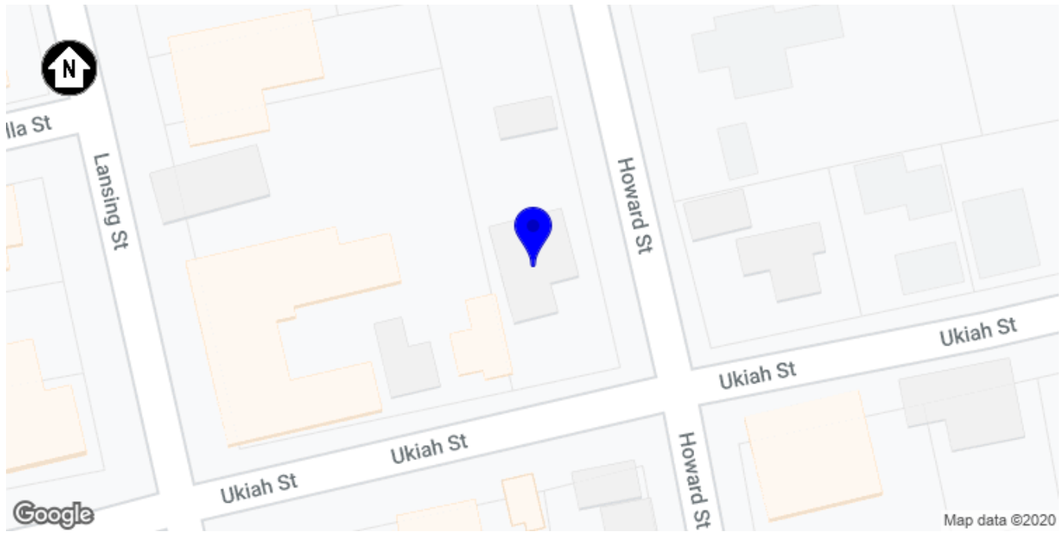
DIRECTORY OF PAGES

PROJECT DETAILS

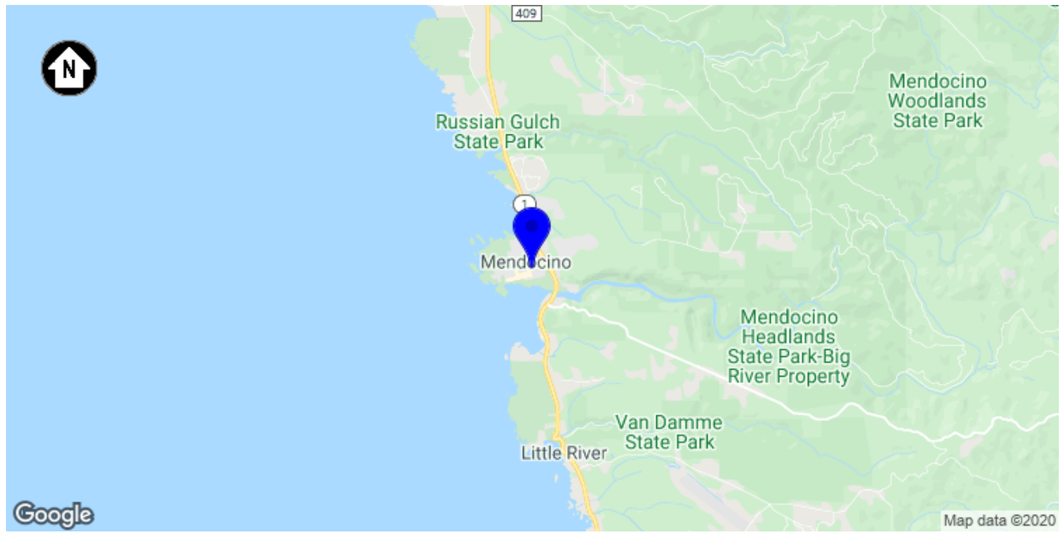
PROPERTY OWNER	PATRICIA KHAN
PROPERTY ADDRESS	44960 UKIAH ST, MENDOCINO, CA 95460 US
APN	11911500800
ZONING	RESIDENTIAL
USE AND OCCUPANCY CLASSIFICATION	ONE- OR TWO-FAMILY DWELLING GROUP (GROUP R3)
AHJ	COUNTY OF MENDOCINO
UTILITY COMPANY	PACIFIC GAS & ELECTRIC CO
METER SERIAL NUMBER	1NG 10091983780510
ELECTRICAL CODE	2017 NEC (NFPA 70)
FIRE CODE	2019 CFC
OTHER BUILDING CODES	2019 CA BUILDING CODE 2019 CA RES. BUILDING CODE 2019 CA PLUMBING CODE 2019 CA MECHANICAL CODE 2019 CA FUEL GAS CODE 2019 CA ENERGY CODE

CONTRACTOR INFORMATION

COMPANY	MENDOCINO SOLAR SERVICE
LICENSE NUMBER	536983 (B, C-10)
ADDRESS	40501 LITTLE RIVER AIRPORT RD, LITTLE RIVER, CA 95456
PHONE NUMBER	(707) 937-1701
CONTRACTOR SIGNATURE	



1 PV-1 PLOT
SCALE: NTS



2 PV-1 LOCALE
SCALE: NTS

SCOPE OF WORK

THIS PROJECT INVOLVES THE INSTALLATION OF A PHOTOVOLTAIC POWER SYSTEM. SOLAR PANELS WILL BE RACKED USING A PREENGINEERED RACKING SYSTEM. THE RACKED MODULES WILL BE ELECTRICALLY CONNECTED WITH DC TO AC POWER INVERTERS AND INTERCONNECTED TO THE LOCAL UTILITY USING MEANS AND METHODS CONSISTENT WITH THE RULES ENFORCED BY THE LOCAL UTILITY AND PERMITTING JURISDICTION.

THIS DOCUMENT HAS BEEN PREPARED FOR THE PURPOSE OF DESCRIBING THE DESIGN OF A PROPOSED PV SYSTEM WITH ENOUGH DETAIL TO DEMONSTRATE COMPLIANCE WITH APPLICABLE CODES AND REGULATIONS. THE DOCUMENT SHALL NOT BE RELIED UPON AS A SUBSTITUTE FOR FOLLOWING MANUFACTURER INSTALLATION INSTRUCTIONS. THE SYSTEM SHALL COMPLY WITH ALL MANUFACTURERS LISTING AND INSTALLATION INSTRUCTIONS, AS WELL AS ALL APPLICABLE CODES. NOTHING IN THIS DOCUMENT SHALL BE INTERPRETED IN A WAY THAT OVERRIDES THEM. CONTRACTOR IS RESPONSIBLE FOR VERIFICATION OF ALL CONDITIONS, DIMENSIONS, AND DETAILS IN THIS DOCUMENT.

SYSTEM DETAILS

DESCRIPTION	NEW GRID-INTERACTIVE PHOTOVOLTAIC SYSTEM WITH NO BATTERY STORAGE
DC RATING OF SYSTEM	4.20KW
AC RATING OF SYSTEM	3.84KW
AC OUTPUT CURRENT	16.0A
INVERTER(S)	N/A
MODULE	SUNPOWER SPR-X21-350-BLK-D-AC
ARRAY WIRING	(1) BRANCH OF 12 X21-345-C-AC (INTEGRATED WITH MODULE) MICROINVERTERS

INTERCONNECTION DETAILS

POINT OF CONNECTION	NEW LOAD-SIDE AC CONNECTION PER NEC 705.12(B)(2)(3)(D) AT MSP
UTILITY SERVICE	120/240V 1Φ
LOCATION	MAIN SERVICE PANEL W/CENTER-FED 200A BUSBAR 200A MCB

SITE DETAILS

ASHRAE EXTREME LOW	-3°C (27°F)
ASHRAE 2% HIGH	37°C (99°F)
CLIMATE DATA SOURCE	UKIAH MUNICIPAL AIRPORT (KUKI)
WIND SPEED	110 MPH (ASCE7-10)
RISK CATEGORY	II
WIND EXPOSURE CATEGORY	D
GROUND SNOW LOAD	0 PSF

P-143873

MENDOCINO SOLAR SERVICE

GRID-TIED SOLAR POWER SYSTEM

KHAN RESIDENCE
44960 UKIAH ST
MENDOCINO, CA 95460

PROJECT SUMMARY

DOC ID: 143873-177876-0
DATE: 10/16/20
CREATOR: B.E.
REVIEWER: J.L.

REVISIONS

PV-1

1 SITE PLAN
PV-2 SCALE: 1" = 10'

GENERAL NOTES	
1	EQUIPMENT LIKELY TO BE WORKED UPON WHILE ENERGIZED SHALL BE INSTALLED IN LOCATIONS THAT SATISFY MINIMUM WORKING CLEARANCES PER NEC 110.26.
2	CONTRACTOR SHALL USE ONLY COMPONENTS LISTED BY A NATIONALLY RECOGNIZED TESTING LABORATORY FOR THE INTENDED USE.
3	CONTRACTOR IS RESPONSIBLE FOR FURNISHING ALL EQUIPMENT, CABLES, ADDITIONAL CONDUITS, RACEWAYS, AND OTHER ACCESSORIES NECESSARY FOR A COMPLETE AND OPERATIONAL PV SYSTEM.

1. (E) UTILITY METER, OUTDOOR
2. (E) MAIN SERVICE PANEL (MSP), OUTDOOR
3. (N) TRANSITION BOX (JB1), OUTDOOR , OUTPUT CIRCUIT CONDUCTORS SHALL BE RUN IN LFMC CONDUIT THROUGH THE INTERIOR OF THE BUILDING
4. (N) PROPOSED ROOF-MOUNTED PHOTOVOLTAIC ARRAY. 10:12 (40°) SLOPED ROOF, 4 PV MODULES (BLACK FRAME, BLACK BACKSHEET), 169° AZIMUTH
5. (N) PROPOSED ROOF-MOUNTED PHOTOVOLTAIC ARRAY. 10:12 (40°) SLOPED ROOF, 8 PV MODULES (BLACK FRAME, BLACK BACKSHEET), 73° AZIMUTH
6. ALL ARRAY CIRCUITS SHALL BE ROUTED THROUGH THE INTERIOR OF THE BUILDING, AND WHERE POSSIBLE, ALONG THE BOTTOM OF LOAD BEARING MEMBERS. NO CONDUIT SHALL BE INSTALLED ABOVE THE ROOF.

P-143873

MENDOCINO SOLAR SERVICE

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SITE PLAN

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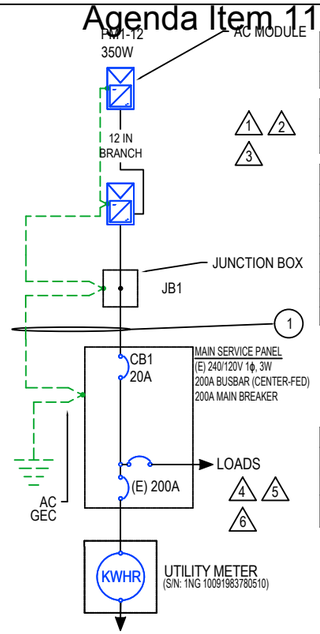
REVISIONS

PV-2



MODULES						
REF.	QTY.	MAKE AND MODEL	PMAX (AC)	MAX OUTPUT CURRENT	AC VOLTAGE	CEC WEIGHTED EFFICIENCY
PM1-12	12	SUNPOWER SPR-X21-350-BLK-D-AC	320W	1.3A	240.0V	96.0%

PASS-THRU BOXES AND COMBINERS				
REF.	QTY.	MAKE AND MODEL	RATED CURRENT	MAX RATED VOLTAGE
JB1	1	GENERIC GEN-AWB-TB-2-4X OR EQUIV.	30A	240VAC / 600VDC

OCPDS			
REF.	QTY.	RATED CURRENT	MAX VOLTAGE
CB1	1	20A	240VAC

SYSTEM SUMMARY	
INVERTERS PER BRANCH	12
MAX AC CURRENT	15.96A
MAX AC OUTPUT	3,840W
ARRAY STC POWER	4,200W
ARRAY PTC POWER	3,971W
MAX AC CURRENT	16A
MAX AC POWER OUTPUT	3,840W
DERATED AC POWER OUTPUT	3,812W

NOTES

1. SUNPOWER SYSTEM MEETS REQUIREMENTS FOR PHOTOVOLTAIC RAPID SHUTDOWN SYSTEM (PVRSS), AS PER NEC 690.12(B).
2. DC PV CONDUCTORS ARE NOT SOLIDLY-GROUNDED. NO DC PV CONDUCTOR SHALL BE WHITE- OR GRAY-COLORED
3. ALL METAL ENCLOSURES, RACEWAYS, CABLES AND EXPOSED NONCURRENT-CARRYING METAL PARTS OF EQUIPMENT SHALL BE GROUNDED TO EARTH AS REQUIRED BY NEC 250.4(B) AND PART IIIOF ARTICLE 250 AND DC EQUIPMENT GROUNDING CONDUCTORS SHALL BE SIZED ACCORDING TO NEC 690.45. THE GROUNDING ELECTRODE SYSTEM SHALL ADHERE TO NEC 690.47(A) AND NEC 250.166 AND INSTALLED IN COMPLIANCE WITH NEC 250.64.
4. POINT-OF-CONNECTION IS ON LOAD SIDE OF SERVICE DISCONNECT, IN COMPLIANCE WITH NEC 705.12(B)(2)(3)(D). OUTPUT IS BACKFED THROUGH BREAKER IN MAIN PANEL.
5. THE PV BREAKER SHALL NOT BE MARKED FOR "LINE" AND "LOAD".
6. THE PV BREAKER SHALL BE LOCATED AT THE OPPOSITE END OF THE BUSBAR FROM THE MAIN BREAKER.

CONDUCTOR AND CONDUIT SCHEDULE W/ELECTRICAL CALCULATIONS																
ID	TYPICAL	CONDUCTOR	CONDUIT / CABLE	CURRENT-CARRYING CONDUCTORS IN CONDUIT / CABLE	OCPD	EGC	TEMP. CORR. FACTOR	FILL FACTOR	CONT. CURRENT	MAX. CURRENT (125%)	BASE AMP.	DERATED AMP.	TERM. TEMP. RATING	AMP. @ TERM. TEMP. RATING	LENGTH	VOLTAGE DROP
1	1	12 AWG THWN-2, COPPER	0.5" DIA. LFMC	2	20A	12 AWG THWN-2, COPPER	0.71 (57°C)	1.0	15.96A	19.95A	30A	21.3A	75°C	25A	27FT	0.71%

GENERAL ELECTRICAL NOTES

1	UTILITY HAS 24-HR UNRESTRICTED ACCESS TO ALL PHOTOVOLTAIC SYSTEM COMPONENTS LOCATED AT THE SERVICE ENTRANCE.
2	MODULES CONFORM TO AND ARE LISTED UNDER UL 1703.
3	CONDUCTORS EXPOSED TO SUNLIGHT SHALL BE LISTED AS SUNLIGHT RESISTANT PER NEC ARTICLE 300.6 (C) (1) AND ARTICLE 310.10 (D).
4	CONDUCTORS EXPOSED TO WET LOCATIONS SHALL BE SUITABLE FOR USE IN WET LOCATIONS PER NEC ARTICLE 310.10 (C).

GROUNDING NOTES

1	ALL EQUIPMENT SHALL BE PROPERLY GROUNDED PER THE REQUIREMENTS OF NEC ARTICLES 250 & 690
2	PV MODULES SHALL BE GROUNDED TO MOUNTING RAILS USING MODULE LUGS OR RACKING INTEGRATED GROUNDING CLAMPS AS ALLOWED BY LOCAL JURISDICTION. ALL OTHER EXPOSED METAL PARTS SHALL BE GROUNDED USING UL-LISTED LAY-IN LUGS.
3	INSTALLER SHALL CONFIRM THAT MOUNTING SYSTEM HAS BEEN EVALUATED FOR COMPLIANCE WITH UL 2703 "GROUNDING AND BONDING" WHEN USED WITH PROPOSED PV MODULE.
4	ALL GROUNDING SYSTEM COMPONENTS SHALL BE LISTED FOR THEIR PURPOSE
5	IF THE EXISTING MAIN SERVICE PANEL DOES NOT HAVE A VERIFIABLE GROUNDING ELECTRODE, IT IS THE CONTRACTOR'S RESPONSIBILITY TO INSTALL A SUPPLEMENTAL GROUNDING ELECTRODE.
6	AC SYSTEM GROUNDING ELECTRODE CONDUCTOR (GEC) SHALL BE A MINIMUM SIZE #8AWG WHEN INSULATED, #6AWG IF BARE WIRE.
7	EQUIPMENT GROUNDING CONDUCTORS SHALL BE SIZED ACCORDING TO NEC ARTICLE 690.45, AND BE A MINIMUM OF #10AWG WHEN NOT EXPOSED TO DAMAGE, AND #6AWG SHALL BE USED WHEN EXPOSED TO DAMAGE
8	GROUNDING AND BONDING CONDUCTORS, IF INSULATED, SHALL BE COLOR CODED GREEN, OR MARKED GREEN IF #4AWG OR LARGER

1 PV-3 SINGLE-LINE DIAGRAM
SCALE: NTS

P-143873

MENDOCINO SOLAR SERVICE

GRID-TIED SOLAR POWER SYSTEM

KHAN RESIDENCE
44960 UKIAH ST
MENDOCINO, CA 95460

SINGLE-LINE DIAGRAM

PROJECT ID:	143873
DATE:	10/16/20
CREATED BY:	B.E.
CHECKED BY:	J.L.

REVISIONS

PV-3

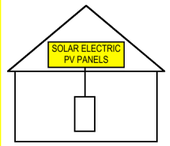
MSP - MAIN SERVICE PANEL

1 2 3 4 5 6

1 SEE NOTE NO. 4 (MSP)

PHOTOVOLTAIC 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.



NEC 690.56(C)(1) AND CFC 1204.5.1

3 AC DISCONNECT (CB1 IN MSP)

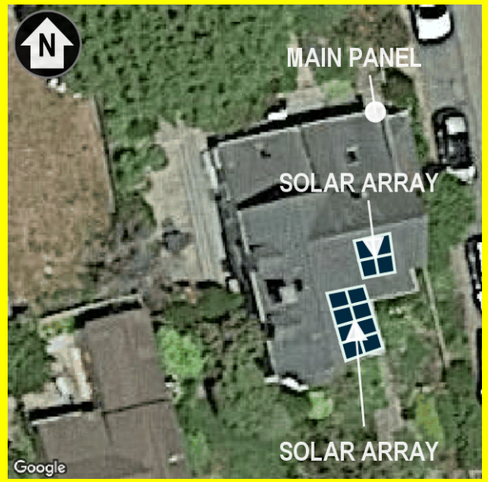
MAXIMUM AC OPERATING CURRENT: 16.0A
MAXIMUM AC OPERATING VOLTAGE: 240V

NEC 690.54

2 POINT-OF-INTERCONNECTION OR AT MAIN SERVICE DISCONNECT (MSP)

! CAUTION !

POWER TO THIS BUILDING IS ALSO FROM ROOF MOUNTED SOLAR ARRAYS WITH SAFETY DISCONNECTS AS SHOWN



INSTALLED BY MENDOCINO SOLAR SERVICE • 707-937-1701

NEC 690.56(B) AND NEC 705.10

4 ANY AC ELECTRICAL PANEL THAT IS FED BY BOTH THE UTILITY AND THE PHOTOVOLTAIC SYSTEM (MSP)

! WARNING !

DUAL POWER SOURCE. SECOND SOURCE IS PHOTOVOLTAIC SYSTEM.

NEC 705.12(B)(3)

5 SOLAR BREAKER (MSP)

! WARNING !

INVERTER OUTPUT CONNECTION. DO NOT RELOCATE THIS OVERCURRENT DEVICE.

NEC 705.12(B)(2)(3)(B)

6 SOLAR BACKFEED BREAKER AS MAIN AC SOLAR DISCONNECT (CB1 IN MSP)

PV SYSTEM DISCONNECT

NEC 690.13(B)

LABELING NOTES

1	ALL PLAQUES AND SIGNAGE REQUIRED BY 2017 NEC AND 2019 CFC WILL BE INSTALLED AS REQUIRED.
2	LABELS, WARNING(S) AND MARKING SHALL COMPLY WITH ANSI Z535.4, WHICH REQUIRES THAT DANGER, WARNING, AND CAUTION SIGNS USED THE STANDARD HEADER COLORS, HEADER TEXT, AND SAFETY ALERT SYMBOL ON EACH LABEL. THE ANSI STANDARD REQUIRES A HEADING THAT IS AT LEAST 50% TALLER THAN THE BODY TEXT, IN ACCORDANCE WITH NEC 110.21(B).
3	A PERMANENT PLAQUE OR DIRECTORY SHALL BE INSTALLED PROVIDING THE LOCATION OF THE SERVICE DISCONNECTING MEANS AND THE PHOTOVOLTAIC SYSTEM DISCONNECTING MEANS IF NOT IN THE SAME LOCATION IN ACCORDANCE WITH NEC 690.56(B).
4	LABEL(S) WITH MARKING, "TURN RAPID SHUTDOWN SWITCH TO THE 'OFF' POSITION TO SHUT DOWN PV SYSTEM AND REDUCE SHOCK HAZARD IN THE ARRAY," SHALL BE LOCATED WITHIN 3 FT OF SERVICE DISCONNECTING MEANS THE TITLE SHALL UTILIZE CAPITALIZED LETTERS WITH A MINIMUM HEIGHT OF 3/8" IN BLACK ON A YELLOW BACKGROUND, AND REMAINING TEXT SHALL BE CAPITALIZED WITH A MINIMUM HEIGHT OF 3/16" IN BLACK ON WHITE BACKGROUND

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SAFETY LABELS

DOC ID: 143873-177876-0
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CREATOR: B.E.
REVIEWER: J.L.

REVISIONS

PV-4

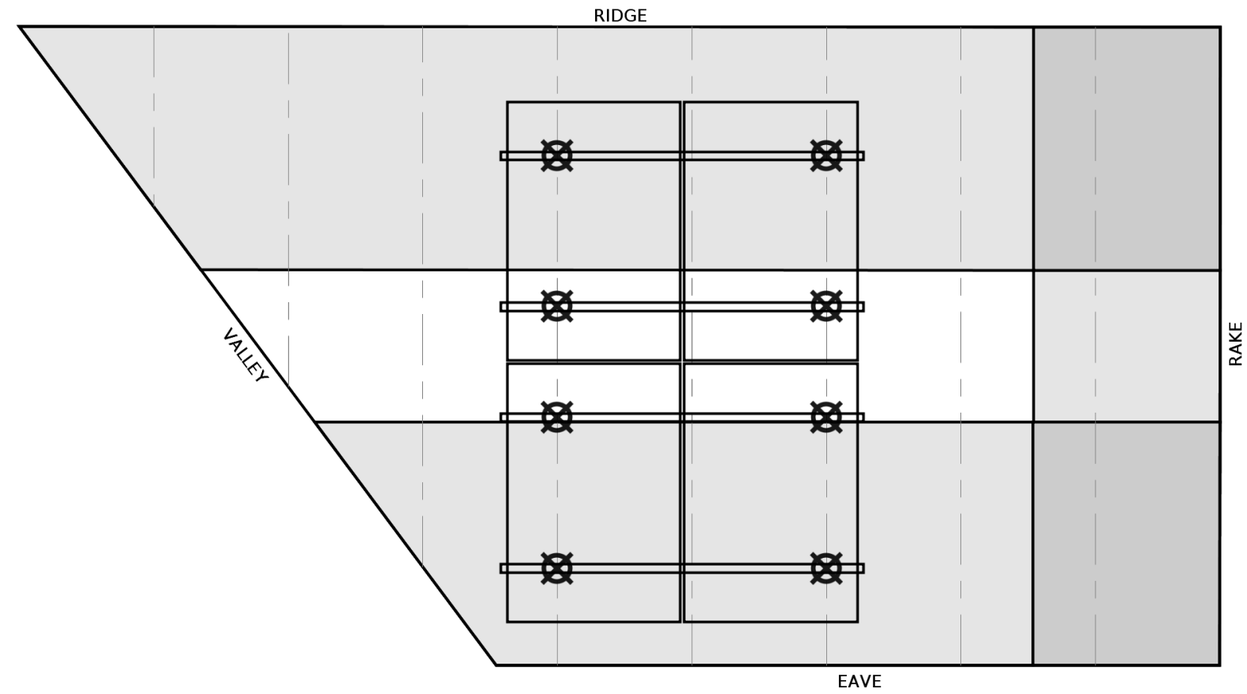
ROOF PROPERTIES	
ROOF MATERIAL	COMPOSITION SHINGLE (1 LAYER)
SLOPE	10/12 (39.8°)
MEAN ROOF HEIGHT	24.2FT
DECK SHEATHING	23/32" (3/4" NOM.) PLYWOOD
CONSTRUCTION	RAFTERS (4X6'S), 32IN OC

MODULE MECHANICAL PROPERTIES	
MODEL	SUNPOWER SPR-X21-350-BLK-D-AC
DIMENSIONS (AREA)	61.3IN X 41.2IN X 1.8IN (17.5 SQ FT)
WEIGHT	45.4LB

MOUNTING SYSTEM PROPERTIES	
RAIL MODEL	INVISIMOUNT INVISIMOUNT
ANCHOR MODEL	QUICKMOUNT QUICK MOUNT FLASHING, 3.0IN AIR GAP
FASTENING METHOD	3.0 INCH EMBEDMENT WITH 1 FASTENER
MAX. MOUNT SPACING	64.0IN (ZONES 1, 2, AND 3)
MAX. ALLOW. CANTILEVER	21.1IN (ZONES 1, 2, AND 3)
GROUNDING AND BONDING	INTEGRAL GROUNDING CERTIFIED TO UL 2703 REQUIREMENTS

DEAD LOAD CALCULATIONS			
LOAD	QTY	LBS	TOTAL LBS
MODULES	4	45.4	181.7
MICROINVERTERS	4	2.0	8.0
LINEAR FEET OF RAIL	29 FT	1.1	31.6
ANCHORS	8	0.5	4.0
TOTAL ARRAY WEIGHT			225.3 LBS
AREA NAME	QTY	SQFT	TOTAL SQFT
MODULES	4	17.5	70.0
POINT LOAD (225.3 LBS / 8 ATTACHMENTS)			28.2 LBS
DIST. LOAD (225.3 LBS / 70.0 SQFT)			3.22 PSF

NOTES	
1	BEAM LOCATIONS ARE APPROXIMATE. ACTUAL LOCATIONS MAY DIFFER AND CONTRACTOR MAY NEED TO ADJUST MOUNT LOCATIONS. IN NO CASE SHALL THE MOUNT SPACING EXCEED "MAX. MOUNT SPACING"



WIND ZONE I WIND ZONE II WIND ZONE III

DISTANCE α IS EQUAL TO 10% OF THE BUILDING'S LEAST HORIZONTAL DIMENSION OR 40% OF THE MEAN ROOF HEIGHT, WHICHEVER IS SMALLER, BUT NOT LESS THAN 4% OF THE LEAST HORIZONTAL DIMENSION OR 3 FEET (ACSE 7-10). THESE SETBACKS ARE APPLIED TO THE BUILDING FOOTPRINT AND PROJECTED TO THE PLANES OF ROOF CORNERS, RAKES, HIPS, EAVES, MANSARDS, AND RIDGES OF ROOF FACES.

α = MAX(MIN(0.4 * MEAN ROOF HEIGHT, 0.1 * LEAST HORIZONTAL DIMENSION), 0.04 * LEAST HORIZONTAL DIMENSION, 3 FT)

3.7 FT = MAX(MIN(0.4 * 24.2 FT, 0.1 * 37.0 FT), 0.04 * 37.0 FT, 3 FT)

1 / PV-5.1 ATTACHMENT PLAN (ORTHOGONAL PROJECTION)
SCALE: 3/8" = 1'

P-143873

MENDOCINO SOLAR SERVICE

GRID-TIED SOLAR POWER SYSTEM

KHAN RESIDENCE
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ATTACHMENT PLAN

DOC ID: 143873-177876-0
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REVIEWER: J.L.

REVISIONS

PV-5.1

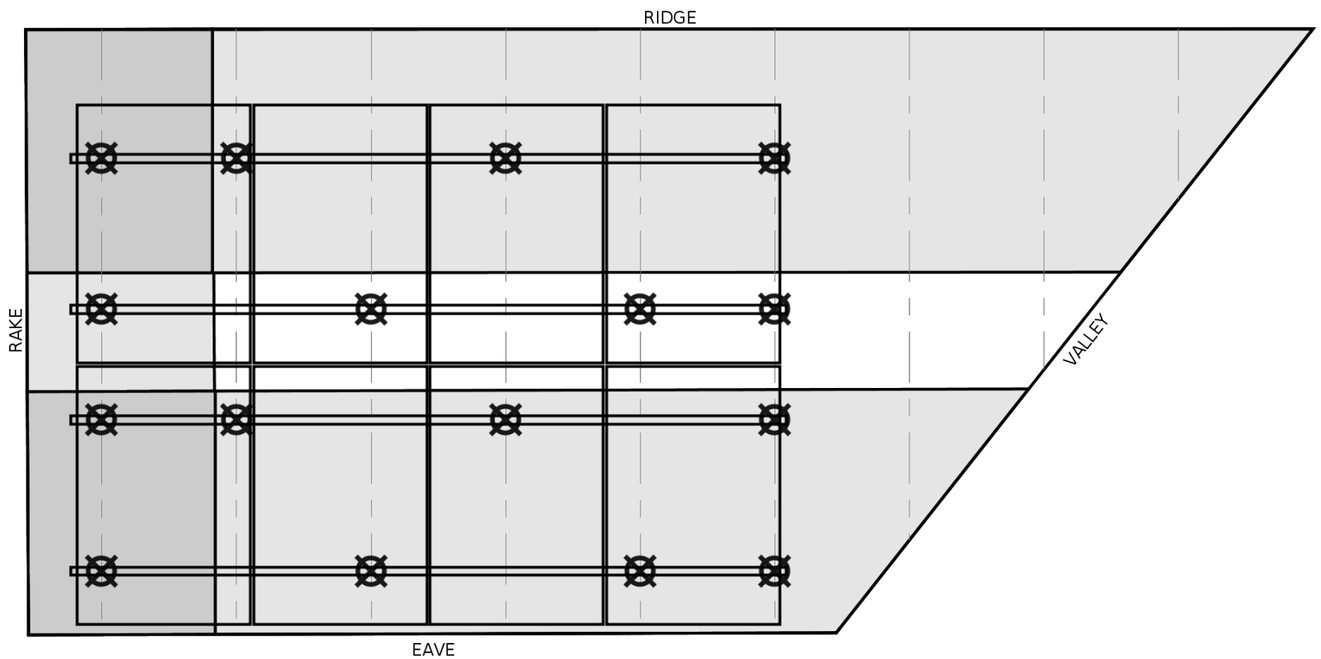
ROOF PROPERTIES	
ROOF MATERIAL	COMPOSITION SHINGLE (1 LAYER)
SLOPE	10/12 (39.8°)
MEAN ROOF HEIGHT	23.9FT
DECK SHEATHING	23/32" (3/4" NOM.) PLYWOOD
CONSTRUCTION	RAFTERS (4X6'S), 32IN OC

MODULE MECHANICAL PROPERTIES	
MODEL	SUNPOWER SPR-X21-350-BLK-D-AC
DIMENSIONS (AREA)	61.3IN X 41.2IN X 1.8IN (17.5 SQ FT)
WEIGHT	45.4LB

MOUNTING SYSTEM PROPERTIES	
RAIL MODEL	INVISIMOUNT INVISIMOUNT
ANCHOR MODEL	QUICKMOUNT QUICK MOUNT FLASHING, 3.0IN AIR GAP
FASTENING METHOD	3.0 INCH EMBEDMENT WITH 1 FASTENER
MAX. MOUNT SPACING	64.0IN (ZONES 1, 2, AND 3)
MAX. ALLOW. CANTILEVER	21.1IN (ZONES 1, 2, AND 3)
GROUNDING AND BONDING	INTEGRAL GROUNDING CERTIFIED TO UL 2703 REQUIREMENTS

DEAD LOAD CALCULATIONS			
LOAD	QTY	LBS	TOTAL LBS
MODULES	8	45.4	363.3
MICROINVERTERS	8	2.0	16.0
LINEAR FEET OF RAIL	57 FT	1.1	62.4
ANCHORS	16	0.5	8.0
TOTAL ARRAY WEIGHT			449.7 LBS
AREA NAME	QTY	SQFT	TOTAL SQFT
MODULES	8	17.5	140.0
POINT LOAD (449.7 LBS / 16 ATTACHMENTS)			28.1 LBS
DIST. LOAD (449.7 LBS / 140.0 SQFT)			3.21 PSF

NOTES	
1	BEAM LOCATIONS ARE APPROXIMATE. ACTUAL LOCATIONS MAY DIFFER AND CONTRACTOR MAY NEED TO ADJUST MOUNT LOCATIONS. IN NO CASE SHALL THE MOUNT SPACING EXCEED "MAX. MOUNT SPACING"



WIND ZONE I WIND ZONE II WIND ZONE III

DISTANCE α IS EQUAL TO 10% OF THE BUILDING'S LEAST HORIZONTAL DIMENSION OR 40% OF THE MEAN ROOF HEIGHT, WHICHEVER IS SMALLER, BUT NOT LESS THAN 4% OF THE LEAST HORIZONTAL DIMENSION OR 3 FEET (ACSE 7-10). THESE SETBACKS ARE APPLIED TO THE BUILDING FOOTPRINT AND PROJECTED TO THE PLANES OF ROOF CORNERS, RAKES, HIPS, EAVES, MANSARDS, AND RIDGES OF ROOF FACES.

α = MAX(MIN(0.4 * MEAN ROOF HEIGHT, 0.1 * LEAST HORIZONTAL DIMENSION), 0.04 * LEAST HORIZONTAL DIMENSION, 3 FT)

3.7 FT = MAX(MIN(0.4 * 23.9 FT, 0.1 * 37.0 FT), 0.04 * 37.0 FT, 3 FT)

1 PV-5.2 ATTACHMENT PLAN (ORTHOGONAL PROJECTION)
SCALE: 1/4" = 1'

P-143873

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GRID-TIED SOLAR POWER SYSTEM

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ATTACHMENT PLAN

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PV-5.2

1 FIRE SAFETY PLAN
PV-7 SCALE: 1" = 10'

GENERAL NOTES	
1	AT LEAST TWO 36"-WIDE PATHWAYS ON SEPARATE ROOF PLANES, FROM LOWEST ROOF EDGE TO RIDGE, SHALL BE PROVIDED ON ALL BUILDINGS. THERE SHALL BE AT LEAST ONE PATHWAY ON THE STREET OR DRIVEWAY SIDE OF THE ROOF. FOR EACH ROOF PLANE WITH A PV ARRAY, AT LEAST ONE SUCH PATHWAY SHALL BE PROVIDED ON THE SAME ROOF PLANE, OR ON AN ADJACENT ROOF PLANE, OR STRADDLING THE SAME AND ADJACENT ROOF PLANES. (CFC 1204.2.1.1)
2	FOR PV ARRAYS OCCUPYING MORE THAN 1/3 OF THE PLAN VIEW TOTAL ROOF AREA, A MIN. 3'-WIDE SETBACK IS REQUIRED ON BOTH SIDES OF A HORIZONTAL RIDGE. (CFC 1204.2.1.2)
3	PV MODULES SHALL NOT BE INSTALLED ON THE PORTION OF A ROOF THAT IS BELOW AN EMERGENCY ESCAPE AND RESCUE OPENING. A 36"-WIDE PATHWAY SHALL BE PROVIDED TO THE EMERGENCY ESCAPE AND RESCUE OPENING. (CFC 1204.2.2)

1. 3.0 FT. WIDE FIRE ACCESS PATHWAY, PER CFC 1204.2.1.1
2. 1.5 FT. WIDE SMOKE-VENTILATION SETBACK
3. 0.7 FT. WIDE FIRE ACCESS PATHWAY, PER CFC 1204.2.1.1
4. 0.7 FT. WIDE FIRE ACCESS PATHWAY, PER CFC 1204.2.1.1
5. ROOF ACCESS POINT
6. ROOF ACCESS POINT
7. ROOF ACCESS POINT
8. ROOF ACCESS POINT
9. 1.5 FT. WIDE SMOKE-VENTILATION SETBACK
10. 0.7 FT. WIDE FIRE ACCESS PATHWAY, PER CFC 1204.2.1.1
11. THIS SYSTEM UTILIZES MICROINVERTERS. THERE ARE NO DC CIRCUITS OUTSIDE OF THE ARRAY PERIMETER OR INSIDE THE BUILDING.
12. ALL ARRAY CIRCUITS SHALL BE ROUTED THROUGH THE INTERIOR OF THE BUILDING, AND WHERE POSSIBLE, ALONG THE BOTTOM OF LOAD BEARING MEMBERS. NO CONDUIT SHALL BE INSTALLED ABOVE THE ROOF.

P-143873

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FIRE SAFETY PLAN

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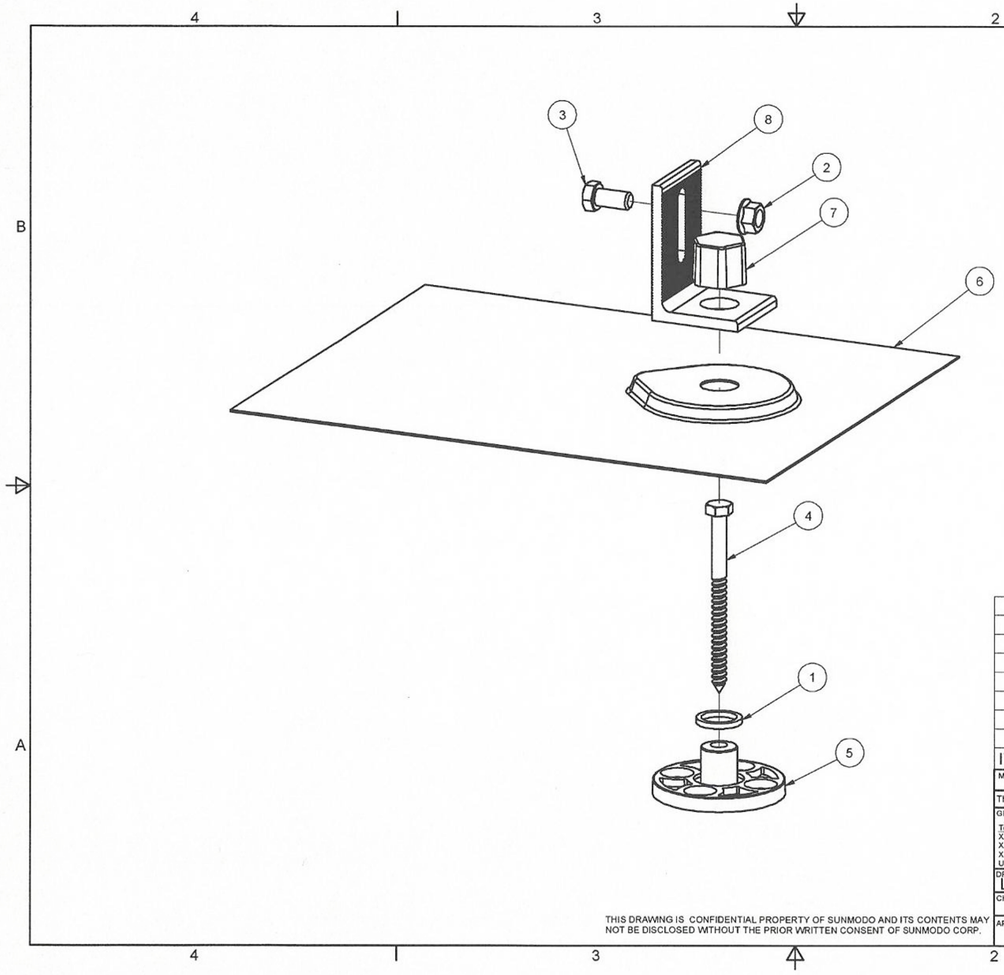
REVISIONS

PV-7



ITEM	PART NUMBER	DESCRIPTION	QTY
8	A20064-001	L FOOT	1
7	A20066-001	HEX CAP	1
6	A20052-001	ROOF MOUNT FLASHING	1
5	A20065-001	ROOF MOUNT SHOE	1
4	B15015-002	HEX LAG BOLT 5/16 X 4.00	1
3	B15018-001	HEX CAP SCREW 3/8-16 X 3/4	1
2	B15003-001	FLANGE NUT 3/8-16	1
1	C10006-001	FLAT WASHER 19.5mm ID X 3.0mm	1

MATERIAL: SEE NOTES

Third Angle Projection:

GENERAL SPECIFICATIONS
All Dimensions in inches [millimeters]
Tolerances
X.XXX ±0.01 [0.25mm]
X.XX ±0.02 [0.50mm]
X.X ±0.039 [1.0mm]
Unless otherwise spec'd
Break all sharp edges .010-.020 unless otherwise specified.

DRAWN BY: LWF
DATE: 09/21/2010
CHECKED BY:
APPROVALS:

Sunmodo Corp.
1915 E 5TH STREET, STE C, VANCOUVER, WA 98661

TITLE: EZ ROOF MOUNT KIT
B
DRAWING NUMBER: K10068-001
SCALE: NONE
SHEET 1 of 1

P-143873

MENDOCINO SOLAR SERVICE

GRID-TIED SOLAR POWER SYSTEM

KHAN RESIDENCE
44960 UKIAH ST
MENDOCINO, CA 95460

SUNMODO FLASHING

DOC ID: 143873-177876-0
DATE: 10/16/20
CREATOR: B.E.
REVIEWER: J.L.

REVISIONS

PV-8

Conductor, Conduit, and OCPD Sizing Validation

1. Maximum System Voltage Test

1.1. 12 Sunpower SPR-X21-350-BLK-D-AC (350W)s

Array Properties

Array Type	Microinverter Array
System Description	12 Sunpower SPR-X21-350-BLK-D-AC (350W)s
Module	SPR-X21-350-BLK-D-AC (350W)
Highest number of modules in series in a PV Source Circuit	1
Design Low Temp.	-3°C
Module Voc	68.3V
Temp. Coefficient Voc	-0.167V/C

NEC Code Validation Tests

1.	PV Source Circuit maximum Voc must not exceed 600V 72.98V < 600V = true	PASS

NEC Code Calculations

A. Maximum Voltage of PV Source Circuit 72.98V
see 690.7(A)

NEC 690.7(A) requires that if the PV module manufacturer provides a temperature coefficient of open-circuit voltage, it must be used to calculate the PV array's maximum system voltage. It includes an information note recommending the use of the ASHRAE 'Extreme Annual Mean Minimum Design Dry Bulb Temperature' as the design low temperature. Using these values, the module Voc (68.3V) will increase to 72.98V at the design low temperature (-3°C).

(-3°C - 25°C) X -0.167V/C + 68.3V = 72.98V

The module Voc at the design low temperature is 72.98V.

72.98V X 1 = 72.98V

2. Wire, Conduit, and OCPD Code Compliance Validation

2.1. #1: AC Branch Output: Transition Box to Main Service Panel

Circuit Section Properties

Conductor	12 AWG THWN-2, Copper
Equipment Ground Conductor (EGC)	12 AWG THWN-2, Copper
OCPD(s)	20A
Raceway/Cable	0.5" dia. LFMC
Lowest Terminal Temperature Rating	75°C
Maximum Wire Temperature	57°C
Power Source Description	Branch of 12 X21-345-C-AC (Integrated with Module) microinverters
Current	15.96A
Voltage	240V

NEC Code Calculations

A. Continuous Current 15.96A
see Article 100

Equipment maximum rated output current is 12 X 1.33A = 15.96A

B. Ampacity of Conductor 30A
see Table 310.15(B)(16)

Ampacity (30°C) for a copper conductor with 90°C insulation in conduit/cable is 30A.

C. Derated Ampacity of Conductor 21.3A
see Table 310.15(B)(3)(c), Table 310.15(B)(3)(a), and Article 100

The temperature factor for 90°C insulation at 57°C is 0.71.
The fill factor for a conduit/cable that has 2 wires is 1.
The ampacity derated for Conditions of Use is the product of the conductor ampacity (30A) multiplied by the temperature factor (0.71) and by the fill factor (1).

30A X 0.71 X 1 = 21.3A

D. Max Current for Terminal Temp. Rating 25A
see 110.14(C)

The lowest temperature limit for this conductor at any termination is 75°C.
Using the method specified in 110.14(C), the maximum current permitted to ensure that the device terminal temperature does not exceed its 75°C rating would be the amount referenced in the 75°C column in Table 310.15(B)(16), which is 25A.

E. Minimum Allowed OCPD Rating 20A
see 240.4

NEC 690.9(B) requires that the OCPD be rated for no less than 1.25 times the Continuous Current of the circuit.

15.96A X 1.25 = 19.95A

F. Maximum Allowed OCPD Rating 20A
see 240.4(D)

NEC 240.4(D) requires that OCPD rating not exceed 20A when protecting a Copper 12 AWG conductor.

G. Minimum Required EGC Size 12 AWG
see Table 250.122

The smallest EGC size allowed is 12 AWG for OCPD rating 20A according to Table 250.122.

H. Minimum Recommended Conduit Size 0.5" dia.
see 300.17

The total area of all conductors is 0.0532in². With a maximum fill rate of 0.4, the recommended conduit diameter is 0.5.

Qty	Description	Size	Type	Area	Total Area
2	Conductor	12 AWG	THWN-2	0.0133in²	0.0266in²
1	Neutral	12 AWG	THWN-2	0.0133in²	0.0133in²
1	Equipment Ground	12 AWG	THWN-2	0.0133in²	0.0133in²
4					0.0532in²

0.0532in² / 0.4 = 0.133in² (Corresponding to a diameter of 0.5")

NEC Code Validation Tests

1.	OCPD rating must be at least 125% of Continuous Current (240.4) 20A >= 15.96A X 1.25 = true	PASS
2.	Derated ampacity must exceed OCPD rating, or rating of next smaller OCPD (240.4) 21.3A >= 20A (OCPD Rating) = true	PASS
3.	OCPD rating must not exceed max OCPD rating for conductor (240.4) 20A (OCPD Rating) <= 20A = true	PASS
4.	Derated Ampacity must be greater than or equal to the Continuous Current (Article 100) 21.3A >= 15.96A = true	PASS
5.	Conductor Ampacity must be at least 125% of Continuous Current (215.2(A)(1)) 30A > 15.96A x 1.25 = true	PASS
6.	Max current for terminal must be at least 125% of the Continuous Current. (110.14(C)) 25A >= 15.96A X 1.25 = true	PASS
7.	EGC must meet code requirements for minimum size (Table 250.122) 12 AWG >= 12 AWG = true	PASS
8.	Conduit must meet code recommendation for minimum size (300.17) 0.5in. >= 0.5in. = true	PASS

SunPower® X21-350-BLK-D-AC | Residential AC Module Series

SunPower® X21-350-BLK-D-AC | Residential AC Module Series

Design-Driven Advantages

- #1 module aesthetics and efficiency[1]
- Unmatched module reliability[2]
- No electrolytic capacitors
- 25-year Complete Confidence Warranty
- California Rule 21 Phase 1 compliant

Maximize Value for Roof

- Size system for roof, not string inverter
- Optimize performance of each module

Expand Deployment Options

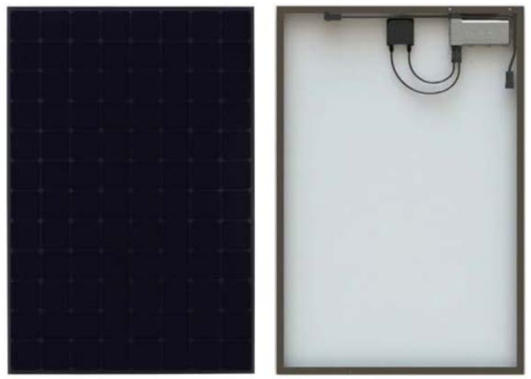
- Complex roofs and partial shading
- Small systems
- System expandability

Simplify & Speed Installation

- Factory-integrated microinverter
- Robust, double-locking AC connectors
- Design flexibility offsite and onsite
- No DC string sizing process
- Fewer installation steps than competing systems
- Intuitive commissioning

Component of Complete System

- Built for use with SunPower® InvisiMount™ and the SunPower Monitoring System (PVS5x)
- Superior system reliability and aesthetics



X21 SERIES

Optimize System and Installation Efficiency

SunPower® AC modules, which include a factory-integrated SunPower microinverter, provide a revolutionary combination of high efficiency, high reliability, and module-level DC-to-AC power conversion. Designed specifically for use with SunPower InvisiMount™ and the SunPower Monitoring System, SunPower AC modules enable rapid installation, best-in-class system aesthetics, and intuitive visibility into system performance. All this comes with the best Combined Power and Product Warranty in the industry.

Grid Support Utility-Interactive Smart Inverter

SunPower's new Type D AC module is UL tested and certified to UL 1741 SA and provides advanced smart inverter functions. SunPower Type D AC modules are fully compliant with the California Rule 21 Phase 1 requirements, and the Rule 21 grid profile is easily set during commissioning with SunPower PVS5x monitoring hardware.

sunpower.com

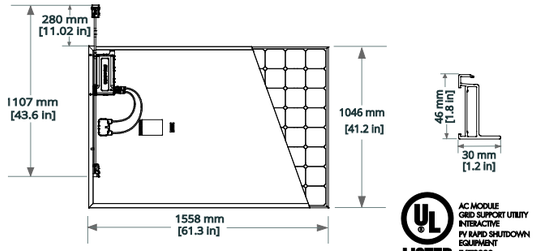
AC Electrical Data[3]			
SRD Profile		IEEE 1547a-2014[3] (default settings) min. / nom. / max.	CA Rule 21[3] min. / nom. / max.
Frequency (Hz)		59.5 / 60.0 / 60.5	58.5 / 60.0 / 60.5
Power Factor		0.99 / 1.00 / 1.00	0.85 lead. / 1.00 / 0.85 lag.
Reactive Power			±169 Var Volt-VAr
Voltage	@240 V @208 V	211.2 / 240 / 264 V 183 / 208 / 228.8 V	
Max. Current	@240 V @208 V	1.33 A 1.54 A	
DC/AC CEC Conversion Efficiency	@240 V @208 V	96.0% 95.5%	
Max. Units Per 20 A Branch Circuit	@240 V @208 V	12 (single phase) 10 (two pole) wye	
Power		320 W, 320 VA	
No active phase balancing for 3 phase installations			

DC Power Data	X21-350-BLK-D-AC	X21-335-BLK-D-AC	X20-327-BLK-D-AC
Nominal Power[4] (Pnom)	350 W	335 W	327 W
Power Tolerance	+5/–0%	+5/–0%	+5/–0%
Panel Efficiency[5]	21.5%	21.0%	20.4%
Temp. Coef. (Power)		–0.29%/° C	
Shade Tolerance		• Three bypass diodes • Integrated module-level maximum power point tracking	

Tested Operating Conditions	
Operating Temp.	–40° F to +149° F (–40° C to +65° C)
Max. Ambient Temp.	122° F (50° C)
Max. Load	Wind: 62 psf, 3000 Pa, 305 kg/m² front & back Snow: 125 psf, 6000 Pa, 611 kg/m² front
Impact Resistance	1 inch (25 mm) diameter hail at 52 mph (23 m/s)

Mechanical Data	
Solar Cells	96 Monocrystalline Maxeon Gen III
Front Glass	High-transmission tempered glass with anti-reflective coating
Environmental Rating	Outdoor rated
Frame	Class 1 black anodized (highest AAMA rating)
Weight	45.5 lbs (20.6 kg)
Recommended Max. Module Spacing	1.3 in. (33 mm)

Warranties and Certifications	
Warranties	• 25-year limited power warranty • 25-year limited product warranty
Certifications	UL listed to UL 1741 SA • SRDs: IEEE 1547-2003, IEEE 1547a-2014, CA Rule 21 Phase 1 • PV Rapid Shutdown Equipment • Equipment Grounding • UL 6703, UL 9703 Connectors and cables (load break disconnection) • UL 1741 AC Module (Type 2 fire rating) Enables installation in accordance with: • NEC 690.6 • NEC 690.12 Rapid Shutdown (inside and outside the array) • NEC 690.15 AC Connectors, 690.33(A) – (E)(1) FCC and ICES-003 Class B When used with InvisiMount racking (UL 2703): • Integrated grounding and bonding • Class A fire rated
PID Test	Potential-induced degradation free



AC MODULE
GRID SUPPORT UTILITY INTERACTIVE
PV RAPID SHUTDOWN EQUIPMENT
E478330
LISTED
Module Fire Performance: Type 2

Please read the safety and installation instructions for details.

[1] SunPower 327 W compared to a conventional panel on same-sized arrays (260 W, 16% efficient, approx. 1.6 m^2), 4% more energy per watt (based on PVSyst pan files), 0.75%/yr. slower degradation (Campeau, Z. et al. *SunPower Module Degradation Rate*. San Jose CA, 2013).
[2] Based on search of datasheet values from websites of top 10 manufacturers per IHS, as of January 2017.
[3] #1 rank in "Fraunhofer PV Durability Initiative for Solar Modules: Part 3." *PV-Tech Power*, September 2015; Campeau, Z. et al. *SunPower Module Degradation Rate*. San Jose CA, 2013.
[4] Factory set to 1547a-2014 profile. CA Rule 21 profile set during commissioning. See the *Equinox Installation Guide #518101* for more information.
[5] Standard Test Conditions (1000 W/m^2 irradiance, AM 1.5, 25°C). NREL calibration standard: SOMS current, LACCS FF and voltage. All DC voltage is fully contained within the module.

See www.sunpower.com/facts for more reference information.

527031 RevA

SUNPOWER®