DIRECTORY OF PLAN PAGES	
PV1	PROJECT INFORMATION
PV2	SITE PLAN
PV-3A PV-3B PV-3C	THREE-LINE DIAGRAM
PV4	PLACARDS
PV-5A	UNIRAC ECOFOOT2+ INSTALLATION AND DESIGN PLAN
PV-5B PV-5C PV-5D PV-5E	UNIRAC ECOFOOT2+ ENGINEERING REPORT
PV-5F	UNIRAC ECOFOOT2+ UPLIST BALLAST MAP
PV-5G	UNIRAC ECOFOOT2+ DOWNPOINT LOAD MAP
PV-5H	UNIRAC ECOFOOT2+ BILL OF MATERIALS
PV6	UNIRAC ECOFOOT2+ BALLAST MOUNT DATASHEET
PV-7A	UNIRAC ECOFOOT2+ GROUNDING & BONDING
PV-7B	UNIRAC ECOFOOT2+ CLASS A FIRE RATING
PV-7C	UNIRAC ECOFOOT2+ UL 2703 CERTIFICATION
PV8	PV MODULE DATASHEET
PV9	INVERTER DATASHEET
PV10	RAPID SHUTDOWN DATASHEET
PV11	FUSED AC DISCONNECT DATASHEET
PV12	UL LISTING CERTIFICATION (SMA INVERTER)

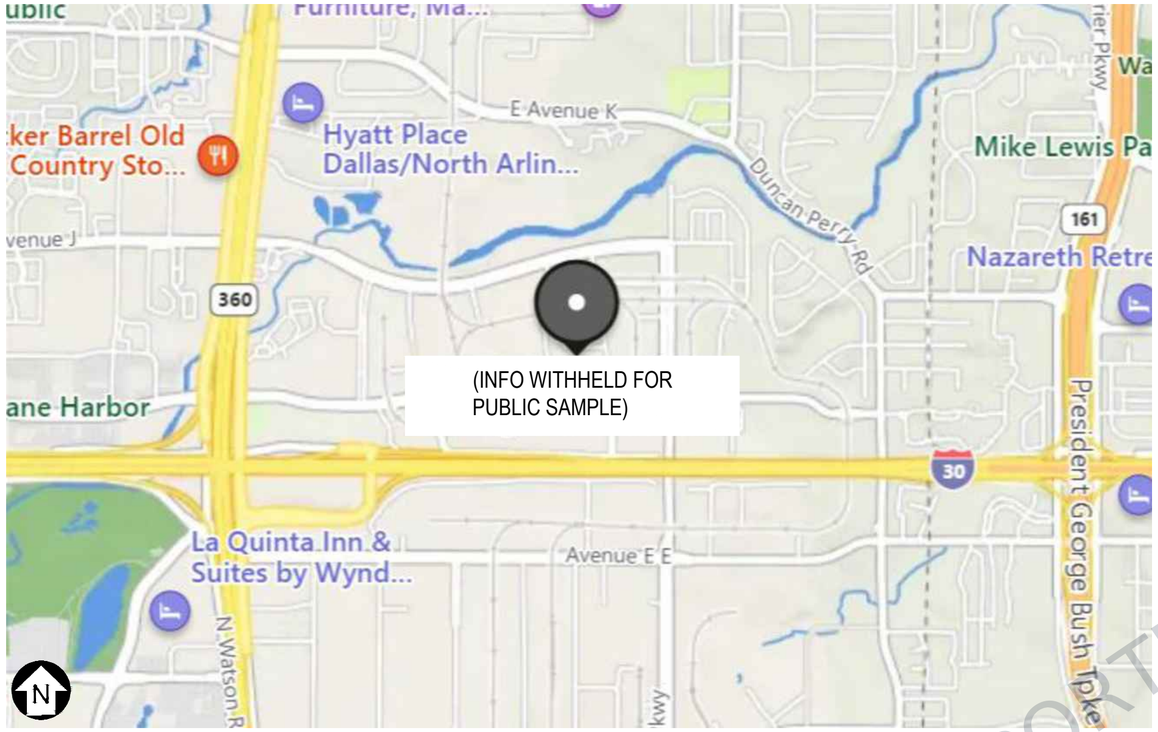
PROJECT DETAILS	
PROPERTY OWNER	(INFO WITHHELD FOR PUBLIC SAMPLE)
PROPERTY ADDRESS	(INFO WITHHELD FOR PUBLIC SAMPLE)
SITE NUMBER	(INFO WITHHELD FOR PUBLIC SAMPLE)
ACCOUNT NO.	(INFO WITHHELD FOR PUBLIC SAMPLE)
STATE CODE	(INFO WITHHELD FOR PUBLIC SAMPLE)
TAD MAP	(INFO WITHHELD FOR PUBLIC SAMPLE)
SOLAR MOUNTING	ROOF BALLAST-MOUNTED PHOTOVOLTAIC ARRAY
AHJ	CITY OF ARLINGTON
UTILITY COMPANY	ONCOR ENERGY
OBSERVED CODES	2015 EDITION OF THE INTERNATIONAL CODES; 2015 INTERNATIONAL BUILDING CODE 2015 INTERNATIONAL FUEL GAS CODE 2015 INTERNATIONAL ENERGY CONSV. CODE 2015 INTERNATIONAL MECHANICAL CODE 2015 INTERNATIONAL PLUMBING CODE 2015 INTERNATIONAL ENERGY CONS. CODE 2015 INTERNATIONAL RESIDENTIAL CODE 2015 INTERNATIONAL FIRE CODE 2017 NATIONAL ELECTRICAL CODE OSHA 29 CFR 1910.269 UNDERWRITERS LABORATORIES (UL) STANDARDS
STRUCT. METHOD	ASCE7-10

CONTRACTOR INFORMATION	
COMPANY	(INFO WITHHELD FOR PUBLIC SAMPLE)
LICENSE NO.	(INFO WITHHELD FOR PUBLIC SAMPLE)
ADDRESS	(INFO WITHHELD FOR PUBLIC SAMPLE)
PHONE	(INFO WITHHELD FOR PUBLIC SAMPLE)
CONTRACTOR SIGNATURE	

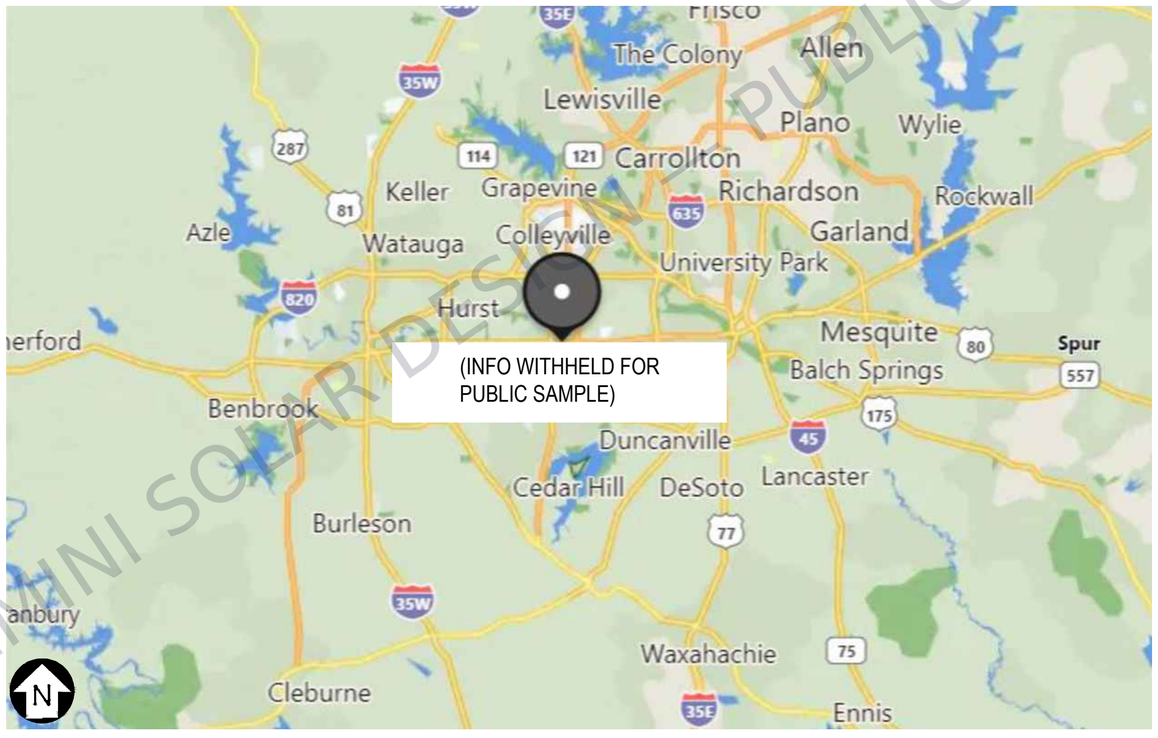
PLAN DESIGNER INFORMATION	
COMPANY	GEMINI SOLAR DESIGN, LLC.
NAME	SANJAY CHRISTOPHER MALLIPUDI
ADDRESS	6020 ELK RIVER ROAD EUREKA, CA 95503
PHONE	(609) 802-5743
PLAN DESIGNER SIGNATURE	Sanjay Mallipudi

SYSTEM DETAILS	
DC RATING OF SYSTEM	32,400W
AC OUTPUT CURRENT	96A @ 240VAC
INVERTER	(3) SMA SB7.7-1SP-US-41
MODULE	(72) AXITEC AC-450MH/144V
STRING CONFIGURATION	3 STRINGS OF 8 MODULES (INV. #1) 3 STRINGS OF 8 MODULES (INV. #2) 3 STRINGS OF 8 MODULES (INV. #3)
INTERCONNECTION	LINE-SIDE TAP

SITE SPECIFICATIONS	
UTILITY SERVICE	120 / 240 / 208VAC, 3-Ø, 4-WIRE "STINGER HIGH-LEG DELTA"
MAIN SERVICE PANEL	*200A RATED BUSBAR* *200A / 3P MAIN BREAKER*
ASHRAE EXTREME ANNUAL MEAN MINIMUM DENSITY DRY BULB TEMP.	-9°C
ASHRAE 2% ANNUAL DRY DENSITY BULB TEMP.	37°C
DESIGN GROUND SNOW LOAD	5 PSF
DESIGN WIND SPEED	115 MPH
WIND EXPOSURE CATEGORY	B
RISK CATEGORY	II



1 PV-1 PLOT
SCALE: NTS



2 PV-1 LOCALE
SCALE: NTS

GENERAL CONSTRUCTION NOTES

1	CONTRACTOR SHALL FIELD VERIFY ALL DIMENSIONS PRIOR TO INITIATING CONSTRUCTION.
2	CONTRACTOR SHALL REVIEW ALL MANUFACTURER INSTALLATION DOCUMENTS PRIOR TO INITIATING CONSTRUCTION.
3	ALL EQUIPMENT SHALL BE LISTED BY THE U.L. (OR EQUAL) AND LISTED FOR ITS SPECIFIC APPLICATION.
4	ALL EQUIPMENT SHALL BE RATED FOR THE ENVIRONMENT IN WHICH IT IS INSTALLED.
5	ALL EQUIPMENT SHALL BE INSTALLED IN ACCORDANCE WITH THE MANUFACTURER'S INSTALLATION INSTRUCTIONS.
6	ACCESS TO ELECTRICAL COMPONENTS OVER 150 VOLTS TO GROUND SHALL BE RESTRICTED TO QUALIFIED PERSONNEL.
7	ALL CONDUCTORS SHALL BE COPPER, RATED FOR 600 VOLTS AND 90°C WET ENVIRONMENT, UNLESS OTHERWISE NOTED.
8	WHERE SIZES OF JUNCTION BOXES, RACEWAYS, AND CONDUITS ARE NOT SPECIFIED, CONTRACTOR SHALL SIZE THEM ACCORDING TO APPLICABLE CODES.
9	PV MODULES FRAMES SHALL BE BONDED TO RACKING RAIL OR BARE COPPER G.E.C. PER THE MODULE MANUFACTURER'S LISTED INSTRUCTION SHEET.
10	PV MODULES RACKING RAIL SHALL BE BONDED TO BARE COPPER G.E.C VIA WEEB LUG, ILSCO GBL-4DBT LAY-IN LUG, OR EQUIVALENT LISTED LUG.
11	GROUNDING ELECTRODE CONDUCTOR (G.E.C) SHALL BE CONTINUOUS AND/OR IRREVERSIBLY SPLICED
12	ALL JUNCTION BOXES, COMBINER BOXES, AND DISCONNECTS SHALL BE INSTALLED IN AN ACCESSIBLE LOCATION.

PROJECT DESCRIPTION

THE PROPOSED SYSTEM IS A BALLAST-MOUNTED PHOTOVOLTAIC ARRAY. THE PHOTOVOLTAIC (PV) SYSTEM IS TO BE INSTALLED ON THE COMERCIALLY ZONED PROPERTY IN THE CITY OF ARLINGTON, TEXAS. THE ENERGY PRODUCED BY THE PV SYSTEM SHALL BE INTERCONNECTED WITH THE UTILITY GRID THROUGH THE EXISTING ON-SITE ELECTRICAL EQUIPMENT VIA A LINE-SIDE TAP POINT OF CONNECTION. THIS PROJECT DOES NOT INCLUDE STORAGE BATTERIES.

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551 W. GALENA PARK BLVD. STE. 101 DRAPER, UTAH 84020 PHONE (801) 990-1775 WWW.VECTORSE.COM

STATE OF TEXAS
RUSSELL N. EMERY
136827
LICENSED
PROFESSIONAL ENGINEER

05/18/2022
Firm License Number: F11411
VSE Project Number: U2717-0039-221

Vector Structural Engineering has reviewed the existing structure with loading from the solar array. The design of the racking system, racking connections, ballast weight, and all other structural is by others. Mechanical, architectural, and all other nonstructural aspects of the design are by others. Electrical is by others, unless stamped by Dean Levorsen.

A PV-1 PROJECT INFORMATION
SCALE: N/A

(LOGO WITHHELD FOR SAMPLE)

(INFO WITHHELD)
PHONE: (INFO WITHHELD)
LICENSE NO. (INFO WITHHELD)

NEW GRID-TIED SYSTEM 32.40kW

(INFO WITHHELD FOR PUBLIC SAMPLE)

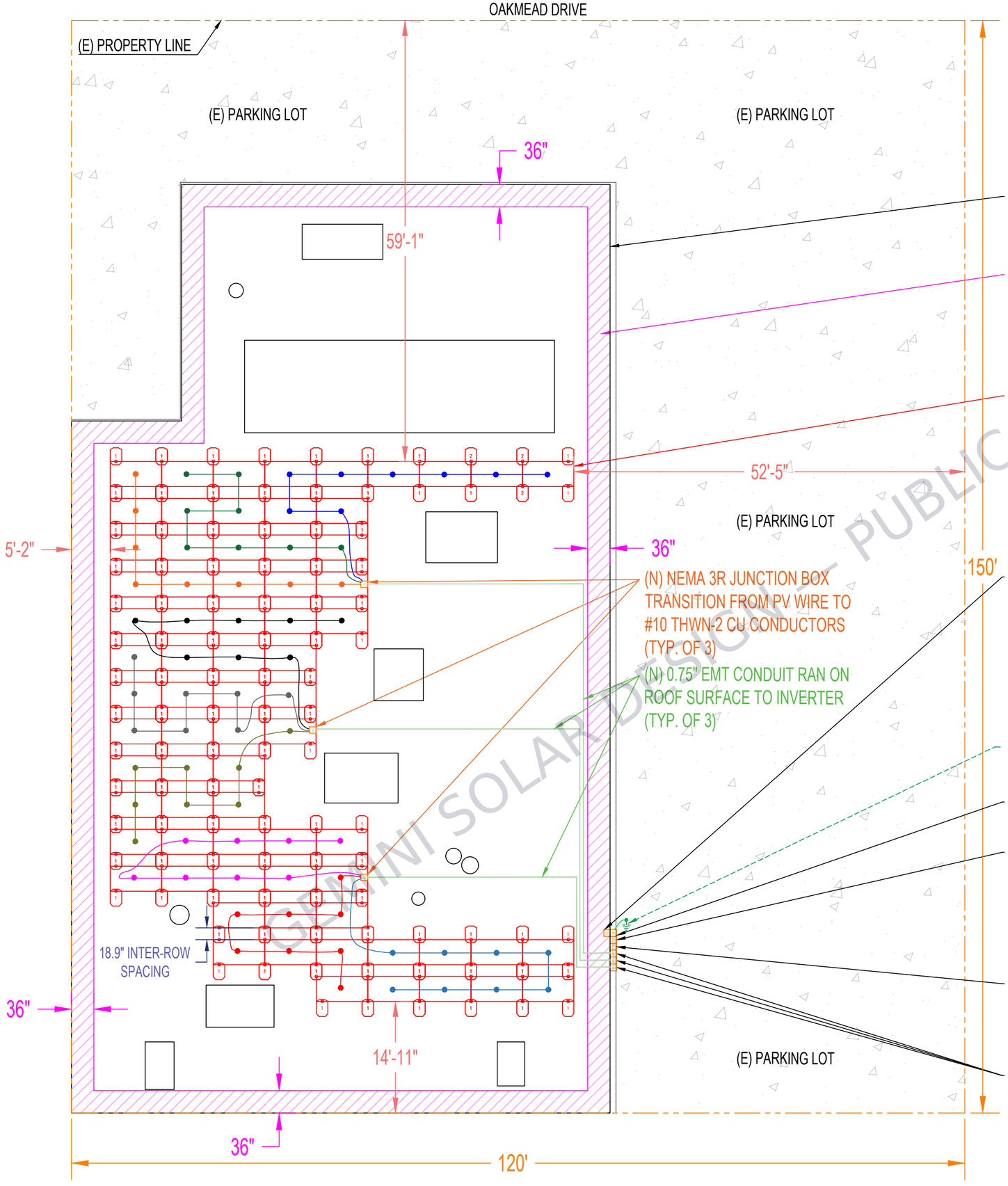
SHEET SIZE
ANSI EXPAND C (22" X 17")

PROJECT INFO

PROJECT NO: GSD-20220318-174098
DRAWN BY: SCM
DATE: 3/18/2022

PV-1

SITE PLAN NOTES	
1	CONDUCTORS EXPOSED TO SUNLIGHT SHALL BE LISTED AS SUNLIGHT RESISTANT PER CEC 319.0(D).
2	CONDUCTORS EXPOSED TO WET LOCATIONS SHALL BE SUITABLE FOR USE IN WET LOCATIONS PER CEC 310.8(C).
3	ARRAYS SHALL BE INSTALLED IN A WAY THAT ENSURES THAT PV SOURCE CONDUCTORS SHALL NOT BE READILY ACCESSIBLE.



1 STRING OF 8 MODULES (AXITEC AC-450MH/144V), MPPT #1, INV. #1 (SMA SB7.7-1SP-US-41)
1 STRING OF 8 MODULES (AXITEC AC-450MH/144V), MPPT #2, INV. #1 (SMA SB7.7-1SP-US-41)
1 STRING OF 8 MODULES (AXITEC AC-450MH/144V), MPPT #3, INV. #1 (SMA SB7.7-1SP-US-41)
1 STRING OF 8 MODULES (AXITEC AC-450MH/144V), MPPT #1, INV. #2 (SMA SB7.7-1SP-US-41)
1 STRING OF 8 MODULES (AXITEC AC-450MH/144V), MPPT #2, INV. #2 (SMA SB7.7-1SP-US-41)
1 STRING OF 8 MODULES (AXITEC AC-450MH/144V), MPPT #3, INV. #2 (SMA SB7.7-1SP-US-41)
1 STRING OF 8 MODULES (AXITEC AC-450MH/144V), MPPT #1, INV. #3 (SMA SB7.7-1SP-US-41)
1 STRING OF 8 MODULES (AXITEC AC-450MH/144V), MPPT #2, INV. #3 (SMA SB7.7-1SP-US-41)
1 STRING OF 8 MODULES (AXITEC AC-450MH/144V), MPPT #3, INV. #3 (SMA SB7.7-1SP-US-41)

(E) COMERCIALLY ZONED STRUCTURE

36" FIRE ACCESS PATHWAY (PURPLE HATCHED AREAS)

(N) PV ARRAY
180° AZIMUTH, 10° TILT, BALLAST MOUNT
(72) AXITEC AC-450MH/144V
(72) SMA JMS-F SUNSPEC RSD

(N) NEMA 3R JUNCTION BOX TRANSITION FROM PV WIRE TO #10 THWN-2 CU CONDUCTORS (TYP. OF 3)

(N) 0.75" EMT CONDUIT RAN ON ROOF SURFACE TO INVERTER (TYP. OF 3)

(E) MAIN SERVICE PANEL
120 / 240 / 208VAC, 3-Ø, 4-WIRE
"STINGER HIGH-LEG DELTA"
200A RATED BUSBAR
200A / 3P MAIN BREAKER
(N) SOLAR SHALL BE INTERCONNECTED VIA LINE-SIDE TAP AS PER NEC SECTIONS 240.21(B)(1) & NEC 705.12(A)
(LOC. ON INTERIOR)

(E) AC GROUNDING ELECTRODE
(6 FT. DRIVEN ROD IN GROUND)

(E) ONCOR POWER UTILITY METER
(LOC. ON EXTERIOR)

(N) FUSED AC DISCONNECT, 240VAC, NEMA 3R RATED
200A RATING, FUSIBLE, MODEL: SQUARE D D324NRB
EQUIP WITH (3) X 125A FUSES, 240VAC RATED,
THIS AC DISCONNECT SHALL FUNCTION AS THE MEANS OF DISCONNECT FOR THE LINE-SIDE TAP
(LOC. ON EXTERIOR WITHIN 10 FEET OF UTILITY METER)

(N) 125A RATED LOAD CENTER (PV-LOADS ONLY)
3-ϕ , 4-WIRE, 240VAC, MAIN LUG ONLY
NEMA 3R OUTDOOR RATED
(LOC. ON EXTERIOR)

(N) STRING INVERTER, TYP. OF 3
MODEL: SMA SB7.7-1SP-US-41
(LOC. ON EXTERIOR)

A / PV-2 SITE PLAN
SCALE: 1" = 11'-0"

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STATE OF TEXAS
RUSSELL N. EMERY
136827
LICENSED
PROFESSIONAL ENGINEER

05/18/2022
Firm License Number: F11411
VSE Project Number: U2717-0039-221

Vector Structural Engineering has reviewed the existing structure with loading from the solar array. The design of the racking system, racking connections, ballast weight, and all other structural is by others. Mechanical, architectural, and all other nonstructural aspects of the design are by others. Electrical is by others, unless stamped by Dean Levorsen.

(LOGO WITHHELD FOR SAMPLE)

(INFO WITHHELD)
PHONE: (INFO WITHHELD)
LICENSE NO. (INFO WITHHELD)

NEW GRID-TIED SYSTEM 32.40kW

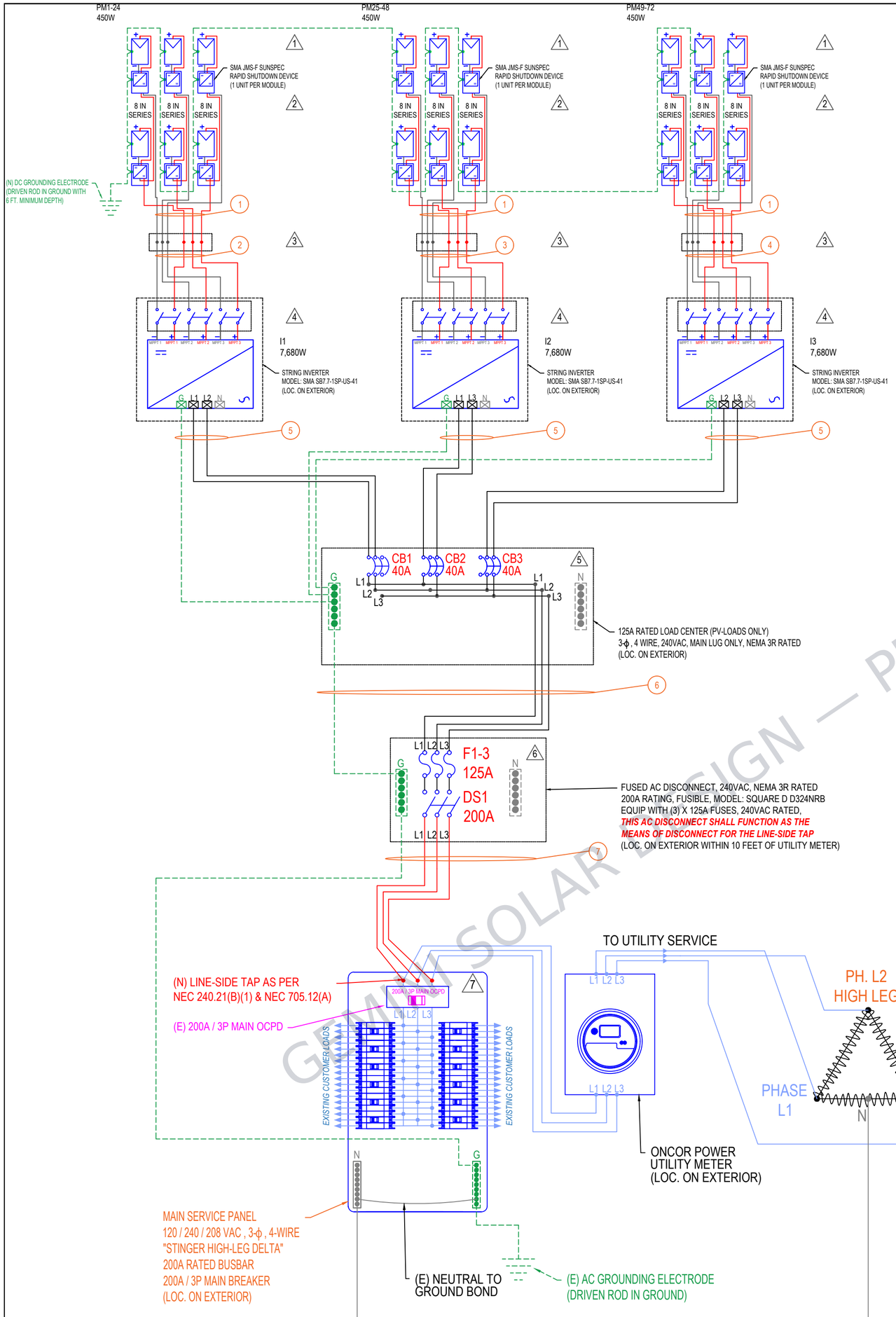
(INFO WITHHELD FOR PUBLIC SAMPLE)

SHEET SIZE
ANSI EXPAND C (22" X 17")

SITE PLAN

PROJECT NO: GSD-20220318-174098
DRAWN BY: SCM
DATE: 3/18/2022

PV-2



PLEASE SEE SHEET PV-3B FOR THE CORRESPONDING DATA AND EQUIPMENT SPECIFICATIONS FOR THIS THREE LINE DIAGRAM.

PLEASE SEE SHEET PV-3C FOR THE CORRESPONDING WIRE AND CONDUCTOR SCHEDULE FOR THIS THREE LINE DIAGRAM.

SEPARATE SHEETS WERE CREATED DUE TO SPACE LIMITATIONS.

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ELECTRICAL ONLY

STATE OF TEXAS
DEAN PAUL LEVORSEN
119319
LICENSED
PROFESSIONAL ENGINEER

05/27/2022

Firm License Number: F11411

VSE Project Number: U2717-0039-221

A
PV-3A
THREE-LINE DIAGRAM
SCALE: N/A

(LOGO WITHHELD FOR SAMPLE)

(INFO WITHHELD)
PHONE: (INFO WITHHELD)
LICENSE NO. (INFO WITHHELD)

CONFIDENTIAL: THE INFORMATION CONTAINED IN THIS DRAWING SET IS CONFIDENTIAL AND SHALL NOT BE DISCLOSED IN FULL OR IN PART TO ANYONE EXCEPT THOSE INVOLVED IN THE DESIGN AND INSTALLATION OF THE PV SYSTEM REPRESENTED IN THIS PLAN.

NEW GRID-TIED SYSTEM 32.40kW

(INFO WITHHELD FOR PUBLIC SAMPLE)

SHEET SIZE

ANSI EXPAND C (22" X 17")

THREE-LINE DIAGRAM

PROJECT NO: GSD-20220318-174098
DRAWN BY: SCM
DATE: 3/18/2022

PV-3A

PHOTOVOLTAIC MODULE

REF.	TYP.	MODULE	STC POWER	PTC POWER	ISC	IMP	VOC	VMP	FUSE RATING
PM1-72	72	AXITEC AC-450MH/144V	450W	419.84W	11.48A	10.88A	50.10V	41.39V	20A

STRING INVERTER

REF.	TYP.	INVERTER	GROUND	AC VOLTAGE	OCPD SIZE	MAX OUTPUT POWER	MAX AC CURRENT	# OF MPPT TRACKER	MAX. SHORT CIRCUIT CURRENT PER MPPT	MAX INPUT VOLTAGE	CEC WEIGHTED EFFICIENCY
I1, I2, I3	3	SMA SB7.7-1SP-US-41	UNGROUNDED	240VAC	40A	7,680W	32A	3	18A PER MPPT	600VDC	97.0%

MODULE LEVEL RAPID SHUTDOWN

REF.	TYP.	RATED DC INPUT POWER	MAXIMUM CONTINUOUS INPUT CURRENT I_MAX	OUTPUT POWER RANGE	MAXIMUM OUTPUT VOLTAGE	CERTIFICATION
SMA JMS-F SUNSPEC RSD DEVICE	72	600W	15A	0 W TO 600 W	60V	UL 1741 RAPID SHUTDOWN EQUIPMENT

SYSTEM SUMMARY (TOTAL SYSTEM)

	INVERTER #1	INVERTER #2	INVERTER #3
ARRAY STC POWER	10,800W	10,800W	10,800W
ARRAY PTC POWER	10,076W	10,076W	10,076W
ARRAY CIRCUITS	1 X 8 (MPPT #1) / 1 X 8 (MPPT #2) / 1 X 8 (MPPT #3)	1 X 8 (MPPT #1) / 1 X 8 (MPPT #2) / 1 X 8 (MPPT #3)	1 X 8 (MPPT #1) / 1 X 8 (MPPT #2) / 1 X 8 (MPPT #3)
ARRAY VMP	331V (MPPT #1) / 331V (MPPT #2) / 331V (MPPT #3)	331V (MPPT #1) / 331V (MPPT #2) / 331V (MPPT #3)	331V (MPPT #1) / 331V (MPPT #2) / 331V (MPPT #3)
ARRAY VOC	401V (MPPT #1) / 401V (MPPT #2) / 401V (MPPT #3)	401V (MPPT #1) / 401V (MPPT #2) / 401V (MPPT #3)	401V (MPPT #1) / 401V (MPPT #2) / 401V (MPPT #3)
ARRAY VMP @ DESIGN HIGH TEMP. OF 37°C	**286V (MPPT #1) / 286V (MPPT #2) / 286V (MPPT #3)**	**286V (MPPT #1) / 286V (MPPT #2) / 286V (MPPT #3)**	**286V (MPPT #1) / 286V (MPPT #2) / 286V (MPPT #3)**
ARRAY VOC @ DESIGN LOW TEMP. OF -9°C	**438V (MPPT #1) / 438V (MPPT #2) / 438V (MPPT #3)**	**438V (MPPT #1) / 438V (MPPT #2) / 438V (MPPT #3)**	**438V (MPPT #1) / 438V (MPPT #2) / 438V (MPPT #3)**
ARRAY IMP	10.88A (MPPT #1) / 10.88A (MPPT #2) / 10.88A (MPPT #3)	10.88A (MPPT #1) / 10.88A (MPPT #2) / 10.88A (MPPT #3)	10.88A (MPPT #1) / 10.88A (MPPT #2) / 10.88A (MPPT #3)
ARRAY ISC	11.48A (MPPT #1) / 11.48A (MPPT #2) / 11.48A (MPPT #3)	11.48A (MPPT #1) / 11.48A (MPPT #2) / 11.48A (MPPT #3)	11.48A (MPPT #1) / 11.48A (MPPT #2) / 11.48A (MPPT #3)
MAX AC OUTPUT CURRENT	32A @ 240VAC	32A @ 240VAC	32A @ 240VAC
DERATED AC POWER OUTPUT	7,680W	7,680W	7,680W
TOTAL ARRAY STC POWER	32,400W		
TOTAL ARRAY PTC POWER	30,228W		
TOTAL MAX AC OUTPUT CURRENT	96A @ 240VAC		
TOTAL DERATED AC POWER OUTPUT	23,040W		

OCPD SCHEDULE

REF.	TYP.	POLES	CURRENT RATING	RATED VOLTAGE
CB1 (BACKFED SOLAR BREAKER, INVERTER #1)	1	3 | (USE ONLY L1, L2)	40A	240VAC
CB2 (BACKFED SOLAR BREAKER, INVERTER #2)	1	3 | (USE ONLY L1, L3)	40A	240VAC
CB3 (BACKFED SOLAR BREAKER, INVERTER #3)	1	3 | (USE ONLY L2, L3)	40A	240VAC
F1-3 (FUSES FOR AC SOLAR DISCONNECT)	3	N/A	125A	240VAC

DISCONNECT SCHEDULE

REF.	TYP.	POLES	CURRENT RATING	MAX. VOLTAGE
DS1 (SQUARE D D324NRB)	1	3	200A	240VAC

SCHEMATIC NOTES

1. MAXIMUM OPEN CIRCUIT VOLTAGE OF ARRAY AT DESIGN LOW TEMPERATURE OF -9°C WOULD BE 438VDC.
2. THE SMA JMS-F SUNSPEC RSD DEVICE SHALL BE USED TO MEET THE RAPID SHUTDOWN REQUIREMENT AS OUTLINED BY NEC SECTION 690.12. THE DEVICE IS A MODULE LEVEL RAPID SHUTDOWN SOLUTION.
3. NEMA 3R RATED JUNCTION BOX RATED FOR 600VDC MUST HAVE NOTE: "WARNING ELECTRIC SHOCK HAZARD. THE DC CONDUCTORS OF THIS PHOTOVOLTAIC SYSTEM ARE UNGROUNDED AND MAY BE ENERGIZED."
4. INTEGRATED DC DISCONNECT IS PROVIDED WITH INVERTER. DISCONNECT IS LISTED FOR USE WITH SMA UL 1741 LISTED STRING INVERTERS.
5. OUTPUT OF THE THREE (3) STRING INVERTERS SHALL BE BACKFED VIA CIRCUIT BREAKER INTO A 125A RATED LOAD CENTER. THIS LOAD CENTER SHALL BE FOR SOLAR-LOADS ONLY. PLEASE SEE THE OCPD SCHEDULE FOR THE RESPECTIVE BREAKER SIZES FOR EACH INVERTER OUTPUT CIRCUIT.
6. FUSED AC DISCONNECT SHALL HAVE THE FOLLOWING SPECS;

   MODEL: SQUARE D D324NRB OR EQVNT, 3-ϕ , 4-WIRE, 3-POLE
   200A RATING, EQUIP WITH (3) X 125A FUSES, 240VAC RATED

   THIS FUSED AC DISCONNECT SHALL FUNCTION AS THE MEANS OF DISCONNECTION FOR THE LINE-SIDE TAP. THE DISCONNECT SHALL BE VISIBLE AND ACCESSIBLE AS PER UTILITY & LOCATED WITHIN 10 FEET OF THE UTILITY METER.
7. LINE SIDE TAP POINT OF INTERCONNECTION SHALL TAKE PLACE BETWEEN THE MAIN UTILITY DISCONNECT AND THE UTILITY METER. AS PER NEC 240.21(B)(1) & NEC 705.12(A), LENGTH OF TAP CONDUCTORS SHALL NOT EXCEED 10 FEET
8. THIS UTILITY SERVICE IS A 120 / 240 / 208VAC, 3-Ø, 4-WIRE, STINGER HIGH-LEG DELTA SERVICE. THE HIGH LEG IS ON PHASE L2.

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ELECTRICAL ONLY

STATE OF TEXAS
DEAN PAUL LEVORSEN
119319
LICENSED
PROFESSIONAL ENGINEER

05/27/2022

Firm License Number: F11411

VSE Project Number: U2717-0039-221

A PV-3B THREE-LINE DIAGRAM
SCALE: N/A

(LOGO WITHHELD FOR SAMPLE)

(INFO WITHHELD)
PHONE: (INFO WITHHELD)
LICENSE NO. (INFO WITHHELD)

NEW GRID-TIED SYSTEM 32.40kW

(INFO WITHHELD FOR PUBLIC SAMPLE)

SHEET SIZE

ANSI EXPAND C (22" X 17")

THREE-LINE DIAGRAM

PROJECT NO: GSD-20220318-174098
DRAWN BY: SCM
DATE: 3/18/2022

PV-3B

CONDUCTOR SCHEDULE WITH NEC ELECTRICAL CALCULATIONS

ID	TYP	DESCRIPTION	CONDUCTOR	CONDUIT	NO. OF CURRENT CARRYING CNDRS. IN CNDT.	FILL %	RATED AMPS	OCPD	EGC	TEMP. CORR. FACTOR @ 90°C TEMP. RATING	FILL ADJ. FACTOR	CONT. CURRENT	MAX. CURRENT	TERMINAL RATING CHECK (ASSUME 75°C) SHALL EXCEED 1.25X CONT. CURRENT	BASE AMPACITY @ 90°C TEMP. RATING	CONDITIONS OF USE (COU) @ 90°C TEMP. RATING
1	9	PV SOURCE CIRCUIT: SERIES STRING OUTPUT TO JUNCTION BOX	12 AWG PV WIRE COPPER	***FREE AIR***	N/A	N/A	11.48A (I_SC)	N/A	***6 AWG BARE COPPER***	0.71 (59°C) (ROOF-TOP CONDITION)	1.0	14.35A (I_SC)	17.94A (I_SC)	25A > 17.94A **PASS**	**40A** ***(IN FREE AIR)***	**28.4A** ***(IN FREE AIR)***
2	1	PV SOURCE CIRCUIT (TRANSITIONED): JUNCTION BOX TO INVERTER #1	10 AWG THWN-2 COPPER	***0.75" DIA. EMT (ALL CONDUIT SHALL BE 7/8" MIN. ABOVE THE ROOF SURFACE)***	***6 3 X (DC +) 3 X (DC -) 3 DC CIRCUITS TO BE RAN IN SINGLE CONDUIT***	**23.8%**	11.48A (I_SC)	N/A	N/A	0.71 (59°C) (ROOF-TOP CONDITION)	0.8	14.35A (I_SC)	17.94A (I_SC)	35A > 17.94A **PASS**	***40A (IN CONDUIT)***	**22.72A** ***(IN CONDUIT)***
3	1	PV SOURCE CIRCUIT (TRANSITIONED): JUNCTION BOX TO INVERTER #2	10 AWG THWN-2 COPPER	***0.75" DIA. EMT (ALL CONDUIT SHALL BE 7/8" MIN. ABOVE THE ROOF SURFACE)***	***6 3 X (DC +) 3 X (DC -) 3 DC CIRCUITS TO BE RAN IN SINGLE CONDUIT***	**23.8%**	11.48A (I_SC)	N/A	N/A	0.71 (59°C) (ROOF-TOP CONDITION)	0.8	14.35A (I_SC)	17.94A (I_SC)	35A > 17.94A **PASS**	***40A (IN CONDUIT)***	**22.72A** ***(IN CONDUIT)***
4	1	PV SOURCE CIRCUIT (TRANSITIONED): JUNCTION BOX TO INVERTER #3	10 AWG THWN-2 COPPER	***0.75" DIA. EMT (ALL CONDUIT SHALL BE 7/8" MIN. ABOVE THE ROOF SURFACE)***	***6 3 X (DC +) 3 X (DC -) 3 DC CIRCUITS TO BE RAN IN SINGLE CONDUIT***	**23.8%**	11.48A (I_SC)	N/A	N/A	0.71 (59°C) (ROOF-TOP CONDITION)	0.8	14.35A (I_SC)	17.94A (I_SC)	35A > 17.94A **PASS**	***40A (IN CONDUIT)***	**22.72A** ***(IN CONDUIT)***
5	1	INVERTER #1, #2, #3 OUTPUTS: INVERTER #1, #2, #3 TO 125A SOLAR-ONLY LOAD CENTER	8 AWG THWN-2 COPPER	***0.75" DIA. EMT (EACH INVERTER OUTPUT IN ITS OWN EMT CONDUIT)***	***2 1 X (L1, L2) (EACH INVERTER OUTPUT IN ITS OWN EMT CONDUIT)***	**20.7%**	32A (I1) 32A (I2) 32A (I3)	40A / 3P (CB1) 40A / 3P (CB2) 40A / 3P (CB3)	***8 AWG THWN-2 COPPER***	0.91 (37°C) (GROUND-LEVEL CONDITION)	1.0	32A (I1) 32A (I2) 32A (I3)	40A (I1) 40A (I2) 40A (I3)	50A > 40A **PASS**	**55A** ***(IN CONDUIT)***	**50.05A** ***(IN CONDUIT)***
6	1	COMBINED OUTPUT OF INVERTERS: 125A SOLAR-ONLY LOAD CENTER TO 200A FUSED AC DISCONNECT	1 AWG THWN-2 COPPER	***1.50" DIA. EMT***	***3 1 X (L1, L2, L3)***	**25.5%**	96A	125A (F1-3) 200A / 3P (DS1)	***6 AWG THWN-2 COPPER***	0.91 (37°C) (GROUND-LEVEL CONDITION)	1.0	96A	120A	130A > 120A **PASS**	**150A** ***(IN CONDUIT)***	**136.5A** ***(IN CONDUIT)***
7	1	FUSED AC DISCONNECT OUTPUT: FUSED AC DISCONNECT TO ***LINE-SIDE TAP POINT OF CONNECTION AS PER NEC 240.21(B)(1) & NEC 705.12(A)***	1 AWG THWN-2 COPPER	***1.50" DIA. EMT***	***3 1 X (L1, L2, L3)***	**25.5%**	96A	N/A	***6 AWG THWN-2 COPPER***	0.91 (37°C) (GROUND-LEVEL CONDITION)	1.0	96A	120A	130A > 120A **PASS**	**150A** ***(IN CONDUIT)***	**136.5A** ***(IN CONDUIT)***

ALL CONDUCTORS, OCPD SIZES AND TYPES SPECIFIED ACCORDING TO NEC ARTICLES 690.8(A)(1), NEC ARTICLE 240, AND NEC ARTICLE 690.7.

VECTOR ENGINEERS
651 W. GALENA PARK BLVD. STE. 101
DRAPER, UTAH 84020
PHONE (801) 990-1775
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ELECTRICAL ONLY

STATE OF TEXAS
DEAN PAUL LEVORSEN
119319
LICENSED
PROFESSIONAL ENGINEER

05/27/2022

Firm License Number: F11411

VSE Project Number: U2717-0039-221

A PV-3C THREE-LINE DIAGRAM
SCALE: N/A

(LOGO WITHHELD FOR SAMPLE)

(INFO WITHHELD)
PHONE: (INFO WITHHELD)
LICENSE NO. (INFO WITHHELD)

NEW GRID-TIED SYSTEM 32.40kW

(INFO WITHHELD FOR PUBLIC SAMPLE)

SHEET SIZE

ANSI EXPAND C (22" X 17")

THREE-LINE DIAGRAM

PROJECT NO: GSD-20220318-174098
DRAWN BY: SCM
DATE: 3/18/2022

PV-3C

JUNCTION BOX

1 JUNCTION BOX

⚠ WARNING ⚠
ELECTRIC SHOCK HAZARD
THE DC CONDUCTORS OF THIS PHOTOVOLTAIC SYSTEM ARE UNGROUNDED AND MAY BE ENERGIZED

NEC 690.35(F)

2 JUNCTION BOX

DO NOT DISCONNECT UNDER LOAD

NEC 690.16(B)

3 JUNCTION BOX

⚠ WARNING ⚠
PHOTOVOLTAIC POWER SOURCE

NEC 690.35

INVERTERS #1, #2, #3

4 INVERTERS #1, #2, #3

PHOTOVOLTAIC SYSTEM
DC DISCONNECT

OPER. VOLTAGE (PER MPPT)	331 VDC
OPER. CURRENT (PER MPPT)	10.88 A
MAX SYSTEM VOLTAGE	438 VDC
SHORT CIR. CURRENT (PER MPPT)	11.48 A

NEC 690.53

5 INVERTERS #1, #2, #3

⚠ WARNING ⚠
ELECTRIC SHOCK HAZARD
THE DC CONDUCTORS OF THIS PHOTOVOLTAIC SYSTEM ARE UNGROUNDED AND MAY BE ENERGIZED

NEC 690.35(F)

6 INVERTERS #1, #2, #3

⚠ WARNING ⚠
ELECTRIC SHOCK HAZARD
IF GROUND FAULT IS INDICATED ALL NORMALLY GROUNDED CONDUCTORS MAY BE UNGROUNDED AND ENERGIZED

NEC 690.5(C)

7 INVERTERS #1, #2, #3

SOLAR INVERTER MAXIMUM RATING

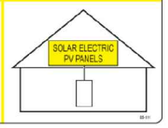
OPERATING CURRENT	32 AMPS
OPERATING VOLTAGE	240 VAC

NEC 690.54

9 INVERTERS #1, #2, #3

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



9 INVERTERS #1, #2, #3

SOLAR DC DISCONNECT

NEC 690.13(B)

RACEWAYS

10 RACEWAYS, CABLES PER 10 FT.

⚠ WARNING ⚠
PHOTOVOLTAIC POWER SOURCE

NEC 690.31(E)(3),(4)

FUSED AC DISCONNECT (DS1)

11 FUSED AC DISCONNECT (DS1)

⚠ WARNING ⚠
ELECTRIC SHOCK HAZARD
DO NOT TOUCH TERMINALS
TERMINALS ON BOTH THE LINE AND LOAD SIDES MAY BE ENERGIZED IN THE OPEN POSITION

NEC 690.17.4

12 FUSED AC DISCONNECT (DS1)

PHOTOVOLTAIC SYSTEM
AC DISCONNECT

OPERATING CURRENT	96 AMPS
OPERATING VOLTAGE	240 VOLTS

NEC 690.54

13 FUSED AC DISCONNECT (DS1)

⚠ WARNING ⚠
INVERTER OUTPUT CONNECTION
DO NOT RELOCATE THIS OVERCURRENT DEVICE

NEC 705.12(D)(7)

MAIN SERVICE PANEL

14 MAIN SERVICE PANEL

⚠ WARNING ⚠
DUAL POWER SUPPLY
SOURCES: UTILITY GRID AND PV SOLAR ELECTRIC SYSTEM

NEC 690.56(B)

15 MAIN SERVICE PANEL

THIS ELECTRIC SYSTEM IS ALSO SERVED BY A PHOTOVOLTAIC SYSTEM

NEC 705.12(D)(4)

SOLAR-ONLY LOAD CENTER

16 INVERTER #1 BACKFEED (CB1)

PHOTOVOLTAIC SYSTEM
AC DISCONNECT

OPERATING CURRENT	32 AMPS
OPERATING VOLTAGE	240 VOLTS

NEC 690.14(C)(2) & NEC 690.54

17 INVERTER #2 BACKFEED (CB2)

PHOTOVOLTAIC SYSTEM
AC DISCONNECT

OPERATING CURRENT	32 AMPS
OPERATING VOLTAGE	240 VOLTS

NEC 690.14(C)(2) & NEC 690.54

18 INVERTER #3 BACKFEED (CB3)

PHOTOVOLTAIC SYSTEM
AC DISCONNECT

OPERATING CURRENT	32 AMPS
OPERATING VOLTAGE	240 VOLTS

NEC 690.14(C)(2) & NEC 690.54

19 SOLAR-ONLY LOAD CENTER

⚠ WARNING ⚠
INVERTER OUTPUT CONNECTION
DO NOT RELOCATE THIS OVERCURRENT DEVICE

NEC 705.12(D)(7)

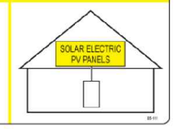
20 SOLAR-ONLY LOAD CENTER

⚠ WARNING ⚠
SOLAR ELECTRIC BREAKER IS BACKFED

21 SOLAR-ONLY LOAD CENTER

SOLAR PV SYSTEM EQUIPPED WITH RAPID SHUTDOWN

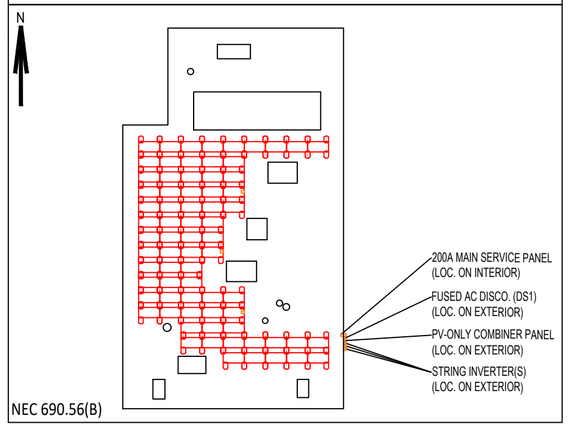
TURN RAPID SHUTDOWN SWITCH TO THE "OFF" POSITION TO SHUT DOWN PV SYSTEM AND REDUCE SHOCK HAZARD IN THE ARRAY



EXTERIOR OF UTILITY METER

22 EXTERIOR OF UTILITY METER

⚠ CAUTION ⚠
POWER TO THIS SERVICE IS ALSO SUPPLIED FROM THE FOLLOWING SOURCES WITH DISCONNECTS LOCATED AS SHOWN



NEC 690.56(B)

SIGNAGE REQUIREMENTS	
1	ALL PLACARDS AND SIGNAGE REQUIRED BY THE 2017 NATIONAL ELECTRICAL CODE, AND ANY OTHER STATE CODES OR LOCAL ORDINANCES WILL BE INSTALLED AS REQUIRED.
2	RED BACKGROUND
3	WHITE LETTERING
4	MINIMUM 3/8" LETTER HEIGHT
5	ALL CAPITAL LETTERS
6	AERIAL OR SIMILAR FONT
7	WEATHER RESISTANT MATERIAL, PER UL 969

VECTOR ENGINEERS
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VSE Project Number: U2717-0039-221

(LOGO WITHHELD FOR SAMPLE)

(INFO WITHHELD)
PHONE: (INFO WITHHELD)
LICENSE NO. (INFO WITHHELD)

NEW GRID-TIED SYSTEM 32.40kW

(INFO WITHHELD FOR PUBLIC SAMPLE)

SHEET SIZE
ANSI EXPAND C (22" X 17")

PLACARDS

PROJECT NO: GSD-20220318-174098
DRAWN BY: SCM
DATE: 3/18/2022

PV-4

A PV-4 PLACARDS
SCALE: N/A

UNIRAC

U-BUILDER PROJECT REPORT

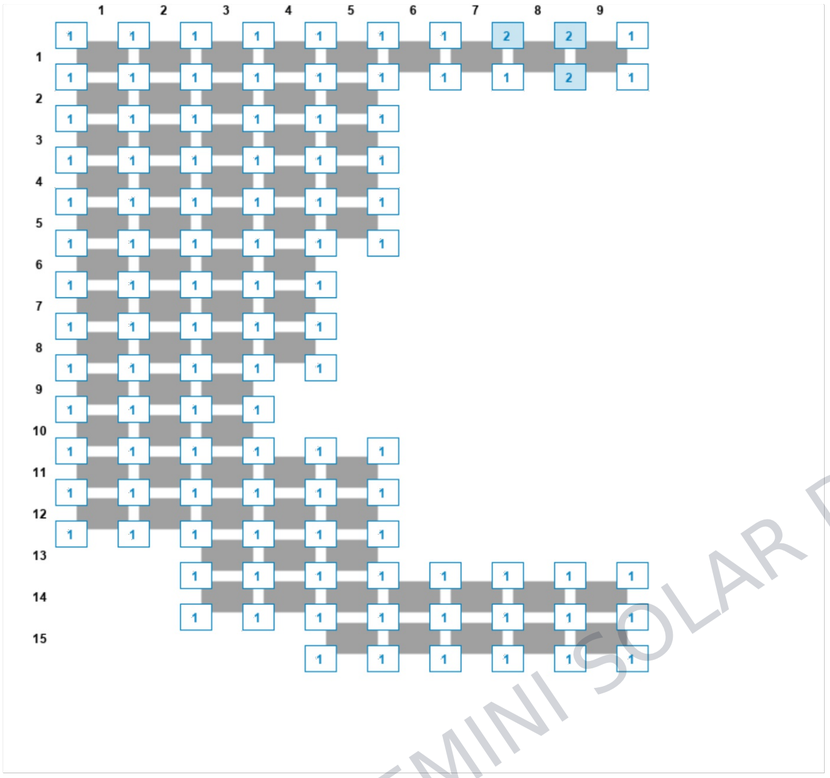
VERSION: 3.1.6

PROJECT TITLE	PROJECT ID	CREATED
EcoFoot2+	4F394AB9	March 7, 2022, 7:31 p.m.

NAME	EcoFoot2+
ADDRESS	Custom
CITY, STATE	72 - Custom
MODULE	1684.66 ft^2
	32.40 KW

INSTALLATION AND DESIGN PLAN

Roof Area 1 / Roof Area 1 - Array 1



LEGEND

Module

1 Standard corner bay with CMU block count

4 Supplemental bay with CMU block count

NOTE

Blocks above with values greater than 3 require extra ballast bays, except north-most bays which require extra bays for values greater than 6. The proper number of bays are provided in the Bill of Materials. The installer must install these extra bays as near to the indicated location as possible.

Layout Dimensions

NS DIMENSION	~ 75.51 ft
EW DIMENSION	~ 62.25 ft

ROW	MODULES	BAYS	BALLAST BLOCKS (CMU)	BALLAST WEIGHT (LBS)
1	9	10	12	384
2	5	10	11	352
3	5	6	6	192
4	5	6	6	192
5	5	6	6	192
6	4	6	6	192
7	4	5	5	160
8	4	5	5	160
9	3	5	5	160
10	3	4	4	128
11	5	6	6	192
12	5	6	6	192
13	3	6	6	192
14	7	8	8	256
15	5	8	8	256
16	0	6	6	192

A PV-5A UNIRAC ECOFOOT2+ INSTALLATION AND DESIGN PLAN
SCALE: N/A

(LOGO WITHHELD FOR SAMPLE)

(INFO WITHHELD)
PHONE: (INFO WITHHELD)
LICENSE NO. (INFO WITHHELD)

NEW GRID-TIED SYSTEM 32.40kW

(INFO WITHHELD FOR PUBLIC SAMPLE)

SHEET SIZE

ANSI EXPAND C (22" X 17")

DESIGN PLAN

PROJECT NO: GSD-20220318-174098
DRAWN BY: SCM
DATE: 3/18/2022

PV-5A

UNIRAC

U-BUILDER PROJECT REPORT

VERSION: 3.1.6

PROJECT TITLE	PROJECT ID	CREATED
EcoFoot2+	4F394AB9	March 7, 2022, 7:31 p.m.

NAME	EcoFoot2+
ADDRESS	Custom
CITY, STATE	72 - Custom
MODULE	1684.66 ft²
	32.40 KW

ENGINEERING REPORT

Plan review

AVERAGE PSF	3.11 psf
TOTAL NUMBER OF MODULES	72
TOTAL KW	32.40 KW
TOTAL MODULE AREA	~2600 ft²
TOTAL WEIGHT ON ROOF	8089 lbs
TOTAL RACKING WEIGHT	416 lbs
TOTAL MODULE WEIGHT	3778 lbs
TOTAL BALLAST WEIGHT	3392 lbs
TOTAL BALLAST BLOCK COUNT	106
MAX BAY LOAD (DEAD)	127 lbs
DEFLECTOR COUNT	72

Inspection

PRODUCT	TX-Arlington-The Sound Organization
MODULE MANUFACTURER	Custom
MODEL	Custom
MODULE WATTS	450 watts
MODULE LENGTH	82.44"
MODULE WIDTH	40.87"
MODULE THICKNESS	1.38"
MODULE WEIGHT	52.47 lbs
BALLAST BLOCK (CMU) WEIGHT	32.0 lbs
MAX BLOCKS PER BAY NORTH ROW	6
MAX BLOCKS PER BAY(EXCEPT NORTH ROW)	3
BUILDING HEIGHT	25.00 ft
ROOF TYPE	TPO
PARAPET HEIGHT	< 1/2 Array Height (< 5.5 inches)
SLIP SHEET	NO
ECOFOOT SURFACE	BARE

A PV-5B UNIRAC ECOFOOT2+ ENGINEERING REPORT
SCALE: N/A

(LOGO WITHHELD FOR SAMPLE)

(INFO WITHHELD)
PHONE: (INFO WITHHELD)
LICENSE NO. (INFO WITHHELD)

NEW GRID-TIED SYSTEM 32.40kW

(INFO WITHHELD FOR PUBLIC SAMPLE)

SHEET SIZE

ANSI EXPAND C (22" X 17")

ENGINEERING REPORT

PROJECT NO: GSD-20220318-174098
DRAWN BY: SCM
DATE: 3/18/2022

PV-5B

Loads Used for Design

BUILDING CODE	ASCE 7-10
BASIC WIND SPEED	115.00 mph
GROUND SNOW LOAD	5.00 psf
SEISMIC (SS)	0.08
ELEVATION	705.00 ft
WIND EXPOSURE	B
MRI	25
VELOCITY PRESSURE, QZ	16.64551364841338 psf

Loads Determined by Zip 76011

CITY, STATE	Arlington, TX
BASIC WIND SPEED	115.00 mph
GROUND SNOW LOAD	5.00 psf

Roof Area 1 - Array 1

AVERAGE PSF	3.11 psf
ROOF SLOPE:	0
TOTAL NUMBER OF MODULES:	72
TOTAL KW:	32.40 KW
TOTAL AREA:	2600 ft^2
TOTAL WEIGHT ON ROOF:	8089 lbs
RACKING WEIGHT:	416 lbs
TOTAL MODULE WEIGHT:	3778 lbs
BALLAST WEIGHT:	3392 lbs

MINIMUM SEISMIC SEPARATION (UNATTACHED ARRAYS) *	
ARRAY TO ARRAY:	3.0"
TO FIXED OBJECT ON ROOF:	6.0"
TO ROOF EDGE WITH QUALIFYING PARAPET:	6.0"
TO ROOF EDGE WITHOUT QUALIFYING PARAPET:	9.0"
MAX ARRAY (SEISMIC) (FOR UNATTACHED ARRAYS) *	
MAX NUMBER OF NORTH-SOUTH ROWS:	35
MAX NUMBER OF EAST-WEST COLUMNS:	56

*In jurisdictions that follow SEAOC PV-1 methodology.

UPLIFT

Ballast weight calculation for single selected module (row1, col1) for Uplift

Uplift Gcp	-0.26
Building Factor	1.00
Slope Adjustment Factor	1.00
Large Module Factor	1.00
Sub Array Factor	1.00
Modified Uplift Gcp	-0.26
Module Weight	52.47 lbs
Racking Weight	13.77 lbs
Uplift: 0.6*qh*Modified Gcp*Module area*cos(10)	59.83 lbs
Required Ballast : 0.6D = FV-0.6*(Module weight + Racking weight)	20.09 lbs
Ballast to be Provided : Required ballast/0.6	33.48 lbs

(LOGO WITHHELD FOR SAMPLE)

(INFO WITHHELD)
PHONE: (INFO WITHHELD)
LICENSE NO. (INFO WITHHELD)

NEW GRID-TIED SYSTEM 32.40kW

(INFO WITHHELD FOR PUBLIC SAMPLE)

SHEET SIZE

ANSI EXPAND C (22" X 17")

ENGINEERING REPORT

PROJECT NO: GSD-20220318-174098
DRAWN BY: SCM
DATE: 3/18/2022

A
PV-5C

UNIRAC ECOFOOT2+ ENGINEERING REPORT
SCALE: N/A

PV-5C

SLIDING

Ballast weight calculation for single selected module (row1, col1) for Sliding

Drag Gcp	1.38
Uplift Gcp for Drag	0.54
Area Reduction Factor	0.17
Building Factor	1.00
Large Module Factor	1.00
Modified Drag Gcp	0.24
Modified Uplift Gcp For Drag	0.09
Module Area	23.40 ft^2
Module Area for Drag	4.06 ft^2
Module Area for Uplift	23.04 ft^2
Module Tilt	0°
Friction Coefficient	0.48
Weight on Module: module_weight + racking_weight_per_module	63.49 lbs
Drag Load on Module : (0.6 * Qz * (Modified Drag Gcp * Module area for drag * (1 / Friction coefficient) + Modified uplift Gcp for drag * Module area for uplift) - 0.6 * weight_on_module) * 1/0.6	5.42 lbs

SLIDING CONDITION FOR THE ARRAY

Total Ballast Required for Sliding	108.79 lbs
Total Ballast Required for Uplift	3392.00 lbs
No Additional Ballast Required for sliding	

Ecofoot2Plus WIND DESIGN DETAIL

Velocity Pressure Exposure Coefficient, Kz	0.67	Table 27.3-1 (ASCE 7-10)
Ground Elevation Factor, Ke	1.00	
Wind Directionality Factor, Kd	0.85	Table 26.6-1 (ASCE 7-10)
Topographic Factor, Kzt	1.00	Section 26.8.2 (ASCE 7-10)
MRI Factor, Fc	0.86	Section 26.8.2 (ASCE 7-10)
Numerical Coefficient	0.002555	Section 26.8.2 (ASCE 7-10)
Velocity Pressure, qz	16.65 psf	Section 27.3.2 (ASCE 7-10)

(LOGO WITHHELD FOR SAMPLE)

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PHONE: (INFO WITHHELD)
LICENSE NO. (INFO WITHHELD)

NEW GRID-TIED SYSTEM 32.40kW

(INFO WITHHELD FOR PUBLIC SAMPLE)

SHEET SIZE

ANSI EXPAND C (22" X 17")

ENGINEERING REPORT

PROJECT NO: GSD-20220318-174098
DRAWN BY: SCM
DATE: 3/18/2022

EcoFoot2+ U-BUILDER PRODUCT ASSUMPTIONS

EcoFoot2+ – Ballasted Flat Roof Systems

Limitations of Responsibility: It is the user's responsibility to ensure that inputs are correct for your specific project.
Unirac is not the solar, electrical, or building engineer of record and is not responsible for the solar, electrical, or building design for this project.

Building Assumptions

1. Roof Slope ≥ 0° (0:12) and ≤ 3° (5/8:12) for Seismic Design Category C, D, E and F. For low seismic regions Seismic Design Category A and B (provided Array Importance factor = 1.0), Roof Slope ≥ 0° (0:12) and ≤ 7° (1 1/2:12).
2. Roofing Material Types: Mineral Cap EDPM, PVC, TPO, or Tar & Gravel
3. Surrounding Building Grade: Level

Ballast Blocks

The installer is responsible for procuring the ballast blocks (Concrete Masonry Units – CMU) and verifying the required minimum weight needed for this design. CMU should comply with ASM standard specification for concrete roof pavers designation (C1491 or C90 with an integral water repellent suitable for the climate it is placed. It is recommended that the blocks are inspected periodically for any signs of degradation. If degradation of the block is observed, the block should immediately be replaced.
The CMU ballast block should have nominal dimensions of 4"x8"x16". The actual block dimensions are 3/8" less than the nominal dimensions. Ballast blocks should have a weight as specified for the project in the "Inspection" section of this report.

Design Parameters

1. Risk Category II
2. Wind Design
   a. Basic Wind Speed: 85-180 mph (ASCE 7-10)/85-180 mph (ASCE 7-16)
   b. Exposure: B, C or D (ASCE 7-10/ASCE 7-16)
   c. 25year Design Life/50year Design Life for ASCE 7-10, 50year Design Life for ASCE 7-16.
   d. Elevation: Insertion of the project at - grade elevation can result in a reduction of wind pressure. If your project is in a special case study region or in an area where wind studies have been performed, please verify with your jurisdiction to ensure that elevation effects have not already been factored into the wind speed. If elevation effects have been included in your wind speed, please select 0 ft as the project site elevation.
   e. Wind Tunnel Testing: Wind tunnel testing coefficients have been utilized for design of the system.
3. Snow Design
   a. Ground Snow Load: 0-60psf (ASCE 7-10/ASCE 7-16)
   b. Exposure Factor: 0.9
   c. Thermal Factor: 1.2
   d. Roof Snow Load: Calculation per Section 7.3 (ASCE 7-10/ASCE 7-16)
   e. Unbalanced/Drifting/Sliding: Results are based on the uniform snow loading and do not consider unbalanced, drifting, and sliding conditions
4. Seismic Design
   a. Report *SEAOC PV1-2012/ASCE 7-16 SECTION 13.6.12 – Structural Seismic Requirements and Commentary for Rooftop Solar Photovoltaic Arrays*
   b. Seismic Site Class: A, B, C, or D (ASCE 7-10/ASCE 7-16)
   c. Importance Factor Array (Ip): 1.0
   d. Importance Factor Building (Ie): 1.0
   e. Site Class: D

Properties

1. Bay Weight: ~4.04 lbs
2. Module Gaps (E/W) = 0.5 in
3. Bays: North row bays overhang the module by ~22.5 inches.

Testing

1. Coefficient of Friction
2. Wind Tunnel
3. UL 2703
4. Component Testing (Bay and Clamp)

Setbacks

For the wind tunnel recommendations in U-Builder to apply, the following setbacks should be observed/followed for U-Builder wind design:

1. Modules should be placed a minimum of 3 feet from the edge of the building in any direction and maximum setback distance is 0.5 * building height.
2. If the array is located near an obstruction that is 3.5 feet wide and 3.5 feet high or larger, the nearest module of the array must be located a distance from the obstruction that is greater than or equal to the height of the obstruction. Exception: When using ASCE 7-16 Building Code and using the obstruction feature in the module editor to accurately model the size and location of obstruction.
3. Installations within the setbacks listed above require site specific engineering[2]
4. The setbacks above are for wind. High seismic areas, fire access isles, mechanical equipment, etc., may require larger setbacks than listed above for wind.

Site Specific Engineering

Conditions listed below are beyond the current capabilities of U-Builder. Site specific engineering is required.

1. Wind designs for a project design life exceeding 25 years[1]/ASCE 7-16
2. Building assumptions and design parameters outside of U-Builder assumptions[2]
3. Attachments[2]
4. Risk Category III or IV projects (U-Builder can be adjusted for the correct wind, but not the seismic or snow design)[2]
5. Wind tunnel testing reduction factors are not permitted by the Authority Having Jurisdiction (AHJ)[3]
6. Seismic designs that fall outside SEAOC PV1-2012/ASCE 7-16 SECTION 13.6.12 recommendations (>3% roof slope, or AHJ's that require shake table testing or non-linear site-specific response history analysis)[3]
7. Signed and sealed site-specific calculations, layouts, and drawings[3]

Notes:

[1]Please contact info@unirac.com.
[2] Please contact EngineeringServices@unirac.com for more information.
[3]Please contact Theresa Allen with PZSE Structural Engineers at theresa@pzse.com. These items will require direct coordination with PZSE to complete the requested services.

A PV-5E UNIRAC ECOFOOT2+ ENGINEERING REPORT
SCALE: N/A

(LOGO WITHHELD FOR SAMPLE)

(INFO WITHHELD)
PHONE: (INFO WITHHELD)
LICENSE NO. (INFO WITHHELD)

NEW GRID-TIED SYSTEM 32.40kW

(INFO WITHHELD FOR PUBLIC SAMPLE)

SHEET SIZE
ANSI EXPAND C (22" X 17")

ENGINEERING REPORT

PROJECT NO: GSD-20220318-174098
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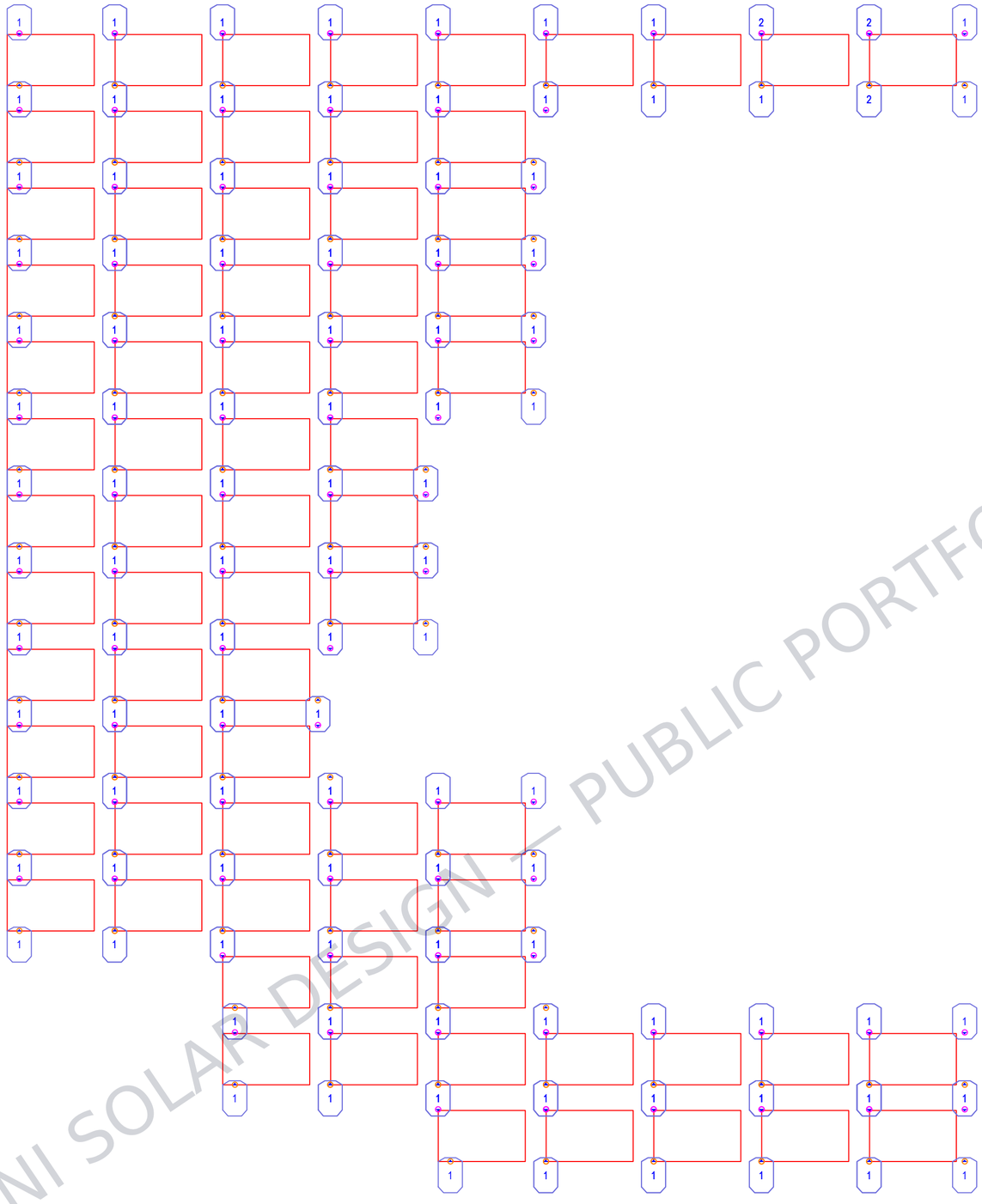
PV-5E



UPLIFT BALLAST MAP

Legend

N — Number of blocks in each bay

A / PV-5F — UNIRAC ECOFOOT2+ UPLIST BALLAST MAP
SCALE: N/A

(LOGO WITHHELD FOR SAMPLE)

(INFO WITHHELD)
PHONE: (INFO WITHHELD)
LICENSE NO. (INFO WITHHELD)

NEW GRID-TIED SYSTEM 32.40kW

(INFO WITHHELD FOR PUBLIC SAMPLE)

SHEET SIZE
ANSI EXPAND C (22" X 17")

UPLIST BALLAST MAP

PROJECT NO: GSD-20220318-174098
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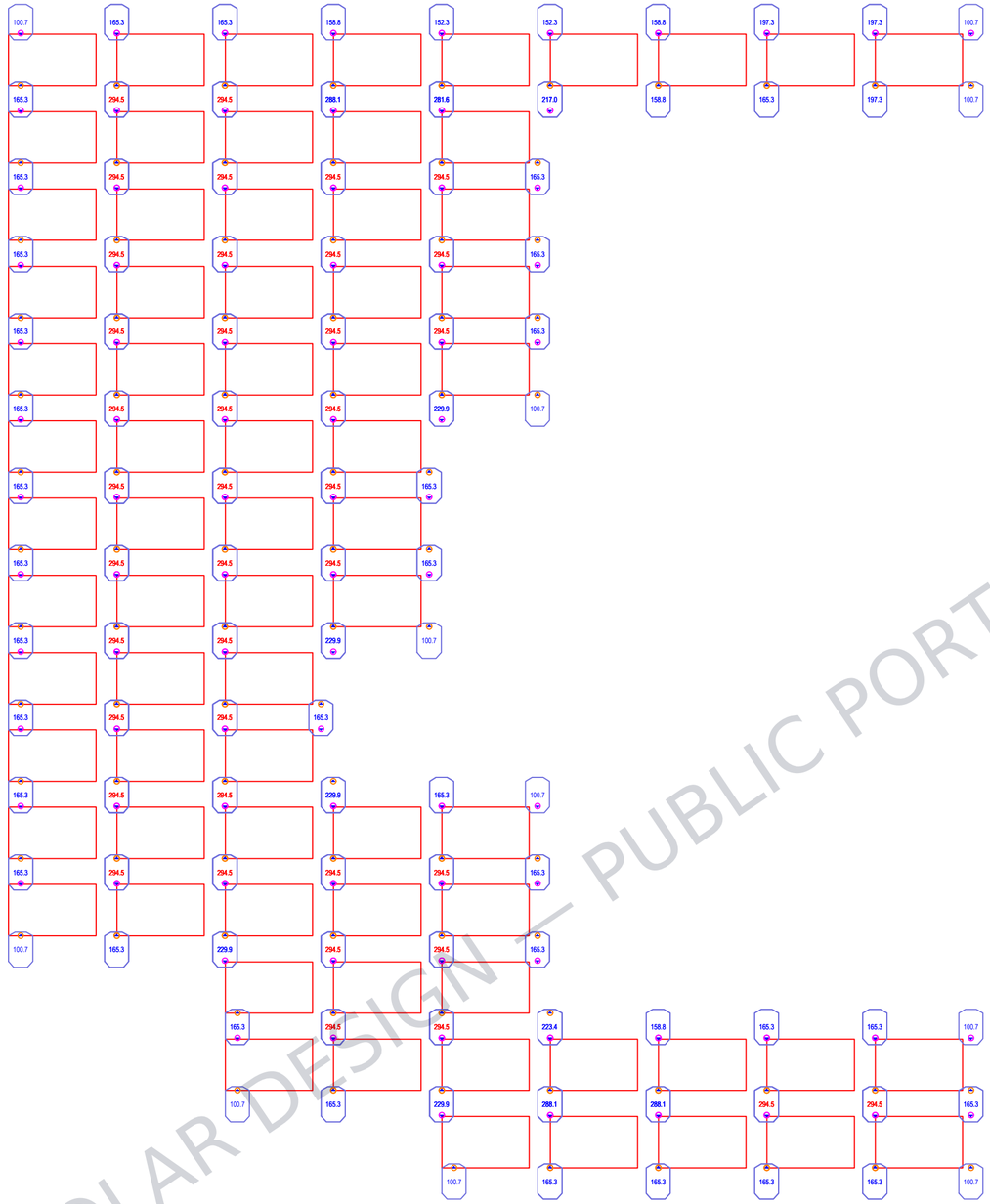
DATE: 3/18/2022

PV-5F



DOWNPOINT LOAD MAP

Legend

N — Bay - Downpoint load

N — Bay - Maximum downpoint load

A / PV-5G — UNIRAC ECOFOOT2+ DOWNPOINT LOAD MAP
SCALE: N/A

(LOGO WITHHELD FOR SAMPLE)

(INFO WITHHELD)
PHONE: (INFO WITHHELD)
LICENSE NO. (INFO WITHHELD)

NEW GRID-TIED SYSTEM 32.40kW

(INFO WITHHELD FOR PUBLIC SAMPLE)

SHEET SIZE
ANSI EXPAND C (22" X 17")

DOWNPOINT LOAD MAP

PROJECT NO: GSD-20220318-174098
DRAWN BY: SCM
DATE: 3/18/2022

PV-5G

UNIRAC

U-BUILDER PROJECT REPORT

VERSION: 3.1.6

PROJECT TITLE	PROJECT ID	CREATED
EcoFoot2+	4F394AB9	March 7, 2022, 7:31 p.m.

NAME	EcoFoot2+
ADDRESS	Custom
CITY, STATE	72 - Custom
MODULE	1684.66 ft^2
	32.40 KW

BILL OF MATERIALS

LEGEND: ■ Base System Part ■ Accessory

PART NUMBER	PART TYPE	DESCRIPTION	QUANTITY	SUGGESTED QUANTITY	UNIT PRICE (USD)	TOTAL LIST PRICE (USD)
ES20207	Base	EcoFoot2+ Base	103	103	19.40	1998.20
ES10466	Clamp	EcoFoot Universal Clamp Kit	87	87	17.95	1561.65
ES20311H	Wind Deflector	Ecofoot2+ 86" Wind Deflector	72	72	21.93	1578.96
008009P	Wire Management	Ilsco Lay in Lug	1	1	6.98	6.98
ES10378	Wire Management	38" Bonding Jumper	14	14	5.85	81.90
User Supplied	Ballast Block	BALLAST BLOCK	106	106	0.00	0.00

BASE SYSTEM PRICE	ACCESSORIES PRICE	TOTAL PRICE
$5227.69	$0.00	$5227.69
$0.163 PER WATT	$0.000 PER WATT	$0.163 PER WATT

This design is to be evaluated to the product appropriate Unirac Code Compliant Installation Manual which references International Building Code 2009, 2012, 2015, 2018 and ASCE 7-05, ASCE 7-10, ASCE 7-16 and California Building Code 2010, 2016. The installation of products related to this design is subject to requirements in the above mentioned installation manual.

DETAILED PARTS DESCRIPTION

QTY

Base ES20207 EcoFoot2+ Base — 103

EcoFoot2+ Base Supports Modules at 10° in Landscape, and 5° in Portrait.

Clamp ES10466 EcoFoot Universal Clamp Kit — 87

Upper and Lower Pre-assembled Universal Clamps for 32-50 mm modules. Includes 2 Clevis Pins.

Wind Deflector ES20311H Ecofoot2+ 86" Wind Deflector — 72

EcoFoot2+ 86" Wind Deflector for 72-Cell Landscape. G90 Galvanized Steel

Wire Management 008009P Ilsco Lay in Lug — 1

Bonds ground wire to racking or module frame.

Wire Management ES10378 38" Bonding Jumper — 14

Ecofoot 2+ only and is one per row minus one row per array

Ballast Block UserSupplied BALLAST BLOCK — 106

Standard 4x8x16 inch cap blocks. Nationwide availability. Please confirm the weight of your ballast block as this will affect the total blocks required for your installation.

(LOGO WITHHELD FOR SAMPLE)

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NEW GRID-TIED SYSTEM 32.40kW

(INFO WITHHELD FOR PUBLIC SAMPLE)

SHEET SIZE

ANSI EXPAND C (22" X 17")

BILL OF MATERIALS

PROJECT NO: GSD-20220318-174098
DRAWN BY: SCM
DATE: 3/18/2022

PV-5H

A
PV-5H
UNIRAC ECOFOOT2+ BILL OF MATERIALS
SCALE: N/A

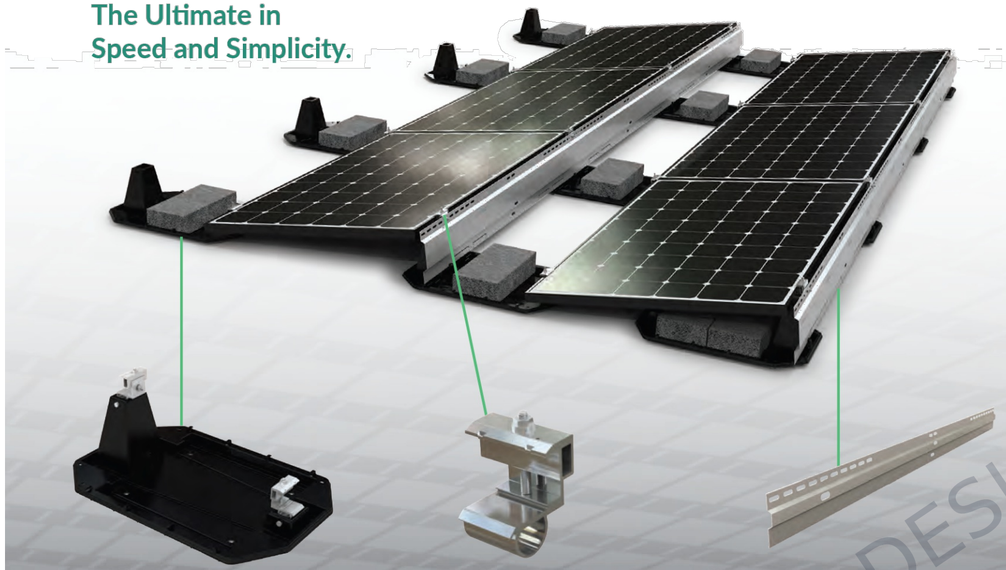
EcoFoot2+®

Ballasted Racking System

Installer-Preferred for Low-Slope Roofs

Three Main Components.

The Ultimate in Speed and Simplicity.



Base

UL-Listed ASA based resin is a durable material commonly used for automotive and construction products. Wire Clips are built-in for easy wire management. Class A fire rated and UL2703 Certified.

Universal Clamp

The preassembled Universal Clamp is ready to go right out of the box. Simply drop the Clamp into the Base. Integrated Bond Pin achieves integrated grounding without the use of grounding washers. Fits 30-50mm module frames with a single component.

Wind Deflector

Corrosion-resistant wind deflector on every module helps minimize uplift, reduce ballast requirements and carries UL2703 validated ground path from modules and racking components.

Ecolibrium Solar

Contact: 740.249.1877 | sales@ecolibriumsolar.com | www.ecolibriumsolar.com

Pure Performance

Unbeatable, Right Out of the Box.

No other racking products install flat roof arrays better than EcoFoot2+ Racking Solution. Installers prefer EcoFoot2+ because it's fast, simple, and durable. The line-up is unbeatable:

- Ready-to-go, preassembled components and simple installation
- No PV panel prep required: bases self-align
- Low-effort roof layout, just two chalk lines required
- No training required, 5-minute learning curve

Master the Most Challenging Rooftop

Stackable Bases fit up to 50kW of Bases delivered on a standard pallet.

System Benefits

- Low part count
- Rapid system deployment
- Preassembled Universal Clamp
- Increased design flexibility
- More ballast capacity
- Simplified logistics
- Ship up to 50kW per pallet

Validation Summary

- Certified to UL2703 Fire Class A for Type I and II modules
- Certified to UL2703
- Grounding and Bonding
- Wind tunnel tested to 150mph
- SEAOC seismic compliant
- CFD and structurally tested
- DNV GL rated at 13.5 panels per installer-hour

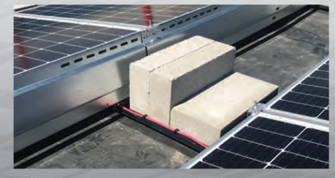
Technical Specifications

Dimensions: 26.5"L x 18.25"W x 8.3"H
Typical System Weight: 3.5–6 lbs. per sq. ft.
Module orientation: Landscape/Portrait
Tilt angle: Landscape 10°/Portrait 5°
Module inter-row spacing: 18.9”
Roof pitch: 0° to 7°
Clamping range: 30-50mm
Ballast requirements: 4" x 8" x 16"
Warranty: 25 years
Slip sheets: not required by Ecolibrium Solar.
If required by roofer, use 20"x29" under Base.

Commercial

Residential

Design Flexibility



Wire Management Built-In

Ecolibrium Solar

740-249-1877 | www.ecolibriumsolar.com
507 Richland Avenue, Athens, OH 45701

EcoFoot2+ Sales Sheet v2.1 121919

(LOGO WITHHELD FOR SAMPLE)

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NEW GRID-TIED SYSTEM 32.40kW

(INFO WITHHELD FOR PUBLIC SAMPLE)

SHEET SIZE
ANSI EXPAND C (22" X 17")

RACKING DATASHEET

PROJECT NO: GSD-20220318-174098
DRAWN BY: SCM
DATE: 3/18/2022

A PV-6 UNIRAC ECOFOOT2+ BALLAST MOUNT DATASHEET
SCALE: N/A

PV-6

ADDENDUM C Grounding & Bonding

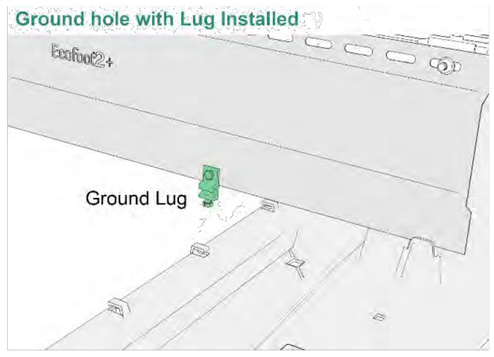
The EcoFoot2+ system has been tested by TüV Rheinland and conforms to UL 2703 for Grounding and Bonding when installed per the published installation instructions.

EcoFoot2+ carries module-to-module ground bond through the Wind Deflector, Item E listed in the "EcoFoot2+ Core Components" table in this document.

Each row of modules/wind deflectors in an array of up to 400 modules must be grounded per the NEC and ANSI/NFPA 70 either through the designated ground hole in the Wind Deflector, or by drilling a ¼" ground hole into the Wind Deflector a minimum of ½" from any edge. One Ground Lug is required for every 400 modules connected within an array.

Ecolibrium Solar recommends using #6 copper ground wire in conjunction with WEEB grounding devices such as the WEEB-LUG-6.7 or WEEB DSK516. Lugs are a single use component.

Other grounding methods must be reviewed and approved by a licensed master electrician or electrical engineer and Authority Having Jurisdiction (AHJ).



Green lines represent ground bond path. Wind Deflectors carry module-to-module east/west ground bond. Bonding jumpers carry row-to-row north/south ground bond.

(LOGO WITHHELD FOR SAMPLE)

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LICENSE NO. (INFO WITHHELD)

NEW GRID-TIED SYSTEM 32.40kW

(INFO WITHHELD FOR PUBLIC SAMPLE)

SHEET SIZE
ANSI EXPAND C (22" X 17")

GROUNDING DETAILS

PROJECT NO: GSD-20220318-174098
DRAWN BY: SCM
DATE: 3/18/2022

A
PV-7A
UNIRAC ECOFOOT2+ GROUNDING & BONDING
SCALE: N/A

PV-7A

TÜV Rheinland PTL

Business Stream Products
Renewable and Solar Technology

Attn: Ben Stuart
Ecolibrium Solar Inc.
340 W State St, Unit 22
Athens, OH 45701

Email:
agunnoe@us.tuv.com

July 22, 2016

Letter of Compliance for UL 1703 System Fire Test

Type of Equipment: PV Module Mounting System
Model Designation: Ecofoot2+ (black resin, Resin 2)
TÜV Rheinland Project Number: ELS151221
Test Requirement: UL 1703 October 2015, §31.2

This letter is confirmation that the **Ecolibrium Solar Inc. Ecofoot2+ (black resin, Resin 2)**, when installed over a Class A Low Slope roof deck, has successfully completed fire testing according to UL 1703 ed. 3 R20151012, §31.2.

Congratulations on this achievement.

The Ecofoot2+ (black resin, Resin 2) PV Mounting System has demonstrated compliance with a Class A Fire Rating when installed with the following PV module Fire Classification Types:

- Type 1
- Type 2

Complete test results, including any necessary mitigation measures for the fire rating, can be found in report R1-ELS151221.

This correspondence may be used as a Letter of Compliance (LOC) indicating the **Ecolibrium Solar Inc. Ecofoot2+** has met the relevant system fire requirements. Resin 2 was used in this letter to further differentiate the tested product from the non-tested product of the similar model name. This letter is not intended to replace a certification nor is it an authorization to mark.

Sincerely,

Andrew Gunnoe
Fire Test Manager
TÜV Rheinland PTL

TÜV Rheinland PTL
Photovoltaic Testing Laboratory
2210 South Roosevelt Street
Tempe, Arizona 85282
Main Phone: 480-966-1700
Main Fax; 775-314-6458
Email: info@tuvptl.com

TÜV Rheinland
North America Holding, Inc.
1 Federal Street
Boston, MA 02110
Main Phone: 617-426-4888
Main Fax: 617-426-6888

Member of
TÜV Rheinland Group

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NEW GRID-TIED SYSTEM 32.40kW

(INFO WITHHELD FOR PUBLIC SAMPLE)

SHEET SIZE
ANSI EXPAND C (22" X 17")

CLASS A FIRE RATING

PROJECT NO: GSD-20220318-174098
DRAWN BY: SCM
DATE: 3/18/2022

A
PV-7B
UNIRAC ECOFOOT2+ CLASS A FIRE RATING
SCALE: N/A

PV-7B

TÜV Rheinland PTL

Business Stream Products
Renewable and Solar Technology

Attn: Mr. Chad Parsons
Ecolibrium Solar
340 West State Street
Athens, OH 45701 USA

Email:
jcastagna@us.tuv .com

480-966-1700, x153

June 16, 2014

UL SU 2703 Bonding Tests Completed

Type of Equipment: PV Mounting System
Model Designation: Ecolibrium Solar Ecofoot2+
Test Requirement: UL Subject 2703

TÜV Rheinland File Number: L1-ELS130905
TÜV Rheinland Project Number: ELS130905

Dear Mr. Parsons,

This letter is confirmation that the Ecolibrium Solar Ecofoot2+ PV Mounting System has successfully completed electrical bonding tests according to the UL Subject 2703 standard.

Congratulations on this achievement.

All summary test results will be provided to you separately when the full report is completed. The final Test Report and associated Constructional Data Form (CDF) will be submitted to our certification department for final processing and subsequent listing on the TUV Rheinland Certipedia website.

You may use this correspondence as an interim Letter of Compliance (LOC) indicating your system has met the relevant bonding requirements of UL Subject 2703.

Sincerely,

Jack Castagna
Solar Components Program Manager
TÜV Rheinland PTL, LLC

TÜV Rheinland PTL
Photovoltaic Testing Laboratory
2210 South Roosevelt Street
Tempe, Arizona 85282
Main Phone: 480-966-1700
Main Fax; 775-314-6458
Email: info@tuvptl.com

TÜV Rheinland
North America Holding, Inc.
1 Federal Street
Boston, MA 02110
Main Phone: 617-426-4888
Main Fax: 617-426-6888

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PHONE: (INFO WITHHELD)
LICENSE NO. (INFO WITHHELD)

NEW GRID-TIED SYSTEM 32.40kW

(INFO WITHHELD FOR PUBLIC SAMPLE)

SHEET SIZE
ANSI EXPAND C (22" X 17")

UL2703 CERTIFICATION

PROJECT NO: GSD-20220318-174098
DRAWN BY: SCM
DATE: 3/18/2022

A
PV-7C
UNIRAC ECOFOOT2+ UL 2703 CERTIFICATION
SCALE: N/A

PV-7C

430 - 455 Wp

AXIpremium XL HC

High performance solar module
144 halfcell, monocrystalline

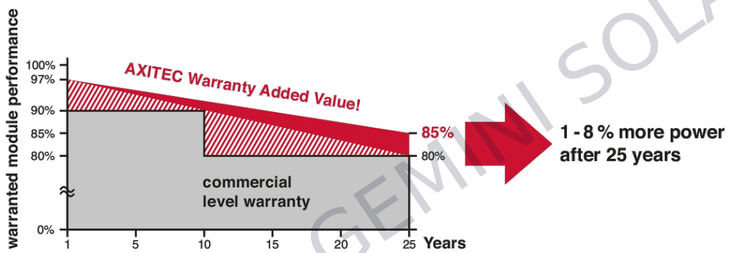
The advantages:

- 15 years Manufacturer's warranty
- High module performance through Half-Cut-technology and selected materials
- Guaranteed positive power tolerance from 0-5 Wp by individual measurement
- 100 % visual electroluminescence inspection in production
- High stability due to innovative frame design
- High quality junction box and connector systems

AXITEC
high quality german solar brand

Exclusive linear AXITEC high performance guarantee!

- 15 years manufacturer's guarantee on 90 % of the nominal performance
- 25 years manufacturer's guarantee on 85 % of the nominal performance



1 - 8 % more power after 25 years

AXITEC Energy GmbH & Co. KG, Otto-Lilienthal-Str. 5, 71034 Böblingen, Germany, energy@axitecsolar.com, www.axitecsolar.com

AXITEC
high quality german solar brand

AXIpremium XL HC 430 - 455 Wp

Electrical data (at standard conditions (STC) irradiance 1000 watt/m², spectrum AM 1.5 at a cell temperature of 25°C)

Type	Nominal output Pmpp	Nominal voltage Umpp	Nominal current Impp	Short circuit current Isc	Open circuit voltage Uoc	Module conversion efficiency
AC-430MH/144V	430 Wp	40.59 V	10.60 A	11.21 A	49.22 V	19.78 %
AC-435MH/144V	435 Wp	40.79 V	10.67 A	11.28 A	49.42 V	20.01 %
AC-440MH/144V	440 Wp	40.99 V	10.74 A	11.35 A	49.62 V	20.24 %
AC-445MH/144V	445 Wp	41.19 V	10.81 A	11.41 A	49.86 V	20.47 %
AC-450MH/144V	450 Wp	41.39 V	10.88 A	11.48 A	50.10 V	20.70 %
AC-455MH/144V	455 Wp	41.61 V	10.94 A	11.54 A	50.34 V	20.93 %

Design

Frontside	3.2 mm hardened, low-reflection white glass
Cells	144 monocrystalline high efficiency cells
Backside	Composite film
Frame	35 mm silver aluminium frame

Mechanical data

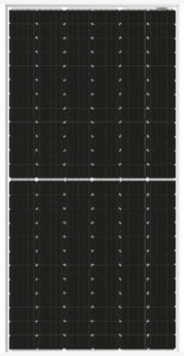
L x W x H	2094 x 1038 x 35 mm
Weight	23.8 kg with frame

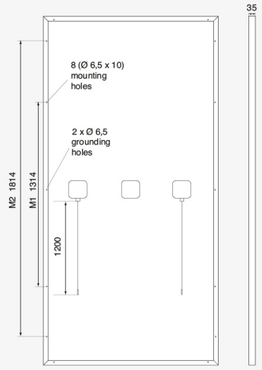
Mechanical load

Design load (pressure/suction)	1600 Pa / 1600 Pa
Test load (pressure/suction)	2400 Pa / 2400 Pa

Power connection

Socket	Protection Class IP68
Wire	approx. 1.2 m, 4 mm²
Plug-in system	Plug/socket IP68, Stäubli EVO2 / EVO2 pluggable





All dimensions in mm

Limit values

System voltage	1500 VDC
NOCT (nominal operating cell temperature)*	45°C +/-2K
Reverse current feed IR	20.0 A
Permissible operating temperature	-40°C to 85°C / -40F to 185F

(No external voltages greater than Uoc may be applied to the module)

* NOCT, irradiance 800 W/m²; AM 1.5; wind speed 1 m/s; Temperature 20°C

Temperature coefficients

Voltage Uoc	-0.27 %/K
Current Isc	0.048 %/K
Output Pmpp	-0.35 %/K

Low-light performance (Example for AC-455MH/144V)

I-U characteristic curve	Current Ipp	Voltage Upp
200 W/m²	2,24 A	40.05 V
400 W/m²	4,51 A	40.51 V
600 W/m²	6,74 A	40.82 V
800 W/m²	8,91 A	41.17 V
1000 W/m²	10,94 A	41.61 V

Packaging

Module pieces per pallet	30
Module pieces per HC-container	660

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NEW GRID-TIED SYSTEM 32.40kW

(INFO WITHHELD FOR PUBLIC SAMPLE)

SHEET SIZE
ANSI EXPAND C (22" X 17")

MODULE DATASHEET

PROJECT NO: GSD-20220318-174098
DRAWN BY: SCM
DATE: 3/18/2022

PV-8

A
PV-8
PV MODULE DATASHEET
SCALE: N/A

SUNNY BOY
3.0-US / 3.8-US / 5.0-US / 6.0-US / 7.0-US / 7.7-US

Value-Added Improvements
- SunSpec certified technology for cost-effective module-level shutdown
- Advanced AFCI compliant to UL 1699B for arc fault protection

Reduced Labor
- New Installation Assistant with direct access via smartphone minimizes time in the field
- Advanced communication interface with fewer components creates 50% faster setup and commissioning

Optimized Power Production
- ShadeFix, SMA's proprietary shade management solution, produces more power than alternatives
- Reduced component count provides maximum system reliability

Trouble-Free Service
- SMA Service Mobile App provides simplified, expedited field service
- Equipped with SMA Smart Connected, a proactive service solution that is integrated into Sunny Portal

SUNNY BOY 3.0-US / 3.8-US / 5.0-US / 6.0-US / 7.0-US / 7.7-US

Power with a purpose

The residential PV market is changing rapidly. Your bottom line matters more than ever—so we've designed a superior residential solution to help you decrease costs at every stage of your business operations. The Sunny Boy 3.0-US/3.8-US/5.0-US/6.0-US/7.0-US/7.7-US join the SMA lineup of field-proven solar technology backed by the world's #1 service team. This improved residential solution features ShadeFix, SMA's proprietary technology that optimizes system performance. ShadeFix also provides superior power production with a reduced component count versus competitors, which provides maximum reliability. No other optimized solution generates more power or is as easy as systems featuring SMA ShadeFix and SunSpec certified devices. Finally, SMA Smart Connected will automatically detect errors and initiate the repair and replacement process so that installers can reduce service calls and save time and money.

www.SMA-America.com

Technical data	Sunny Boy 6.0-US		Sunny Boy 7.0-US		Sunny Boy 7.7-US	
	208 V	240 V	208 V	240 V	208 V	240 V
Input (DC)						
Max. PV power	9600 Wp		11200 Wp		12320 Wp	
Max. DC Voltage	600 V					
Rated MPP Voltage range	220 – 480 V		245 - 480 V		270 - 480 V	
MPPT operating voltage range	100 – 550 V					
Min. DC voltage / start voltage	100 V / 125 V					
Max. operating input current per MPPT	10 A					
Max. short circuit current per MPPT	18 A					
Number of MPPT tracker / string per MPPT tracker	3 / 1					
Output (AC)						
AC nominal power	5200 W	6000 W	6660 W	7000 W	6660 W	7680 W
Max. AC apparent power	5200 VA	6000 VA	6660 VA	7000 VA	6660 VA	7680 VA
Nominal voltage / adjustable	208 V / ●	240 V / ●	208 V / ●	240 V / ●	208 V / ●	240 V / ●
AC voltage range	183 – 229 V	211 – 264 V	183 – 229 V	211 – 264 V	183 – 229 V	211 – 264 V
AC grid frequency	60 Hz / 50 Hz					
Max. output current	25.0 A	25.0 A	32.0 A	29.2 A	32.0 A	32.0 A
Power factor (cos φ) / harmonics	1 / < 4 %					
Output phases / line connections	1 / 2					
Efficiency						
Max. efficiency	97.3 %	97.7 %	97.3 %	97.9 %	97.3 %	97.5 %
CEC efficiency	96.5 %	97.0 %	96.5 %	97.0 %	96.5 %	97.0 %
Protection devices						
DC disconnect device / DC reverse polarity protection	● / ●					
Ground fault monitoring / Grid monitoring	●					
AC short circuit protection	●					
All-pole sensitive residual current monitoring unit (RCMU)	●					
Arc fault circuit interrupter (AFCI)	●					
Protection class / overvoltage category	I / IV					
General data						
Dimensions (W / H / D) in mm (in)	535 x 730 x 198 (21.1 x 28.5 x 7.8)					
Packaging Dimensions (W / H / D) in mm (in)	600 x 800 x 300 (23.6 x 31.5 x 11.8)					
Weight / packaging weight	26 kg (57 lb) / 30 kg (66 lb)					
Temperature range: operating / non-operating	-25°C ...+60°C / -40°C ...+60°C					
Environmental protection rating	NEMA 3R					
Noise emission (typical)	39 dB(A)		45 dB(A)			
Internal power consumption at night	< 5 W					
Topology / cooling concept	transformerless / convection		transformerless / fan			
Features						
Ethernet ports	2					
Secure Power Supply	● 1)					
Display (2 x 16 characters)	●					
2.4 GHz WLAN / External WLAN antenna	▲ / ○					
ShadeFix technology for string level optimization	●					
Cellular (4G / 3G) / Revenue Grade Meter	○ / ○ 2)					
Warranty: 10 / 15 / 20 years	● / ○ / ○ 3)					
Certificates and approvals	UL 1741, UL 1741 SA incl. CA Rule 21 RSD, UL 1998, UL 1699B Ed. 1, IEEE1547, FCC Part 15 (Class A & B), CAN/CSA V22.2 107.1-1, HECO Rule 14H, PV Rapid Shutdown System Equipment					
● Standard features ○ Optional features – Not available ▲ Subject to availability						
Data at nominal conditions 1) Not compatible with SunSpec shutdown devices 2) Standard in SBX.X-1TP-US-41						
Type designation	SB6.0-1SP-US-41 / SB6.0-1TP-US-41		SB7.0-1SP-US-41 / SB7.0-1TP-US-41		SB7.7-1SP-US-41 / SB7.7-1TP-US-41	

THE SMA ENERGY SYSTEM HOME

The SMA Energy System Home combines legendary SMA inverter performance and SunSpec certified shutdown devices in one cost-effective, comprehensive package. In addition, SMA ShadeFix technology optimizes power production and provides greater reliability than alternatives.

This rapid shutdown solution fulfills UL 1741, NEC 2014, and NEC 2017 requirements and is certified to the power line-based SunSpec Rapid Shutdown communication signal over DC wires, making it the most simple and cost-effective rapid shutdown solution on the market.

Visit www.SMA-America.com for more information.

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NEW GRID-TIED SYSTEM 32.40kW

(INFO WITHHELD FOR PUBLIC SAMPLE)

SHEET SIZE
ANSI EXPAND C (22" X 17")

INVERTER DATASHEET

PROJECT NO: GSD-20220318-174098
DRAWN BY: SCM
DATE: 3/18/2022

A
PV-9
INVERTER DATASHEET
SCALE: N/A

PV-9

JMS-F SUNSPEC RAPID SHUTDOWN DEVICE

Cost-effective
- Simple plug-and-play installation
- No additional components necessary, reducing balance of system costs

Simple and robust
- Power line based communication certified for compatibility with the SunSpec signal for rapid shutdown
- Shuts down PV module whenever SunSpec signal is interrupted

Safe and certified
- Certified and listed for compliance to:
  - › UL 1741 Rapid Shutdown System Equipment
  - › NEC 2017 690.12(B)(2) Module Level Shutdown

Reduced risk
- Technical support from SMA's #1 ranked service organization
- Fully SunSpec certified solution when paired with an SMA SunSpec certified inverter

JMS-F SUNSPEC RAPID SHUTDOWN DEVICE

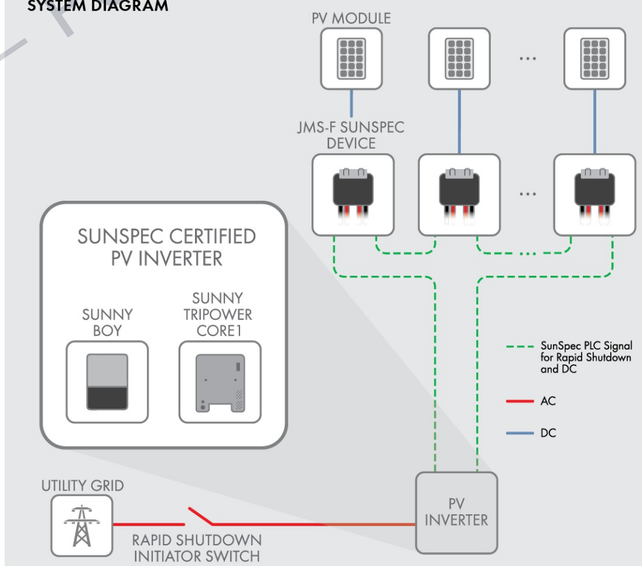
The easy module level rapid shutdown solution

The SunSpec Certified Rapid Shutdown System (model JMS-F), available from SMA, is the most cost-effective and reliable solution for fulfilling NEC 2017 module level shutdown requirements. The module-level device is certified for compatibility with the SunSpec communication signal and SMA inverters, making compliance simple and easy. By using the existing DC lines between the inverter and PV array for power line communications, installation and labor are significantly reduced. No additional wires or communication equipment is needed. The solution also features up to 50% fewer internal components vs alternatives, resulting in greater lifetime reliability.

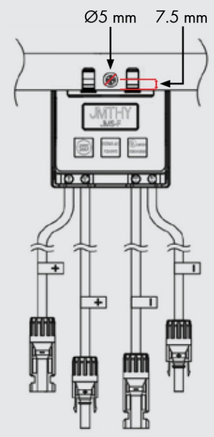
www.SMA-America.com

Technical data	JMS-F
Input (DC)	
Rated DC input power	600 Wp
Maximum PV module open circuit voltage	60 V
Minimum input voltage	10 V
Maximum continuous input current I_{MAX}	15 A
Maximum short-circuit input current I_{SC}	15 A
Output (DC)	
Output power range	0 W to 600 W
Maximum output voltage	60 V
Standby output voltage	1 V
Maximum system voltage	1500 V
Allowable series string connections	6 to 30 JMS-F devices
Mechanical	
Dimensions L / W / H in mm (in)	89 x 88.5 x 23.1 (3.5 x 3.48 x 0.9)
Weight (including cables)	0.95 lb (435 g)
Input / output connector	MC4
Output wire length	1.2 m
Operating temperature range	–40°C to +75°C (–40°F to +167°F)
Enclosure rating	Type 4X (as per UL 50E)
Relative humidity	0% to 100%
Features and compliance	
Certification	UL 1741 Rapid Shutdown Equipment
Communication mode	Power Line Communication (PLC)
SunSpec Rapid Shutdown Communication Protocol	SunSpec certified
Rapid shutdown time	10 seconds
Warranty (contact SMA Service Line)	25 years
SunSpec certified SMA inverters	Sunny Boy US (SBx.x-1SP-US-41) Sunny Tripower CORE1-US (STP xx-US-41)
Type designation	JMS-F
SMA part number	119814-00.01
Package quantity	40

SYSTEM DIAGRAM



BRACKET DIMENSIONS



Toll Free +1 888 4 SMA USA
www.SMA-America.com

SMA America, LLC

(LOGO WITHHELD FOR SAMPLE)

(INFO WITHHELD)
PHONE: (INFO WITHHELD)
LICENSE NO. (INFO WITHHELD)

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NEW GRID-TIED SYSTEM 32.40kW

(INFO WITHHELD FOR PUBLIC SAMPLE)

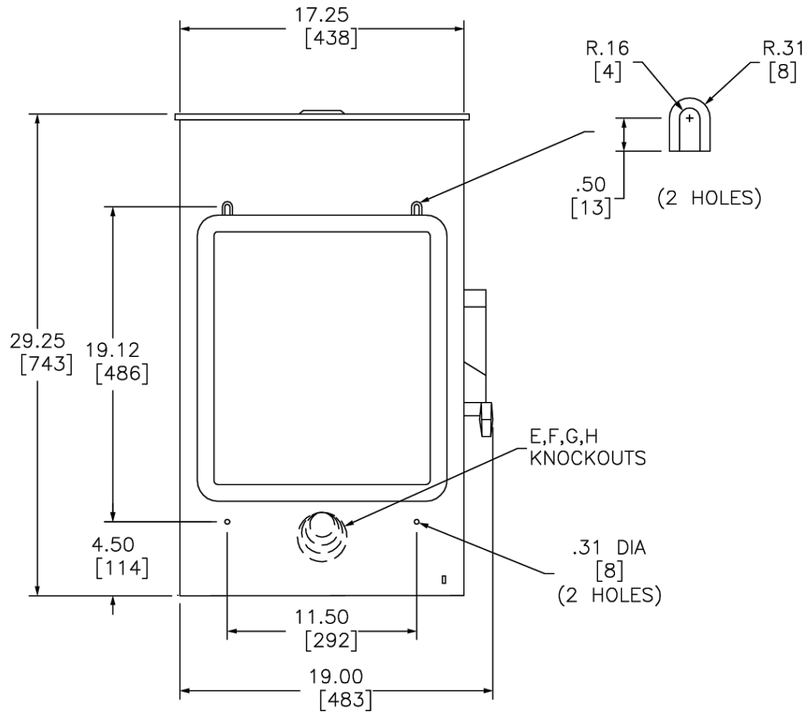
SHEET SIZE
ANSI EXPAND C (22" X 17")

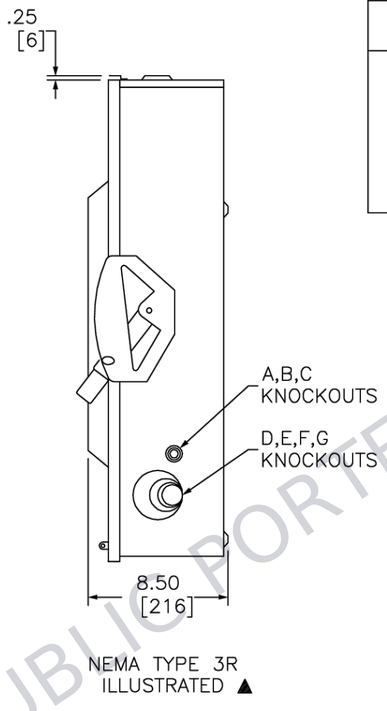
RAPID SHUTDOWN

PROJECT NO: GSD-20220318-174098
DRAWN BY: SCM
DATE: 3/18/2022

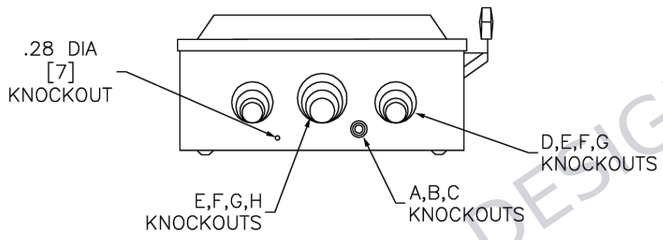
A
PV-10
RAPID SHUTDOWN DATASHEET
SCALE: N/A

PV-10





NEMA TYPE 3R
ILLUSTRATED ▲



WIRING DIAGRAMS

FUSIBLE	NOT FUSIBLE
A B	C

TERMINAL LUGS ‡			
AMPERES	MAX WIRE	MIN WIRE	TYPE
200	250 KCMIL	#6 AWG	AL OR CU

KNOCKOUTS		
SYMBOL	CONDUIT SIZE	
	IN	MM
A	.50	13
B	.75	19
C	1.00	25
D	1.25	32
E	1.50	38
F	2.00	51
G	2.50	64
H	3.00	76

DUAL DIMENSIONS: INCHES / MILLIMETERS

CATALOG NUMBER	VOLTAGE RATINGS	WIRING DIAG	HORSEPOWER RATINGS 240VAC STD 1Ø	STD 3 Ø	MAX 1Ø	MAX 3 Ø
D224NRB	240VAC	A	15	25&	–	60&
D324NRB	240VAC	B	15^	25#	–	60#
DU324RB ■	240VAC	C	–	–	15^	60<

NOTES:
FINISH – GRAY BAKED ENAMEL
UL LISTED – FILE E–2875
ALL NEUTRALS – INSULATED GROUNDABLE
SUITABLE FOR USE AS SERVICE EQUIPMENT
SHORT CIRCUIT CURRENT RATINGS:
10,000 AMPERES WITH CLASS H OR K FUSES.
100,000 AMPERES WITH CLASS R FUSES (HAVING CLASS R REJECTION KITS INSTALLED) OR WITH CLASS J FUSES.
WHEN MOUNTING THESE SWITCHES, ALLOW 4.00 [102] MIN CLEARANCE BETWEEN ENCLOSURES FOR OPENING OF SIDE HINGED DOOR.
▲ TOP OF NEMA TYPE 3R DEVICES HAVE PROVISIONS FOR MAXIMUM 2.50 [64] BOLT–ON HUB.
‡ LUGS SUITABLE FOR 75°C CONDUCTORS.
& FOR CORNER GROUNDED DELTA, USE SWITCHING POLES FOR UNGROUNDED CONDUCTORS. USE ANY TOW SWITCHING POLES.
# IF CORNER GROUNDED DELTA, USE OUTER SWITCHING POLES FOR UNGROUNDED CONDUCTORS.
< IF CORNER GROUNDED DELTA, INSTALL NEUTRAL AND USE OUTER SWITCHING POLES FOR UNGROUNDED CONTUCTORS.
■ REQUIRES FIELD INSTALLATION OF EQUIPMENT GROUNDING KIT PKOGTA–2 WHEN USED AS SERVICE EQUIPMENT.

GENERAL DUTY SAFETY SWITCHES
VISIBLE BLADE TYPE
200 AMPERE – SERIES F1
ENCLOSURE – NEMA TYPE 3R RAINPROOF

SQUARE D COMPANY

DWG# NO. 3227

DECEMBER 2001

3227

(LOGO WITHHELD FOR SAMPLE)

(INFO WITHHELD)
PHONE: (INFO WITHHELD)
LICENSE NO. (INFO WITHHELD)

NEW GRID-TIED SYSTEM 32.40kW

(INFO WITHHELD FOR PUBLIC SAMPLE)

SHEET SIZE

ANSI EXPAND C (22" X 17")

FUSED AC DISCO.

PROJECT NO: GSD-20220318-174098
DRAWN BY: SCM
DATE: 3/18/2022

A PV-11 FUSED AC DISCONNECT DATASHEET
SCALE: N/A

PV-11

CERTIFICATE OF COMPLIANCE

Certificate Number 2019-03-13-E210376
Report Reference E210376-2019-03-13
Issue Date 2019-03-13

Issued to: SMA Solar Technology AG
Sonnenallee 1
34266 Niestetal GERMANY

This is to certify that representative samples of STATIC INVERTERS, CONVERTERS AND ACCESSORIES FOR USE IN INDEPENDENT POWER SYSTEMS

SMA Solar Technology AG Models:
SB3.0-1SP-US-41, SB3.0-1TP-US-41, SB3.8-1SP-US-41, SB3.8-1TP-US-41,SB5.0-1SP-US-41, SB5.0-1TP-US-41,SB6.0-1SP-US-41, SB6.0-1TP-US-41,SB7.0-1SP-US-41, SB7.0-1TP-US-41, SB7.7-1SP-US-41 and SB7.7-1TP-US-41.

Integral Type 1 Photovoltaic DC Arc-Fault Circuit Interrupter Protection for model inverters as noted above.

Have been investigated by UL in accordance with the Standard(s) indicated on this Certificate.

Standard(s) for Safety: UL 1741 - Inverters, Converters, Controllers and Interconnection System Equipment for Use With Distributed Energy Resources
UL 1699B, Standard for Photovoltaic (PV) DC Arc-Fault Circuit Protection
CAN/CSA C22.2 No. 107.1-1 - Power Conversion Equipment
ANSI/UL 1998 - Software in Programmable Components

Additional Information: See the UL Online Certifications Directory at www.ul.com/database for additional information

Bruce Mahrenholz, Director North American Certification Program
UL LLC

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CERTIFICATE OF COMPLIANCE

Certificate Number 2019-03-13-E210376
Report Reference E210376-2019-03-13
Issue Date 2019-03-13

Only those products bearing the UL Certification Mark should be considered as being covered by UL's Certification and Follow-Up Service.

The UL Recognized Component Mark generally consists of the manufacturer's identification and catalog number, model number or other product designation as specified under "Marking" for the particular Recognition as published in the appropriate UL Directory. As a supplementary means of identifying products that have been produced under UL's Component Recognition Program, UL's Recognized Component Mark: , may be used in conjunction with the required Recognized Marks. The Recognized Component Mark is required when specified in the UL Directory preceding the recognitions or under "Markings" for the individual recognitions.

Recognized components are incomplete in certain constructional features or restricted in performance capabilities and are intended for use as components of complete equipment submitted for investigation rather than for direct separate installation in the field. The final acceptance of the component is dependent upon its installation and use in complete equipment submitted to UL LLC.

Look for the UL Certification Mark on the product.

This is to certify that representative samples of the product as specified on this certificate were tested according to the current UL requirements.

Permanently-connected, Grid Support Utility Interactive inverters.

This description covers the SMA Solar Technology AG Model: SB3.0-1SP-US-41, SB3.0-1TP-US-41, SB3.8-1SP-US-41, SB3.8-1TP-US-41,SB5.0-1SP-US-41, SB5.0-1TP-US-41,SB6.0-1SP-US-41, SB6.0-1TP-US-41,SB7.0-1SP-US-41, SB7.0-1TP-US-41, SB7.7-1SP-US-41 and SB7.7-1TP-US-41 inverters.

The Certificate is valid for the HP-Version V2.04.15.R.

USL - Evaluated to the requirements of the Standard for Safety for Inverters, Converters, Controllers and Interconnection System Equipment for Use With Distributed Energy Resources, UL 1741, Second Edition, dated February 15th , 2018. Including the Certification Requirement Decision dated April 26, 2010, for the evaluation of transformerless / non-Isolated EPS interactive PV inverters with PV array inputs in compliance with article 690.35 of the NEC. Additionally evaluated to the requirements of the Standard for Safety for Inverters, Converters, Controllers and Interconnection System Equipment for Use With Distributed Energy Resources, UL 1741SA, Second Edition, dated , February 15th 2018, using the Source Requirement Documents of California Public Utilities Commission Rule 21 for grid support utility interactive inverters: the Generating Facility Interconnections of PG&E (Pacific Gas and Electric Company, Cal. P.U.C. Sheet No. 36812-E), SCE (Southern California Edison, Cal. PUC Sheet No. 60550-E) and SDG&E (San Diego Gas & Electric Company, Cal. P.U.C. Sheet No. 28143-E) and HECO SRD-UL-1741-SA-V1.1, 2017-09-22.

UL 1699B, Standard for Photovoltaic (PV) DC Arc-Fault Circuit Protection, First Edition, August 22, 2018

Bruce Mahrenholz, Director North American Certification Program
UL LLC

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(INFO WITHHELD)
PHONE: (INFO WITHHELD)
LICENSE NO. (INFO WITHHELD)

NEW GRID-TIED SYSTEM 32.40kW

(INFO WITHHELD FOR PUBLIC SAMPLE)

SHEET SIZE
ANSI EXPAND C (22" X 17")

UL LISTING

PROJECT NO: GSD-20220318-174098
DRAWN BY: SCM
DATE: 3/18/2022

A
PV-12
UL LISTING CERTIFICATION (SMA INVERTER)
SCALE: N/A

PV-12