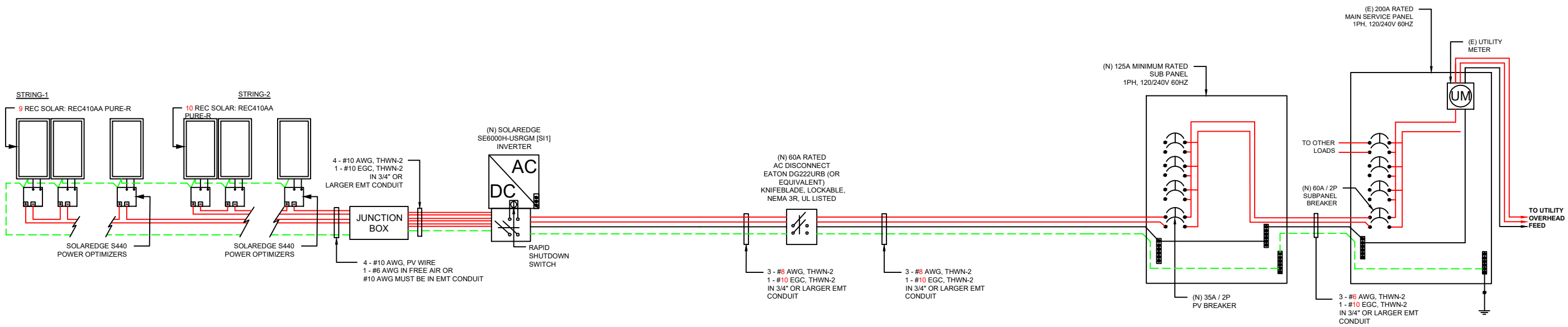
**ATTACHMENT DETAIL**  
Scale: NTS

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**GREG ALBRIGHT**  
*Greg Albright*  
CONTRACTOR LICENSE:  
ELECTRICAL CONTRACTOR U.34043

MOUNTING DETAILS			
JOB NO:	DATE:	DESIGNED BY:	SHEET:
333019	5/18/2023	A.N.	PV-3



BACKFEED BREAKER SIZING					
MAX. CONTINUOUS OUTPUT 25.00A @ 240V					
25.00	X	1.25	=	31.25AMPS	35A BREAKER - OK
SEE 705.12 OF 2017 NEC					
125	X	1.20	=	150	
150	-	60	=	90A ALLOWABLE BACKFEED	



NOTE : USE QUAD/THIN BREAKERS TO MAKE ROOM FOR THE SUB PANEL BREAKER IN MSP.

NOTE:  
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THREE LINE DIAGRAM			
JOB NO: 333019	DATE: 5/18/2023	DESIGNED BY: A.N.	SHEET: PV-4

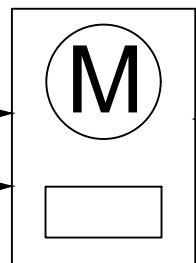






**WARNING:**  
POWER SOURCE OUTPUT  
CONNECTION  
DO NOT RELOCATE THIS  
OVERCURRENT DEVICE.

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



**"WARNING"**  
DUAL POWER SOURCES  
SECOND SOURCE IS PHOTOVOLTAIC SYSTEM  
RATED AC OUTPUT CURRENT - 25.00 AMPS  
AC NORMAL OPERATING VOLTAGE - 240 VOLTS

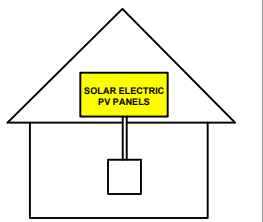
690.54

**NOTES:**

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

**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

PM

AC

**PV SYSTEM AC DISCONNECT**  
RATED AC OUTPUT CURRENT - 25.00 AMPS  
AC NORMAL OPERATING VOLTAGE - 240 VOLTS

690.15, 690.54

**RAPID SHUTDOWN SWITCH FOR  
SOLAR PV SYSTEM**

690.56(C)(3)

INVERTER

MAXIMUM VOLTAGE  V  
MAXIMUM CIRCUIT CURRENT  A  
MAX DC-DC CONVERTER  
OUTPUT CURRENT  A

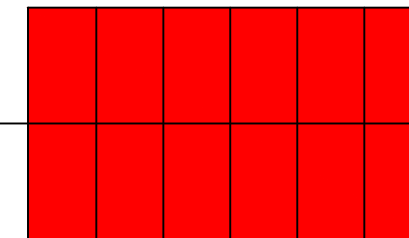
**"WARNING"**  
ELECTRICAL SHOCK HAZARD.  
TERMINALS ON BOTH LINE AND LOAD SIDES  
MAY BE ENERGIZED IN THE OPEN POSITION.

690.13 (B)

**PV SYSTEM DC DISCONNECT**  
MAXIMUM VOLTAGE: 480V  
MAXIMUM CIRCUIT CURRENT: 16.5A  
MAX RATED OUTPUT CURRENT OF  
THE CONTROLLER OR DC-TO-DC  
CONVERTER: 15A

690.53

**ARRAY**



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

**"WARNING"**  
PHOTOVOLTAIC POWER SOURCE

EVERY 10' ON CONDUIT AND ENCLOSURES

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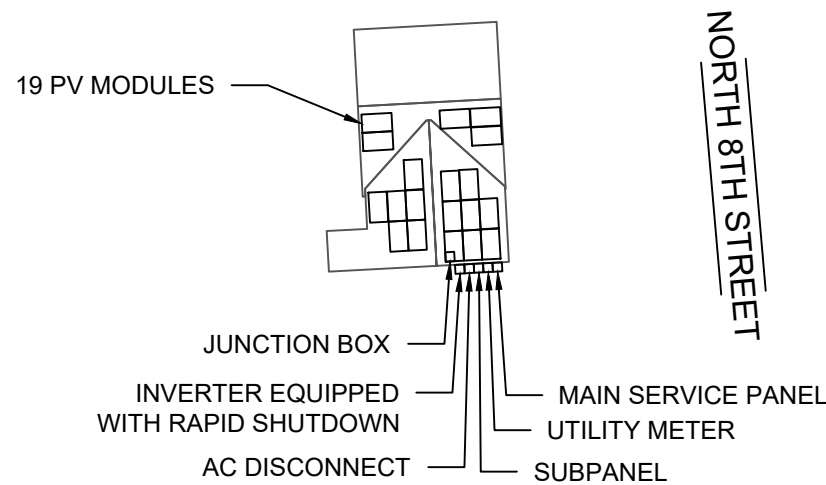
GREG ALBRIGHT

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ELECTRICAL CONTRACTOR U.34043

LABELS			
JOB NO:	DATE:	DESIGNED BY:	SHEET:
333019	5/18/2023	A.N.	PV-7

# CAUTION:

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



## WARNING

TURN OFF PHOTOVOLTAIC AC DISCONNECT PRIOR TO WORKING INSIDE PANEL



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### SITE PLACARD

JOB NO:	DATE:	DESIGNED BY:	SHEET:
333019	5/18/2023	A.N.	PV-7A

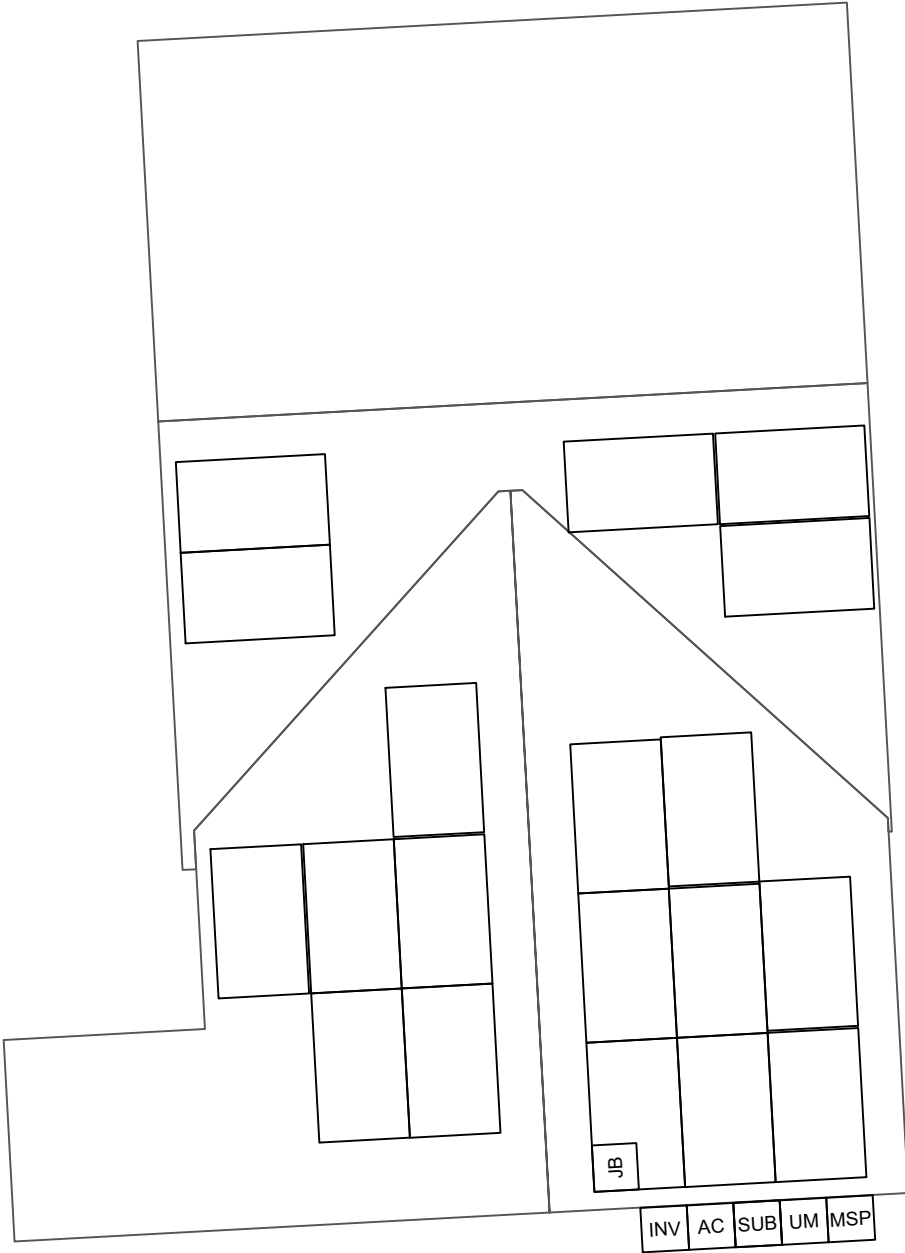
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  - B. RED BACKGROUND COLOR WHITE TEXT AND LINE WORK.
  - C. AERIAL FONT.
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4. SIGNS SHALL BE ATTACHED TO THE SERVICE EQUIPMENT WITH POP-RIVETS OR SCREWS.

# SOLAREEDGE OPTIMIZER CHART

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

1  
2  
3  
4  
5  
6  
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9  
10

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 PURE-R  
 OPTIMIZERS: 19 X SOLAREEDGE S440  
 INVERTER: SOLAREEDGE SE6000H-USRGM [S1]

REVISIONS		
NO.	REVISED BY	DATE
-	-	-
-	-	-
-	-	-



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

**GREG ALBRIGHT**

**CONTRACTOR LICENSE:**  
 ELECTRICAL CONTRACTOR U.34043

**OPTIMIZER CHART**

JOB NO: 333019	DATE: 5/18/2023	DESIGNED BY: A.N.	SHEET: PV-8
-------------------	--------------------	----------------------	----------------

# SAFETY PLAN

# MARK UP KEY

### INSTRUCTIONS:

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

### INCIDENT REPORTING:

INJURIES - CALL INJURY HOTLINE

**(855) 400-7233**

*\*If injury is life threatening, call 911 first THEN the Injury Hotline*

NON-INJURIES - USE MOBILE INCIDENT REPORTING

(Auto, Property Damage, Near Miss)



### NEAREST OCCUPATIONAL/INDUSTRIAL CLINIC:

NAME: \_\_\_\_\_

ADDRESS: \_\_\_\_\_

### NEAREST HOSPITAL:

NAME: \_\_\_\_\_

ADDRESS: \_\_\_\_\_

### SAFETY COACH CONTACT INFORMATION:

NAME: \_\_\_\_\_

PHONE NUMBER: \_\_\_\_\_

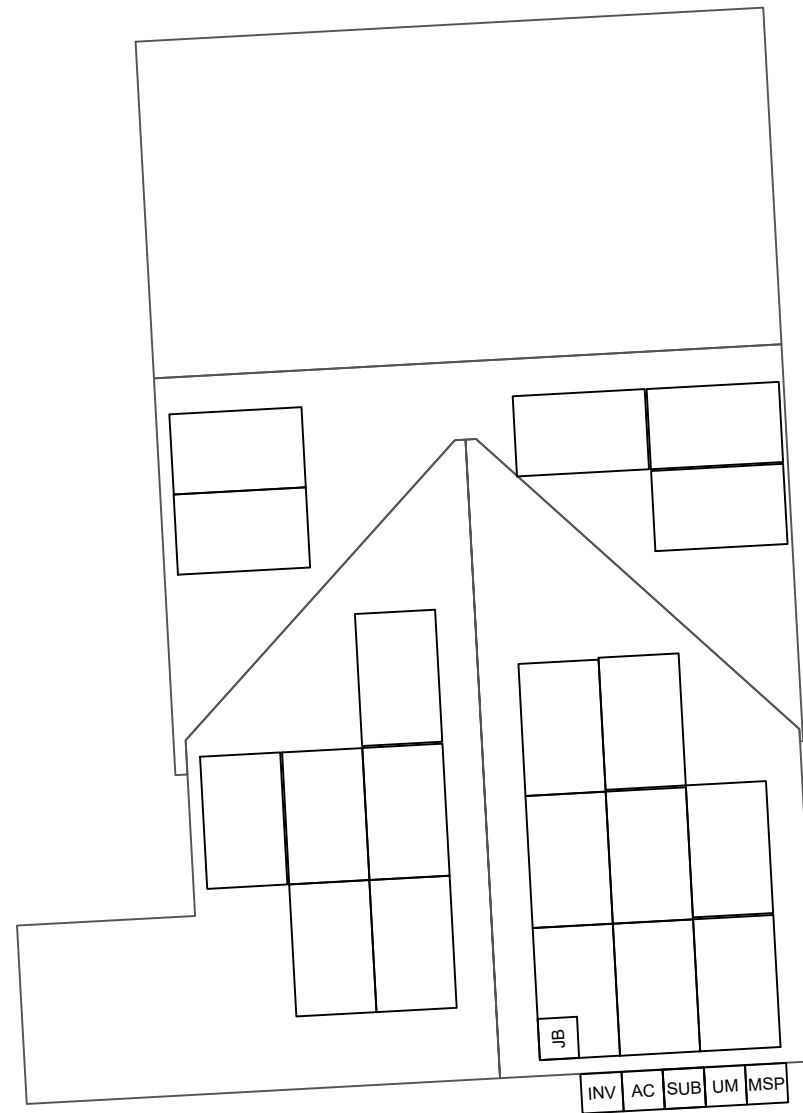
ALL EMPLOYEES ON SITE SHALL BE MADE AWARE OF THE SAFETY PLAN AND SIGN INDICATING THAT THEY ARE AWARE OF THE HAZARDS ON-SITE AND THE PLAN FOR WORKING SAFELY.

NAME

SIGNATURE

_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

DATE: \_\_\_\_\_ TIME: \_\_\_\_\_



- P PERMANENT ANCHOR
- T TEMPORARY ANCHOR
- IL INSTALLER LADDER
- B JUNCTION / COMBINER BOX
- S STUB-OUT
- ☒ SKYLIGHT
- NO LADDER ACCESS (STEEP GRADE OR GROUND LEVEL OBSTRUCTIONS)
- RESTRICTED ACCESS
- CONDUIT
- GAS GAS SHUT OFF
- H<sub>2</sub>O WATER SHUT OFF
- 7 SERVICE DROP
- Z POWER LINES

**CLIENT:**  
 SHAKIRAH GHAFUR  
 106 NORTH 8TH STREET, ERWIN, NC 28339  
 AHJ: HARNETT COUNTY (NC)  
 UTILITY: DUKE ENERGY  
 METER: 332303350  
 PHONE: (609) 665-6817  
 EMAIL: SHAKIRAHG1017@GMAIL.COM  
 FINANCE: OTHER

**SYSTEM:**  
 SYSTEM SIZE (DC): 19 X 410 = 7.790 kW  
 SYSTEM SIZE (AC): 6.000 kW @ 240V  
 MODULES: 19 X REC SOLAR: REC410AA PURE-R  
 OPTIMIZERS: 19 X SOLAREEDGE S440  
 INVERTER: SOLAREEDGE SE6000H-USRGM [S11]

# BREAK AND WATER LOG

THIS LOG IS TO BE FILLED OUT ANY TIME THE TEMP EXCEEDS **90** DEGREES. THE CREW LEAD AND ROOF LEAD ARE RESPONSIBLE FOR ENSURING THIS IS COMPLETED AND UPLOADED AT THE END OF EVERYDAY WHEN TEMPS EXCEED **90** DEGREES

NAME	0800HRS	0900HRS	1000HRS	1100HRS	1200HRS	1300HRS	1400HRS	1500HRS	1600HRS

REVISIONS		
NO.	REVISED BY	DATE
-	-	-
-	-	-
-	-	-
-	-	-

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

**GREG ALBRIGHT**

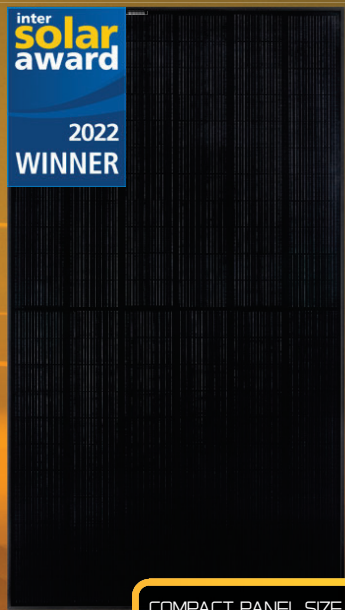
CONTRACTOR LICENSE:  
 ELECTRICAL CONTRACTOR U.34043

SAFETY PLAN			
JOB NO:	DATE:	DESIGNED BY:	SHEET:
333019	5/18/2023	A.N.	PV-9





SOLAR'S MOST TRUSTED



COMPACT PANEL SIZE

# REC ALPHA<sup>®</sup> PURE SERIES PRODUCT SPECIFICATIONS

410 WP  
19.3 W/FT<sup>2</sup>  
22.2% EFFICIENCY



ELIGIBLE



LEAD-FREE  
ROHS COMPLIANT



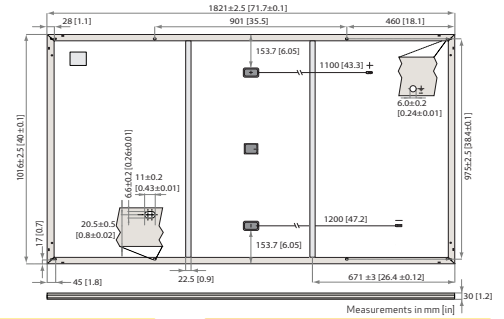
PERFORMANCE

## REC ALPHA PURE SERIES PRODUCT SPECIFICATIONS



### GENERAL DATA

Cell type:	132 half-cut REC heterojunction bifacial cells with lead-free, gapless technology, 6 strings of 22 cells in series
Glass:	0.13 in (3.2 mm) solar glass with anti-reflective surface treatment in accordance with EN 12150
Backsheet:	Highly resistant polymer (black)
Frame:	Anodized aluminum (black)
Junction box:	3-part, 3 bypass diodes, lead-free IP68 rated, in accordance with IEC 62790
Connectors:	Stäubli MC4 PV-KBT4/KST4 (4 mm <sup>2</sup> ) in accordance with IEC 62852, IP68 only when connected
Cable:	12 AWG (4 mm <sup>2</sup> ) PV wire, 43+47 in (1.1+1.2 m) in accordance with EN 50618
Dimensions:	71.7 x 40 x 1.2 in (19.91 ft) / 1821 x 1016 x 30 mm (1.85 m <sup>2</sup> )
Weight:	45 lbs (20.5 kg)
Origin:	Made in Singapore



### ELECTRICAL DATA

	Product Code: RECxxxAA Pure				
Power Output - P <sub>max</sub> (Wp)	390	395	400	405	410
Watt Class Sorting - (W)	0/+5	0/+5	0/+5	0/+5	0/+5
Nominal Power Voltage - V <sub>MPP</sub> (V)	41.5	41.8	42.1	42.4	42.7
Nominal Power Current - I <sub>MPP</sub> (A)	9.40	9.45	9.51	9.56	9.61
Open Circuit Voltage - V <sub>OC</sub> (V)	48.6	48.7	48.8	48.9	49.0
Short Circuit Current - I <sub>SC</sub> (A)	10.22	10.25	10.28	10.30	10.35
Power Density (W/ft <sup>2</sup> )	211	214	216	219	222
Panel Efficiency (%)	21.1	21.4	21.6	21.9	22.2
Power Output - P <sub>max</sub> (Wp)	297	301	305	309	312
Nominal Power Voltage - V <sub>MPP</sub> (V)	39.1	39.4	39.7	40.0	40.2
Nominal Power Current - I <sub>MPP</sub> (A)	7.59	7.63	7.68	7.72	7.76
Open Circuit Voltage - V <sub>OC</sub> (V)	45.8	45.9	46.0	46.1	46.2
Short Circuit Current - I <sub>SC</sub> (A)	8.20	8.24	8.28	8.32	8.36

STC

NMOT

Values at standard test conditions (STC: air mass AM1.5, irradiance 10.75 W/sq ft (1000 W/m<sup>2</sup>), temperature 77°F (25°C), based on a production speed with a tolerance of P<sub>max</sub>, V<sub>OC</sub> & I<sub>SC</sub> ±3% within one watt class. Nominal module operating temperature (NMOT: air mass AM1.5, irradiance 800 W/m<sup>2</sup>, temperature 68°F (20°C), wind speed 3.3 ft/s (1 m/s)). \*Where xxx indicates the nominal power class (P<sub>max</sub>) at STC above.

### MAXIMUM RATINGS

Operational temperature:	-40 ... +85°C
Maximum system voltage:	1000 V
Maximum test load (front):	+7000 Pa (146 lbs/ft <sup>2</sup> )
Maximum test load (rear):	-4000 Pa (83.5 lbs/ft <sup>2</sup> )
Max series fuse rating:	25 A
Max reverse current:	25 A

\*See installation manual for mounting instructions. Design load = Test load / 1.5 (safety factor)

### WARRANTY

	Standard	REC ProTrust
Installed by an REC Certified Solar Professional	No	Yes
System Size	All	<25 kW 25-500 kW
Product Warranty (yrs)	20	25
Power Warranty (yrs)	25	25
Labor Warranty (yrs)	0	25
Power in Year 1	98%	98%
Annual Degradation	0.25%	0.25%
Power in Year 25	92%	92%

See warranty documents for details. Conditions apply

Available from:

### CERTIFICATIONS

IEC 61215:2016, IEC 61730:2016, UL 61730	
IEC 62804	PID
IEC 61701	Salt Mist
IEC 62716	Ammonia Resistance
UL 61730	Fire Type Class 2
IEC 62782	Dynamic Mechanical Load
IEC 61215-2:2016	Hailstone (35mm)
IEC 62321	Lead-free acc. to RoHS EU 863/2015
ISO 14001, ISO 9001, IEC 45001, IEC 62941	



### TEMPERATURE RATINGS\*

Nominal Module Operating Temperature:	44°C (±2°C)
Temperature coefficient of P <sub>max</sub> :	-0.26 %/°C
Temperature coefficient of V <sub>OC</sub> :	-0.24 %/°C
Temperature coefficient of I <sub>SC</sub> :	0.04 %/°C

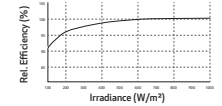
\*The temperature coefficients stated are linear values

### DELIVERY INFORMATION

Panels per pallet:	33
Panels per 40 ft GP/high cube container:	792 (24 pallets)
Panels per 53 ft truck:	891 (27 pallets)

### LOW LIGHT BEHAVIOUR

Typical low irradiance performance of module at STC:



Founded in 1996, REC Group is an international pioneering solar energy company dedicated to empowering consumers with clean, affordable solar power. As Solar's Most Trusted, REC is committed to high quality, innovation, and a low carbon footprint in the solar materials and solar panels it manufactures. Headquartered in Norway with operational headquarters in Singapore, REC also has regional hubs in North America, Europe, and Asia-Pacific.



www.recgroup.com

Specifications subject to change without notice

Ref: PM-0512-06-Rev-H-08-22



# Power Optimizer For North America

S440, S500



POWER OPTIMIZER

## PV power optimization at the module level

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

\* Expected availability in 2022

[solaredge.com](http://solaredge.com)



## Power Optimizer For North America S440, S500

	S440	S500	Unit
<b>INPUT</b>			
Rated Input DC Power <sup>(1)</sup>	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	15	Adc
Maximum Efficiency	99.5		%
Weighted Efficiency	98.6		%
Oversvoltage Category	II		
<b>OUTPUT DURING OPERATION</b>			
Maximum Output Current	15		Adc
Maximum Output Voltage	60		Vdc
<b>OUTPUT DURING STANDBY (POWER OPTIMIZER DISCONNECTED FROM INVERTER OR INVERTER OFF)</b>			
Safety Output Voltage per Power Optimizer	1+/-0.1		Vdc
<b>STANDARD COMPLIANCE</b>			
Photovoltaic Rapid Shutdown System	NEC 2014, 2017 & 2020		
EMC	FCC Part 15 Class B, IEC61000-6-2, IEC61000-6-3		
Safety	IEC62109-1 (class II safety), UL1741		
Material	UL94 V-0, UV Resistant		
RoHS	Yes		
Fire Safety	VDE-AR-E 2100-712:2013-05		
<b>INSTALLATION SPECIFICATIONS</b>			
Maximum Allowed System Voltage	1000		Vdc
Dimensions (W x L x H)	129 x 153 x 30 / 5.07 x 6.02 x 1.18		mm / in
Weight (including cables)	655 / 1.5		gr / lb
Input Connector	MC4 <sup>(2)</sup>		
Input Wire Length	0.1 / 0.32		m / ft
Output Connector	MC4		
Output Wire Length	(+) 2.3, (-) 0.10 / (+) 7.54, (-) 0.32		m / ft
Operating Temperature Range <sup>(3)</sup>	-40 to +85		°C
Protection Rating	IP68 / Type6B		
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

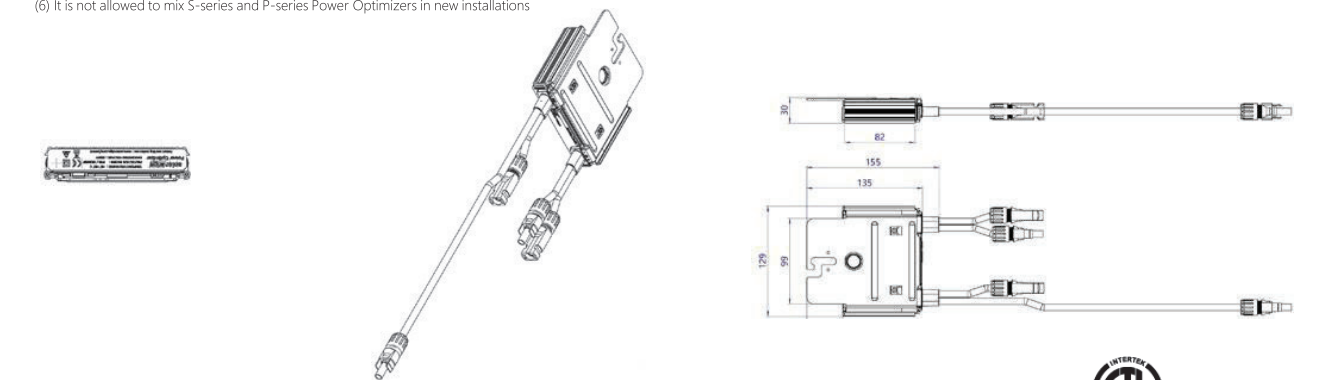
(3) For ambient temperature above +70°C / +158°F power de-rating is applied. Refer to Power Optimizers Temperature De-Rating Technical Note for more details

PV System Design Using a SolarEdge Inverter	Single Phase HD-Wave	Three Phase for 208V grid	Three Phase for 277/480V grid	
Minimum String Length (Power Optimizers)	S440, S500	8	14	18
Maximum String Length (Power Optimizers)	25		50 <sup>(4)</sup>	
Maximum Nominal Power per String	5700 (6000 with SE7600-US-SE11400-U)	6000	12750	W
Maximum Allowed Connected Power per String <sup>(5)</sup> (Permitted only when the difference in connected power between strings is 1,000W or less)	Refer to Footnote 5	One String 7200W Two strings or more 7800W	15,000W	
Parallel Strings of Different Lengths or Orientations	Y			

(4) A string with more than 30 optimizers does not meet NEC rapid shutdown requirements; safety voltage will be above the 30V requirement

(5) If the inverters rated AC power < 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>

(6) It is not allowed to mix S-series and P-series Power Optimizers in new installations



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

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

12-25  
YEAR  
WARRANTY



INVERTERS

## Optimized installation with HD-Wave technology

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

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

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

MODEL NUMBER	SE3000H-US	SE3800H-US	SE5000H-US	SE6000H-US	SE7600H-US	SE10000H-US	SE11400H-US	
APPLICABLE TO INVERTERS WITH PART NUMBER	SEXXXXH-XXXXBXX4							
<b>OUTPUT</b>								
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 <sup>(1)</sup>							Hz
Maximum Continuous Output Current @240V	12.5	16	21	25	32	42	47.5	A
Maximum Continuous Output Current @208V	-	16	-	24	-	-	48.5	A
Power Factor	1, Adjustable - 0.85 to 0.85							
GFDI Threshold	1							A
Utility Monitoring, Islanding Protection, Country Configurable Thresholds	Yes							
<b>INPUT</b>								
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							Vdc
Maximum Input Current @240V <sup>(2)</sup>	8.5	10.5	13.5	16.5	20	27	30.5	Adc
Maximum Input Current @208V <sup>(2)</sup>	-	9	-	13.5	-	-	27	Adc
Max. Input Short Circuit Current	45							Adc
Reverse-Polarity Protection	Yes							
Ground-Fault Isolation Detection	600k $\Omega$ Sensitivity							
Maximum Inverter Efficiency	99	99.2						%
CEC Weighted Efficiency	99						99 @ 240V 98.5 @ 208V	%
Nighttime Power Consumption	< 2.5							W

(1) For other regional settings please contact SolarEdge support

(2) A higher current source may be used; the inverter will limit its input current to the values stated

# / Single Phase Inverter with HD-Wave Technology

## for North America

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

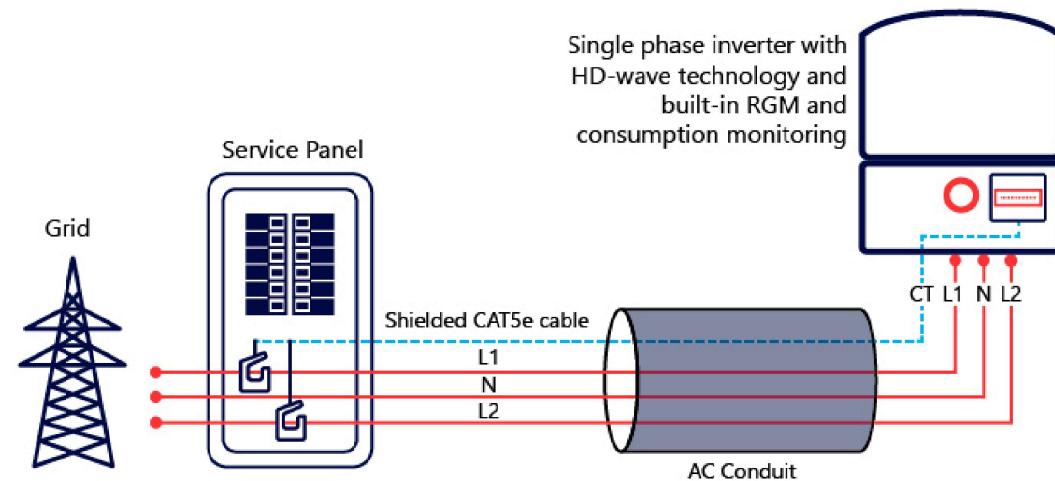
MODEL NUMBER	SE3000H-US	SE3800H-US	SE5000H-US	SE6000H-US	SE7600H-US	SE10000H-US	SE11400H-US
<b>ADDITIONAL FEATURES</b>							
Supported Communication Interfaces	RS485, Ethernet, ZigBee (optional), Cellular (optional)						
Revenue Grade Metering, ANSI C12.20	Optional <sup>(3)</sup>						
Consumption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

(3) Inverter with Revenue Grade Meter P/N: SExxxxH-US000BNC4; Inverter with Revenue Grade Production and Consumption Meter P/N: SExxxxH-US000BNI4. For consumption metering, current transformers should be ordered separately: SEACT0750-200NA-20 or SEACT0750-400NA-20. 20 units per box

(4) Full power up to at least 50°C / 122°F; for power de-rating information refer to: <https://www.solaredge.com/sites/default/files/se-temperature-derating-note-na.pdf>

## How to Enable Consumption Monitoring

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



## Product specifications

# Eaton DG222URB

Catalog Number: DG222URB

Eaton General duty non-fusible safety switch, single-throw, 60 A, NEMA 3R, Rainproof, Painted galvanized steel, Two-pole, Two-wire, 240 V

## General specifications

Product Name	Catalog Number
Eaton general duty non-fusible safety switch	DG222URB
	UPC
	782113144238

Product Length/Depth	Product Height
7.38 in	14.38 in

Product Width	Product Weight
8.69 in	9 lb

Warranty	Certifications
Eaton Selling Policy 25-000, one (1) year from the date of installation of the Product or eighteen (18) months from the date of shipment of the Product, whichever occurs first.	UL Listed

	<a href="#">Catalog Notes</a>
	WARNING! Switch is not approved for service entrance unless a neutral kit is installed.



## Product specifications

Product Category  
General duty safety switch

Enclosure material  
Painted galvanized steel

Type  
Non-fusible, single-throw

Fuse configuration  
Non-fusible

Number of wires  
2

Enclosure  
NEMA 3R

Voltage rating  
240V

Amperage Rating  
60A

Number Of Poles  
Two-pole

## Resources

Catalogs  
[Eaton's Volume 2—Commercial Distribution](#)

Multimedia  
[Double Up on Safety](#)  
[Switching Devices Flex Center](#)

Specifications and datasheets  
[Eaton Specification Sheet - DG222URB](#)

Warranty guides  
[Selling Policy 25-000 - Distribution and Control Products and Services](#)



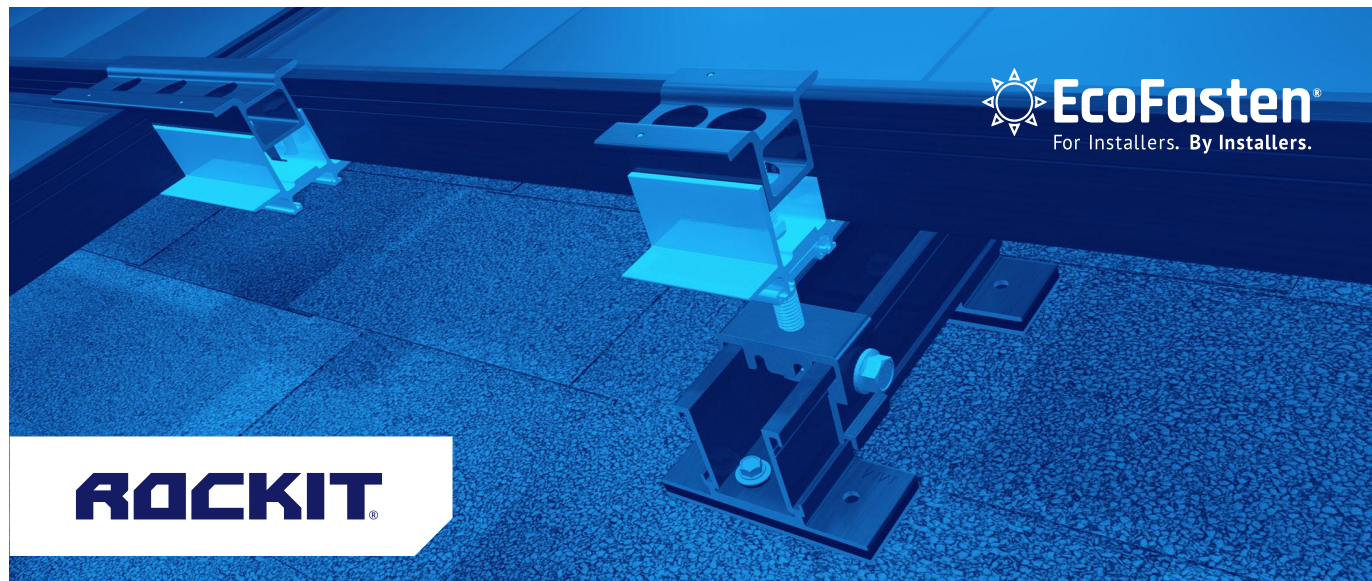
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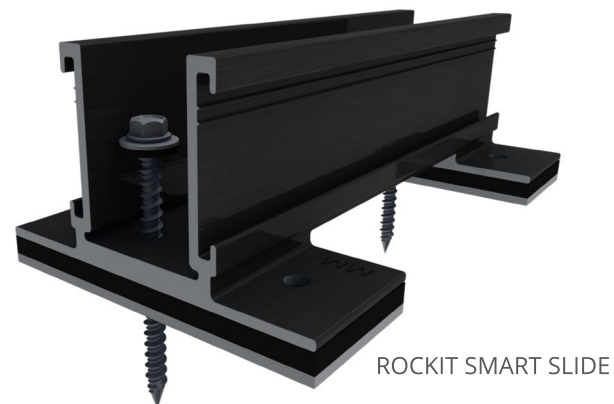
**ROCKIT**

## INTRODUCING ROCKIT SMART SLIDE!

Introducing EcoFasten’s patent pending RockIt Smart Slide, our simple solution for quickly installing the popular RockIt rail-less racking system to composition shingle roofs.

### Features & Benefits

- 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

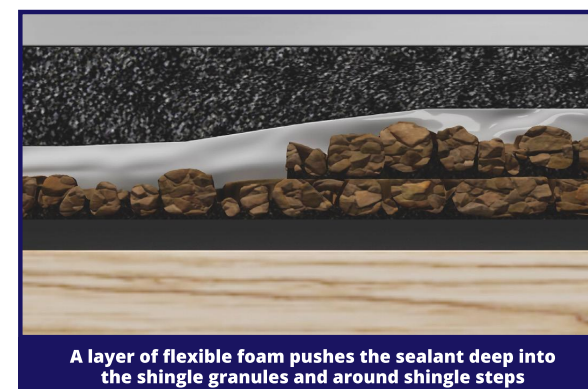
### Required Components:

Part Number:	Description:
2011024	RI SMART SLIDE BLK 6.75”
2011025	RI SMART SCRW #12X3” W/BW

# ROCKIT SMART SLIDE

## Integrated UltraGrip Technology™

Pre-installed sealing pads are compatible with all composition shingle roofs. The compression achieved when fastened to the roof creates a super strong watertight seal. In most cases, the slide can be mounted to the deck without the need for sealant. A layer of flexible foam provides cushioning, which allows the waterproofing sealant to embed deep into the granules of the shingle as well as to flexibly conform over the steps found on architectural-style shingles.



A layer of flexible foam pushes the sealant deep into the shingle granules and around shingle steps



RockIt Smart Slide can be installed on top of architectural shingles steps

## Testing & Documentation

- [UL441 Rain Report](#)
- [TAS 100 \(A\)-95 Wind and Wind Driven Rain Resistance](#)
- [Mechanical Load Test/Structural Capacity Certification](#)
- [Florida Product Approval](#)
- [RockIt Installation Manual](#)
- [RockIt CutSheets](#)



# RI SMART SLIDE BLK 6.75"

PART NUMBER	DESCRIPTION
2011024	RI SMART SLIDE BLK 6.75"

ITEM NO.	DESCRIPTION
1	ROCKIT SMART SLIDE ASSEMBLY

1) ROCKIT FLASHLESS SLIDE ASSEMBLY

MATERIAL	ALUMINUM, EPDM, ADHESIVE, TREATED PAPER
FINISH	BLACK

Rev: CS-3

# RI SMART SCREW #12X3" W/BW

PART NUMBER	DESCRIPTION
2011025	RI SMART SCREW #12X3" W/BW

ITEM NO.	DESCRIPTION
1	SELF TAPPING SCREW #12 WITH SEALING WASHER ASSEMBLY

MATERIAL	STAINLESS STEEL, EPDM RUBBER
FINISH	MILL, BLACK

Rev: CS-2





May 16, 2022

EcoFasten Solar LLC  
4141 W Van Buren St, Ste 2  
Phoenix, AZ 85009  
TEL: (877) 859-3947

Attn.: Eco Fasten Solar LLC - Engineering Department

Re: Report # 2015-05884HG.07.01 – EcoFasten - RockIt System for Gable and Hip Roofs  
Subject: Engineering Certification for the State of North Carolina

PZSE, Inc. – Structural Engineers has provided engineering and span tables for the EcoFasten - RockIt System, as presented in PZSE Report # 2015-05884HG.07.01, "Engineering Certification for the EcoFasten - RockIt System for Gable and Hip Roofs". All information, data, and analysis therein are based on, and comply with, the following building codes and typical specifications:

- Building Codes:
1. ASCE/SEI 7-10, 7-16, Minimum Design Loads for Buildings and Other Structures, by American Society of Civil Engineers
  2. 2015 & 2018 International Building Code
  3. 2015 & 2018 International Residential Code
  4. AC428, Acceptance Criteria for Modular Framing Systems Used to Support Photovoltaic (PV) Panels, November 1, 2012 by ICC-ES
  5. Aluminum Design Manual 2015 & 2018, by The Aluminum Association, Inc.
  6. ANSI/AWC NDS-2015 & 2018, National Design Specification for Wood Construction, by the American Wood Council

Design Criteria:

Risk Category II  
Seismic Design Category = A - E  
Exposure Category = B, C & D  
Basic Wind Speed (ultimate) per ASCE 7-16 = 90 mph to 180 mph  
Ground Snow Load = 0 to 60 (psf)

This letter certifies that the loading criteria and design basis for the EcoFasten - RockIt System Span Tables are in compliance with the above codes.

If you have any questions on the above, do not hesitate to call.

Prepared by:  
PZSE, Inc. – Structural Engineers  
Roseville, CA

DIGITALLY SIGNED

