

PHOTOVOLTAIC ROOF MOUNT SYSTEM

50 MODULES-ROOF MOUNTED - 26.700 KW DC, 22.800 KW AC

2224 HOUSTON PL, DENTON, TX 76201

PROJECT DATA

PROJECT ADDRESS 2224 HOUSTON PL, DENTON, TX 76201

OWNER: THEODORE WOOD

DESIGNER: ESR

CONTRACTOR: CMS RENEWABLE LLC
2100 N HWY 360 #1004,
GRAND PRAIRIE, TX 75050, USA
PHONE: +14694285563
EMAIL: edgar@cmsrenewable.com

LICENSE NO: #35493

ELECTRICAL LICENSE NO: #213982

METER ID: # 10 791 086

SCOPE: **REPLACING DEFECTIVE EXISTING SYSTEM:**
OLD SYSTEM:
14.400 KW DC ROOF MOUNT
36 HANWHA Q CELLS: Q.PEAK DUO BLK ML-G10+ 400W PV MODULES WITH
01 SOLAREEDGE SE11400H-US (240V) INVERTER AND
36 SOLAREEDGE POWER OPTIMIZERS
NEW SYSTEM:
26.700 KW DC ROOF MOUNT
SOLAR PV SYSTEM WITH
50 VSUN SOLAR VSUN445-144MH 445W P-v MODULES WITH
02 SOLAREEDGE SE11400H-US (240V) INVERTERS AND
50 SOLAREEDGE S500 POWER OPTIMIZERS

AUTHORITIES HAVING JURISDICTION:
BUILDING: CITY OF DENTON
ZONING: CITY OF DENTON
UTILITY: DENTON MUNICIPAL ELECTRIC

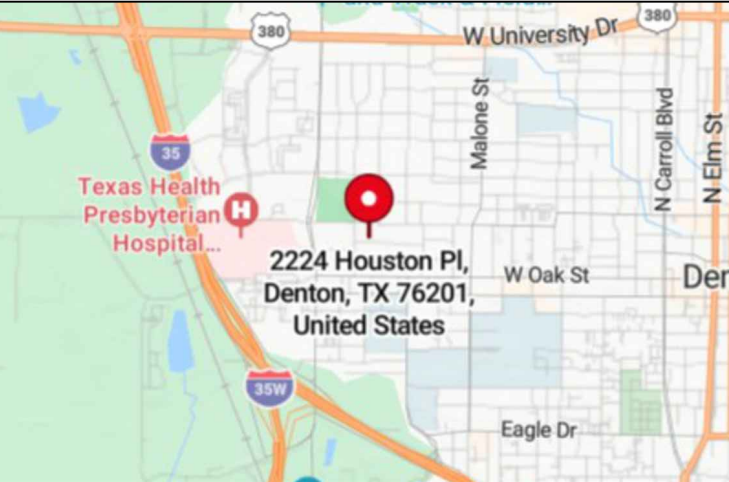
SHEET INDEX

PV-1	COVER SHEET
PV-2	SITE PLAN
PV-3	ROOF PLAN AND MODULES
PV-4	ELECTRICAL PLAN
PV-5	STRUCTURAL DETAIL
PV-5.1	EQUIPMENTS ELEVATION
PV-6	THREE LINE DIAGRAM
PV-6.1	SINGLE LINE DIAGRAM
PV-7	WIRING CALCULATIONS
PV-8	LABELS
PV-9	PLACARD
PV-10	OPTIMIZER CHART
PV-11+	EQUIPMENT SPECIFICATIONS

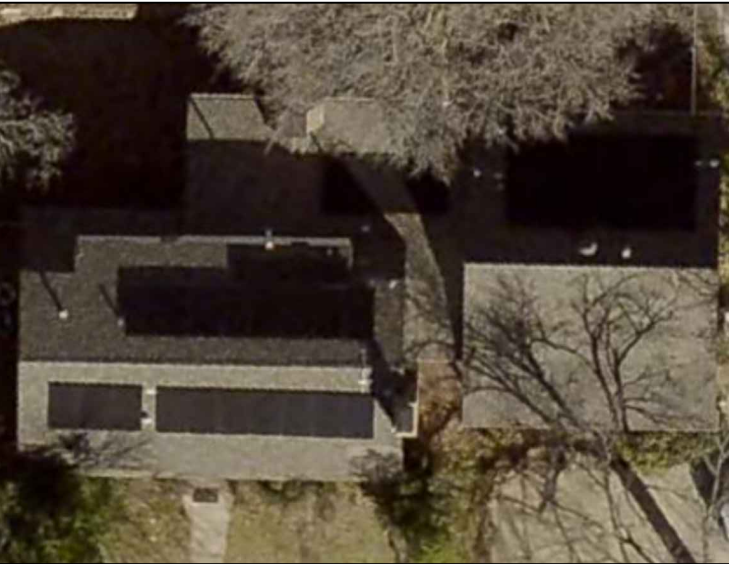
GENERAL NOTES

- ALL COMPONENTS ARE UL LISTED AND NEC CERTIFIED, WHERE WARRANTED.
- THE SOLAR PV SYSTEM WILL BE INSTALLED IN ACCORDANCE WITH ARTICLE 690 OF THE NEC 2020.
- THE UTILITY INTERCONNECTION APPLICATION MUST BE APPROVED AND PV SYSTEM INSPECTED PRIOR TO PARALLEL OPERATION.
- ALL CONDUCTORS OF A CIRCUIT, INCLUDING THE EGC, MUST BE INSTALLED IN THE SAME RACEWAY, OR CABLE, OR OTHERWISE RUN WITH THE PV ARRAY CIRCUIT CONDUCTORS WHEN THEY LEAVE THE VICINITY OF THE PV ARRAY.
- WHERE METALLIC CONDUIT CONTAINING DC CONDUCTORS IS USED INSIDE THE BUILDING, IT SHALL BE IDENTIFIED AS "CAUTION: SOLAR CIRCUIT" EVERY 10FT.
- HEIGHT OF THE AC DISCONNECT SHALL NOT EXCEED 6'-7" PER NEC CODE 240.24.
- A GROUNDING ELECTRODE SYSTEM IN ACCORDANCE WITH NEC 2020 690.47 AND 250.50 THROUGH 60 AND 250-166 SHALL BE PROVIDED. PER NEC GROUNDING ELECTRODE SYSTEM OF EXISTING BUILDING MAY BE USED AND BONDED TO THE SERVICE ENTRANCE. IF EXISTING SYSTEM IS INACCESSIBLE OR INADEQUATE A SUPPLEMENTAL GROUNDING ELECTRODE WILL BE USED AT THE INVERTER LOCATION CONSISTING OF A UL LISTED 8 FT. GROUND ROD WITH ACORN CLAMP. GROUNDING ELECTRODE CONDUCTORS SHALL BE NO LESS THAN #8 AWG AND NO LARGER THAN #6 AWG COPPER AND BONDED TO THE EXISTING GROUNDING ELECTRODE TO PROVIDE FOR A COMPLETE SYSTEM.
- PHOTOVOLTAIC MODULES ARE TO BE CONSIDERED NON-COMBUSTIBLE.
- PHOTOVOLTAIC INSTALLATION WILL NOT OBSTRUCT ANY PLUMBING, MECHANICAL, OR BUILDING ROOF VENTS.
- ALL WIRING MUST BE PROPERLY SUPPORTED BY DEVICES OR MECHANICAL MEANS DESIGNED AND LISTED FOR SUCH USE. WIRING MUST BE PERMANENTLY AND COMPLETELY HELD OFF THE ROOF SURFACE.
- ALL SIGNAGE TO BE PLACED IN ACCORDANCE WITH THE LOCAL BUILDING CODE. IF EXPOSED TO SUNLIGHT, IT SHALL BE UV RESISTANT. ALL PLAQUES AND SIGNAGE WILL BE INSTALLED AS REQUIRED BY THE NEC AND AHJ.
- INVERTER(S) USED IN UNGROUNDED SYSTEM SHALL BE UL 1741 LISTED.
- THE INSTALLATION OF EQUIPMENT AND ALL ASSOCIATED WIRING AND INTERCONNECTION SHALL BE PERFORMED ONLY BY QUALIFIED PERSONS [NEC 690.4(C)]
- ALL OUTDOOR EQUIPMENT SHALL BE NEMA 3R RATED (OR BETTER), INCLUDING ALL ROOF MOUNTED TRANSITION BOXES AND SWITCHES.
- ALL EQUIPMENT SHALL BE PROPERLY GROUNDED AND BONDED IN ACCORDANCE WITH NEC ARTICLE 250.
- SYSTEM GROUNDING SHALL BE IN ACCORDANCE WITH NEC 690.41.
- PV SYSTEM CIRCUITS INSTALLED ON OR IN BUILDINGS SHALL INCLUDE A RAPID SHUTDOWN FUNCTION IN ACCORDANCE WITH NEC 690.12
- DISCONNECTING MEANS SHALL BE LOCATED IN A VISIBLE, READILY ACCESSIBLE LOCATION WITHIN THE PV SYSTEM EQUIPMENT OR A MAXIMUM OF 10 FEET AWAY FROM THE SYSTEM [NEC 690.13(A)]
- ALL WIRING METHODS SHALL BE IN ACCORDANCE WITH NEC 690.31
- WORK CLEARANCES AROUND ELECTRICAL EQUIPMENT WILL BE MAINTAINED PER NEC 110.26(A)(1), 110.26(A)(2) AND 110.26(A)(3).
- ROOFTOP MOUNTED PHOTOVOLTAIC PANELS AND MODULES SHALL BE TESTED, LISTED & IDENTIFIED IN ACCORDANCE WITH UL1703
- ELECTRICAL CONTRACTOR TO PROVIDE CONDUIT EXPANSION JOINTS AND ANCHOR CONDUIT RUNS AS REQUIRED PER NEC.
- IN ACCORDANCE WITH 2021 IFC 1205.5, 2018 IFC 1204.4, AND 2015 IFC 605.11.2 A CLEAR, BRUSH-FREE AREA OF 10 FEET(3048 MM) SHALL BE REQUIRED FOR GROUND-MOUNTED PHOTOVOLTAIC ARRAYS.
- PANEL LAYOUT ORIENTATION IS SUBJECT TO CHANGE ON DESIGNED MOUNTING PLANES.

VICINITY MAP



HOUSE PHOTO



CODE REFERENCES

PROJECT TO COMPLY WITH THE FOLLOWING:

2020 NATIONAL ELECTRICAL CODE (NEC)
2021 INTERNATIONAL RESIDENTIAL CODE (IRC)
2021 INTERNATIONAL BUILDING CODE (IBC)
2021 INTERNATIONAL FIRE CODE (IFC)
2021 INTERNATIONAL ENERGY CONSERVATION CODE (IECC)



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REVISIONS

DESCRIPTION	DATE	REV
INITIAL	02/28/2025	



Reviewed and approved
Richard Pantel, P.E.
TX Lic. No. PE 142628
Firm F-24051
05/02/2025

PROJECT NAME & ADDRESS

THEODORE WOOD
RESIDENCE
2224 HOUSTON PL,
DENTON, TX 76201

DRAWN BY

ESR

SHEET NAME

COVER SHEET

SHEET SIZE

ANSI B
11" X 17"

SHEET NUMBER

PV-1

NUMBER OF MODULES = 50 MODULES
MODULE TYPE = VSUN SOLAR VSUN445-144MH 445W PV MODULES
MODULE WEIGHT = 52.47 LBS / 23.8KG
MODULE DIMENSIONS = 82.99" x 41.26" = 23.78 SF

REPLACING DEFECTIVE EXISTING SYSTEM:
 OLD SYSTEM: 14.400 KW DC ROOF MOUNT
 (36) HANWHA QCELLS: Q.PEAK DUO BLK ML-G10+
 400W PV MODULES
 (01) SOLAREEDGE SE114000H-US (240V) INVERTER
 (36) SOLAREEDGE POWER OPTIMIZERS

ROOF TYPE				ASPHALT SHINGLE	
ROOF	# OF MODULES	ROOF PITCH	AZIMUTH	TRUSS SIZE	TRUSS SPACING
#1	10	30°	181°	2"x4"	24"
#2	13	30°	1°	2"x4"	24"
#3	13	18°	1°	2"x4"	24"
#4	14	30°	1°	2"x4"	24"

TOTAL PV ARRAY AREA (SQ. FT.)	TOTAL ROOF AREA (Sq. Ft.)	ROOF AREA COVERED BY ARRAY (%)
1189.00	2734.26	43

— NEW PV MODULE
- EXISTING PV MODULE
WHICH IS REMOVABLE



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ROOF PLAN AND MODULES

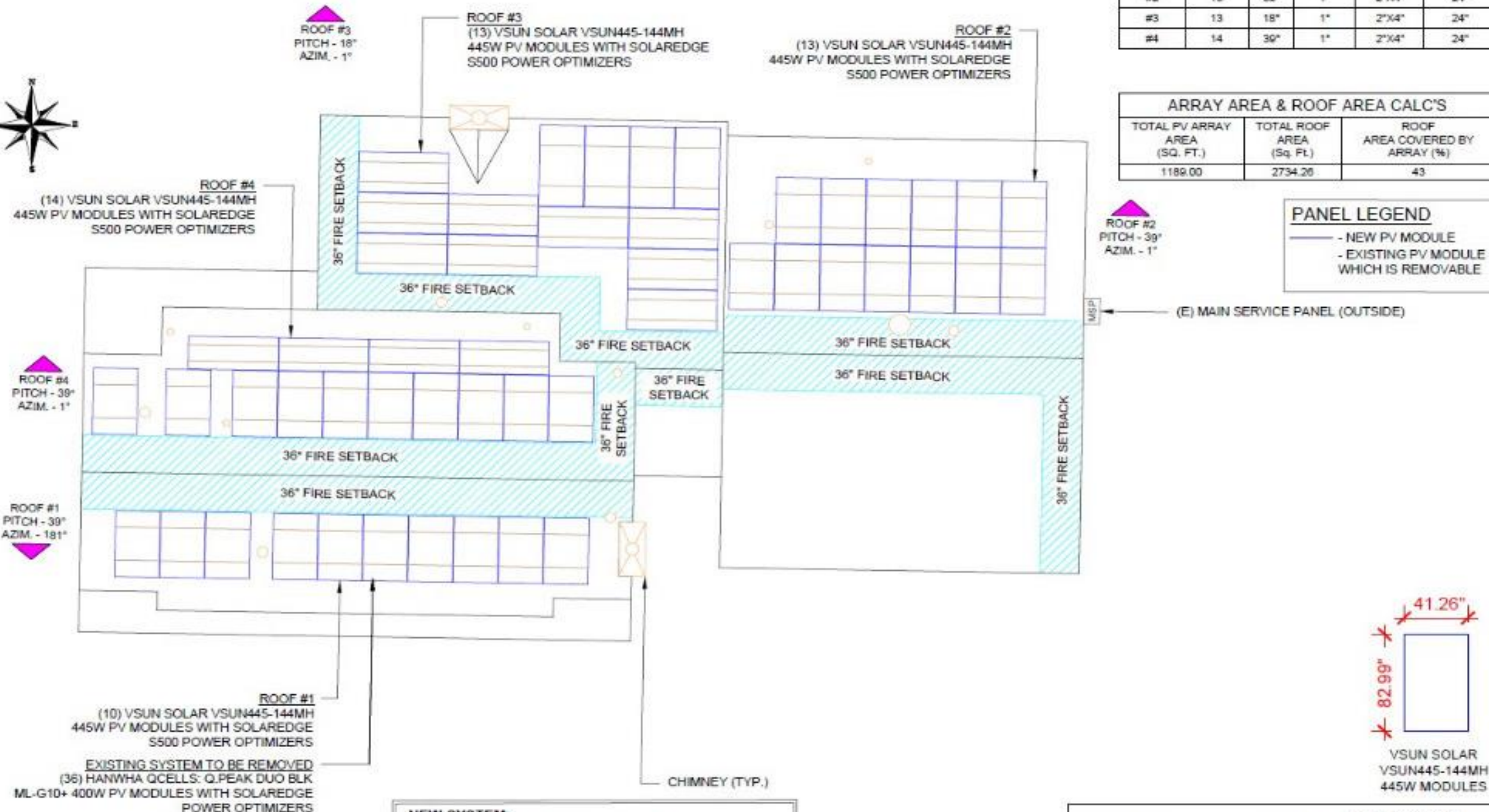
SHEET SIZE

ANSI B

11" X 17"

SHEET NUMBER

PV-3



NEW SYSTEM:

NEW SYSTEMS:
DC SYSTEM SIZE: 50 x 445 = 22.250 KW DC
AC SYSTEM SIZE: 02 x 11400W = 22.800KW AC
(50) VSUN SOLAR VSUN445-144MH 445W PV MODULES WITH
(02) SOLAREGE SE11400H-US (240V) INVERTERS AND
(50) SOLAREGE S500 POWER OPTIMIZERS

LEGEND

MSP - MAIN SERVICE PANEL

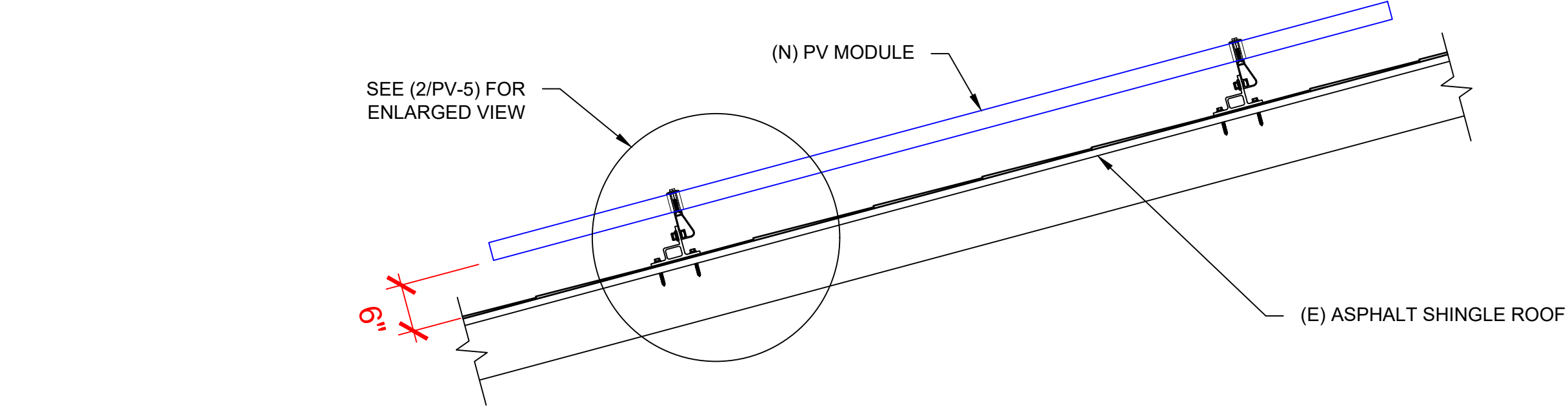
- VENT, ATTIC FAN (ROOF OBSTRUCTION)
- ROOF ATTACHMENT
- TRUSS

1

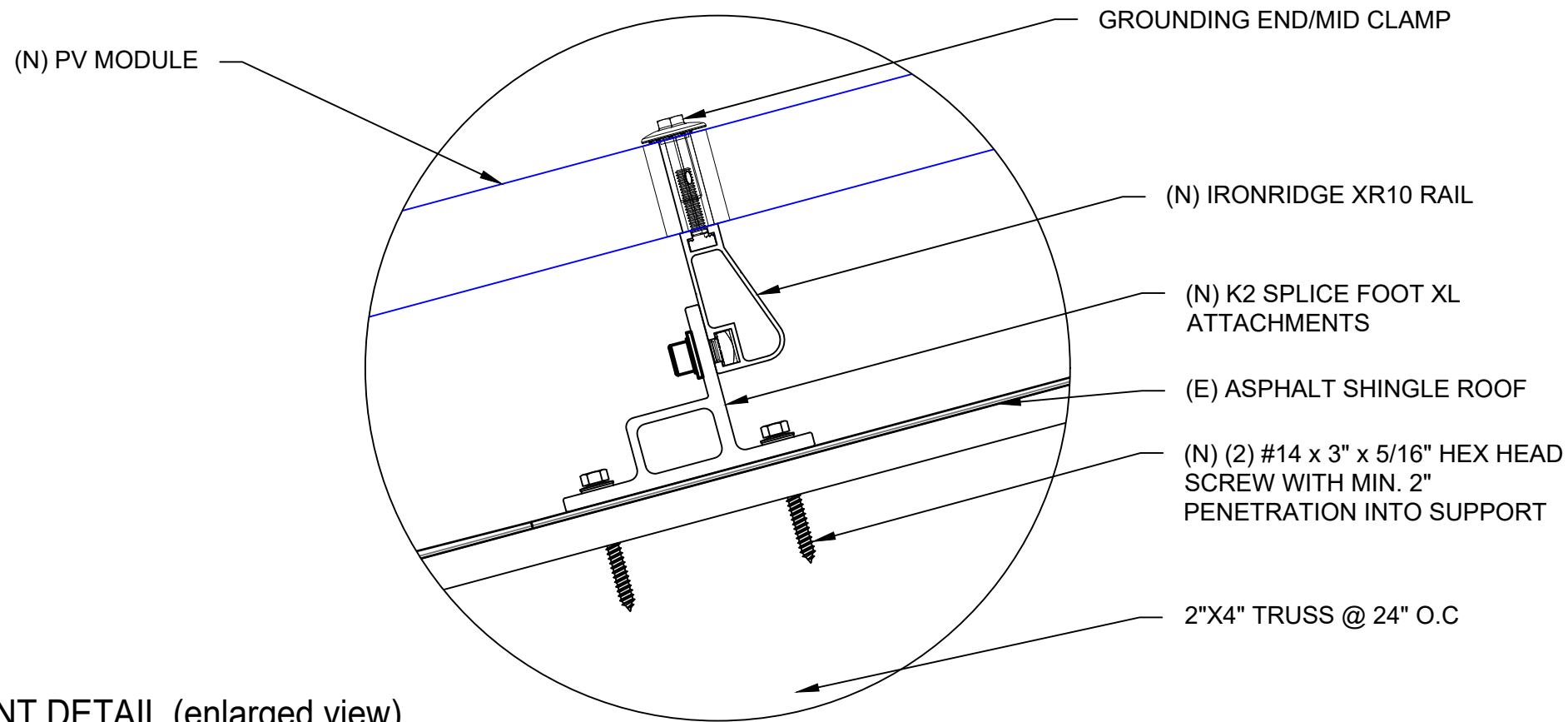
ROOF PLAN AND MODULES

PV-3

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



1 | STRUCTURAL ATTACMENT (SIDE VIEW)
PV-5 | SCALE: N.T.S



2 | ATTACHMENT DETAIL (enlarged view)
PV-5 | SCALE: NTS



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SHEET NAME

STRUCTURAL
DETAIL

SHEET SIZE

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SHEET NUMBER

PV-5

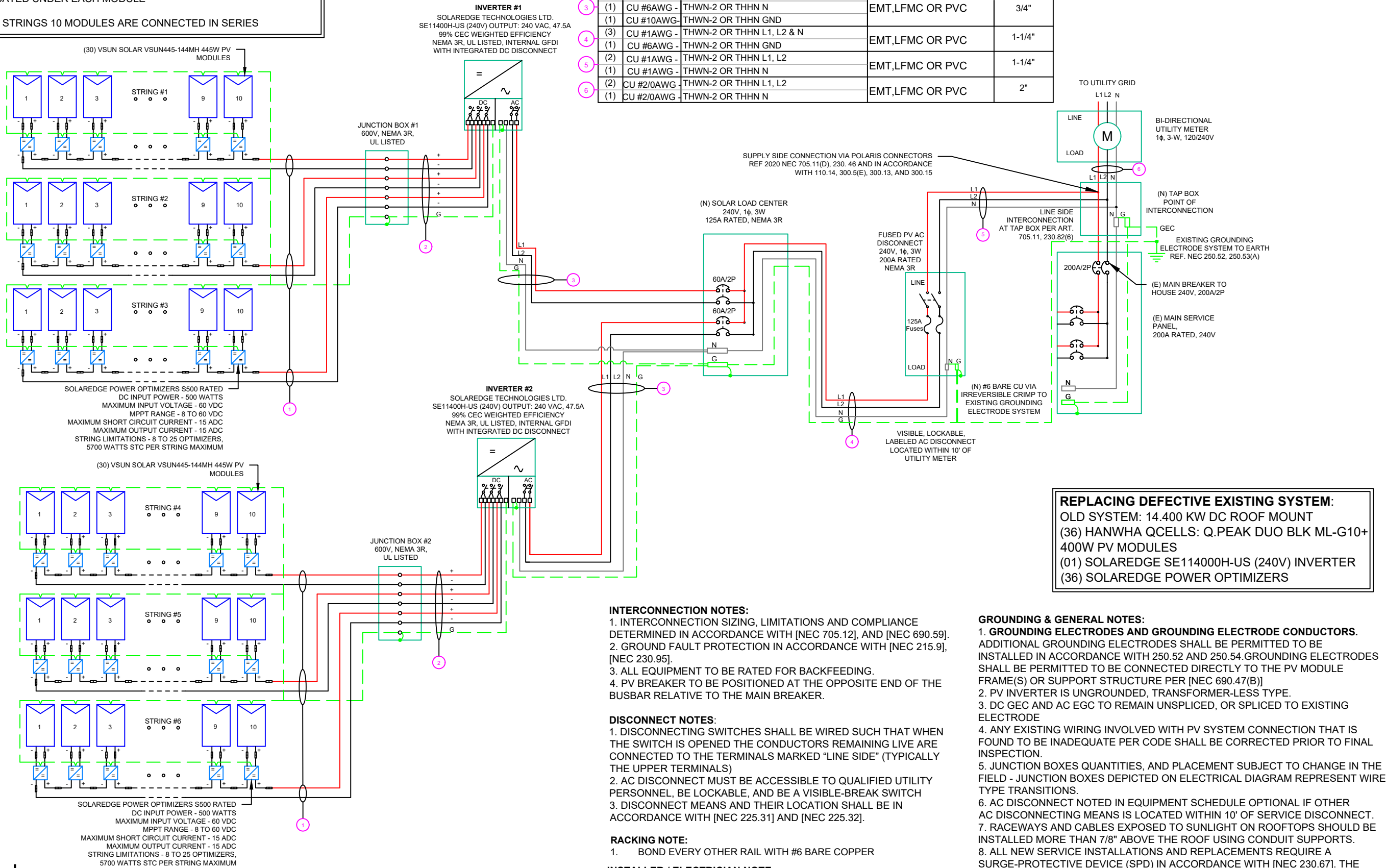
DC SYSTEM SIZE: 60 x 445W = 26.700KW DC
AC SYSTEM SIZE: 02 x 11400W = 22.800KW AC

(60) VSUN SOLAR VSUN445-144MH 445W PV MODULES WITH
(02) SOLAREEDGE SE11400H-US (240V) INVERTERS AND
(60) SOLAREEDGE S500 POWER OPTIMIZERS ARE
LOCATED UNDER EACH MODULE

(06) STRINGS 10 MODULES ARE CONNECTED IN SERIES

METER ID: # 10 791 086

QTY	CONDUCTOR INFORMATION	CONDUIT TYPE	CONDUIT SIZE
(12)	CU#10AWG - PV WIRE (POSITIVE & NEGATIVE)	N/A	N/A
(1)	CU #6AWG - BARE COPPER IN FREE AIR		
(12)	CU#10AWG - THWN-2 (+, -) (EXTERIOR)	EMT/LFMC	3/4"
(1)	CU #10AWG - THWN-2 GND		
(2)	CU #6AWG - THWN-2 OR THHN L1 & L2	EMT,LFMC OR PVC	3/4"
(1)	CU #6AWG - THWN-2 OR THHN N		
(1)	CU #10AWG - THWN-2 OR THHN GND	EMT,LFMC OR PVC	1-1/4"
(3)	CU #1AWG - THWN-2 OR THHN L1, L2 & N		
(1)	CU #6AWG - THWN-2 OR THHN GND	EMT,LFMC OR PVC	1-1/4"
(2)	CU #1AWG - THWN-2 OR THHN L1, L2		
(1)	CU #1AWG - THWN-2 OR THHN N	EMT,LFMC OR PVC	1-1/4"
(2)	CU #2/0AWG - THWN-2 OR THHN L1, L2		
(1)	CU #2/0AWG - THWN-2 OR THHN N	EMT,LFMC OR PVC	2"



REPLACING DEFECTIVE EXISTING SYSTEM:
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SHEET NAME

THREE LINE
DIAGRAM

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SHEET NUMBER

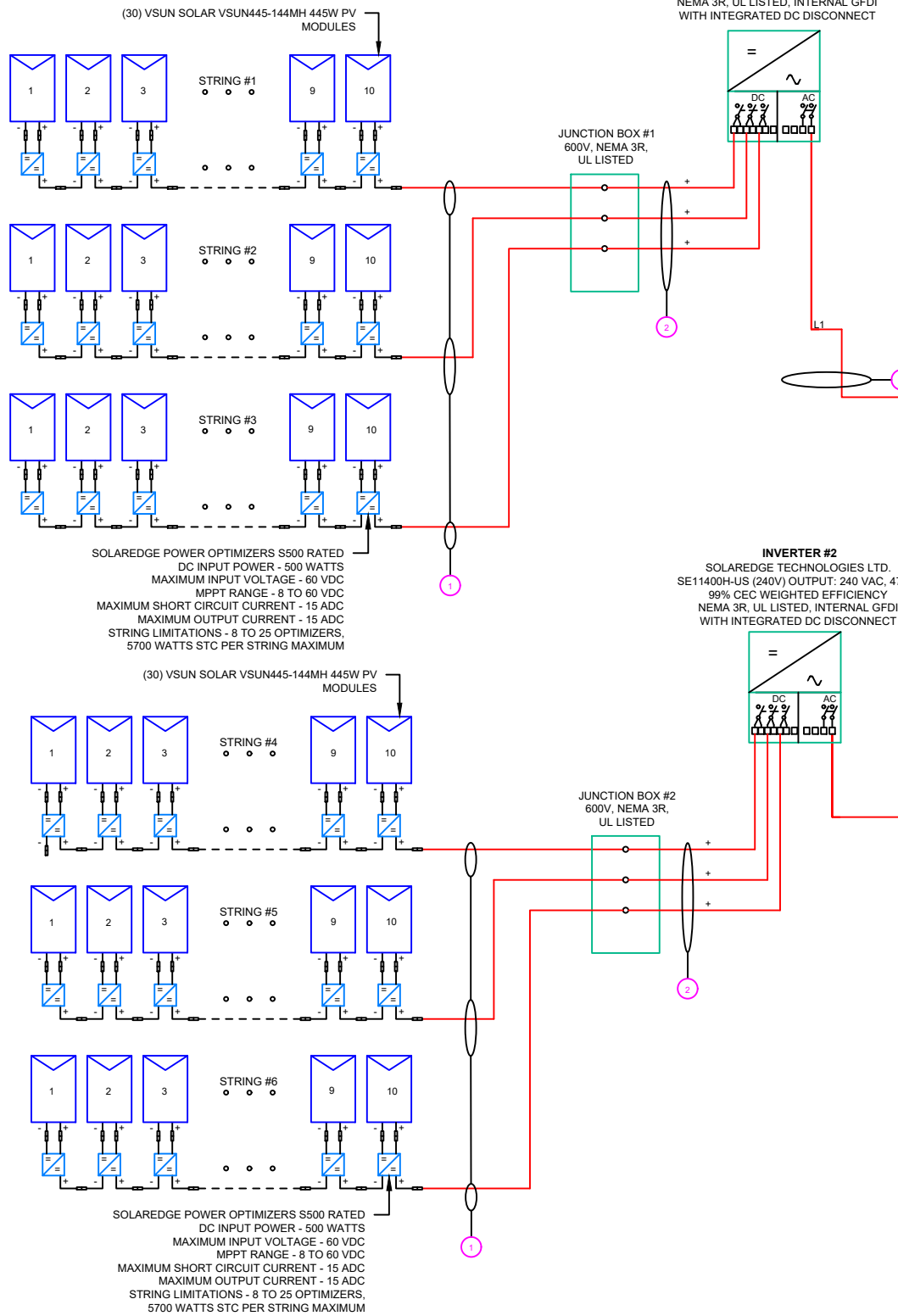
PV-6

DC SYSTEM SIZE: 60 x 445W = 26.700KW DC
AC SYSTEM SIZE: 02 x 11400W = 22.800KW AC

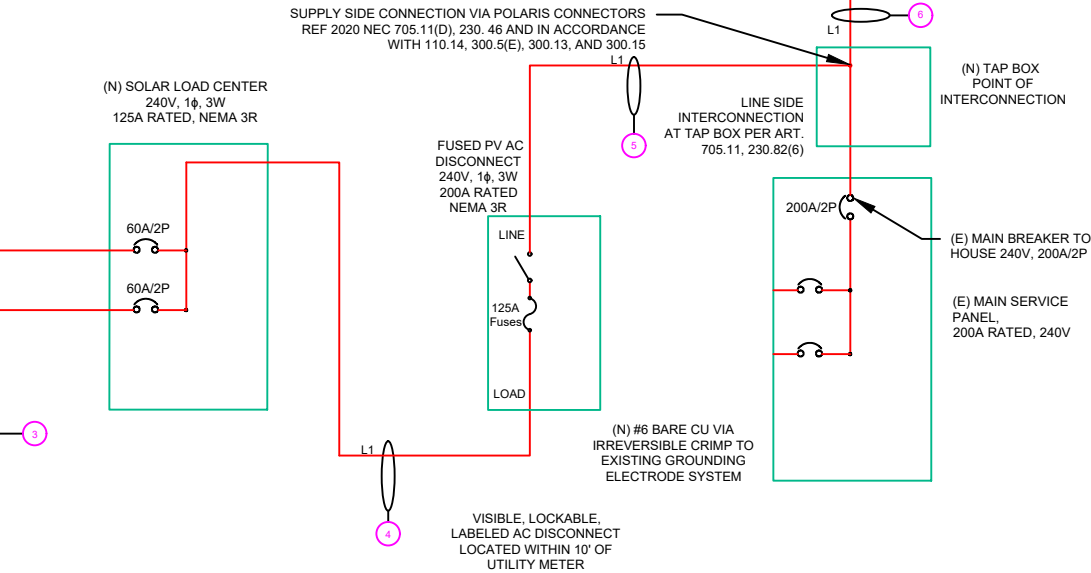
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QTY	CONDUCTOR INFORMATION		CONDUIT TYPE	CONDUIT SIZE
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(1)	CU #6AWG -	BARE COPPER IN FREE AIR		
(12)	CU#10AWG -	THWN-2 (+, -) (EXTERIOR)	EMT/LFMC	3/4"
(1)	CU #10AWG -	THWN-2 GND		
(2)	CU #6AWG -	THWN-2 OR THHN L1 & L2	EMT,LFMC OR PVC	3/4"
(1)	CU #6AWG -	THWN-2 OR THHN N		
(1)	CU #10AWG -	THWN-2 OR THHN GND	EMT,LFMC OR PVC	1-1/4"
(3)	CU #1AWG -	THWN-2 OR THHN L1, L2 & N		
(1)	CU #6AWG -	THWN-2 OR THHN GND	EMT,LFMC OR PVC	1-1/4"
(2)	CU #1AWG -	THWN-2 OR THHN L1, L2		
(1)	CU #1AWG -	THWN-2 OR THHN N	EMT,LFMC OR PVC	2"
(2)	CU #2/0AWG -	THWN-2 OR THHN L1, L2		
(1)	CU #2/0AWG -	THWN-2 OR THHN N		



REPLACING DEFECTIVE EXISTING SYSTEM:
OLD SYSTEM: 14.400 KW DC ROOF MOUNT
(36) HANWHA QCELLS: Q.PEAK DUO BLK ML-G10+
400W PV MODULES
(01) SOLAREEDGE SE114000H-US (240V) INVERTER
(36) SOLAREEDGE POWER OPTIMIZERS

INTERCONNECTION NOTES:
1. INTERCONNECTION SIZING, LIMITATIONS AND COMPLIANCE DETERMINED IN ACCORDANCE WITH [NEC 705.12], AND [NEC 690.59].
2. GROUND FAULT PROTECTION IN ACCORDANCE WITH [NEC 215.9], [NEC 230.95].
3. ALL EQUIPMENT TO BE RATED FOR BACKFEEDING.
4. PV BREAKER TO BE POSITIONED AT THE OPPOSITE END OF THE BUSBAR RELATIVE TO THE MAIN BREAKER.

DISCONNECT NOTES:
1. DISCONNECTING SWITCHES SHALL BE WIRED SUCH THAT WHEN THE SWITCH IS OPENED THE CONDUCTORS REMAINING LIVE ARE CONNECTED TO THE TERMINALS MARKED "LINE SIDE" (TYPICALLY THE UPPER TERMINALS)
2. AC DISCONNECT MUST BE ACCESSIBLE TO QUALIFIED UTILITY PERSONNEL, BE LOCKABLE, AND BE A VISIBLE-BREAK SWITCH
3. DISCONNECT MEANS AND THEIR LOCATION SHALL BE IN ACCORDANCE WITH [NEC 225.31] AND [NEC 225.32].

RACKING NOTE:
1. BOND EVERY OTHER RAIL WITH #6 BARE COPPER

INSTALLER / ELECTRICIAN NOTE:
EC IS TO MEASURE VOLTAGE BEFORE STARTING WORK.
IF RESULT IS ANY OTHER VOLTAGE MEASURED THAN 120/240V IS OBSERVED, DO NOT PROCEED. CONTACT ENGINEER.

GROUNDING & GENERAL NOTES:
1. **GROUNDING ELECTRODES AND GROUNDING ELECTRODE CONDUCTORS.** ADDITIONAL GROUNDING ELECTRODES SHALL BE PERMITTED TO BE INSTALLED IN ACCORDANCE WITH 250.52 AND 250.54. GROUNDING ELECTRODES SHALL BE PERMITTED TO BE CONNECTED DIRECTLY TO THE PV MODULE FRAME(S) OR SUPPORT STRUCTURE PER [NEC 690.47(B)]
2. PV INVERTER IS UNGROUNDED, TRANSFORMER-LESS TYPE.
3. DC GEC AND AC EGC TO REMAIN UNSPLICED, OR SPLICED TO EXISTING ELECTRODE
4. ANY EXISTING WIRING INVOLVED WITH PV SYSTEM CONNECTION THAT IS FOUND TO BE INADEQUATE PER CODE SHALL BE CORRECTED PRIOR TO FINAL INSPECTION.
5. JUNCTION BOXES QUANTITIES, AND PLACEMENT SUBJECT TO CHANGE IN THE FIELD - JUNCTION BOXES DEPICTED ON ELECTRICAL DIAGRAM REPRESENT WIRE TYPE TRANSITIONS.
6. AC DISCONNECT NOTED IN EQUIPMENT SCHEDULE OPTIONAL IF OTHER AC DISCONNECTING MEANS IS LOCATED WITHIN 10' OF SERVICE DISCONNECT.
7. RACEWAYS AND CABLES EXPOSED TO SUNLIGHT ON ROOFTOPS SHOULD BE INSTALLED MORE THAN 7/8" ABOVE THE ROOF USING CONDUIT SUPPORTS.
8. ALL NEW SERVICE INSTALLATIONS AND REPLACEMENTS REQUIRE A SURGE-PROTECTIVE DEVICE (SPD) IN ACCORDANCE WITH [NEC 230.67]. THE SPD SHALL BE TYPE 1 OR TYPE 2 AND IS REQUIRED TO BE AN INTEGRAL PART OF THE SERVICE EQUIPMENT OR LOCATED IMMEDIATELY ADJACENT THERETO.

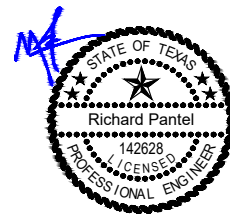


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DRAWN BY

ESR

SHEET NAME

SINGLE LINE
DIAGRAM

SHEET SIZE

ANSI B
11" X 17"

SHEET NUMBER

PV-6.1

INVERTER SPECIFICATIONS	
MANUFACTURER / MODEL #	SOLAREEDGE SE11400H-US (240V) INVERTER
NOMINAL AC POWER	11.400KW
NOMINAL OUTPUT VOLTAGE	240 VAC
NOMINAL OUTPUT CURRENT	47.5A

SOLAR MODULE SPECIFICATIONS	
MANUFACTURER / MODEL #	VSUN SOLAR VSUN445-144MH 445W MODULE
VMP	41.20V
IMP	10.81A
VOC	49.80V
ISC	11.42A
TEMP. COEFF. VOC	-0.286%/°C
MODULE DIMENSION	82.99"L x 41.26"W x 1.38"D (In Inch)

AMBIENT TEMPERATURE SPECS	
RECORD LOW TEMP	-10°C
AMBIENT TEMP (HIGH TEMP 2%)	40°C
MODULE TEMPERATURE COEFFICIENT OF Voc	-0.286%/°C
PERCENT OF VALUES	NUMBER OF CURRENT CARRYING CONDUCTORS IN EMT
.80	4-6
.70	7-9
.50	10-20

DC FEEDER CALCULATIONS																					
CIRCUIT ORIGIN	CIRCIUT DESTINATION	VOLTAGE (V)	FULL LOAD AMPS "FLA" (A)	FLA*1.25 (A)	OCPD SIZE (A)	GROUND SIZE	CONDUCTOR SIZE	75°C AMPACITY (A)	AMPACITY CHECK #1	AMBIENT TEMP. (°C)	TOTAL CC CONDUCTO RS IN RACEWAY	90°C AMPACITY (A)	DERATION FACTOR FOR AMBIENT TEMPERATURE NEC 310.15(B)(2)(a)	DERATION FACTOR FOR CONDUCTORS PER RACEWAY NEC 310.15(B)(3)(a)	90°C AMPACITY DERATED (A)	AMPACITY CHECK #2	FEEDER LENGTH (FEET)	CONDUCTOR RESISTANCE (OHM/KFT)	VOLTAGE DROP AT FLA (%)	CONDUIT SIZE	CONDUIT FILL (%)
STRING 1	JUNCTION BOX #1	400	15.00	18.75	20	BARE COPPER #6 AWG	CU #10 AWG	35	PASS	40	2	40	0.91	1	36.4	PASS	34	1.24	0.316	N/A	#N/A
STRING 2	JUNCTION BOX #1	400	15.00	18.75	20	BARE COPPER #6 AWG	CU #10 AWG	35	PASS	40	2	40	0.91	1	36.4	PASS	38	1.24	0.353	N/A	#N/A
STRING 3	JUNCTION BOX #1	400	15.00	18.75	20	BARE COPPER #6 AWG	CU #10 AWG	35	PASS	40	2	40	0.91	1	36.4	PASS	39	1.24	0.363	N/A	#N/A
JUNCTION BOX #1	INVERTER #1	400	15.00	18.75	20	CU #10 AWG	CU #10 AWG	35	PASS	40	6	40	0.91	0.8	29.12	PASS	30	1.24	0.279	3/4" EMT	27.71107
STRING 4	JUNCTION BOX #2	400	15.00	18.75	20	BARE COPPER #6 AWG	CU #10 AWG	35	PASS	40	2	40	0.91	1	36.4	PASS	61	1.24	0.567	N/A	#N/A
STRING 5	JUNCTION BOX #2	400	15.00	18.75	20	BARE COPPER #6 AWG	CU #10 AWG	35	PASS	40	2	40	0.91	1	36.4	PASS	35	1.24	0.326	N/A	#N/A
STRING 6	JUNCTION BOX #2	400	15.00	18.75	20	BARE COPPER #6 AWG	CU #10 AWG	35	PASS	40	2	40	0.91	1	36.4	PASS	33	1.24	0.307	N/A	#N/A
JUNCTION BOX #2	INVERTER #2	400	15.00	18.75	20	CU #10 AWG	CU #10 AWG	35	PASS	40	6	40	0.91	0.8	29.12	PASS	30	1.24	0.279	3/4" EMT	27.71107

String 1 Voltage Drop	0.595
String 2 Voltage Drop	0.632
String 3 Voltage Drop	0.642
String 4 Voltage Drop	0.846
String 5 Voltage Drop	0.605
String 6 Voltage Drop	0.586

AC FEEDER CALCULATIONS																						
CIRCUIT ORIGIN	CIRCIUT DESTINATION	VOLTAGE (V)	FULL LOAD AMPS "FLA" (A)	FLA*1.25 (A)	OCPD SIZE (A)	NEUTRAL SIZE	GROUND SIZE	CONDUCTOR SIZE	75°C AMPACITY (A)	AMPACITY CHECK #1	AMBIENT TEMP. (°C)	TOTAL CC CONDUCTORS IN RACEWAY	90°C AMPACITY (A)	DERATION FACTOR FOR AMBIENT TEMPERATURE NEC 310.15(B)(2)(a)	DERATION FACTOR FOR CONDUCTORS PER RACEWAY NEC 310.15(B)(3)(a)	90°C AMPACITY DERATED (A)	AMPACITY CHECK #2	FEEDER LENGTH (FEET)	CONDUCTOR RESISTANCE (OHM/KFT)	VOLTAGE DROP AT FLA (%)	CONDUIT SIZE	CONDUIT FILL (%)
INVERTER#1	SOLAR LOAD CENTER	240	47.5	59.375	60	CU #6 AWG	CU #10 AWG	CU #6 AWG	65	PASS	40	2	75	0.91	1	68.25	PASS	5	0.491	0.097	3/4" EMT	32.4953
INVERTER#2	SOLAR LOAD CENTER	240	47.5	59.375	60	CU #6 AWG	CU #10 AWG	CU #6 AWG	65	PASS	40	2	75	0.91	1	68.25	PASS	5	0.491	0.097	3/4" EMT	32.4953
SOLAR LOAD CENTER	AC DISCONNECT	240	95	118.75	125	CU #1 AWG	CU #6 AWG	CU #1 AWG	130	PASS	40	2	145	0.91	1	131.95	PASS	5	0.154	0.061	1 1/4" EMT	34.7126
AC DISCONNECT	POI	240	95	118.75	125	CU #1 AWG	N/A	CU #1 AWG	130	PASS	40	2	145	0.91	1	131.95	PASS	5	0.154	0.061	1 1/4" EMT	31.3235

CUMULATIVE VOLTAGE DROP	0.316
-------------------------	-------

ELECTRICAL NOTES

1. ALL EQUIPMENT TO BE LISTED BY UL OR OTHER NRTL, AND LABELED FOR ITS APPLICATION.
2. ALL CONDUCTORS SHALL BE COPPER, RATED FOR 600 V AND 90 DEGREE C WET ENVIRONMENT.
3. 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.
4. WORKING CLEARANCES AROUND ALL NEW AND EXISTING ELECTRICAL EQUIPMENT SHALL COMPLY WITH NEC 110.26.
5. DRAWINGS INDICATE THE GENERAL ARRANGEMENT OF SYSTEMS. CONTRACTOR SHALL FURNISH ALL NECESSARY OUTLETS, SUPPORTS, FITTINGS AND ACCESSORIES TO FULFILL APPLICABLE CODES AND STANDARDS.
6. WHERE SIZES OF JUNCTION BOXES, RACEWAYS, AND CONDUITS ARE NOT SPECIFIED, THE CONTRACTOR SHALL SIZE THEM ACCORDINGLY.
7. ALL WIRE TERMINATIONS SHALL BE APPROPRIATELY LABELED AND READILY VISIBLE.
8. MODULE GROUNDING CLIPS TO BE INSTALLED BETWEEN MODULE FRAME AND MODULE SUPPORT RAIL, PER THE GROUNDING CLIP MANUFACTURER'S INSTRUCTION.
9. MODULE SUPPORT RAIL TO BE BONDED TO CONTINUOUS COPPER G.E.C. VIA WEEB LUG OR ILSCO GBL-4DBT LAY-IN LUG.
10. TEMPERATURE RATINGS OF ALL CONDUCTORS, TERMINATIONS, BREAKERS, OR OTHER DEVICES ASSOCIATED WITH THE SOLAR PV SYSTEM SHALL BE RATED FOR AT LEAST 75 DEGREE C.
11. CONDUIT INSTALLED AT MINIMUM DISTANCE OF 7/8 INCHES ABOVE ROOFNEC 310.15(B)(3)(C)



CMS Renewable
Contractors

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LICENSE NO: #35493
ELECTRICAL LICENSE: #213982

REVISIONS

DESCRIPTION	DATE	REV
INITIAL	02/28/2025	



Reviewed and approved
Richard Pantel, P.E.
TX Lic. No. PE 142628
Firm F-24051
05/02/2025

PROJECT NAME & ADDRESS

THEODORE WOOD
RESIDENCE

2224 HOUSTON PL,
DENTON, TX 76201

DRAWN BY

ESR

SHEET NAME
WIRING
CALCULATIONS

SHEET SIZE

ANSI B
11" X 17"

SHEET NUMBER

PV-7

CAUTION:
AUTHORIZED SOLAR
PERSONNEL ONLY!

LABEL-1:
LABEL LOCATION:
AC DISCONNECT

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

LABEL- 2:
LABEL LOCATION:
AC DISCONNECT
COMBINER
MAIN SERVICE PANEL
SUBPANEL
MAIN SERVICE DISCONNECT
CODE REF: NEC 690.13(B)

⚠ WARNING DUAL POWER SOURCE
SECOND SOURCE IS PHOTOVOLTAIC SYSTEM

LABEL- 3:
LABEL LOCATION:
UTILITY METER
MAIN SERVICE PANEL
SUBPANEL
CODE REF: NEC 705.12(C) & NEC 690.59

⚠ WARNING
**TURN OFF PHOTOVOLTAIC AC
DISCONNECT PRIOR TO
WORKING INSIDE PANEL**

LABEL- 4:
LABEL LOCATION:
MAIN SERVICE PANEL
SUBPANEL
MAIN SERVICE DISCONNECT
COMBINER
CODE REF: NEC 110.27(C) & OSHA 1910.145 (f) (7)

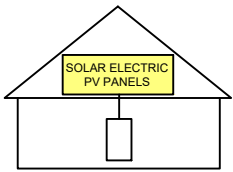
⚠ WARNING
POWER SOURCE OUTPUT
CONNECTION. DO NOT
RELOCATE THIS
OVERCURRENT DEVICE

LABEL- 5:
LABEL LOCATION:
MAIN SERVICE PANEL (ONLY IF SOLAR IS BACK-FED)
SUBPANEL (ONLY IF SOLAR IS BACK-FED)
CODE REF: NEC 705.12(B)(3)(2)

⚠ WARNING
THIS EQUIPMENT FED BY
MULTIPLE SOURCES. TOTAL
RATING OF ALL OVERCURRENT
DEVICES EXCLUDING MAIN
SUPPLY OVERCURRENT DEVICE
SHALL NOT EXCEED AMPACITY
OF BUSBAR.

LABEL- 6:
LABEL LOCATION:
MAIN SERVICE PANEL (ONLY IF SOLAR IS BACK-FED)
SUBPANEL (ONLY IF SOLAR IS BACK-FED)
CODE REF: NEC 705.12(B)(3)(2)

SOLAR PV SYSTEM EQUIPPED
WITH RAPID SHUTDOWN
TURN RAPID SHUTDOWN
SWITCH TO THE
"OFF" POSITION TO
SHUT DOWN PV SYSTEM
AND REDUCE
SHOCK HAZARD
IN THE ARRAY



LABEL- 7:
LABEL LOCATION:
AC DISCONNECT
CODE REF: NEC 690.56(C)

RAPID SHUTDOWN SWITCH
FOR SOLAR PV SYSTEM

LABEL- 8:
LABEL LOCATION:
AC DISCONNECT
CODE REF: NEC 690.56(C)(2)

PHOTOVOLTAIC
AC DISCONNECT

LABEL- 9:
LABEL LOCATION:
AC DISCONNECT
CODE REF: NEC 690.13(B)

PV/ESS
AC DISCONNECT
NOMINAL OPERATING AC VOLATGE 240 V
RATED AC OUTPUT CURRENT 95.00 A

LABEL- 10:
LABEL LOCATION:
MAIN SERVICE PANEL
SUBPANEL
AC DISCONNECT
CODE REF: NEC 690.54

MAIN PHOTOVOLTAIC
SYSTEM DISCONNECT

LABEL- 11:
LABEL LOCATION:
MAIN SERVICE DISCONNECT (ONLY IF MAIN SERVICE DISCONNECT IS PRESENT)
CODE REF: NEC 690.13(B)

INVERTER #1
AC DISCONNECT
NOMINAL OPERATING AC VOLTAGE 240 V
RATED AC OUTPUT CURRENT 47.50 A

LABEL- 12:
LABEL LOCATION:
INVERTER
CODE REF: NEC 690.54

MAXIMUM VOLTAGE 480 V
MAXIMUM CIRCUIT CURRENT 30.50 A
MAXIMUM RATED OUTPUT
CURRENT OF THE CHARGE
CONTROLLER OR DC-TO-DC
CONVERTER (IF INSTALLED)

LABEL- 13:
LABEL LOCATION:
INVERTER
CODE REF: NEC 690.53

INVERTER #2
AC DISCONNECT
NOMINAL OPERATING AC VOLTAGE 240 V
RATED AC OUTPUT CURRENT 47.50 A

LABEL- 14:
LABEL LOCATION:
INVERTER
CODE REF: NEC 690.54

MAXIMUM VOLTAGE 480 V
MAXIMUM CIRCUIT CURRENT 30.50 A
MAXIMUM RATED OUTPUT
CURRENT OF THE CHARGE
CONTROLLER OR DC-TO-DC
CONVERTER (IF INSTALLED)

LABEL- 15:
LABEL LOCATION:
INVERTER
CODE REF: NEC 690.53



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RESIDENCE
2224 HOUSTON PL,
DENTON, TX 76201

DRAWN BY

ESR

SHEET NAME

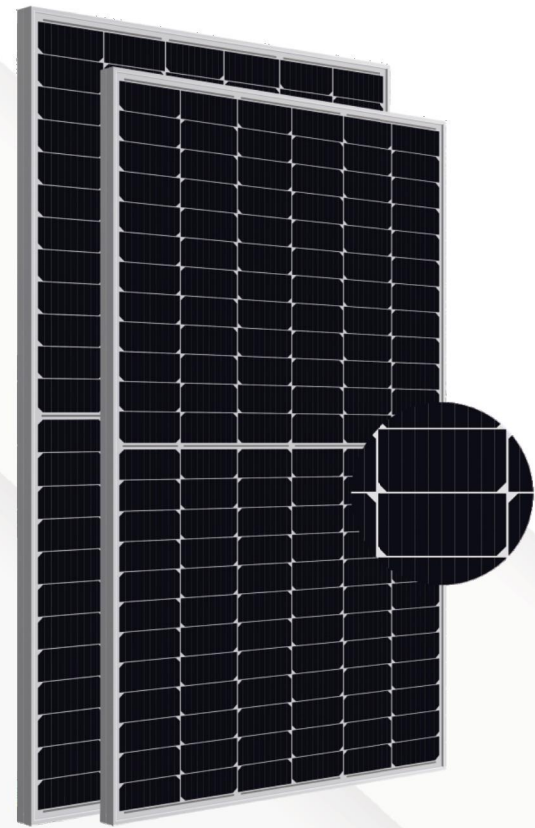
LABELS

SHEET SIZE

ANSI B
11" X 17"

SHEET NUMBER

PV-8

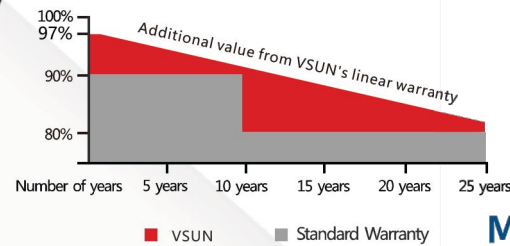


20.37%
Module efficiency

12years
Material & Workmanship warranty

450W
Highest power output

25years
Linear power output warranty



VSUN450-144MH

- 166mm Mono-PERC Cell
- Half-cell technology
- Lower LCOE and BOS
- MBB technology
- Lower risk of micro-crack
- Lower risk of hot spot
- Higher output power
- Positive tolerance offer
- Better shading tolerance

VSUN, a BNEF Tier-1 PV module manufacturer. Invested by Fuji Solar, VSUN is a Japanese solar module solutions provider.

Innovative & Smart – VSUN has been committed to providing greener, cleaner, and more intelligent renewable energy solutions. It is focusing on the new energy market and the development of customized and high-efficiency products.



Electrical Characteristics at Standard Test Conditions(STC)

Module Type	VSUN450-144MH	VSUN445-144MH	VSUN440-144MH	VSUN435-144MH
Maximum Power - Pmax (W)	450	445	440	435
Open Circuit Voltage - Voc (V)	50	49.8	49.6	49.4
Short Circuit Current - Isc (A)	11.5	11.42	11.34	11.26
Maximum Power Voltage - Vmpp (V)	41.4	41.2	41	40.8
Maximum Power Current - Imp (A)	10.87	10.81	10.74	10.67
Module Efficiency	20.37%	20.14%	19.92%	19.69%

Standard Test Conditions (STC): irradiance 1,000 W/m²; AM 1.5; module temperature 25°C. Pmax Sorting : 0~5W. Measuring Tolerance: ±3%.
Remark: Electrical data do not refer to a single module and they are not part of the offer. They only serve for comparison among different module types.

Electrical Characteristics at Normal Operating Cell Temperature(NOCT)

Module Type	VSUN450-144MH	VSUN445-144MH	VSUN440-144MH	VSUN435-144MH
Maximum Power - Pmax (W)	333.8	330.4	326.6	322.2
Open Circuit Voltage - Voc (V)	46.3	46.2	46	46.1
Short Circuit Current - Isc (A)	9.3	9.24	9.17	9.08
Maximum Power Voltage - Vmpp (V)	38.2	38	37.9	37.7
Maximum Power Current - Imp (A)	8.75	8.69	8.62	8.56

Normal Operating Cell Temperature(NOCT) : irradiance 800W/m²; wind speed 1 m/s ; ambient temperature 20°C. Measuring Tolerance: ±3%.

Temperature Characteristics

NOCT	45°C (±2°C)
Voltage Temperature Coefficient	-0.286%/°C
Current Temperature Coefficient	+0.057%/°C
Power Temperature Coefficient	-0.37%/°C

Maximum Ratings

Maximum System Voltage [V]	1500
Series Fuse Rating [A]	20

Material Characteristics

Dimensions	2108×1048×35mm (L×W×H)
Weight	23.8kg
Frame	Anodized aluminum profile
Front Glass	White toughened safety glass, 3.2 mm
Cell Encapsulation	EVA (Ethylene-Vinyl-Acetate)
Back Sheet	Composite film
Cells	12×12 pieces monocrystalline solar cells series strings
Junction Box	IP≥67, 3 diodes
Cable&Connector	Potrait: 500 mm (cable length can be customized) , 1×4 mm ² , compatible with MC4

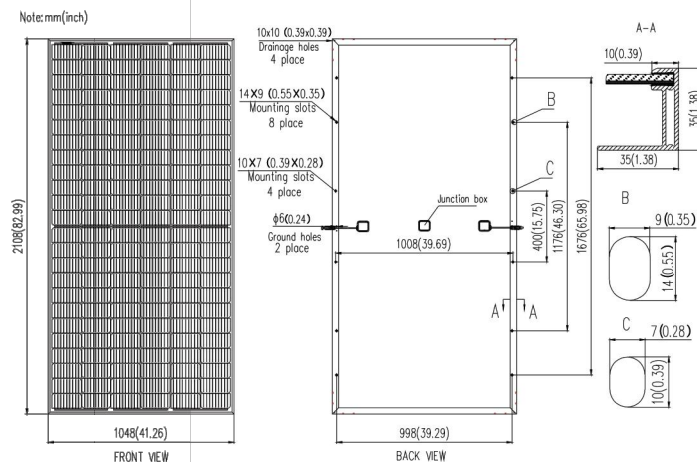
Packaging

Dimensions(L×W×H)	2140×1105×1182mm
Container20'	150
Container40'	660
Container40'HC	715

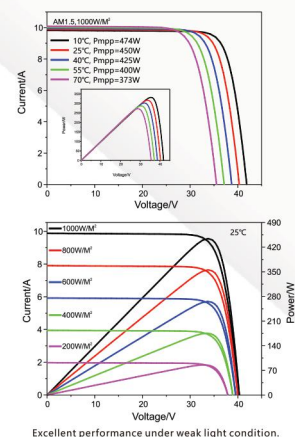
System Design

Temperature Range	-40 °C to + 85 °C
Withstanding Hail	Maximum diameter of 25 mm with impact speed of 23 m·s ⁻¹
Maximum Surface Load	5,400 Pa
Application class	class A

Dimensions



IV-Curves



CMS Renewable
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REVISIONS

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INITIAL	02/28/2025	

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THEODORE WOOD
RESIDENCE
2224 HOUSTON PL.,
DENTON, TX 76201

DRAWN BY

ESR

SHEET NAME

MODULE
DATASHEET

SHEET SIZE

ANSI B
11" X 17"

SHEET NUMBER

PV-11

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)

solaredge.com



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								
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. (185 - 208 - 229)	-	✓	-	✓	-	-	✓	Vac	
AC Frequency (Nominal)	59.3 - 60 - 60.5 ¹⁾							Hz	
Maximum Continuous Output Current @240V	12.5	16	21	25	32	42	47.5	A	
Maximum Continuous Output Current @208V	-	16	-	24	-	-	48.5	A	
Power Factor	1, Adjustable - 0.85 to 0.85								
GFDI Threshold	1							A	
Utility Monitoring, Islanding Protection, Country Configurable Thresholds	Yes								
INPUT									
Maximum DC Power @240V	4650	5900	7750	9300	11800	15500	17650	W	
Maximum DC Power @208V	-	5100	-	7750	-	-	15500	W	
Transformer-less, Ungrounded	Yes								
Maximum Input Voltage	480							Vdc	
Nominal DC Input Voltage	380							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	600ks 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.
(3) Inverter with Revenue Grade Meter P/N: SE3000H-US0008NC4; Inverter with Revenue Grade Production and Consumption Meter P/N: SE3000H-US0008BN4. For consumption metering, current transformers should be ordered separately: SEAC-T0750-209NA-20 or SEAC-T0750-409NA-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-de-rating-note-na.pdf>

Single Phase Inverter with HD-Wave Technology for North America

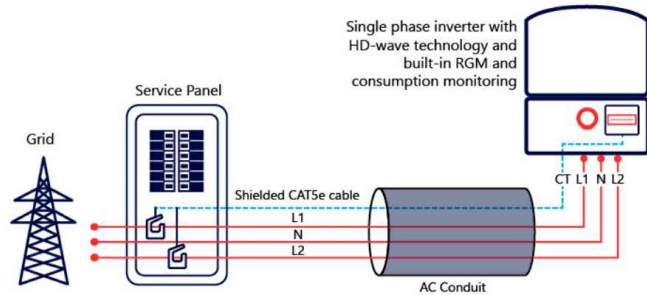
SE3000H-US / SE3800H-US / SE5000H-US / SE6000H-US / SE7600H-US / SE10000H-US / SE11400H-US

MODEL NUMBER	SE3000H-US	SE3800H-US	SE5000H-US	SE6000H-US	SE7600H-US	SE10000H-US	SE11400H-US
ADDITIONAL FEATURES							
Supported Communication Interfaces	RS-485, Ethernet, ZigBee (optional), Cellular (optional)						
Revenue Grade Metering, ANSI C12.20	Optional ³						
Consumption metering	Optional ³						
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						
STANDARD COMPLIANCE							
Safety	UL1741, UL1741 SA, UL1699B, CSA C22.2, Canadian AFCEI according to T.L.L. M-07						
Grid Connection Standards	IEEE1547, Rule 21, Rule 14 (H)						
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		
Weight with Safety Switch	22 / 10	25.1 / 11.4		26.2 / 11.9		28.8 / 13.1	
Noise	< 25				< 30		
Cooling	Natural Convection						
Operating Temperature Range	-40 to +140 / -40 to +60 ⁴						
Protection Rating	NEMA 4X (Inverter with Safety Switch)						
(3) Inverter with Revenue Grade Meter (P/N: SE3000H-US020RNC4; Inverter with Revenue Grade Production and Consumption Meter (P/N: SE6000H-US0300BN4). For consumption metering, current transformers should be ordered separately. SEAC10750-200NA-20 or SEAC10750-400NA-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-de-rating-note-napdf							

(3) Inverter with Revenue Grade Meter P/N: SE3000H-US0008NC4; Inverter with Revenue Grade Production and Consumption Meter P/N: SE3000H-US0008BN4. For consumption metering, current transformers should be ordered separately: SEAC-T0750-209NA-20 or SEAC-T0750-409NA-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-de-rating-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



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RoHS



CMS Renewable
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EMAIL: edgar@cmsrenewable.com
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REVISIONS

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THEODORE WOOD
RESIDENCE
2224 HOUSTON PL.,
DENTON, TX 76201

DRAWN BY

ESR

SHEET NAME

INVERTER
DATASHEET

SHEET SIZE

ANSI B
11" X 17"

SHEET NUMBER

PV-12



AUTHORIZATION TO MARK

This authorizes the application of the Certification Mark(s) shown below to the models described in the Product(s) Covered section when made in accordance with the conditions set forth in the Certification Agreement and Listing Report. This authorization also applies to multiple listee model(s) identified on the correlation page of the Listing Report.

This document is the property of Intertek Testing Services and is not transferable. The certification mark(s) may be applied only at the location of the Party Authorized To Apply Mark.

Applicant: SolarEdge Technologies Ltd

Address: 1 Ha'Mada St.
Herzeliya 4673335

Country: Israel

Party Authorized To Apply Mark: Same as Manufacturer

Report Issuing Office: Intertek Testing Services NA, Inc., Cortland, NY

Control Number: 4004590

Manufacturer: Jabil Circuit (Guangzhou) LTD

Address: DEV EAST DISTRICT
128 JUN CHENG RD
GUANGZHOU
GUANGDONG 510530

Country: China

Authorized by: 
for L. Matthew Snyder, Certification Manager



This document supersedes all previous Authorizations to Mark for the noted Report Number.

This Authorization to Mark is for the exclusive use of Intertek's Client and is provided pursuant to the Certification agreement between Intertek and its Client. Intertek's responsibility and liability are limited to the terms and conditions of the agreement. Intertek assumes no liability to any party, other than to the Client in accordance with the agreement, for any loss, expense or damage occasioned by the use of this Authorization to Mark. Only the Client is authorized to permit copying or distribution of this Authorization to Mark and then only in its entirety. Use of Intertek's Certification mark is restricted to the conditions laid out in the agreement and in this Authorization to Mark. Any further use of the Intertek name for the sale or advertisement of the tested material, product or service must first be approved in writing by Intertek. Initial Factory Assessments and Follow up Services are for the purpose of assuring appropriate usage of the Certification mark in accordance with the agreement, they are not for the purposes of production quality control and do not relieve the Client of their obligations in this respect.

Intertek Testing Services NA Inc.
545 East Algonquin Road, Arlington Heights, IL 60005
Telephone 800-345-3851 or 847-439-5667 Fax 312-283-1672



AUTHORIZATION TO MARK

Standard(s): Inverters, Converters, Controllers and Interconnection System Equipment for use with Distributed Energy Resources [UL 1741:2021 Ed.3]

Grid Support Utility Interactive Equipment - Supplement SA to UL 1741:2021 Ed.3 - Inverters, Converters, Controllers and Interconnection System Equipment for use with Distributed Energy Resources [UL 1741:2021 Ed.3 (Supplement SA)]

Grid Support Utility Interactive Inverters and Converters Based Upon IEEE 1547:2018 & IEEE 1547.1:2020 - Supplement SB to UL 1741:2021 Ed.3 - Inverters, Converters, Controllers and Interconnection System Equipment for use with Distributed Energy Resources [UL 1741:2021 Ed.3 (Supplement SB)]

Power Conversion Equipment [CSA C22.2#107.1:2016 Ed.4]

Interconnection of Distributed Energy Resources and Electricity Supply Systems [CSA C22.3#9:2020 Ed.2]

Photovoltaic (PV) DC Arc-Fault Circuit Protection [UL 1699B:2018 Ed.1+R:18May2021]

Photovoltaic Rapid Shutdown Systems (R2022) [CSA C22.2#330:2017 Ed.1]

Product: Grid support Utility Interactive Inverter - Non Isolated Photovoltaic Inverter with MPPT function and Rapid shut down Function and Arc Fault Protection and Stand alone application.

Brand Name: SolarEdge

Models: SE3000H-US, SE3800H-US, SE5000H-US, SE5700H-US, SE6000H-US, SE7600H-US, SE10000H-US and SE11400H-US



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INVERTER
CERTIFICATION

SHEET SIZE

ANSI B
11" X 17"

SHEET NUMBER

PV-13

Power Optimizer

For Residential Installations

S440 / S500 / S500B / S650B



POWER OPTIMIZER

Enabling PV power optimization at the module level

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

* Functionality subject to inverter model and firmware version

solaredge.com



Power Optimizer

For Residential Installations

S440 / S500 / S500B / S650B

	S440	S500	S500B	S650B	UNIT
INPUT					
Rated Input DC Power ⁽¹⁾	440 ⁽²⁾	500 ⁽³⁾		650	W
Absolute Maximum Input Voltage (Voc)	60		125	85	Vdc
MPPT Operating Range	8 – 60		12.5 – 105	12.5 – 85	Vdc
Maximum Short Circuit Current (Isc) of Connected PV Module	14.5 ⁽²⁾		15		Adc
Maximum Efficiency		99.5			%
Weighted Efficiency		98.6			%
Overvoltage Category		II			
OUTPUT DURING OPERATION					
Maximum Output Current		15			Adc
Maximum Output Voltage	60		80		Vdc
OUTPUT DURING STANDBY (POWER OPTIMIZER DISCONNECTED FROM INVERTER OR INVERTER OFF)					
Safety Output Voltage per Power Optimizer		1 ± 0.1			Vdc
STANDARD COMPLIANCE ⁽⁴⁾					
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 2100-712:2018-12				
INSTALLATION SPECIFICATIONS					
Maximum Allowed System Voltage		1000			Vdc
Dimensions (W x L x H)	129 x 155 x 30		129 x 165 x 45		mm
Weight	720		790		gr
Input Connector		MC4 ⁽⁵⁾			
Input Wire Length		0.1			m
Output Connector		MC4			
Output Wire Length		(+) 2.3, (-) 0.10			m
Operating Temperature Range ⁽⁶⁾		-40 to +85			°C
Protection Rating		IP68			
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 installations after April 1st, 2024, the Rated Input DC Power for S440 is 490W, and the Maximum Isc of Connected PV Module is 15A.
(3) For installations after April 1st, 2024, the Rated Input DC Power for S500 and S500B is 550W.
(4) For details about CE compliance, see Declaration of Conformity – CE.
(5) For other connector types please contact SolarEdge.
(6) Power derating is applied for ambient temperatures above +85°C for S440 and S500, and for ambient temperatures above +75°C for S500B. Refer to the Power Optimizers Temperature Derating technical note for details.

PV System Design Using a SolarEdge Inverter ⁽⁷⁾		SolarEdge Home Wave Inverter Single Phase	SolarEdge Home Short String Inverter Three Phase	Three Phase for 230/400V Grid	Three Phase for 277/480V Grid	
Minimum String Length (Power Optimizers)	S440, S500	8	9	16	18	
	S500B, S650B	6	8		14	
Maximum String Length (Power Optimizers)		25	20		50	
Maximum Continuous Power per String		5700	5625	11,250	12,750	W
Maximum Allowed Connected Power per String ⁽⁸⁾ (In multiple string designs, the maximum is permitted only when the difference in connected power between strings is 2,000W or less)		6800 ⁽⁹⁾	See ⁽⁸⁾	13,500	15,000	W
Parallel Strings of Different Lengths or Orientations		Yes				

(7) It is not allowed to mix S-series and P-series Power Optimizers in new installations in the same string.
(8) If the Inverter's rated AC power ≤ the maximum continuous power per string, then the maximum connected power per string will be able to reach up to the inverter's maximum input DC power. Refer to the Single String Design Guidelines application note for details.
(9) For inverters with a rated AC power ≥ 8000W that are connected to at least two strings.

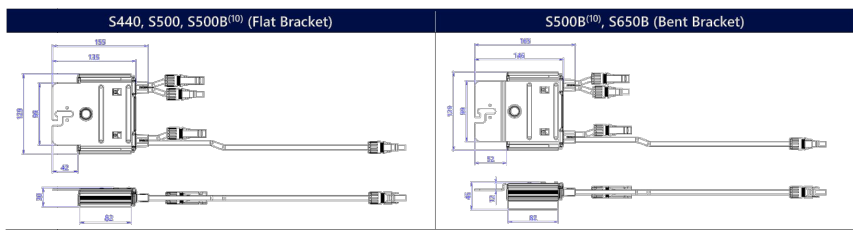
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Power Optimizer

For Residential Installations

S440 / S500 / S500B / S650B



(10) S500B has either a flat bracket or a bent bracket. S500B-1GM4MBM has a flat bracket, and S500B-1GM4MBM has a bent bracket.

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LICENSE NO: #35493
ELECTRICAL LICENSE: #213982

REVISIONS

DESCRIPTION	DATE	REV
INITIAL	02/28/2025	

PROJECT NAME & ADDRESS

THEODORE WOOD
RESIDENCE
2224 HOUSTON PL,
DENTON, TX 76201

DRAWN BY

ESR

SHEET NAME
OPTIMIZER
DATASHEET

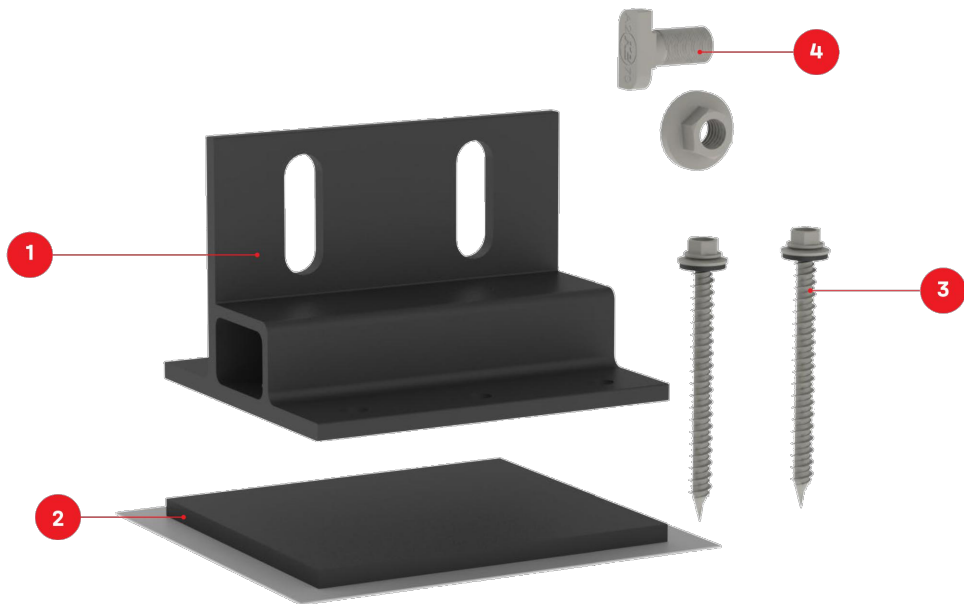
SHEET SIZE

ANSI B
11" X 17"

SHEET NUMBER

PV-14

TECHNICAL DATA



Splice Foot XL

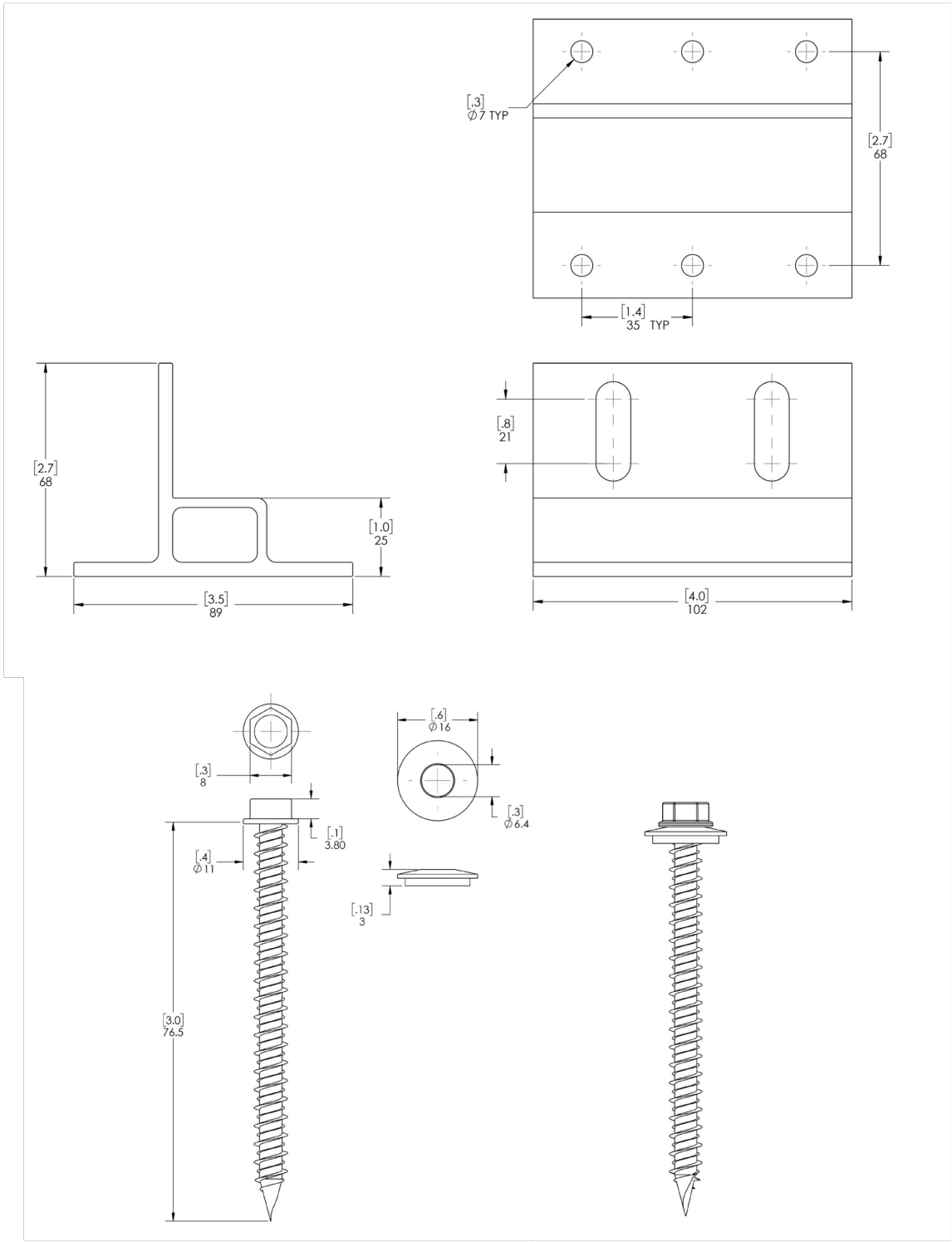
Item Number	Description	Part Number
1	Splice Foot XL	4000165 Splice Foot XL #14 Kit, Dark 4000300 Splice Foot XL #14 Kit, Mill
2	K2 EverSeal	
3	#14 × 3in x 5/16in Hex Head Screw	
4	T-Bolt & Hex Nut Set	

	Splice Foot XL
Roof Type	Composition shingle, EPDM, TPO, Bitumen, Asphalt
Material	Aluminum with stainless steel hardware
Finish	Mill
Roof Connection	#14 × 3in x 5/16in Hex Head Screw
Code Compliance	UL 2703
Compatibility	CrossRail 44-X, 48-X, 48-XL, 80

TECHNICAL DATA



Units: [in] mm



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INITIAL	02/28/2025	

PROJECT NAME & ADDRESS

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RESIDENCE
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DENTON, TX 76201

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SHEET NAME

ATTACHMENT
DATASHEET

SHEET SIZE

ANSI B
11" X 17"

SHEET NUMBER

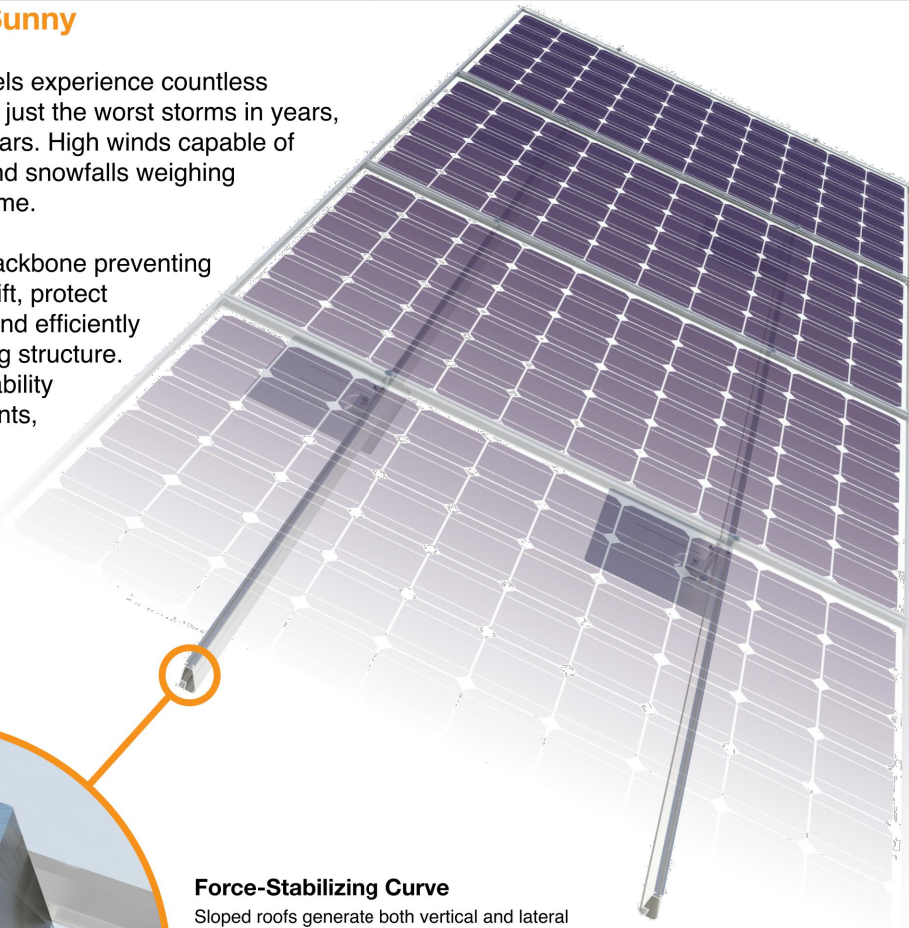
PV-15

XR Rail Family

Solar Is Not Always Sunny

Over their lifetime, solar panels experience countless extreme weather events. Not just the worst storms in years, but the worst storms in 40 years. High winds capable of ripping panels from a roof, and snowfalls weighing enough to buckle a panel frame.

XR Rails are the structural backbone preventing these results. They resist uplift, protect against buckling and safely and efficiently transfer loads into the building structure. Their superior spanning capability requires fewer roof attachments, reducing the number of roof penetrations and the amount of installation time.



Force-Stabilizing Curve

Sloped roofs generate both vertical and lateral forces on mounting rails which can cause them to bend and twist. The curved shape of XR Rails is specially designed to increase strength in both directions while resisting the twisting. This unique feature ensures greater security during extreme weather and a longer system lifetime.

Compatible with Flat & Pitched Roofs



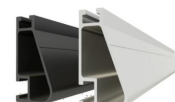
XR Rails are compatible with FlashFoot and other pitched roof attachments.



IronRidge offers a range of tilt leg options for flat roof mounting applications.

Corrosion-Resistant Materials

All XR Rails are made of 6000-series aluminum alloy, then protected with an anodized finish. Anodizing prevents surface and structural corrosion, while also providing a more attractive appearance.



XR Rail Family

The XR Rail Family offers the strength of a curved rail in three targeted sizes. Each size supports specific design loads, while minimizing material costs. Depending on your location, there is an XR Rail to match.



XR10

XR10 is a sleek, low-profile mounting rail, designed for regions with light or no snow. It achieves spans up to 6 feet, while remaining light and economical.

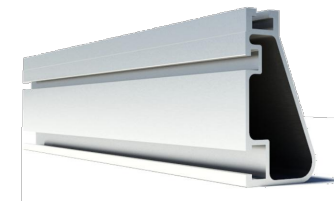
- 6' spanning capability
- Moderate load capability
- Clear & black anodized finish
- Internal splices available



XR100

XR100 is the ultimate residential mounting rail. It supports a range of wind and snow conditions, while also maximizing spans up to 10 feet.

- 10' spanning capability
- Heavy load capability
- Clear & black anodized finish
- Internal splices available



XR1000

XR1000 is a heavyweight among solar mounting rails. It's built to handle extreme climates and spans up to 12 feet for commercial applications.

- 12' spanning capability
- Extreme load capability
- Clear anodized finish
- Internal splices available

Rail Selection

The table below was prepared in compliance with applicable engineering codes and standards.* Values are based on the following criteria: ASCE 7-16, Gable Roof Flush Mount, Roof Zones 1 & 2e, Exposure B, Roof Slope of 8 to 20 degrees and Mean Building Height of 30 ft. Visit IronRidge.com for detailed certification letters.

Load		Rail Span					
Snow (PSF)	Wind (MPH)	4'	5' 4"	6'	8'	10'	12'
None	90	XR10		XR100		XR1000	
	120						
	140						
	160						
20	90						
	120						
	140						
	160						
30	90						
	160						
40	90						
	160						
80	160						
120	160						

*Table is meant to be a simplified span chart for conveying general rail capabilities. Use approved certification letters for actual design guidance.



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ESR

SHEET NAME

RACKING
DATASHEET

SHEET SIZE

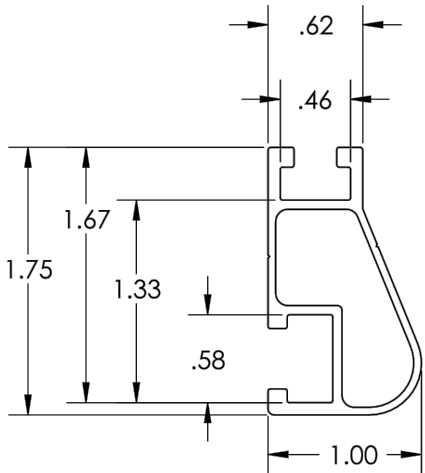
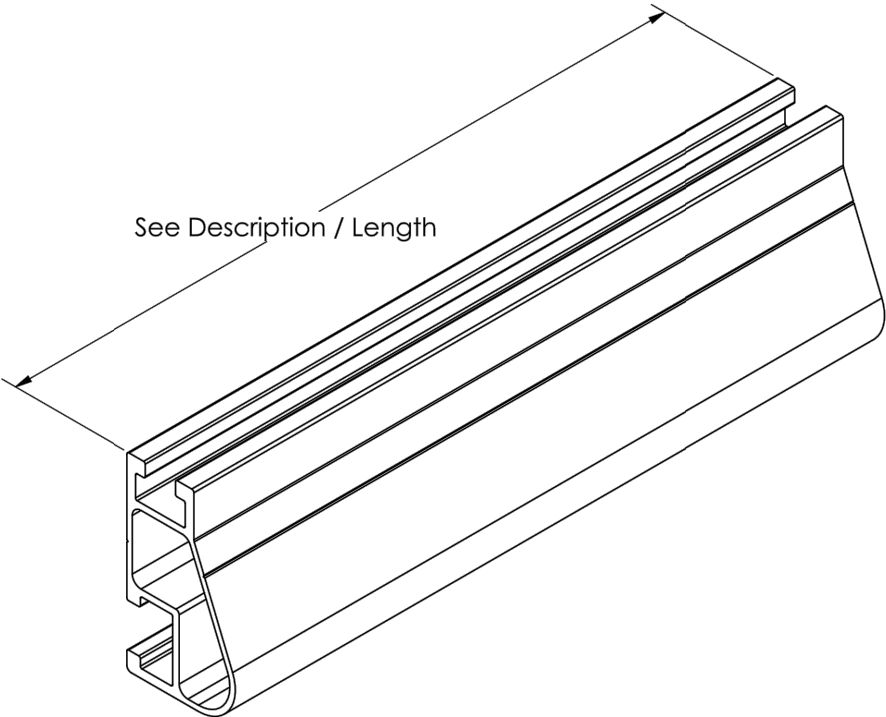
ANSI B
11" X 17"

SHEET NUMBER

PV-16



XR10® Rail



Rail Section Properties	
Property	Value
Total Cross-Sectional Area	0.363 in ²
Section Modulus (X-axis)	0.136 in ³
Moment of Inertia (X-axis)	0.124 in ⁴
Moment of Inertia (Y-axis)	0.032 in ⁴
Torsional Constant	0.076 in ³
Polar Moment of Inertia	0.033 in ⁴

Clear Part Number	Black Part Number	Description / Length	Material	Weight
XR-10-132A	XR-10-132B	XR10, Rail 132" (11 Feet)	6000-Series Aluminum	4.67 lbs.
XR-10-168A	XR-10-168B	XR10, Rail 168" (14 Feet)		5.95 lbs.
XR-10-204A	XR-10-204B	XR10, Rail 204" (17 Feet)		7.22 lbs.

v1.01



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SHEET NAME

RACKING
DATASHEET

SHEET SIZE

ANSI B
11" X 17"

SHEET NUMBER

PV-17



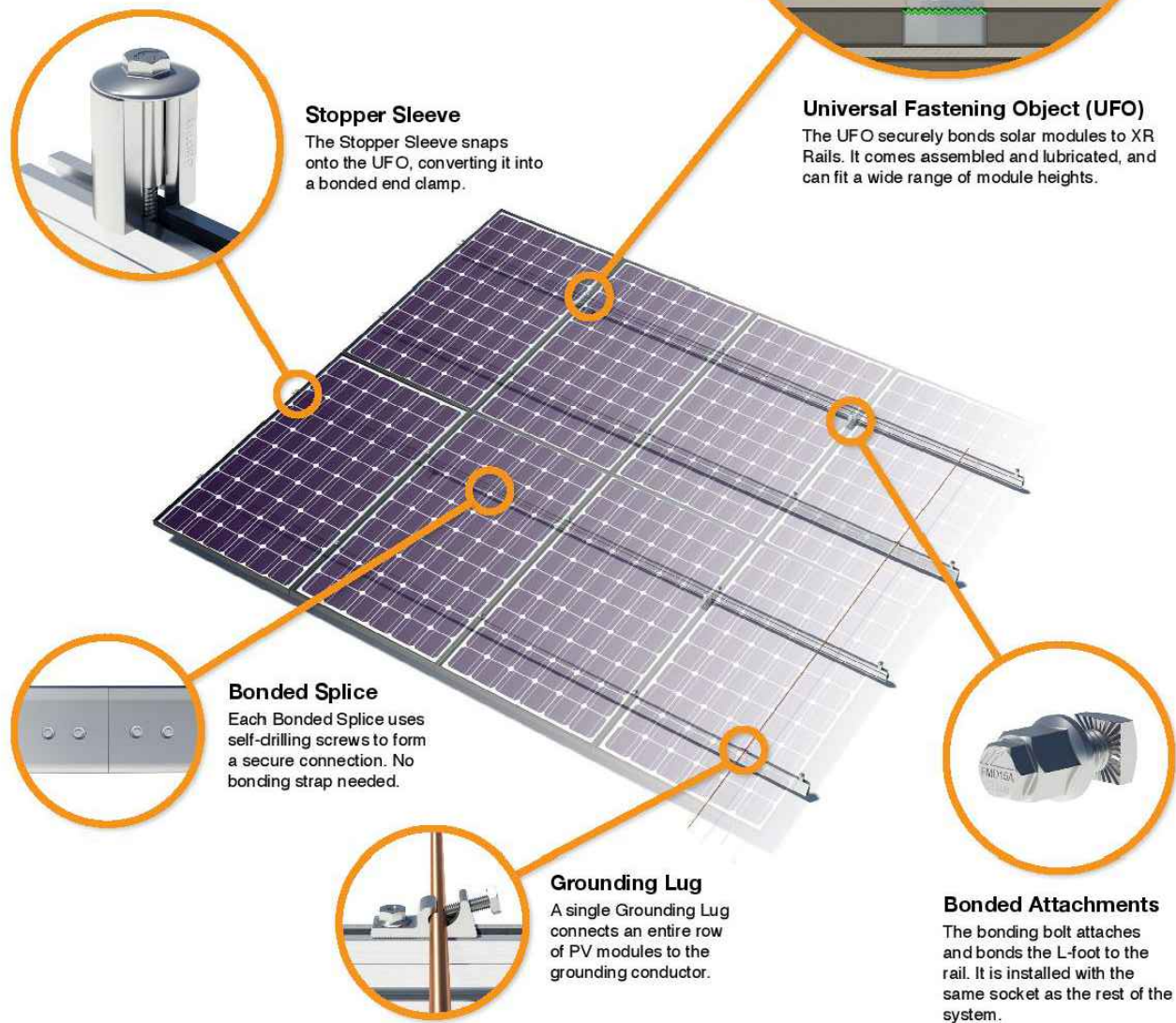
UFO Family of Components

Tech Brief

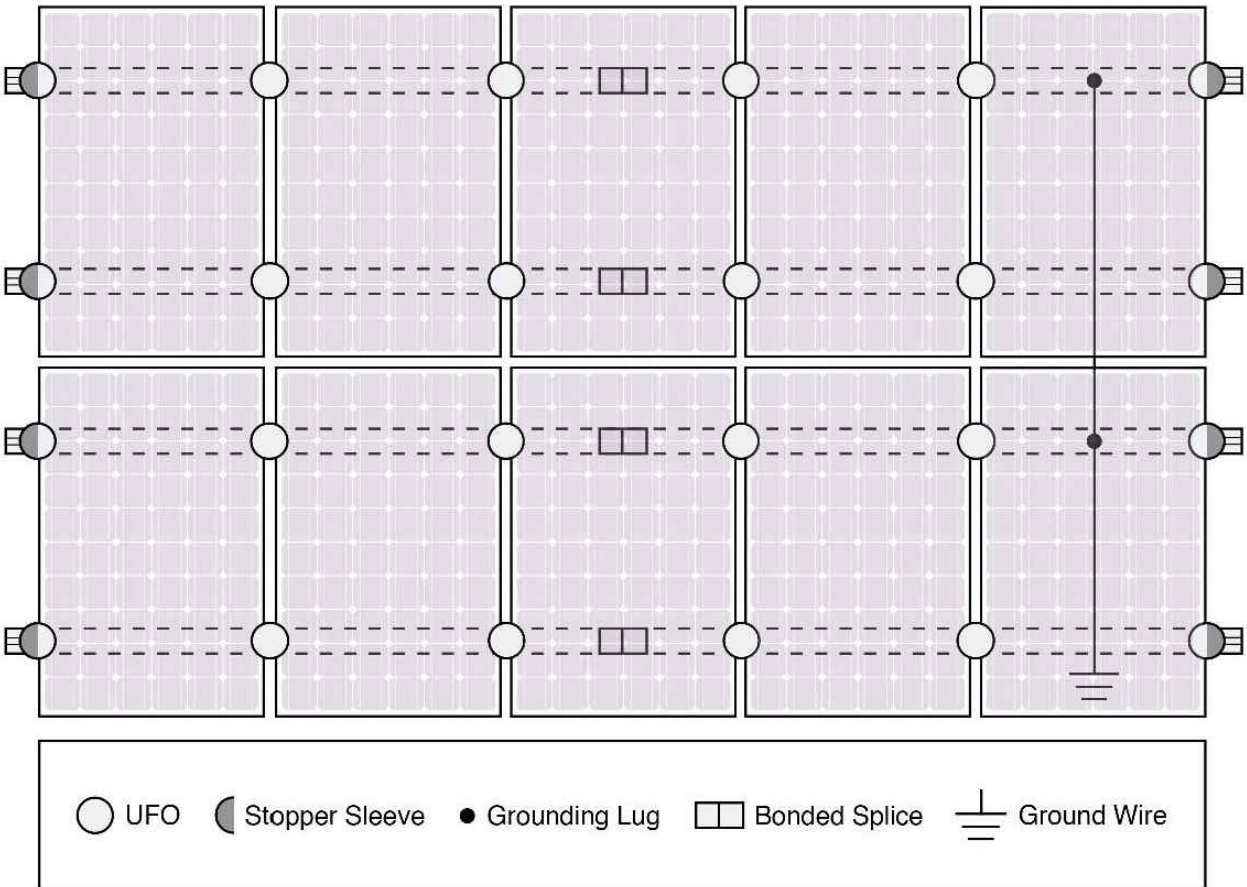
Simplified Grounding for Every Application

The UFO family of components eliminates the need for separate grounding hardware by bonding solar modules directly to IronRidge XR Rails. All system types that feature the UFO family—Flush Mount, Tilt Mount and Ground Mount—are fully listed to the UL 2703 standard.

UFO hardware forms secure electrical bonds with both the module and the rail, resulting in many parallel grounding paths throughout the system. This leads to safer and more reliable installations.



System Diagram



⚡ Approved Enphase microinverters can provide equipment grounding of IronRidge systems, eliminating the need for grounding lugs and field installed equipment ground conductors (EGC). A minimum of two microinverters mounted to the same rail and connected to the same Engage cable is required. Refer to installation manuals for additional details.

UL Certification

The IronRidge Flush Mount, Tilt Mount, and Ground Mount Systems have been listed to UL 2703 by Intertek Group plc.

UL 2703 is the standard for evaluating solar mounting systems. It ensures these devices will maintain strong electrical and mechanical connections over an extended period of time in extreme outdoor environments.

Go to [IronRidge.com/UFO](https://www.ironridge.com/UFO)

Cross-System Compatibility			
Feature	Flush Mount	Tilt Mount	Ground Mount
XR Rails	✓	✓	XR1000 Only
UFO/Stopper	✓	✓	✓
Bonded Splice	✓	✓	N/A
Grounding Lugs	1 per Row	1 per Row	1 per Array
Microinverters & Power Optimizers	Enphase - M250-72, M250-60, M215-60, C250-72 Darfon - MIG240, MIG300, G320, G640 SolarEdge - P300, P320, P400, P405, P600, P700, P730		
Fire Rating	Class A	Class A	N/A
Modules	Tested or Evaluated with over 400 Framed Modules Refer to installation manuals for a detailed list.		

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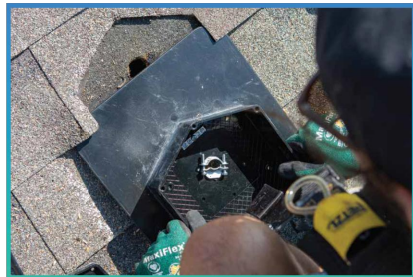
PROJECT NAME & ADDRESS		
THEODORE WOOD RESIDENCE 2224 HOUSTON PL., DENTON, TX 76201		

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ESR		
SHEET NAME		
RACKING DATASHEET		
SHEET SIZE		
ANSI B 11" X 17"		
SHEET NUMBER		
PV-18		



THE ULTIMATE ROOFTOP JUNCTION BOX

EZ Solar believes innovation is key to making Solar Simple! The most revolutionary junction box on the market just got better! Designed with the installer in mind, the **JB-1.2** makes installation fast and easy!



SIMPLE TO INSTALL

- Minimal Shingle Cutting
- Enter Through 3 Sidewalls
- Wider and Taller Sidewalls



HIGH QUALITY

- Made from advanced durable polycarbonate + superior components, UL1741, Nema 3R, CSA C22.2 No. 290
- 3 patented layers of water protection
- 2 Weep Holes for breathability



LOWER PRICE

- We believe that EVERYONE should have access to affordable renewable energy
- With the same great features as the JB-1, the JB-1.2 is now available with updates to make installation even easier.



A. System Specifications and Ratings

- Maximum Voltage: 1,000 Volts
- Maximum Current: **JB-1.2**: 80 Amps; **JB-1.XL**: 120 Amps
- Allowable Wire: 14 AWG – 6 AWG
- Spacing: Please maintain a spacing of at least ½” between uninsulated live parts and fittings for conduit, armored cable, and uninsulated live parts of opposite polarity.
- Enclosure Rating: Type 3R
- Roof Slope Range: 2.5 – 12:12
- Max Side Wall Fitting Size: 1”
- Max Floor Pass-Through Fitting Size: 1”
- Ambient Operating Conditions: (-35°C) - (+75°C)
- Compliance:
 - **JB-1.2**: UL1741, CSA C22.2 No. 290; **JB-1.XL**: UL1741, CSA C22.2 No. 290
 - Approved wire connectors: must conform to UL1741, CSA C22.2 No. 290
- System Marking: **Interek Symbol and File #5019942**
- Periodic Re-inspections: If re-inspections yield loose components, loose fasteners, or any corrosion between components, components that are found to be affected are to be replaced immediately.



Table 1: Typical Wire Size, Torque Loads and Ratings

	1 Conductor	2 Conductor	Torque				
			Type	NM	Inch Lbs	Voltage	Current
ABB ZS6 terminal block	10-24 awg	16-24 awg	Sol/Str	0.5-0.7	6.2-8.85	600V	30 amp
ABB ZS10 terminal block	6-24 awg	12-20 awg	Sol/Str	1.0-1.6	8.85-14.16	600V	40 amp
ABB ZS16 terminal block	4-24 awg	10-20 awg	Sol/Str	1.6-2.4	14.6-21.24	600V	60 amp
ABB M6/8 terminal block	8-22 awg		Sol/Str	.08-1	8.85	600V	50 amp
Ideal 452 Red	8-18 awg		Sol/Str	Self-Torque	Self-Torque	600V	
Ideal 451 Yellow	10-18 awg		Sol/Str	Self-Torque	Self-Torque	600V	
Ideal, In-Sure	10-14 awg		Sol/Str	Self-Torque	Self-Torque	600V	
WAGO, 2204-1201	10-20 awg	16-24 awg	Sol/Str	Self-Torque	Self-Torque	600V	30 amp
WAGO, 221-612	10-20 awg	10-24 awg	Sol/Str	Self-Torque	Self-Torque	600V	30 amp
Dottie DRC75	6-12 awg		Sol/Str	Snap-In	Snap-In		
ESP NG-53	4-6 awg		Sol/Str		45	2000V	
	10-14 awg		Sol/Str		35		
ESP NG-717	4-6 awg		Sol/Str		45	2000V	
	10-14 awg		Sol/Str		35		
Brumall 4-5,3	4-6 awg		Sol/Str		45	2000V	
	10-14 awg		Sol/Str		35		

Table 2: Minimum wire-bending space for conductors through a wall opposite terminals in mm (Inches)

Wire size, AWG or kcmil (mm2)	Wires per terminal (pole)			
	1 mm (inch)	2 mm (inch)	3 mm (inch)	4 or More mm (inch)
14-10 (2.1-5.3)	Not Specified	-	-	-
8 (8.4)	38.1 (1-1/2)	-	-	-
6 (13.3)	50.8 (2)	-	-	-



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SHEET NAME

JUNCTION BOX
DATASHEET

SHEET SIZE

ANSI B
11" X 17"

SHEET NUMBER

PV-19