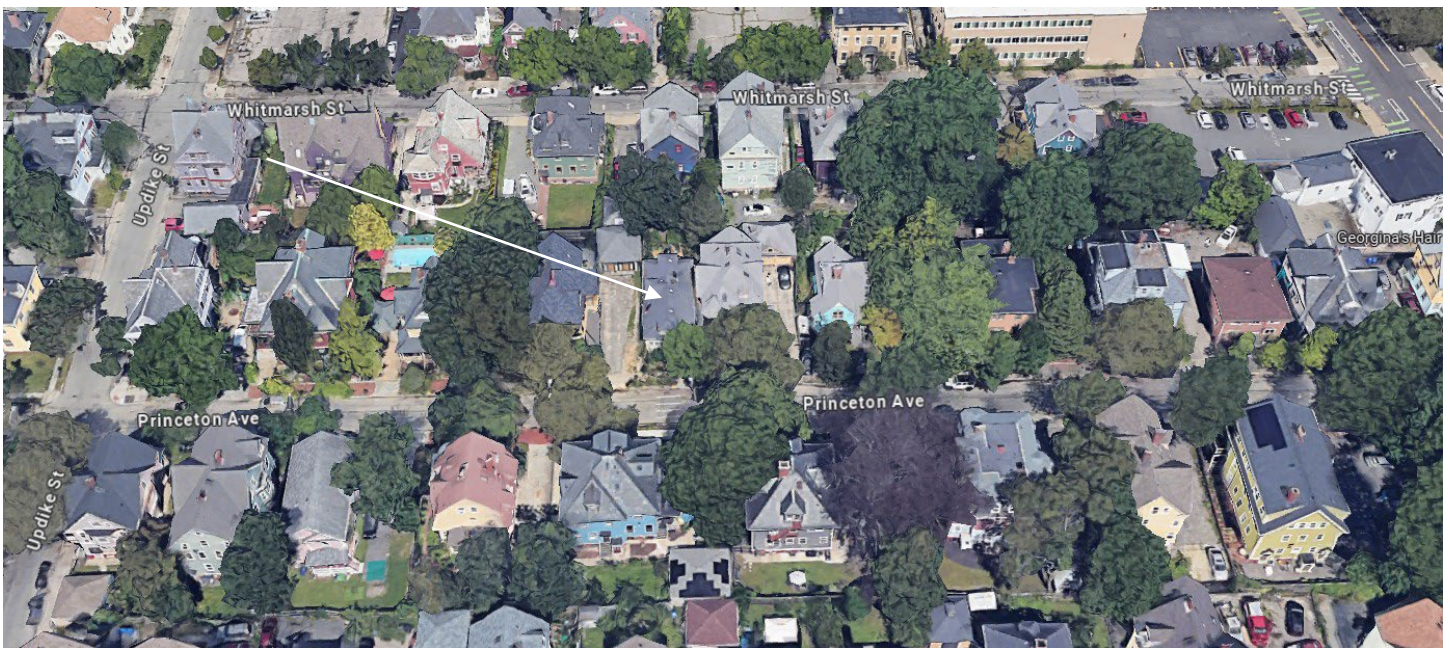


**2. CASE 24.128, 45 PRINCETON AVENUE, House, 1929 (NORTH ELMWOOD)  
CONTRIBUTING**



Arrow indicates 45 Princeton Avenue.



Arrow indicates project location, looking north.

**Applicant/Contractor:** Brandon Murdock, SunRite Solar LLC, 19-2 Bonazzoli Avenue, Hudson, MA 01749

**Owner:** Peter Lutz, 45 Princeton Avenue, Providence, RI 02907

**Proposal:** The scope of work proposed consists of Minor Alterations and includes:

- the installation of 13 solar panels to the east and west slopes of the hip roof.

**Issues:** The following issues are relevant to this application:

- The application as submitted will be partially visible from the public rights-of-way;
- The modifications as proposed meets Minor Alterations: Solar Energy Systems Guidelines, Section 2, in the following manner: Panel layout shall be sympathetic or appropriate to design and scale of building. Rectangular configurations are preferred, with ample setback from edge of roof, dormers, chimneys, etc. (2.A); Panels shall be installed parallel to the existing roof slope and matched as closely as possible to the roof plane (2.B); Panels shall be installed without destroying or replacing original or historic materials or significantly compromising or altering the building's structural integrity (2.C); Panels shall be compatible in color to existing roofing insofar as possible (2.D); Installation of panels shall be as inconspicuous as possible when viewed from public right-of-way (2.E); Installation shall be reversible. Panels shall be removed when no longer viable or functioning and roofing restored to pre-existing conditions (2.F); and,
- Plans, specifications and pictures have been submitted.

**Recommendations:** The staff recommends the PHDC make the following findings of fact:

- a) 45 Princeton Avenue is a structure of historical and architectural significance that contributes to the significance of the North Elmwood local historic district, having been recognized as a contributing structure to the Elmwood National Register Historic District;
- b) The modifications as proposed meets Minor Alterations: Solar Energy Systems Guidelines, Section 2, and the application is considered complete; and,
- c) The work as proposed is in accord with PHDC Standards 8 & 9 as follows: 8) the work will be done so that it does not destroy the historic character of the property or the district as they are not on the primary elevation and will be minimally visible from the public rights-of-way; and, 9) Whenever possible... alterations to structures shall be done in such a manner that if removed in the future, the essential form and integrity of the structure and the site will be unimpaired.

**Staff recommends a motion be made stating that: The application is considered complete. 45 Princeton Avenue is a structure of historical and architectural significance that contributes to the significance of the North Elmwood local historic district, having been recognized as a contributing structure to the Elmwood National Register Historic District. The Commission grants Final Approval of the proposal as submitted as the proposed alteration is appropriate having determined that the proposed alteration does not destroy the historic character of the property or the district and are historically and architecturally compatible with the property and district. The proposed alteration meets Minor Alterations: Solar Energy Systems Guidelines, Section 2, is reversible and will not have an adverse effect on the property or district as they will be minimally visible from the public rights-of-way (Standards 8 & 9), and the recommendations in the staff report, with staff to review any additional required details.**

**SCOPE OF WORK**

TO INSTALL A ROOF MOUNTED SOLAR PHOTOVOLTAIC SYSTEM AT THE OWNER RESIDENCE LOCATED AT 45 PRINCETON AVE, PROVIDENCE, RI 02907, USA. THE POWER GENERATED BY THE PV SYSTEM WILL BE INTERCONNECTED WITH THE UTILITY GRID THROUGH THE EXISTING ELECTRICAL SERVICE EQUIPMENT. THE PV SYSTEM DOES NOT INCLUDE STORAGE BATTERIES.

**EQUIPMENT SUMMARY**

13 JINKO SOLAR JKM425N-54HL4R-B MODULES
13 ENPHASE IQ8PLUS -72-2-US (240V) MICROINVERTERS

**GENERAL NOTES**

- THESE CONSTRUCTION DOCUMENTS HAVE BEEN BASED ON FIELD INSPECTIONS AND OTHER INFORMATION AVAILABLE AT THE TIME. ACTUAL FIELD CONDITIONS MAY REQUIRE MODIFICATIONS
- CONTRACTOR SHALL FURNISH ALL LABOR, MATERIAL, EQUIPMENT, TOOLS, OBTAIN ALL PERMITS, LICENSES AND PAY ALL REQUIRED FEES AND COMPLETE INSTALLATION.
- CONTRACTOR SHALL OBTAIN BULDING PERMIT. NO WORK TO START UNLESS BUILDING PERMIT IS PROPERLY DISPLAYED.
- ALL WORKMANSHIP AND MATERIALS SHALL BE OF FIRST QUALITY AND IN COMPLIANCE WITH THE REQUIREMENTS OF THE NATIONAL BUILDING CODE, THE DEPARTMENT OF ENVIRONMENTAL PROTECTION AND ALL PERTINENT AGENCIES.
- IT IS ESSENTIAL THAT ALL WORK PROCEED WITH THE MAXIMUM COOPERATION OF ALL PARTIES AND WITH MINIMUM INTERFERENCE TO THE OCCUPANTS WITHIN THE BUILDING. THE OWNER'S DIRECTIONS IN THIS REGARD SHALL BE FULLY COMPLIED WITH.
- THE CONTRACTOR SHALL PERFORM THE WORK IN STRICT CONFORMANCE WITH THE LOCAL LAWS, REGULATIONS AND THE NATIONAL ELECTRIC CODE.
- THE CONTRACTOR SHALL OBTAIN ALL PERMITS, APPROVALS, AFFIDAVITS, CERTIFICATIONS, ETC. AND PAY ALL FEES AS REQUIRED BY THE LOCAL AUTHORITIES.
- CONTRACTORS SHALL OBTAIN FIRE CERTIF. UPON COMPLETION OF WORK.

**ELECTRICAL NOTES**

- ALL EQUIPMENT TO BE LISTED BY UL OR OTHER NRTL, AND LABELED FOR ITS APPLICATION.
- ALL CONDUCTORS SHALL BE COPPER, RATED FOR 600 V AND 90 DEGREE C WET ENVIRONMENT.
- WIRING, CONDUIT, AND RACEWAYS MOUNTED ON ROOFTOPS SHALL BE ROUTED DIRECTLY TO, AND LOCATED AS CLOSE AS POSSIBLE TO THE NEAREST RIDGE, HIP, OR VALLEY.
- WORKING CLEARANCES AROUND ALL NEW AND EXISTING ELECTRICAL EQUIPMENT SHALL COMPLY WITH NEC 110.26.
- WHERE SIZES OF JUNCTION BOXES, RACEWAYS, AND CONDUITS ARE NOT SPECIFIED, THE CONTRACTOR SHALL SIZE THEM ACCORDINGLY.
- ALL WIRE TERMINATIONS SHALL BE APPROPRIATELY LABELED AND READILY VISIBLE.
- MODULE GROUNDING CLIPS TO BE INSTALLED BETWEEN MODULE FRAME AND MODULE SUPPORT RAIL, PER THE GROUNDING CLIP MANUFACTURERS INSTRUCTION.
- MODULE SUPPORT RAIL SHALL BE BONDED TO THE MODULE



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 76 N Meadowbrook Drive, Alpine UT 84004  
 Rhode Island COA #9333  
 Signed 9/03/2024

**GOVERNING CODES**

2018 INTERNATIONAL RESIDENTIAL CODE  
 2018 INTERNATIONAL FIRE CODE  
 2018 INTERNATIONAL BUILDING CODE  
 2020 NATIONAL ELECTRICAL CODE  
 2021 RHODE ISLAND STATE BUILDING CODE

AHJ NAME : CITY OF PROVIDENCE

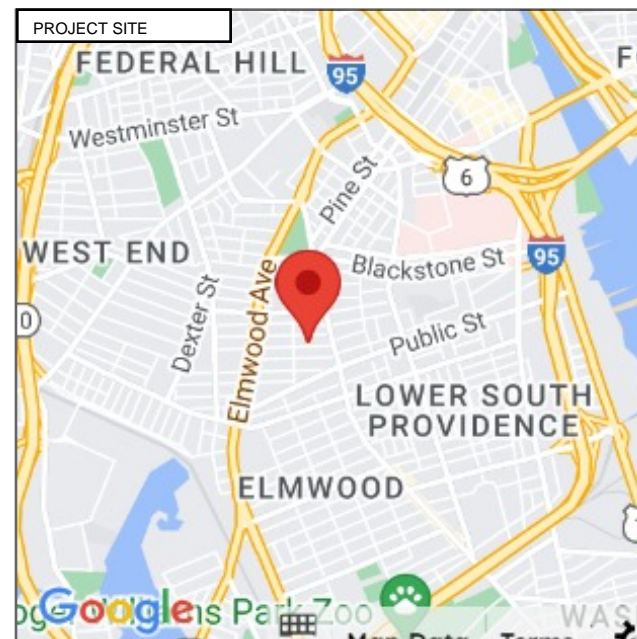
**WIRING AND CONDUIT NOTES**

- ALL CONDUIT SIZES AND TYPES SHALL BE LISTED FOR ITS PURPOSE AND APPROVAL FOR THE SITE APPLICATIONS
- ALL PV CABLES AND HOMERUN WIRES BE #10AWG \*USE-2, PV WIRE, OR PROPRIETARY SOLAR CABLING SPECIFIED BY MFR, OR EQUIVALENT; ROUTED TO SOURCE CIRCUIT COMBINER BOXES AS REQUIRED
- ALL PV DC CONDUCTORS IN CONDUIT EXPOSED TO SUNLIGHT SHALL BE DERATED ACCORDING TO AS PER LATEST NEC CODE.
- EXPOSED ROOF PV DC CONDUCTORS SHALL BE USE-2, 90°C RATED, WET AND UV RESISTANT, AND UL LISTED RATED FOR 600V, UV RATED SPIRAL WRAP SHALL BE USED TO PROTECT WIRE FROM SHARP EDGES
- PHASE AND NEUTRAL CONDUCTORS SHALL BE DUAL RATED THHN/THWN-2 INSULATED, 90°C RATED, WET AND UV RESISTANT, RATED FOR 1000V AS PER APPLICABLE NEC
- 4-WIRE DELTA CONNECTED SYSTEMS HAVE THE PHASE WITH THE HIGHER VOLTAGE TO GROUND MARKED ORANGE OR IDENTIFIED BY OTHER EFFECTIVE MEANS
- ALL SOURCE CIRCUITS SHALL HAVE INDIVIDUAL SOURCE CIRCUIT PROTECTION
- VOLTAGE DROP LIMITED TO 2%
- AC CONDUCTORS >4AWG COLOR CODED OR MARKED: PHASE A OR L1- BLACK, PHASE B OR L2- RED, PHASE C OR L3- BLUE, NEUTRAL- WHITE/GRAY

SYSTEM RATING
5.525 kWDC
3.770 kWAC

PHOTOVOLTAIC SYSTEM FIRE CLASSIFICATION LISTING IN ACCORDANCE WITH UL 1703 STANDARD.

SHEET INDEX	
PV1	COVER PAGE
PV2	SITE PLAN
PV3	ROOF PLAN
PV4	STRING LAYOUT & BOM
PV5-PV6	ATTACHMENT DETAILS
PV7	ELECTRICAL LINE & CALCS.
PV8	SPECIFICATIONS & NOTES
PV9-PV10	SIGNAGE
PV11-PV15	EQUIPMENT SPECIFICATIONS



VICINITY MAP

SCALE: NTS



HOUSE PHOTO

SCALE: NTS

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 SMART GREEN  
 33 BROAD ST SUITE 500,  
 PROVIDENCE, RI 02903, USA  
 PH# : (774) 502-5948

SYSTEM INFO

(13) JINKO SOLAR JKM425N-54HL4R-B
(13) ENPHASE IQ8PLUS -72-2-US (240V)
DC SYSTEM SIZE: 5.525 kWDC
AC SYSTEM SIZE: 3.770 kWAC

METER: 24432762

REVISIONS

DESCRIPTION	DATE	REV

PROJECT NAME & ADDRESS

PETER LUTZ  
 RESIDENCE  
 45 PRINCETON AVE, PROVIDENCE, RI 02907, USA  
 EMAIL ID: PETERJAMESLUTZ@GMAIL.COM  
 PHONE NO. (401) 662-6668

DATE: 8/29/2024

SHEET NAME  
**COVER PAGE**

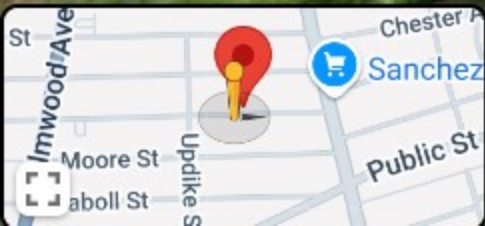
SHEET SIZE  
**ANSI B  
 11" X 17"**

SHEET NUMBER  
**PV-1**

49 Princeton Ave  
Providence, Rhode Island

 Google Street View

Jul 2019 [See more dates](#)



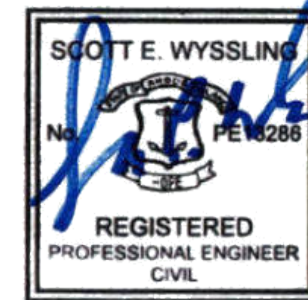
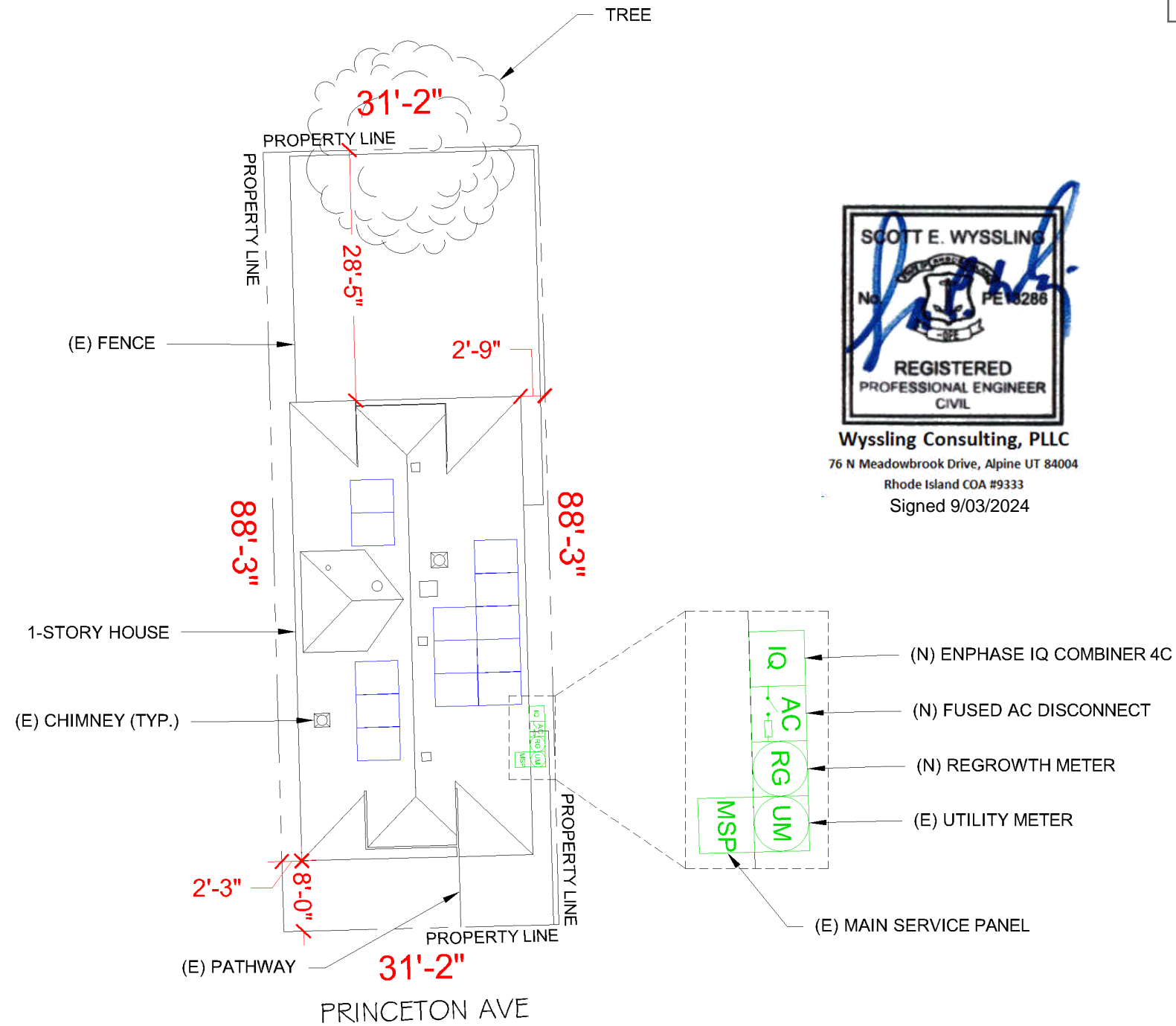
Google

**SITE NOTES**

- A LADDER SHALL BE IN PLACE FOR INSPECTION IN COMPLIANCE WITH OSHA REGULATIONS.
- THE PV MODULES ARE CONSIDERED NON-COMBUSTIBLE AND THIS SYSTEM IS AN UTILITY INTERACTIVE SYSTEM WITH NO STORAGE BATTERIES.
- THE SOLAR PV INSTALLATION SHALL NOT OBSTRUCT ANY PLUMBING, MECHANICAL, OR BUILDING ROOF VENTS.
- PROPER ACCESS AND WORKING CLEARANCE AROUND EXISTING AND PROPOSED ELECTRICAL EQUIPMENT WILL BE PROVIDED AS PER SECTION [NEC 110.26]

**LEGEND**

- JB (N) JUNCTION BOX
- UM (E) UTILITY METER
- MSP (E) MAIN SERVICE PANEL
- IQ (N) ENPHASE IQ COMBINER
- AC (N) FUSED AC DISCONNECT
- VENT, ATTIC FAN (ROOF OBSTRUCTION)
- ROOF ATTACHMENT
- CONDUIT
- ENPHASE IQ8PLUS -72-2-US (240V) MICROINVERTER
- JINKO SOLAR JKM425N-54HL4R-B MODULES
- XR-10-168B RAIL
- TRENCH



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 Rhode Island COA #9333  
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**SYSTEM INFO**

(13) JINKO SOLAR  
 JKM425N-54HL4R-B

(13) ENPHASE  
 IQ8PLUS -72-2-US (240V)

DC SYSTEM SIZE: 5.525 kWDC  
 AC SYSTEM SIZE: 3.770 kWAC

METER: 24432762

**REVISIONS**

DESCRIPTION	DATE	REV

**PROJECT NAME & ADDRESS**

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 RESIDENCE  
 45 PRINCETON AVE, PROVIDENCE, RI 02907, USA  
 EMAIL ID: PETERJAMESLUTZ@GMAIL.COM  
 PHONE NO. (401) 662-6668

DATE: 8/29/2024

SHEET NAME  
**SITE PLAN**

SHEET SIZE  
**ANSI B  
 11" X 17"**

SHEET NUMBER  
**PV-2**



SCALE: 1/16" = 1'-0"

METER NO#: 24432762

DESIGN SPECIFICATION	
RISK CATEGORY:	II
CONSTRUCTION:	SFD
ZONING:	RESIDENTIAL
SNOW LOAD (ASCE7-16):	35 PSF
EXPOSURE CATEGORY:	C
WIND SPEED (ASCE7-16):	125 MPH

MODULE TYPE, DIMENSIONS & WEIGHT	
NUMBER OF MODULES:	13 MODULES
MODULE TYPE:	JINKO SOLAR JKM425N-54HL4R-B
MODULE WEIGHT:	48.5 LBS
MODULE DIMENSIONS:	69.36" X 44.65" = 21.51 SF
UNIT WEIGHT OF AREA:	2.26 PSF

ROOF DESCRIPTION				
ROOF	ROOF TILT	RAFTER SIZE	RAFTER SPACING	ROOF MATERIAL
#1	33°	2" x 6"	24" o.c.	COMP SHINGLE
#2	33°	2" x 6"	24" o.c.	COMP SHINGLE

**LEGEND**

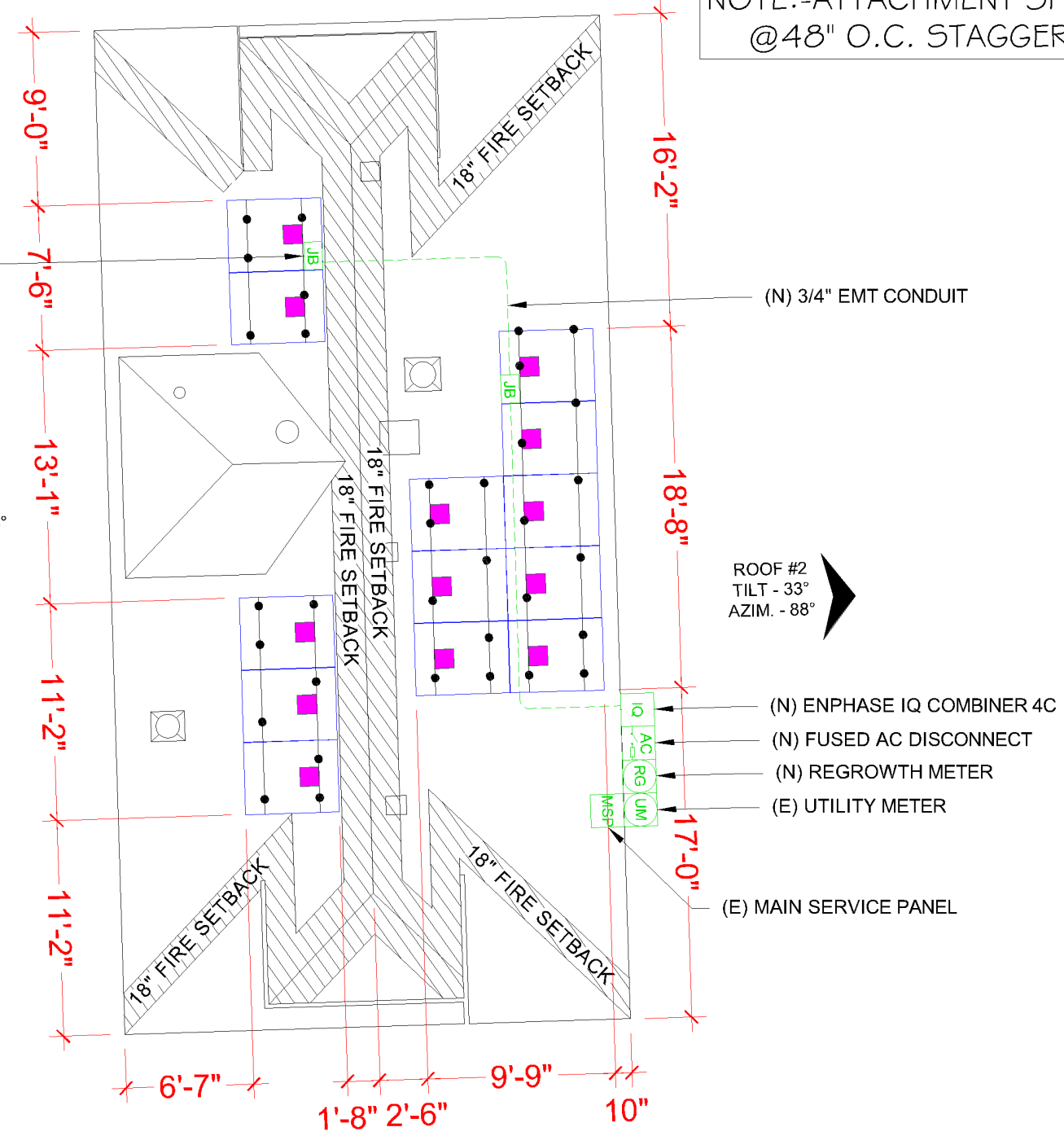
- JB (N) JUNCTION BOX
- UM (E) UTILITY METER
- MSP (E) MAIN SERVICE PANEL
- IQ (N) ENPHASE IQ COMBINER
- AC (N) FUSED AC DISCONNECT
- VENT, ATTIC FAN (ROOF OBSTRUCTION)
- ROOF ATTACHMENT
- CONDUIT
- ENPHASE IQ8PLUS -72-2-US (240V) MICROINVERTER
- JINKO SOLAR JKM425N-54HL4R-B MODULES
- XR-10-168B RAIL
- TRENCH

ARRAY AREA & ROOF AREA CALC'S		
ROOF	# OF MODULES	ARRAY AREA (Sq. Ft.)
#1	5	107.54
#2	8	172.06
(TOTAL ARRAY AREA/TOTAL ROOF AREA) X 100%		
= (279.59/1603) X 100% = 17.45%		

DEAD LOAD CALCULATION			
EQUIPMENT'S DESCRIPTIONS	QTY	LBS/UNIT	TOTAL WEIGHT
MODULES	13	48.5	630.5
MID CLAMP	18	0.3	5.4
END CLAMP	16	0.31	4.96
XR-10-168B RAIL	9	5.95	53.55
SPLICE BAR	2	0.65	1.3
HALO ULTRAGRIP - BLACK (QM-HUG-01-B1)	34	0.57	19.38
SELF DRILLING SCREW, #14, WOOD TIP WITH WASHER, EPDM BACKED	68	0.1	6.80
TOTAL WEIGHT OF THE SYSTEM (LBS)			721.89
TOTAL ARRAY AREA ON THE ROOF (SQ. FT.)			279.59
WEIGHT PER SQ. FT. (LBS)			2.59
WEIGHT PER PENETRATION (LBS)			7.08

**SCOTT E. WYSSLING**  
 No. PE 16286  
**REGISTERED PROFESSIONAL ENGINEER CIVIL**  
 Wyssling Consulting, PLLC  
 76 N Meadowbrook Drive, Alpine UT 84004  
 Rhode Island COA #9333  
 Signed 9/03/2024

(E) BACK OF RESIDENCE



NOTE:-ATTACHMENT SPACING @48" O.C. STAGGERED.

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 PROVIDENCE, RI 02903, USA  
 PH# : (774) 502-5948

SYSTEM INFO	
(13) JINKO SOLAR JKM425N-54HL4R-B	
(13) ENPHASE IQ8PLUS -72-2-US (240V)	
DC SYSTEM SIZE: 5.525 KWDC	
AC SYSTEM SIZE: 3.770 KWAC	
METER: 24432762	

REVISIONS		
DESCRIPTION	DATE	REV

PROJECT NAME & ADDRESS

PETER LUTZ  
 RESIDENCE  
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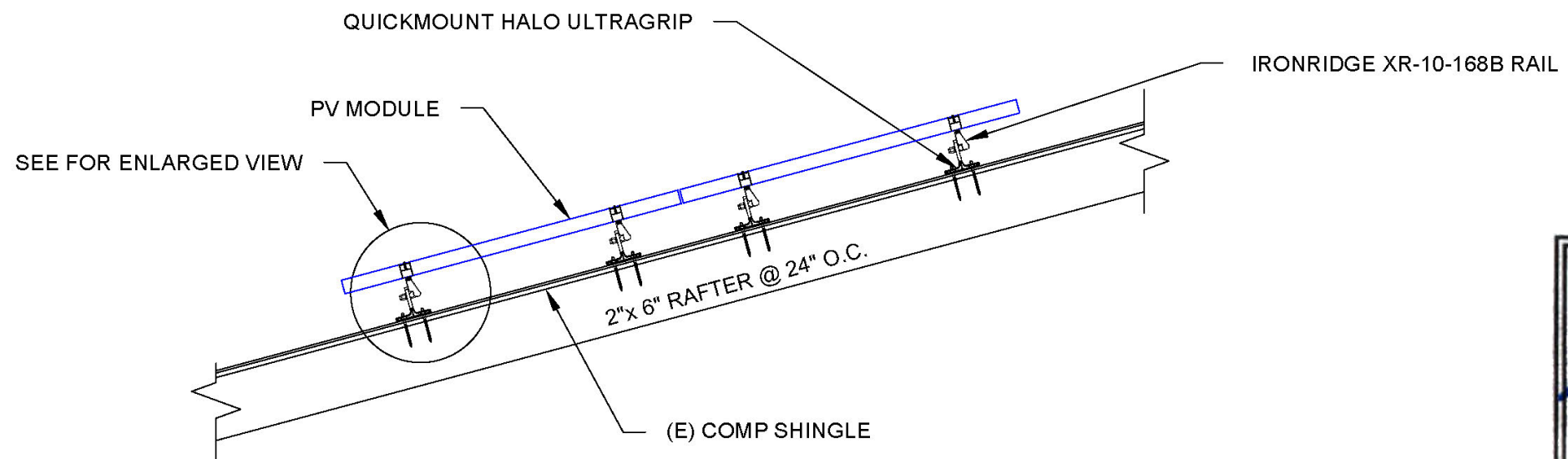
DATE: 8/29/2024
SHEET NAME <b>ROOF PLAN</b>
SHEET SIZE <b>ANSI B 11" X 17"</b>
SHEET NUMBER <b>PV-3</b>



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

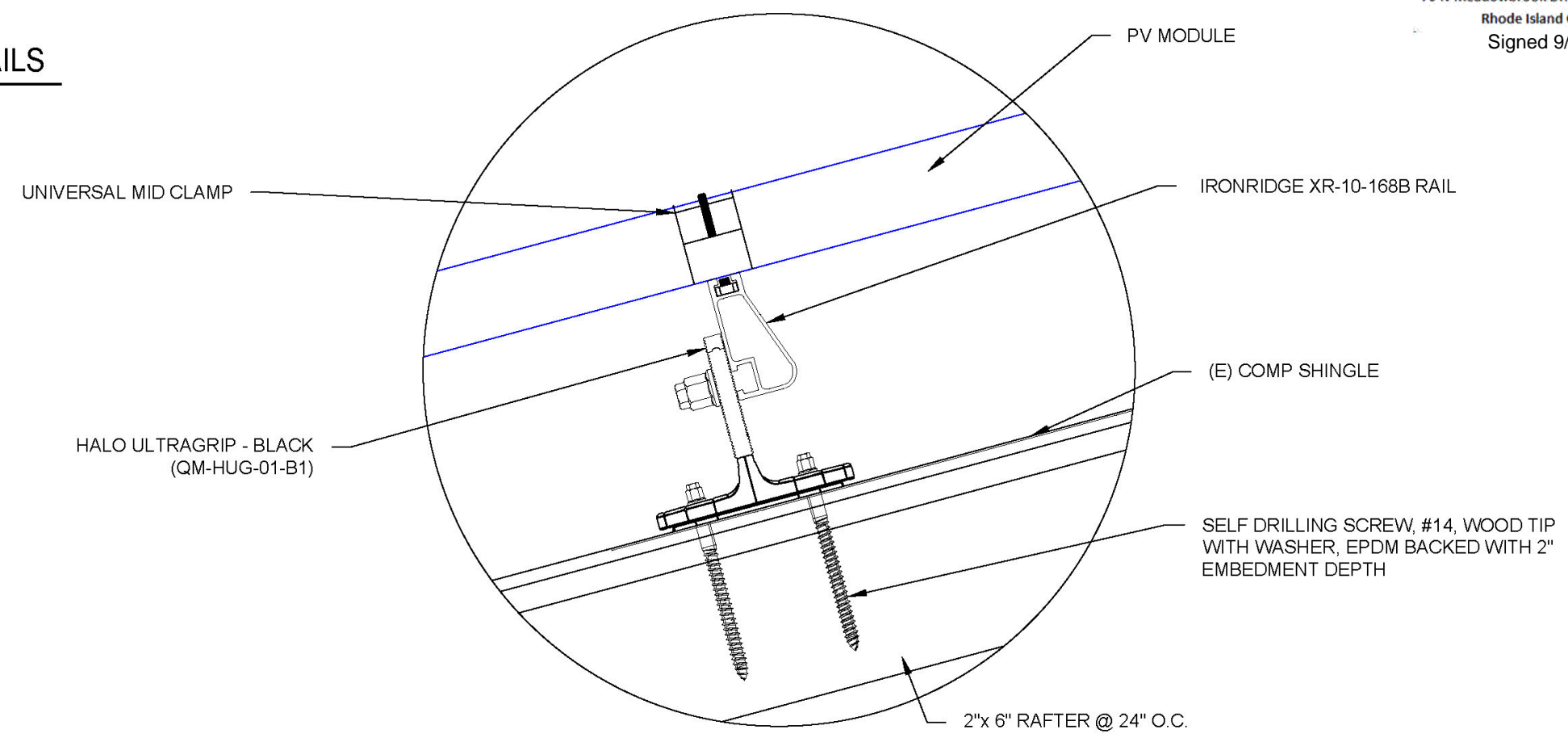
METER NO#: 24432762

(E) FRONT OF RESIDENCE  
 PRINCETON AVE



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**1 ATTACHMENT DETAILS**



**2 ENLARGED VIEW FOR ATTACHMENT DETAILS**  
 SCALE : NTS

SYSTEM INFO
(13) JINKO SOLAR JKM425N-54HL4R-B
(13) ENPHASE IQ8PLUS-72-2-US (240V)
DC SYSTEM SIZE: 5.525 kWDC
AC SYSTEM SIZE: 3.770 kWAC
METER: 24432762

REVISIONS		
DESCRIPTION	DATE	REV

PROJECT NAME & ADDRESS

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 EMAIL ID: PETERJAMESLUTZ@GMAIL.COM  
 PHONE NO. (401) 662-6668

DATE: 8/29/2024

SHEET NAME  
**ATTACHMENT  
 DETAILS**

SHEET SIZE  
**ANSI B  
 11" X 17"**

SHEET NUMBER  
**PV-5**

www.jinkosolar.com



# Tiger Neo N-type 54HL4R-B 425-445 Watt ALL-BLACK MODULE

## N-Type

Positive power tolerance of 0~+3%

- IEC61215(2016), IEC61730(2016)
- ISO9001:2015: Quality Management System
- ISO14001:2015: Environment Management System
- ISO45001:2018 Occupational health and safety management systems



## Key Features



### SMBB Technology

Better light trapping and current collection to improve module power output and reliability.



### Hot 2.0 Technology

The N-type module with Hot 2.0 technology has better reliability and lower LID/LETID.



### PID Resistance

Excellent Anti-PID performance guarantee via optimized mass-production process and materials control.



### Enhanced Mechanical Load

Certified to withstand: wind load (4000 Pascal) and snow load (6000 Pascal).

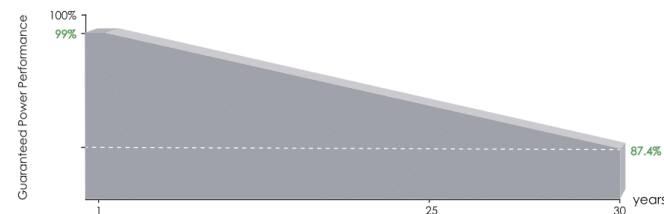


### Durability Against Extreme Environmental Conditions

High salt mist and ammonia resistance.



## LINEAR PERFORMANCE WARRANTY

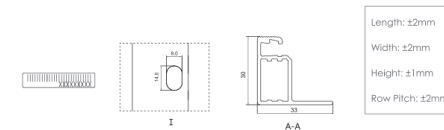
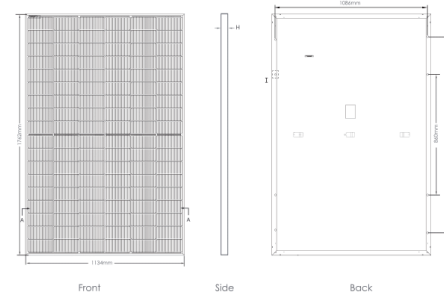


25 Year Product Warranty

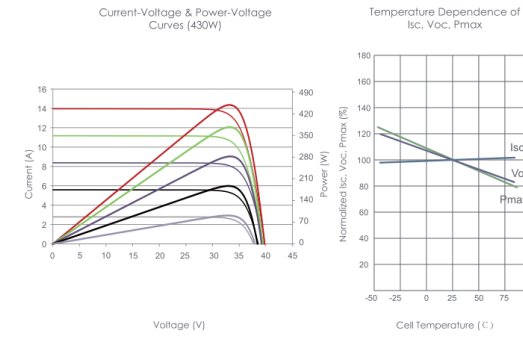
30 Year Linear Power Warranty

0.40% Annual Degradation Over 30 years

## Engineering Drawings



## Electrical Performance & Temperature Dependence



## Mechanical Characteristics

Cell Type	N type Mono-crystalline
No. of cells	108 (6x18)
Dimensions	1762x1134x30mm (69.36x44.65x1.18 inch)
Weight	22 kg (48.50 lbs)
Front Glass	3.2mm, Anti-Reflection Coating, High Transmission, Low Iron, Tempered Glass
Frame	Anodized Aluminium Alloy
Junction Box	IP68 Rated
Output Cables	TUV 1x4.0mm (+): 400mm, (-): 200mm or Customized Length

## Packaging Configuration

[ Two pallets = One stack ]  
36pcs/pallets, 72pcs/stack, 936pcs/ 40'HQ Container

## SPECIFICATIONS

Module Type	JKM425N-54HL4R-B		JKM430N-54HL4R-B		JKM435N-54HL4R-B		JKM440N-54HL4R-B		JKM445N-54HL4R-B	
	STC	NOCT	STC	NOCT	STC	NOCT	STC	NOCT	STC	NOCT
Maximum Power (Pmax)	425Wp	320Wp	430Wp	323Wp	435Wp	327Wp	440Wp	331Wp	445Wp	335Wp
Maximum Power Voltage (Vmp)	32.37V	30.19V	32.58V	30.30V	32.78V	30.50V	32.99V	30.73V	33.19V	30.93V
Maximum Power Current (Imp)	13.13A	10.60A	13.20A	10.66A	13.27V	10.72A	13.34A	10.77A	13.41A	10.83A
Open-circuit Voltage (Voc)	38.95V	37.00V	39.16V	37.20V	39.36V	37.39V	39.57V	37.59V	39.77V	37.78V
Short-circuit Current (Isc)	13.58A	10.96A	13.65A	11.02A	13.72A	11.08A	13.80A	11.14A	13.87A	11.20A
Module Efficiency STC (%)	21.27%		21.52%		21.77%		22.02%		22.27%	
Operating Temperature(°C)	-40°C~+85°C									
Maximum system voltage	1000VDC (IEC)									
Maximum series fuse rating	25A									
Power tolerance	0~+3%									
Temperature coefficients of Pmax	-0.29%/°C									
Temperature coefficients of Voc	-0.25%/°C									
Temperature coefficients of Isc	0.045%/°C									
Nominal operating cell temperature (NOCT)	45±2°C									

\*STC: ☀ Irradiance 1000W/m<sup>2</sup> 🌡 Cell Temperature 25°C ☁ AM=1.5  
NOCT: ☀ Irradiance 800W/m<sup>2</sup> 🌡 Ambient Temperature 20°C ☁ AM=1.5 🌀 Wind Speed 1m/s

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Specifications included in this datasheet are subject to change without notice.

JKM425-445N-54HL4R-B-F2-EN

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### SYSTEM INFO

(13) JINKO SOLAR  
JKM425N-54HL4R-B

(13) ENPHASE  
IQ8PLUS-72-2-US (240V)

DC SYSTEM SIZE: 5.525 kWDC

AC SYSTEM SIZE: 3.770 kWAC

METER: 24432762

### REVISIONS

DESCRIPTION	DATE	REV

### PROJECT NAME & ADDRESS

PETER LUTZ  
RESIDENCE  
45 PRINCETON AVE, PROVIDENCE, RI 02907, USA  
EMAIL ID: PETERJAMESLUTZ@GMAIL.COM  
PHONE NO. (401) 662-6668

DATE: 8/29/2024

SHEET NAME  
**EQUIPMENT  
SPECIFICATIONS**

SHEET SIZE  
**ANSI B  
11" X 17"**

SHEET NUMBER  
**PV-11**