

PHOTOVOLTAIC ROOF MOUNT SYSTEM

48 MODULES-ROOF MOUNTED - 19.920 kW DC, 23.000 kW AC

483 NW DOGWOOD TERRACE, LAKE CITY, FL 32055



4721 N GRADY AVE
TAMPA FL 33614
LIC #: CVC57085
PHONE: 813-540-8807

PROJECT DATA

PROJECT ADDRESS: 483 NW DOGWOOD TERRACE, LAKE CITY, FL 32055

OWNER: JOHN DOLL

CONTRACTOR: LUNEX POWER,
4721 N GRADY AVE
TAMPA FL 33614
PHONE: 813-540-8807

DESIGNER: ESR

SCOPE: 19.920 KW DC ROOF MOUNT
SOLAR PV SYSTEM WITH
48 TRINA SOLAR: TSM-NE09RC.05 415W
PV MODULES WITH
18 TESLA: MCI-2 RAPID SHUTDOWN
DEVICE WITH
02 TESLA SOLAR: POWERWALL 3
(1707000-XX-Y (240V)) [SI1-SB]

AUTHORITIES HAVING JURISDICTION:
BUILDING: COLUMBIA COUNTY
ZONING: COLUMBIA COUNTY
UTILITY: SVEC

SHEET INDEX

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PV-9 PLACARD
PV-10 RAPID SHUTDOWN CHART
PV-11+ EQUIPMENT SPECIFICATIONS

PROFESSIONAL ENGINEER SEAL

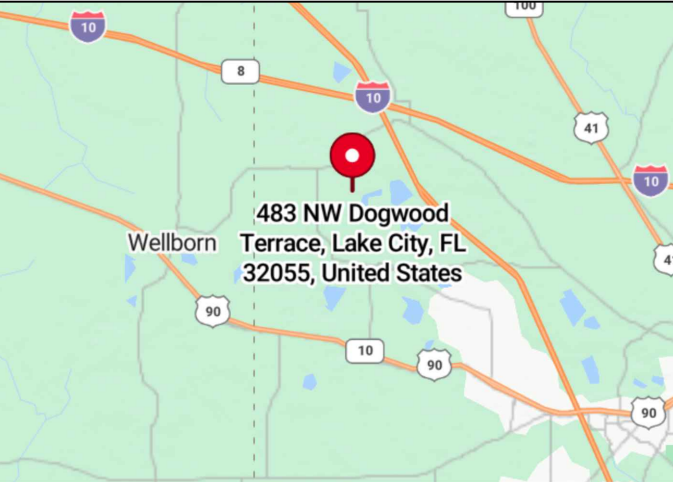
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GENERAL NOTES

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

VICINITY MAP



HOUSE PHOTO



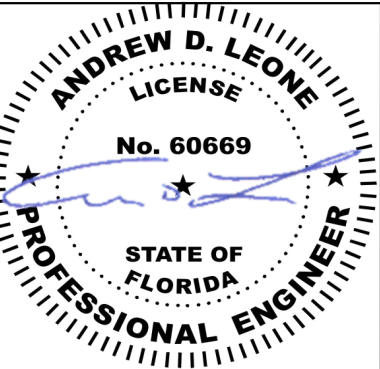
CODE REFERENCES

PROJECT TO COMPLY WITH THE FOLLOWING:

FLORIDA RESIDENTIAL CODE, 8TH EDITION 2023 (FRC)
FLORIDA PLUMBING CODE, 8TH EDITION 2023 (FPC)
FLORIDA BUILDING CODE, 8TH EDITION 2023 EDITION (FBC)
FLORIDA MECHANICAL CODE, 8TH EDITION 2023 (FMC)
2020 NATIONAL ELECTRICAL CODE
FLORIDA FIRE PREVENTION CODE, 8TH EDITION 2023 (FFPC)

REVISIONS

DESCRIPTION	DATE	REV
CLIENT COMMENT	03/13/2025	A
CLIENT COMMENT	09/11/2025	B



09/11/2025
DATE: 02/28/2025

PROJECT NAME & ADDRESS

JOHN DOLL
RESIDENCE
483 NW DOGWOOD
TERRACE,
LAKE CITY, FL 32055

DRAWN BY

ESR

SHEET NAME

COVER SHEET

SHEET SIZE

ANSI B
11" X 17"

SHEET NUMBER

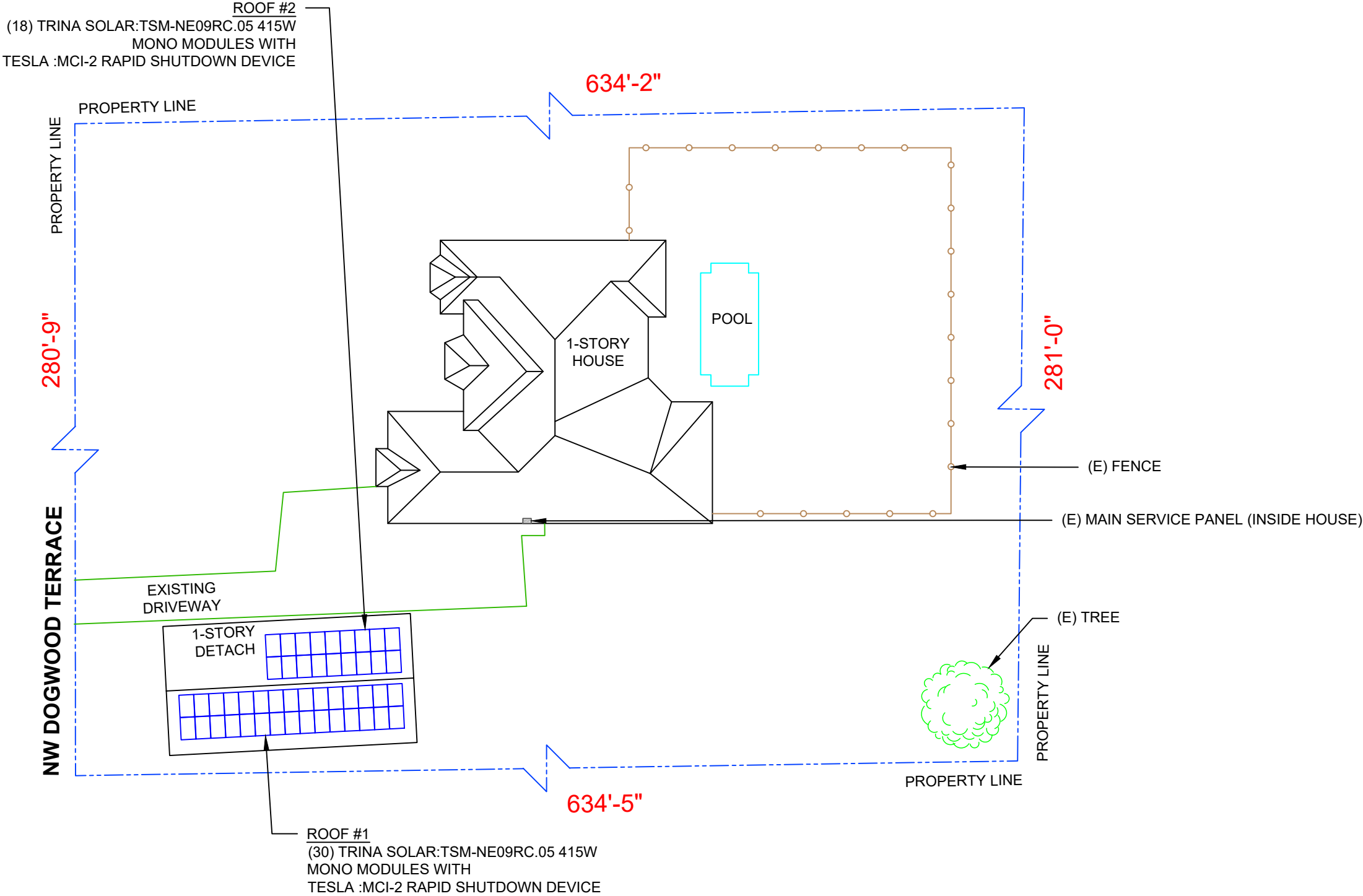
PV-1

PROJECT DESCRIPTION:

48 X TRINA SOLAR: TSM-NE09RC.05 415W PV MODULES
ROOF MOUNTED SOLAR PHOTOVOLTAIC MODULES
DC SYSTEM SIZE: 48 x 415 = 19.920KW DC
AC SYSTEM SIZE: 23.000 kW AC

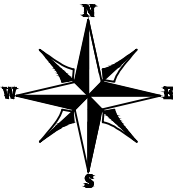
EQUIPMENT SUMMARY
48 TRINA SOLAR: TSM-NE09RC.05 415W MONO MODULES
18 TESLA: MCI-2 RAPID SHUTDOWN DEVICE WITH
02 TESLA SOLAR: POWERWALL 3 (1707000-XX-Y (240V)) [SI1-SB]

ROOF ARRAY AREA #1:- 645.00 SQ FT.
ROOF ARRAY AREA #2:- 387.00 SQ FT.



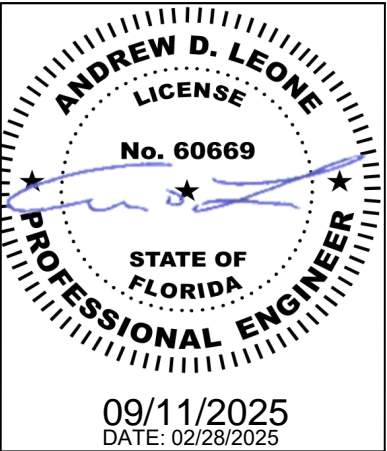
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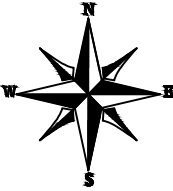
SHEET NAME
SITE PLAN

SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
PV-2

MODULE TYPE, DIMENSIONS & WEIGHT

NUMBER OF MODULES = 48 MODULES
MODULE TYPE = TRINA SOLAR: TSM-NE09RC.05 415W MONO MODULES
MODULE WEIGHT = 47.0 LBS / 21.3 KG.
MODULE DIMENSIONS = 69.37" x 44.65" = 21.50 SF

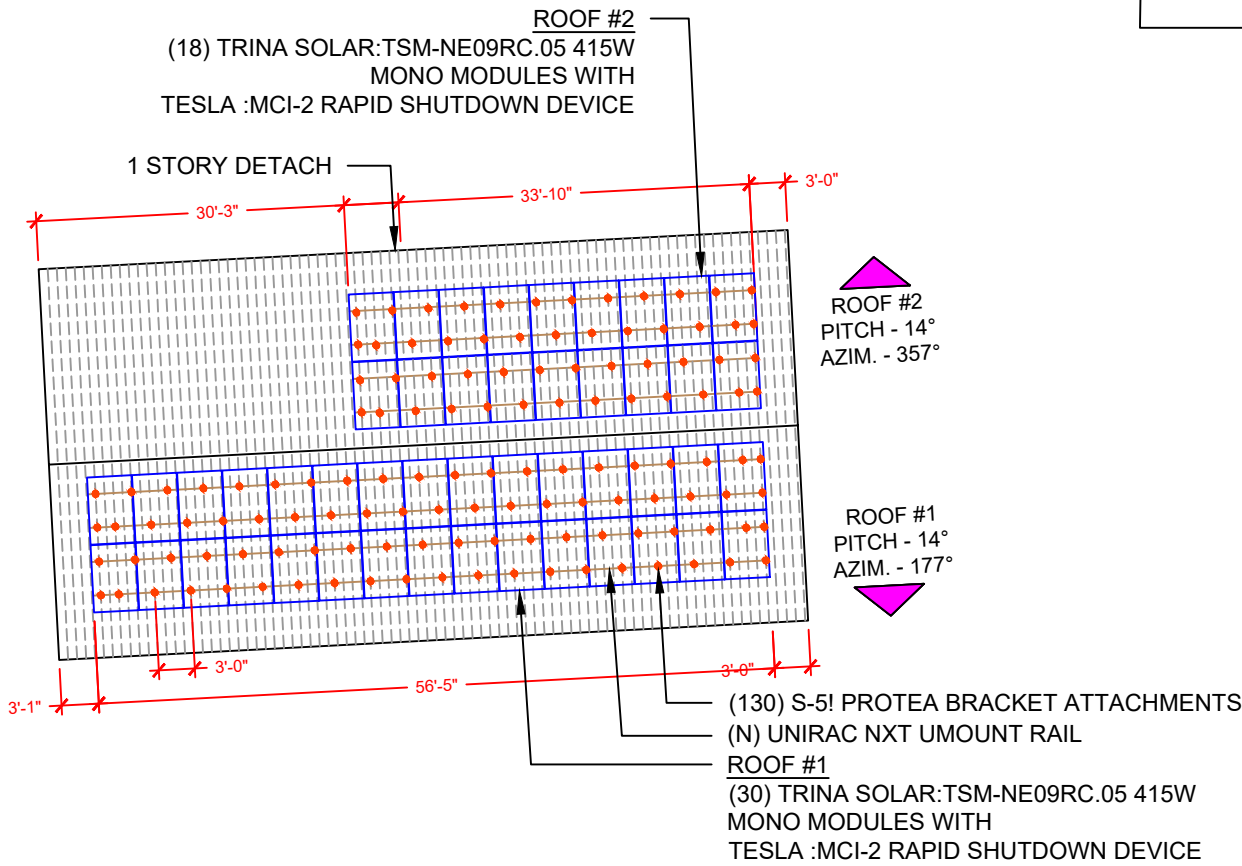


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MAIN HOUSE

(E) MAIN SERVICE PANEL (INSIDE HOUSE)



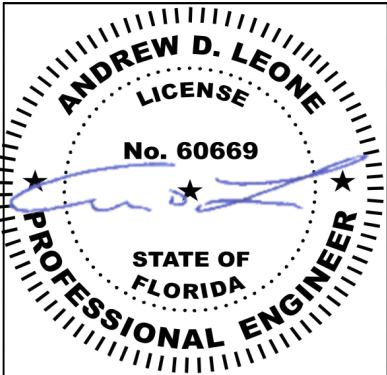
ARRAY AREA & ROOF AREA CALC'S				
ROOF	# OF MODULES	ARRAY AREA (Sq. Ft.)	ROOF AREA (Sq. Ft.)	ROOF AREA COVERED BY ARRAY (%)
#1	30	645.00	1018.75	63
#2	18	387.00	1018.75	38
TOTAL	48	1032.00	2037.50	51

ROOF DESCRIPTION			
ROOF TYPE			METAL ROOF
ROOF	ROOF PITCH	AZIMUTH	SEAM SPACING
#1	14°	177°	9"
#2	14°	357°	9"



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SHEET NAME
ROOF PLAN &
MODULES

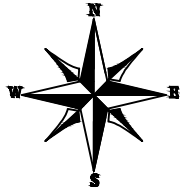
SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
PV-3

LEGEND

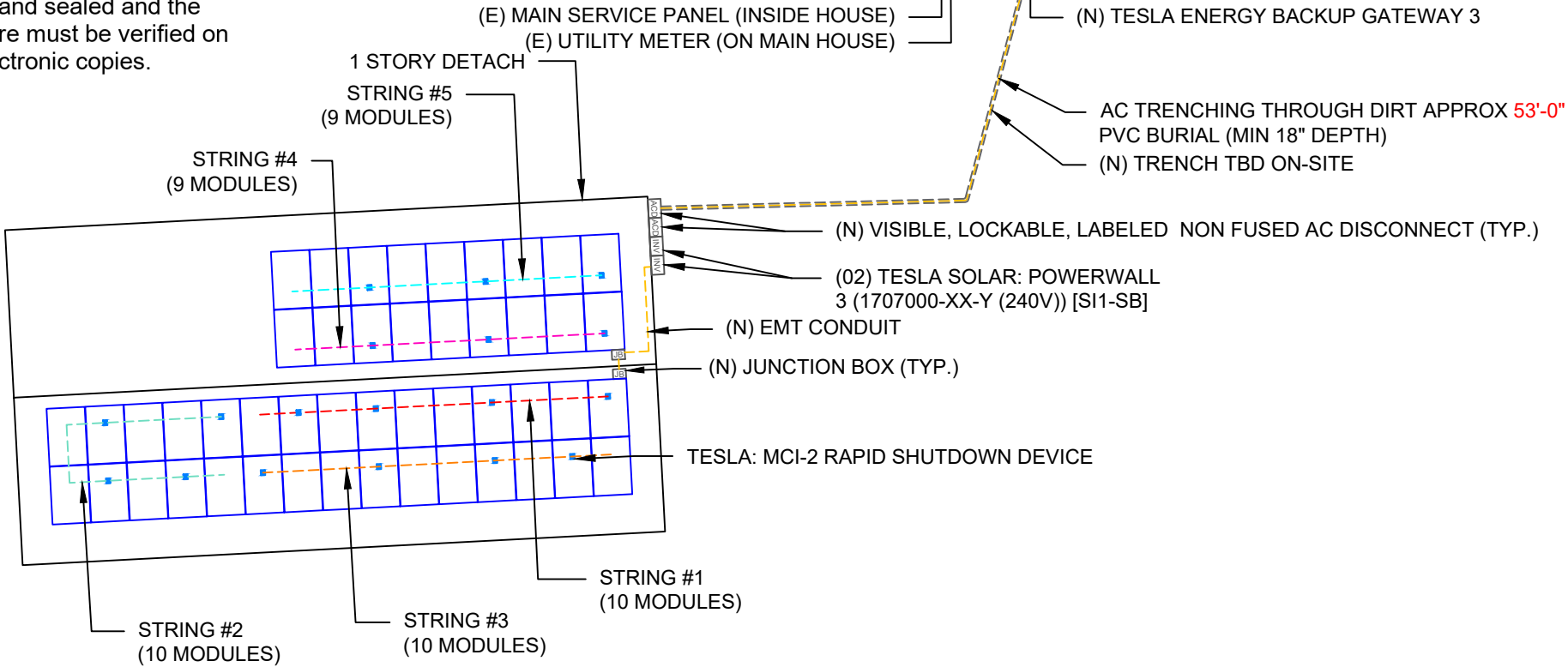
- VENT, ATTIC FAN (ROOF OBSTRUCTION)
- ROOF ATTACHMENT
- SUB PANEL
- MAIN SERVICE PANEL

CIRCUIT LEGENDS	
---	STRING #1
---	STRING #2
---	STRING #3
---	STRING #4
---	STRING #5



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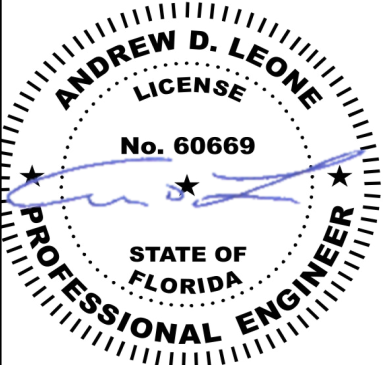


BILL OF MATERIALS		
EQUIPMENT	QTY	DESCRIPTION
SOLAR PV MODULES	48	TRINA SOLAR: TSM-NE09RC.05 415W MODULE
INVERTER	2	TESLA SOLAR: POWERWALL 3 (1707000-XX-Y (240V)) [SI1-SB]
RAPID SHUTDOWN DEVICE	18	TESLA:MCI-2 RAPID SHUTDOWN DEVICE
JUNCTION BOX	2	JUNCTION BOXES
RAILS	26	UNIRAC NXT UMount RAIL
SPLICES	24	SPLICE KIT
MID MODULE CLAMPS	88	MID MODULE CLAMPS
END CLAMPS	16	END CLAMPS / STOPPER SLEEVE
ATTACHMENTS	130	S-5! PROTEA BRACKET ATTACHMENTS



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SHEET NAME

ELECTRICAL PLAN

SHEET SIZE

ANSI B
11" X 17"

SHEET NUMBER

PV-4

LEGEND

JB

- JUNCTION BOX

INV

- INVERTER

UM

- UTILITY METER

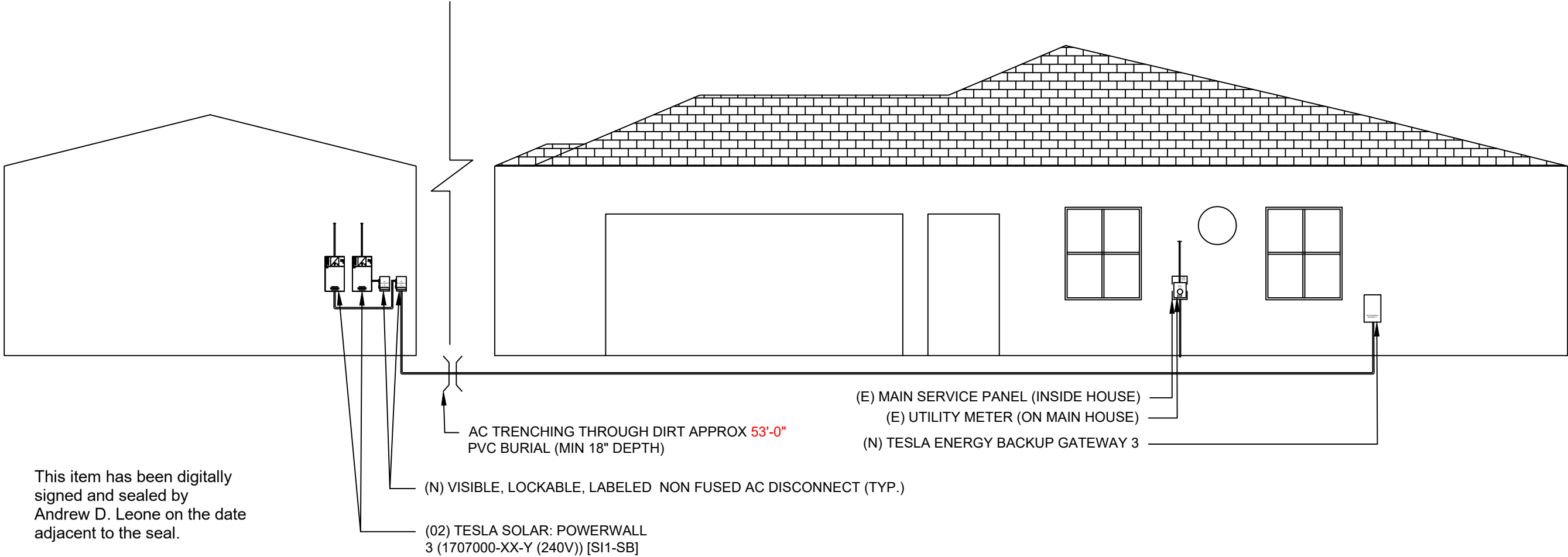
MSP

- MAIN SERVICE PANEL

SUB

- SUB PANEL

- CONDUIT



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SHEET NAME

ELEVATION PLAN

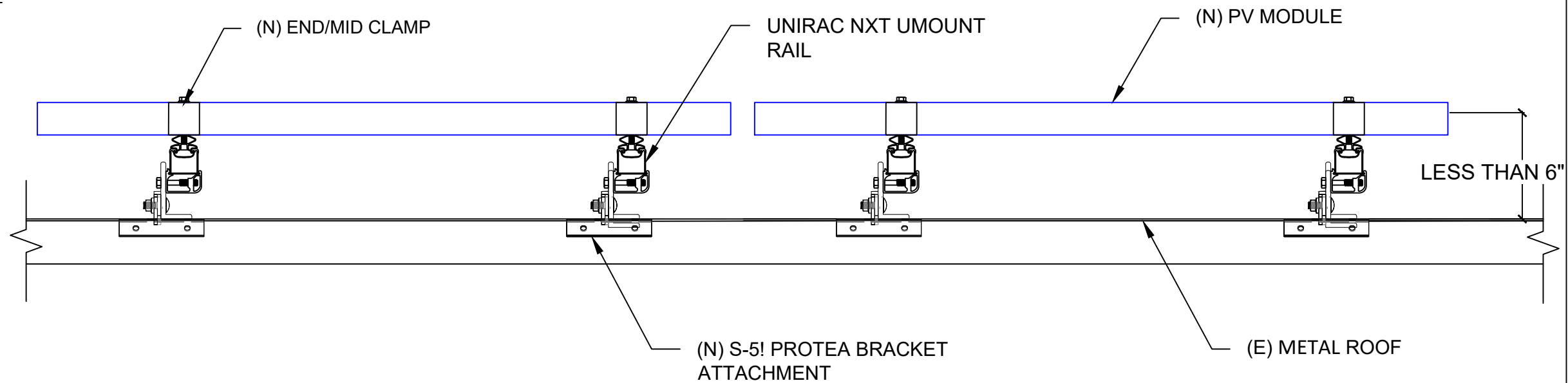
SHEET SIZE

ANSI B
11" X 17"

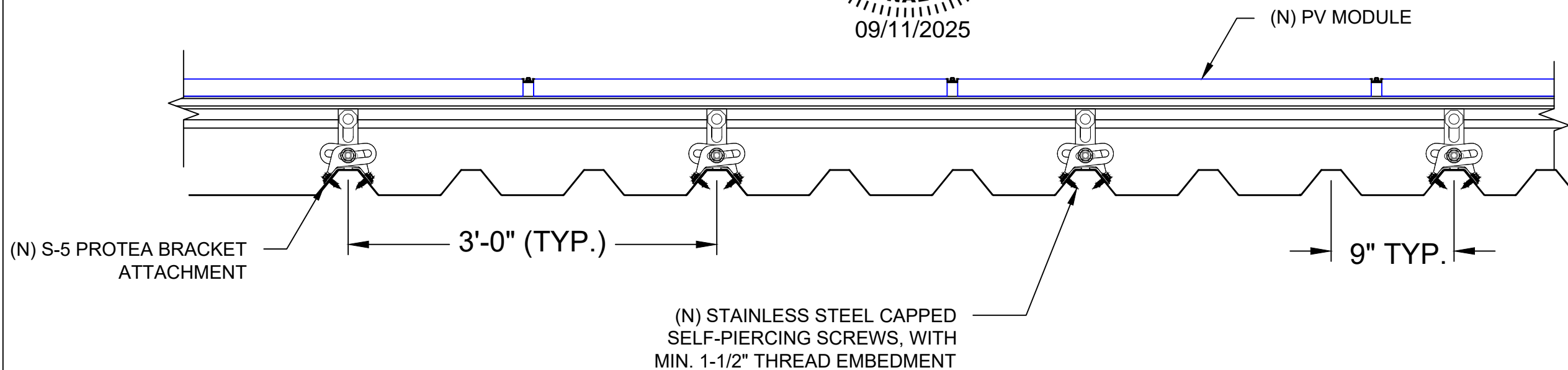
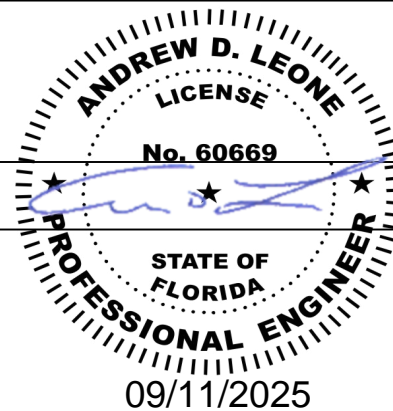
SHEET NUMBER

PV-4 (A)

DESCRIPTION: CANTILEVER
CANTILEVER CONSIDER 1/3RD OF ROOF ATTACHMENT SPACING.
ATTACHMENT SPACING= 36" O/C
CANTILEVER = 12"



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



2 ATTACHMENT DETAIL (FRONT VIEW)
PV-5 SCALE: N.T.S.



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SHEET NAME
STRUCTURAL DETAIL

SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
PV-5

DC SYSTEM SIZE: 48 x 415 = 19.920 kW DC
AC SYSTEM SIZE: 23.000 kW AC

(48) TRINA SOLAR: TSM-NE09RC.05 415W MONO MODULES WITH
(18) TESLA: MCI-2 RAPID SUTDOWN DEVICES
(02) TESLA SOLAR: POWERWALL 3 (1707000-XX-Y (240V)) [SI1-SB]

(3) BRANCH CIRCUITS OF 10 MODULES AND
(2) BRANCH CIRCUITS OF 9 MODULES ARE CONNECTED IN SERIES

INTERCONNECTION NOTES:

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

DISCONNECT NOTES:

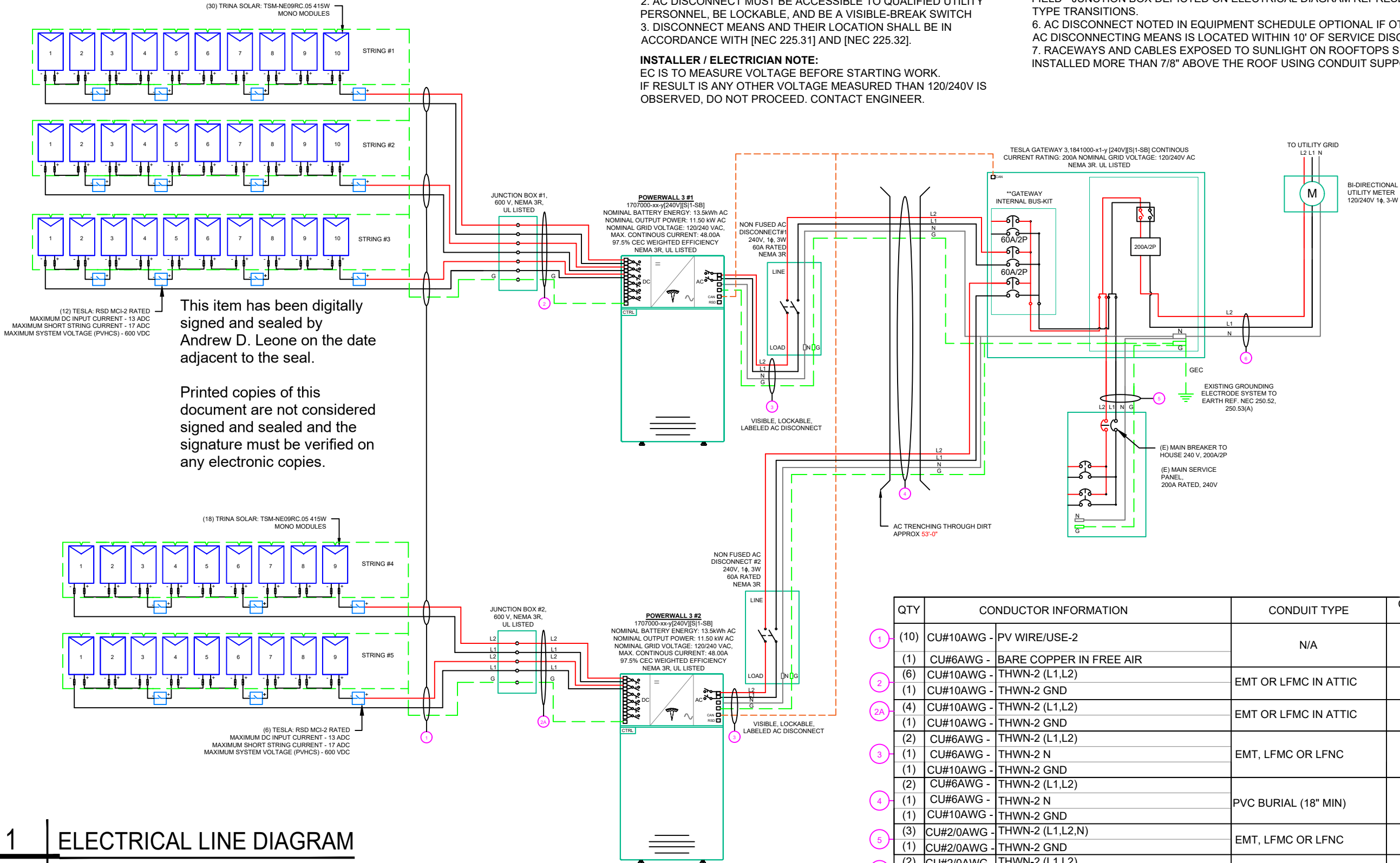
1. DISCONNECTING SWITCHES SHALL BE WIRED SUCH THAT WHEN THE SWITCH IS OPENED THE CONDUCTORS REMAINING LIVE ARE CONNECTED TO THE TERMINALS MARKED "LINE SIDE" (TYPICALLY THE UPPER TERMINALS)
2. AC DISCONNECT MUST BE ACCESSIBLE TO QUALIFIED UTILITY PERSONNEL, BE LOCKABLE, AND BE A VISIBLE-BREAK SWITCH
3.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

INSTALLER / ELECTRICIAN NOTE:

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

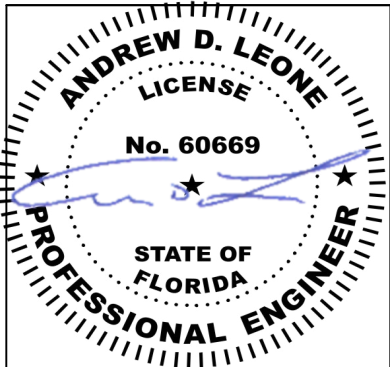
GROUNDING & GENERAL NOTES:

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



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SHEET NAME
ELECTRICAL LINE DIAGRAM

SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
PV-6

1

ELECTRICAL LINE DIAGRAM

PV-6

SCALE: NTS

QTY	CONDUCTOR INFORMATION	CONDUIT TYPE	CONDUIT SIZE
(10)	CU#10AWG - PV WIRE/USE-2	N/A	N/A
(1)	CU#6AWG - BARE COPPER IN FREE AIR		
(6)	CU#10AWG - THWN-2 (L1,L2)	EMT OR LFMC IN ATTIC	3/4"
(1)	CU#10AWG - THWN-2 GND		
(4)	CU#10AWG - THWN-2 (L1,L2)	EMT OR LFMC IN ATTIC	3/4"
(1)	CU#10AWG - THWN-2 GND		
(2)	CU#6AWG - THWN-2 (L1,L2)	EMT, LFMC OR LFNC	3/4"
(1)	CU#6AWG - THWN-2 N		
(1)	CU#10AWG - THWN-2 GND	PVC BURIAL (18" MIN)	3/4"
(2)	CU#6AWG - THWN-2 (L1,L2)		
(1)	CU#6AWG - THWN-2 N	EMT, LFMC OR LFNC	1 1/2"
(1)	CU#10AWG - THWN-2 GND		
(3)	CU#2/0AWG - THWN-2 (L1,L2,N)	EMT, LFMC OR LFNC	1 1/2"
(1)	CU#2/0AWG - THWN-2 GND		
(2)	CU#2/0AWG - THWN-2 (L1,L2)	EMT, LFMC OR LFNC	1 1/2"
(1)	CU#2/0AWG - THWN-2 N		

INVERTER SPECIFICATIONS	
MANUFACTURER / MODEL #	TESLA SOLAR: POWERWALL 3 (1707000-XX-Y (240V)) [SI1-SB]
NOMINAL AC POWER	11.500KW
NOMINAL GRID VOLTAGE	120/240 VAC
NOMINAL OUTPUT CURRENT	48A
PV MAXIMUM INPUT VOLTAGE	600 VDC

SOLAR MODULE SPECIFICATIONS	
MANUFACTURER / MODEL #	TRINA SOLAR: TSM-NE09RC.05 415W MODULE
VMP	42.5V
IMP	9.77A
VOC	50.5V
ISC	10.40A
TEMP. COEFF. VOC	-0.24%/°C
MODULE DIMENSION	69.37"L x 44.65"W x 1.26"D (In Inch)

AMBIENT TEMPERATURE SPECS	
RECORD LOW TEMP	-6°
AMBIENT TEMP (HIGH TEMP 2%)	36°
MODULE TEMPERATURE COEFFICIENT OF Voc	
PERCENT OF VALUES	NUMBER OF CURRENT CARRYING CONDUCTORS IN EMT
.80	4-6
.70	7-9
.50	10-20

DC FEEDER CALCULATIONS																						
CIRCUIT ORIGIN	CIRCUIT DESTINATION	VOLTAGE (V)	FULL LOAD AMPS "FLA" (A)	FLA*1.25 (A)	OCPD SIZE (A)	NEUTRAL SIZE	GROUND SIZE	CONDUCTOR SIZE	75°C AMPACITY (A)	AMPACITY CHECK #1	AMBIENT TEMP. (°C)	TOTAL CC CONDUCTOR S IN RACEWAY	90°C AMPACITY (A)	DERATION FACTOR FOR AMBIENT TEMPERATURE NEC 310.15(B){1}	DERATION FACTOR FOR CONDUCTORS PER RACEWAY NEC 310.15(C){1}	90°C AMPACITY DERATED (A)	AMPACITY CHECK #2	FEEDER LENGTH (FEET)	CONDUCTOR RESISTANCE (OHM/KFT)	VOLTAGE DROP AT FLA (%)	CONDUIT SIZE	CONDUIT FILL (%)
STRING 1	JUNCTION BOX #1	600	13.00	17.00	20	N/A	BARE COPPER #6 AWG	CU #10 AWG	35	PASS	36	2	40	0.91	1	36.4	PASS	34	1.24	0.183	N/A	#N/A
STRING 2	JUNCTION BOX #1	600	13.00	17.00	20	N/A	BARE COPPER #6 AWG	CU #10 AWG	35	PASS	36	2	40	0.91	1	36.4	PASS	36	1.24	0.193	N/A	#N/A
STRING 3	JUNCTION BOX #1	600	13.00	17.00	20	N/A	BARE COPPER #6 AWG	CU #10 AWG	35	PASS	36	2	40	0.91	1	36.4	PASS	34	1.24	0.183	N/A	#N/A
STRING 4	JUNCTION BOX #2	600	13.00	17.00	20	N/A	BARE COPPER #6 AWG	CU #10 AWG	35	PASS	36	2	40	0.91	1	36.4	PASS	31	1.24	0.167	N/A	#N/A
STRING 5	JUNCTION BOX #2	600	13.00	17.00	20	N/A	BARE COPPER #6 AWG	CU #10 AWG	35	PASS	36	2	40	0.91	1	36.4	PASS	31	1.24	0.167	N/A	#N/A
JUNCTION BOX #1	POWERWALL 3 #1	600	13.00	17.00	20	N/A	CU #10 AWG	CU #10 AWG	35	PASS	36	6	40	0.91	0.8	29.12	PASS	23	1.24	0.124	3/4" EMT	27.71107
JUNCTION BOX #2	POWERWALL 3 #2	600	13.00	17.00	20	N/A	CU #10 AWG	CU #10 AWG	35	PASS	36	4	40	0.91	0.8	29.12	PASS	23	1.24	0.124	3/4" EMT	19.79362

String 1 Voltage Drop	0.306
String 2 Voltage Drop	0.317
String 3 Voltage Drop	0.306
String 4 Voltage Drop	0.290
String 5 Voltage Drop	0.290

AC FEEDER CALCULATIONS																						
CIRCUIT ORIGIN	CIRCUIT DESTINATION	VOLTAGE (V)	FULL LOAD AMPS "FLA" (A)	FLA*1.25 (A)	OCPD SIZE (A)	NEUTRAL SIZE	GROUND SIZE	CONDUCTOR SIZE	75°C AMPACITY (A)	AMPACITY CHECK #1	AMBIENT TEMP. (°C)	TOTAL CC CONDUCTOR S IN RACEWAY	90°C AMPACITY (A)	DERATION FACTOR FOR AMBIENT TEMPERATURE NEC 310.15(B){1}	DERATION FACTOR FOR CONDUCTORS PER RACEWAY NEC 310.15(C){1}	90°C AMPACITY DERATED (A)	AMPACITY CHECK #2	FEEDER LENGTH (FEET)	CONDUCTOR RESISTANCE (OHM/KFT)	VOLTAGE DROP AT FLA (%)	CONDUIT SIZE	CONDUIT FILL (%)
POWERWALL 3 #1	AC DISCONNECT #1	240	48	60	60	CU #6 AWG	CU #10 AWG	CU #6 AWG	65	PASS	36	2	75	0.91	1	68.25	PASS	5	0.491	0.098	3/4" EMT	32.4953
POWERWALL 3 #2	AC DISCONNECT #2	240	48	60	60	CU #6 AWG	CU #10 AWG	CU #6 AWG	65	PASS	36	2	75	0.91	1	68.25	PASS	5	0.491	0.098	3/4" EMT	32.4953
AC DISCONNECT #1	GATEWAY 3	240	48	60	60	CU #6 AWG	CU #10 AWG	CU #6 AWG	65	PASS	36	2	75	0.91	1	68.25	PASS	53	0.491	1.041	3/4" PVC	34.0945
AC DISCONNECT #2	GATEWAY 3	240	48	60	60	CU #6 AWG	CU #10 AWG	CU #6 AWG	65	PASS	36	2	75	0.91	1	68.25	PASS	53	0.491	1.041	3/4" PVC	34.0945
GATEWAY 3	BACKUP LOAD PANEL	240	166	166	175	CU #2/0 AWG	CU #6 AWG	CU #2/0 AWG	175	PASS	36	2	195	0.91	1	177.45	PASS	5	0.0967	0.067	1 1/2" EMT	35.2456
GATEWAY 3	POI	240	166	166	175	CU #2/0 AWG	N/A	CU #2/0 AWG	175	PASS	36	2	195	0.91	1	177.45	PASS	5	0.0967	0.067	1 1/2" EMT	32.7554

CUMULATIVE VOLTAGE INV #1	1.206
CUMULATIVE VOLTAGE INV #2	1.206

ELECTRICAL NOTES

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

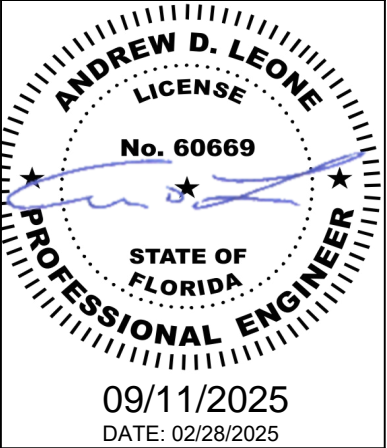
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4721 N GRADY AVE
TAMPA FL 33614
LIC #: CVC57085
PHONE: 813-540-8807

REVISIONS		
DESCRIPTION	DATE	REV
CLIENT COMMENT	03/13/2025	A
CLIENT COMMENT	09/11/2025	B



PROJECT NAME & ADDRESS

JOHN DOLL
RESIDENCE
483 NW DOGWOOD
TERRACE,
LAKE CITY, FL 32055

DRAWN BY ESR
SHEET NAME WIRING CALCULATIONS
SHEET SIZE ANSI B 11" X 17"
SHEET NUMBER PV-7

CAUTION:
AUTHORIZED SOLAR
PERSONNEL ONLY!

LABEL-1:
LABEL LOCATION:
AC DISCONNECT

⚠ WARNING

ELECTRICAL SHOCK HAZARD

TERMINALS ON THE LINE AND LOAD SIDES MAY
BE ENERGIZED IN THE OPEN POSITION

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

**⚠ WARNING DUAL POWER SOURCE
SECOND SOURCE IS PHOTOVOLTAIC SYSTEM**

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

⚠ WARNING

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

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

⚠ CAUTION
**PHOTOVOLTAIC SYSTEM CIRCUIT IS
BACKFEED**

LABEL- 5:
LABEL LOCATION:
MAIN SERVICE PANEL (ONLY IF SOLAR IS BACK-FED)
SUBPANEL (ONLY IF SOLAR IS BACK-FED)
CODE REF: NEC 705.12(D) & NEC 690.59

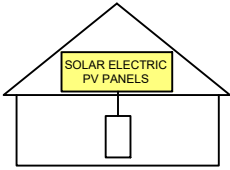
⚠ WARNING

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

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

**SOLAR PV SYSTEM EQUIPPED
WITH RAPID SHUTDOWN**

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



LABEL- 7:
LABEL LOCATION:
AC DISCONNECT
CODE REF: IFC 605.11.3.1(1) & NEC 690.56(C)

**RAPID SHUTDOWN SWITCH
FOR SOLAR PV SYSTEM**

LABEL- 8:
LABEL LOCATION:
AC DISCONNECT
CODE REF: NEC 690.56(C)(2)
AC DISCONNECT #1

**PHOTOVOLTAIC
AC DISCONNECT**

NOMINAL OPERATING AC VOLATGE **240 V**

RATED AC OUTPUT CURRENT **48 A**

LABEL- 9:
LABEL LOCATION:
MAIN SERVICE PANEL
SUBPANEL
AC DISCONNECT
CODE REF: NEC 690.54
AC DISCONNECT #2

**PHOTOVOLTAIC
AC DISCONNECT**

NOMINAL OPERATING AC VOLATGE **240 V**

RATED AC OUTPUT CURRENT **48 A**

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

**MAIN PHOTOVOLTAIC
SYSTEM DISCONNECT**

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

**CAUTION: PHOTOVOLTAIC SYSTEM
FOR SERVICE : LUNEX POWER
813-540-8807**

LABEL-12:

**WARNING: PHOTOVOLTAIC
POWER SOURCE**

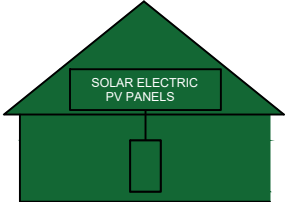
LABEL-13:
LABEL LOCATION:
EMT/CONDUIT RACEWAY
SOLADECK/JUNCTION BOX
CODE REF : NEC 690.31 (D) (14)

**ENERGY
STORAGE SYSTEM
DISCONNECT**

LABEL- 14:
LABEL LOCATION:
ESS DISCONNECT
CODE REF: NEC 706.15(C)

**EMERGENCY RESPONDER
THIS SOLAR PV SYSTEM EQUIPPED
WITH RAPID SHUTDOWN**

TURN RAPID SHUTDOWN
SWITCH TO THE 'OFF'
POSITION TO SHUTDOWN
ENTIRE PV SYSTEM.



**THE LABEL SHALL BE REFLECTIVE, WITH ALL LETTERS CAPITALIZED AND HAVING
A MINIMUM HEIGHT OF 3/8 IN. (9.5 MM), IN WHITE ON A RED BACKGROUND.**

LABEL- 15:
LABEL LOCATION:
AC DISCONNECT
CODE REF:NFPA 1 (11.12.2.1.1.1.1)
1. THE RAPID SHUTDOWN LABEL SHALL BE LOCATED ON OR NO MORE
THAN 3 FT (1 M) FROM THE SERVICE DISCONNECTING MEANS
2. (HEIGHT OF LABEL IS 3/8 IN. (9.5 MM), IN WHITE ON A RED BACKGROUND)

#1

MAXIMUM VOLTAGE: 600 V

MAXIMUM CIRCUIT VOLTAGE: 48.0 A

**MAXIMUM RATED OUTPUT
CURRENT OF THE CHARGE
COTROLLER OR DC-TO-DC
CONVERTER (IF INSTALLED):**

LABEL- 16:
LABEL LOCATION:
ESS DISCONNECT
CODE REF: NEC 706.15(C)

#2

MAXIMUM VOLTAGE: 600 V

MAXIMUM CIRCUIT VOLTAGE: 48.0 A

**MAXIMUM RATED OUTPUT
CURRENT OF THE CHARGE
COTROLLER OR DC-TO-DC
CONVERTER (IF INSTALLED):**

LABEL- 17:
LABEL LOCATION:
ESS DISCONNECT
CODE REF: NEC 706.15(C)

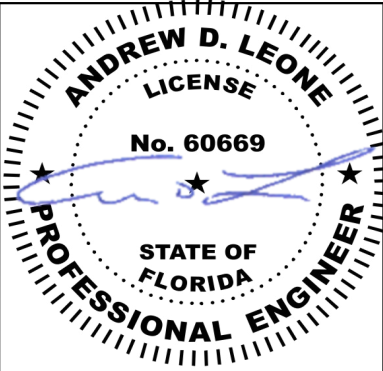
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4721 N GRADY AVE
TAMPA FL 33614
LIC #: CVC57085
PHONE: 813-540-8807

REVISIONS		
DESCRIPTION	DATE	REV
CLIENT COMMENT	03/13/2025	A
CLIENT COMMENT	09/11/2025	B



09/11/2025
DATE: 02/28/2025

PROJECT NAME & ADDRESS

JOHN DOLL
RESIDENCE
483 NW DOGWOOD
TERRACE,
LAKE CITY, FL 32055

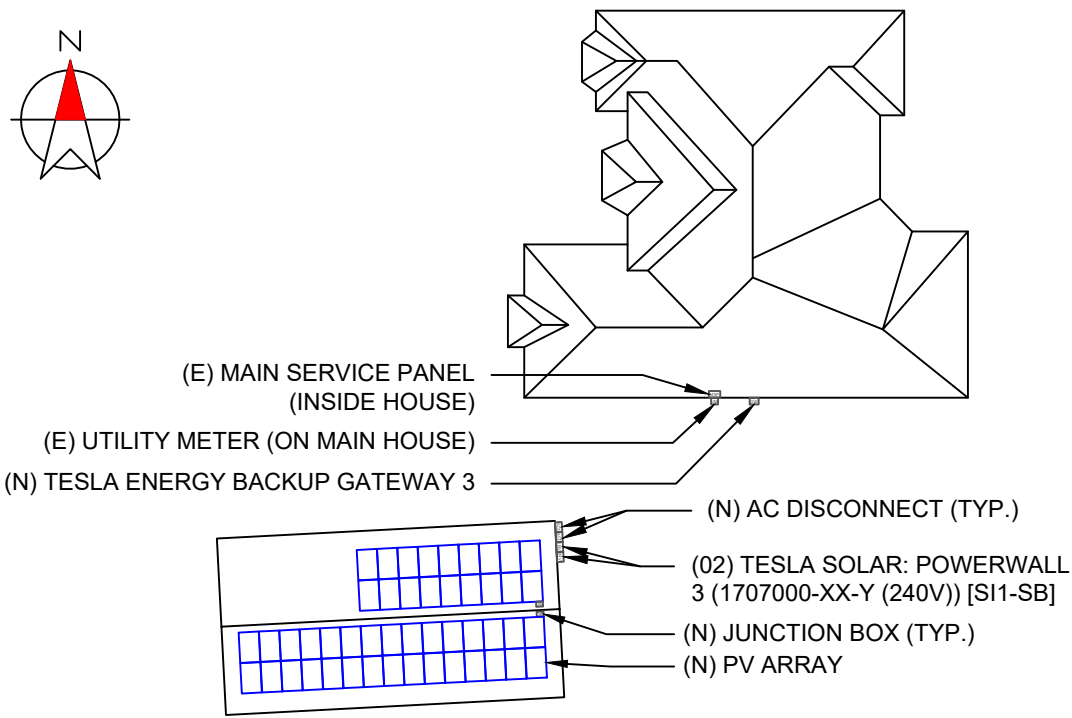
DRAWN BY
ESR

SHEET NAME
LABELS

SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
PV-8

CAUTION
MULTIPLE SOURCES OF POWER



483 NW DOGWOOD TERRACE, LAKE CITY, FL 32055

DIRECTORY
PERMANENT PLAQUE OR DIRECTORY PROVIDING THE LOCATION OF THE
SERVICE DISCONNECTING MEANS AND THE PHOTOVOLTAIC SYSTEM.

(ALL PLAQUES AND SIGNAGE WILL BE INSTALLED AS OUTLINED WITHIN:
NEC 690.56(B)&(C), [NEC 705.10])

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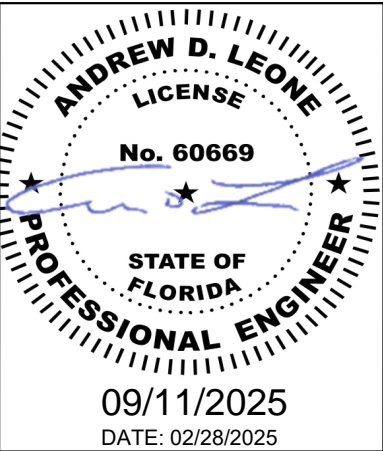
LABELING NOTES:

1. LABELS CALLED OUT ACCORDING TO ALL COMMON CONFIGURATIONS. ELECTRICIAN TO DETERMINE EXACT REQUIREMENTS IN THE FIELD PER CURRENT NEC AND LOCAL CODES AND MAKE APPROPRIATE ADJUSTMENTS.
2. LABELING REQUIREMENTS BASED ON THE 2020 NATIONAL ELECTRIC CODE, OSHA STANDARD 19010.145, ANSI Z535.
3. MATERIAL BASED ON THE REQUIREMENTS OF THE AUTHORITY HAVING JURISDICTION.
4. LABELS TO BE OF SUFFICIENT DURABILITY TO WITHSTAND THE ENVIRONMENT INVOLVED [NEC 110.21]
5. LABELS TO BE A MINIMUM LETTER HEIGHT OF 3/8", WHITE ON RED BACKGROUND; REFLECTIVE, AND PERMANENTLY AFFIXED [IFC 605.11.1.1]



4721 N GRADY AVE
TAMPA FL 33614
LIC #: CVC57085
PHONE: 813-540-8807

REVISIONS		
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PROJECT NAME & ADDRESS

JOHN DOLL
RESIDENCE
483 NW DOGWOOD
TERRACE,
LAKE CITY, FL 32055

DRAWN BY
ESR

SHEET NAME
PLACARD

SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
PV-9

RAPID SHUTDOWN CHART



4721 N GRADY AVE
TAMPA FL 33614
LIC #: CVC57085
PHONE: 813-540-8807

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DATE: 02/28/2025

PROJECT NAME & ADDRESS

JOHN DOLL
RESIDENCE
483 NW DOGWOOD
TERRACE,
LAKE CITY, FL 32055

DRAWN BY

ESR

SHEET NAME

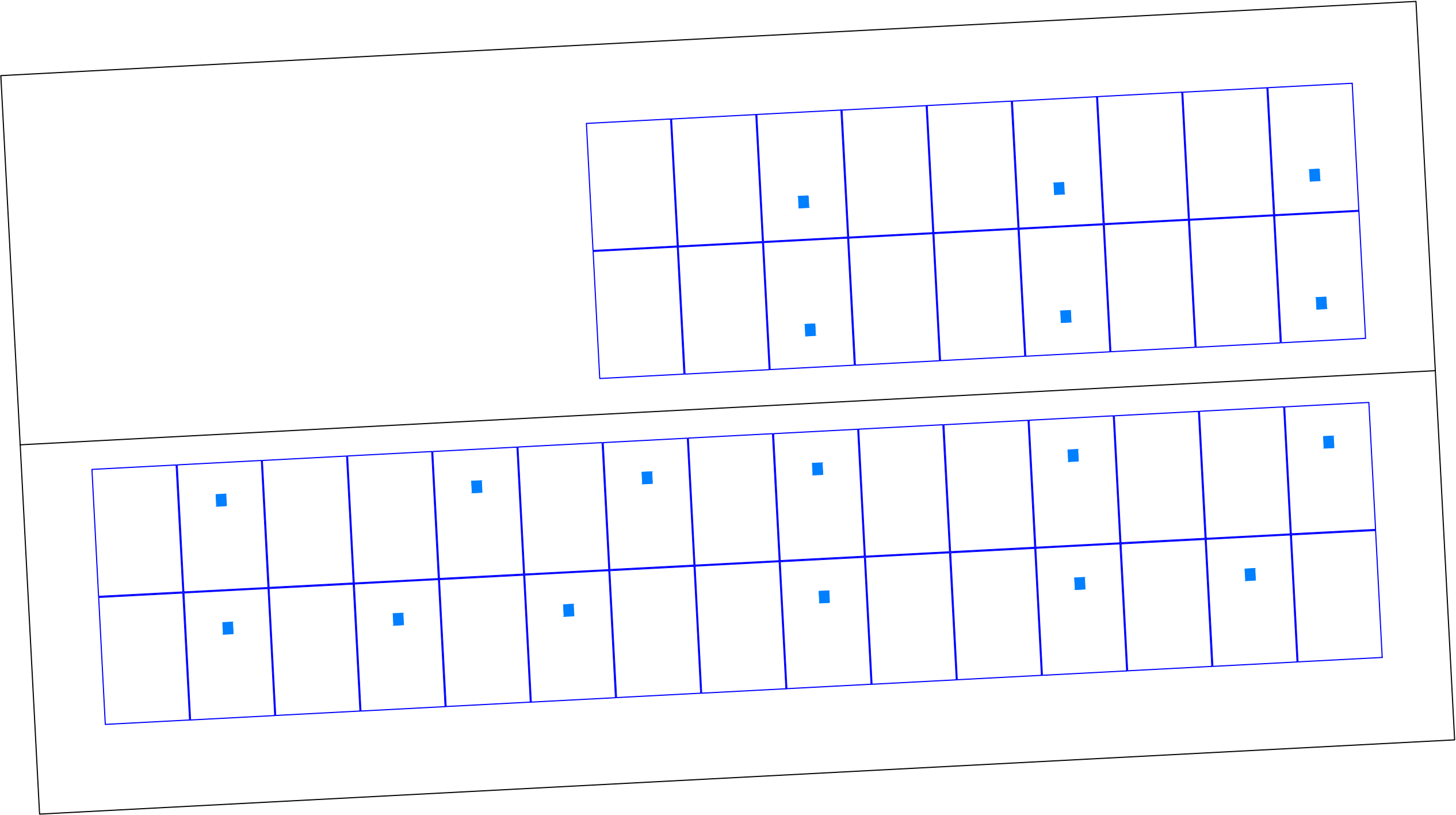
RAPID SHUTDOWN
CHART

SHEET SIZE

ANSI B
11" X 17"

SHEET NUMBER

PV-10





BACKSHEET MONOCRYSTALLINE MODULE

430W
MAXIMUM POWER OUTPUT

0~+5W
POSITIVE POWER TOLERANCE

21.5%
MAXIMUM EFFICIENCY

Mono Multi Solutions

PRODUCT: TSM-NE09RC.05
PRODUCT RANGE: 400-430W



Small in size, bigger on power

- Up to 430W, 21.5% module efficiency with high density interconnect technology
- Reduce installation cost with higher power bin and efficiency
- Boost performance in warm weather with low temperature coefficient and operating temperature



High Reliability

- Innovative non-destructive cutting for improved mechanical resistance and strength
- Excellent fire rating, weather resistance, salt spray, sand dust, ammonia performance which is fully applicable in coastal, high temperature, humidity area and harsh environment



Ultra-low Degradation, longer warranty, higher output

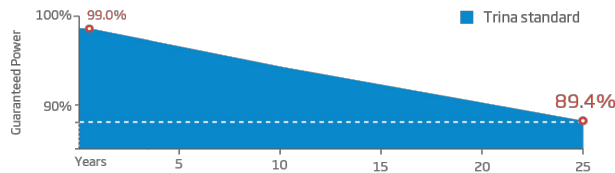
- First-year degradation 1% and annual degradation at 0.4%
- Up to 25 years product warranty and 25 years power warranty



Universal solution for residential and C&I rooftops

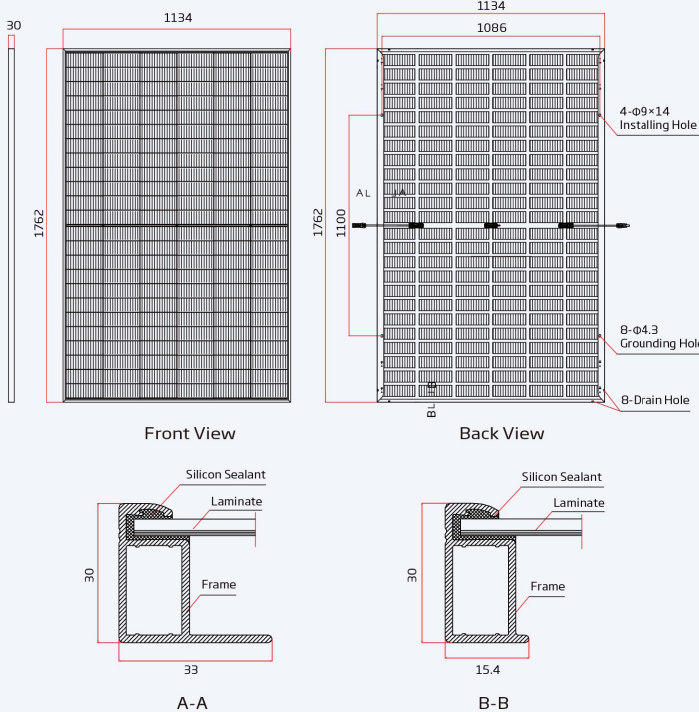
- Easy for integration, designed for compatibility with existing mainstream inverters and diverse mounting systems
- Perfect size and low weight for handling and installation
- Most valuable solution on low load capacity rooftops (weight similar to backsheet version)
- Mechanical performance up to 6000 Pa positive load and 4000 Pa negative load

Trina Solar's Vertex Bifacial Backsheet Performance Warranty

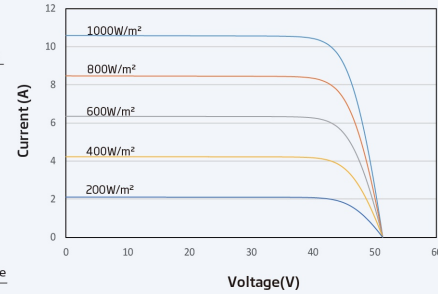


BACKSHEET MONOCRYSTALLINE MODULE

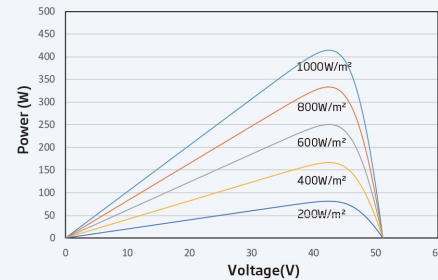
DIMENSIONS OF PV MODULE(mm)



I-V CURVES OF PV MODULE(415 W)



P-V CURVES OF PV MODULE(415W)



ELECTRICAL DATA (STC)

Peak Power Watts- P_{MAX} (Wp)*	400	405	410	415	420	425	430
Power Tolerance- P_{MAX} (W)				0 ~ +5			
Maximum Power Voltage- V_{MPP} (V)	41.3	41.7	42.1	42.5	42.8	43.2	43.6
Maximum Power Current- I_{MPP} (A)	9.68	9.71	9.73	9.77	9.80	9.84	9.87
Open Circuit Voltage- V_{OC} (V)	49.2	49.6	50.1	50.5	50.9	51.4	51.8
Short Circuit Current- I_{SC} (A)	10.30	10.33	10.37	10.40	10.43	10.47	10.50
Module Efficiency η (%)	20.0	20.3	20.5	20.8	21.0	21.3	21.5

STC: Irradiance 1000W/m², Cell Temperature 25°C, Air Mass AM1.5. *Measuring tolerance: ±3%.

Electrical characteristics with different power bin (reference to 10% Irradiance ratio)

Total Equivalent power - P_{MAX} (Wp)	426	431	437	442	447	453	458
Maximum Power Voltage- V_{MPP} (V)	41.3	41.7	42.1	42.5	42.8	43.2	43.6
Maximum Power Current- I_{MPP} (A)	10.31	10.34	10.36	10.41	10.44	10.48	10.51
Open Circuit Voltage- V_{OC} (V)	49.2	49.6	50.1	50.5	50.9	51.4	51.8
Short Circuit Current- I_{SC} (A)	10.97	11.00	11.04	11.08	11.11	11.15	11.18
Irradiance ratio (rear/front)	10%						

Power Bifaciality: 65±10%.

ELECTRICAL DATA (NOCT)

Maximum Power- P_{MAX} (Wp)	312	308	312	316	319	324	328
Maximum Power Voltage- V_{MPP} (V)	38.6	39.0	39.3	39.7	40.0	40.4	40.7
Maximum Power Current- I_{MPP} (A)	7.88	7.91	7.93	7.96	7.98	8.01	8.04
Open Circuit Voltage- V_{OC} (V)	46.6	47.0	47.5	47.8	48.2	48.7	49.1
Short Circuit Current- I_{SC} (A)	8.30	8.32	8.36	8.38	8.41	8.44	8.46

NOCT: Irradiance at 800W/m², Ambient Temperature 20°C, Wind Speed 1m/s.

MECHANICAL DATA

Solar Cells	Topcon Bifacial
No. of cells	144cells
Module Dimensions	1762×1134×30 mm (69.37×44.65×1.18 inches)
Weight	21.3kg (47.0lb)
Front Glass	3.2 mm (0.12inches), High Transmission, Tempered Glass
Encapsulant material	POE/EVA
BackSheet	Black Grid Transparent Backsheet
Frame	30mm (1.18 inches) Anodized Aluminium Alloy, Black
J-Box	IP 68 rated
Cables	Photovoltaic Technology Cable 4.0mm ² (0.006 inches ²) Landscape: N 1100 mm/ P 1100 mm (43.31/43.31 inches)
Connector	MC4 EVO2
Fire Type	Type 1 or Type 2

TEMPERATURE RATINGS

NOCT (Nominal Operating Cell Temperature)	43°C (±2°C)
Temperature Coefficient of P_{MAX}	-0.30%/°C
Temperature Coefficient of V_{OC}	-0.24%/°C
Temperature Coefficient of I_{SC}	0.04%/°C

MAXIMUM RATINGS

Operational Temperature	-40~+85°C
Maximum System Voltage	1500V DC (IEC)
Max Series Fuse Rating	25 A

WARRANTY

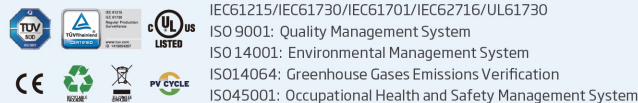
25 year Product Workmanship Warranty
25 year Power Warranty
1% first year degradation
0.4% Annual Power Attenuation

(Please refer to product warranty for details)

PACKAGING CONFIGURATION

Modules per box: 36 pieces
Modules per 40' container: 792 pieces
Pallet dimensions (L x W x H): 1800 x 1135 x 1259 mm
Pallet weight: 829 kg (1827 lb)

Comprehensive Products and System Certificates



CAUTION: READ SAFETY AND INSTALLATION INSTRUCTIONS BEFORE USING THE PRODUCT.
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Version number: TSM_NA_EN_2023_A
www.trinasolar.com



4721 N GRADY AVE
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DATE: 02/28/2025

PROJECT NAME & ADDRESS

JOHN DOLL
RESIDENCE
483 NW DOGWOOD
TERRACE,
LAKE CITY, FL 32055

DRAWN BY
ESR

SHEET NAME
EQUIPMENT
SPECIFICATION

SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
PV-11

Powerwall 3

Power Everything

Powerwall 3 is a fully integrated solar and battery system, designed to accelerate the transition to sustainable energy. Customers can receive whole home backup, cost savings, and energy independence by producing and consuming their own energy while participating in grid services. Once installed, customers can manage their system using the Tesla App to customize system behavior to meet their energy goals.

Powerwall 3 achieves this by supporting up to 20 kW DC of solar and providing up to 11.5 kW AC of continuous power per unit. It has the ability to start heavy loads rated up to 185 LRA, meaning a single unit can support the power needs of most homes. Powerwall 3 Expansions make it easier and more affordable to scale up customers' systems to meet their current or future needs. Powerwall 3 is designed for fast and efficient installations, modular system expansion, and simple connection to any electrical service.



Powerwall 3 Technical Specifications

System Technical Specifications

Model Number	1707000-xx-y			
Nominal Grid Voltage (Input & Output)	120/240 VAC			
Grid Type	Split phase			
Frequency	60 Hz			
Nominal Battery Energy	13.5 kWh AC ¹			
Nominal Output Power (AC)	5.8 kW	7.6 kW	10 kW	11.5 kW
Maximum Apparent Power	5,800 VA	7,600 VA	10,000 VA	11,500 VA
Maximum Continuous Current	24 A	31.7 A	41.7 A	48 A
Overcurrent Protection Device ²	30 A	40 A	60 A	60 A
Configurable Maximum Continuous Discharge Power Off-Grid (PV Only, -20°C to 25°C)	15.4 kW ³			
Maximum Continuous Charge Current / Power (Powerwall 3 only)	20.8 A AC / 5 kW			
Maximum Continuous Charge Current / Power (Powerwall 3 with up to (3) Expansion units)	33.3 A AC / 8 kW			
Output Power Factor Rating	0 - 1 (Grid Code configurable)			
Maximum Output Fault Current (1 s)	160 A			
Maximum Short-Circuit Current Rating	10 kA			
Load Start Capability	185 LRA			
Solar to Battery to Home/Grid Efficiency	89% ^{1,4}			
Solar to Home/Grid Efficiency	97.5% ⁵			
Power Scalability	Up to 4 Powerwall 3 units supported			
Energy Scalability	Up to 3 Expansion units (for a maximum total of 7 units)			
Supported Islanding Devices	Gateway 3, Backup Switch, Backup Gateway 2			
Connectivity	Wi-Fi (2.4 and 5 GHz), Ethernet, Cellular (LTE/4G ⁶)			
Hardware Interface	Dry contact relay, Rapid Shutdown (RSD) certified switch and 2-pin connector, RS-485 for meters			
AC Metering	Revenue Grade (+/- 0.5%, ANSI C12.20)			
Protections	Integrated arc fault circuit interrupter (AFCI), Isolation Monitor Interrupter (IMI), PV Rapid Shutdown (RSD) using Tesla Mid-Circuit Interrupters			
Customer Interface	Tesla Mobile App			
Warranty	10 years			

¹Values provided for 25°C (77°F), at beginning of life. 3.3 kW charge/discharge power.

²See [Powerwall 3 Installation Manual](#) for fuse requirements if using fuse for overcurrent protection.

³If enabling the 15.4 kW off-grid maximum continuous discharge power, Powerwall 3 must be installed with an 80 A breaker and appropriately sized conductors.

⁴Typical solar shifting use case.

⁵Tested using CEC weighted efficiency methodology.

⁶The customer is expected to provide internet connectivity for Powerwall 3; cellular should not be used as the primary mode of connectivity. Cellular connectivity subject to network operator service coverage and signal strength.

LUNEX POWER
THE PURE SOURCE

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LIC #: CVC57085
PHONE: 813-540-8807

REVISIONS		
DESCRIPTION	DATE	REV
CLIENT COMMENT	03/13/2025	A
CLIENT COMMENT	09/11/2025	B

DATE: 02/28/2025

PROJECT NAME & ADDRESS

JOHN DOLL
RESIDENCE
483 NW DOGWOOD
TERRACE,
LAKE CITY, FL 32055

DRAWN BY
ESR

SHEET NAME
EQUIPMENT
SPECIFICATION

SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
PV-12

Powerwall 3 Technical Specifications

Solar Technical Specifications

Maximum Solar STC Input	20 kW
Withstand Voltage	600 V DC
PV DC Input Voltage Range	60 — 550 V DC
PV DC MPPT Voltage Range	60 — 480 V DC
MPPTs	6
Maximum Current per MPPT (I _{mp})	13 A ⁷
Maximum Short Circuit Current per MPPT (I _{sc})	15 A ⁷

⁷Where the DC input current exceeds the MPPT rating, a jumper can be used to combine two MPPTs into a single input to intake DC current up to 26 A I_{MP} / 30 A I_{SC}.

Environmental Specifications

Operating Temperature	–20°C to 50°C (–4°F to 122°F) ⁸
Operating Humidity (RH)	Up to 100%, condensing
Storage Temperature	–20°C to 30°C (–4°F to 86°F), up to 95% RH, non-condensing, State of Energy (SOE): 25% initial
Maximum Elevation	3000 m (9843 ft)
Environment	Indoor and outdoor rated
Enclosure Rating	NEMA 3R
Ingress Rating	IP67 (Battery & Power Electronics) IP55 (Wiring Compartment)
Pollution Rating	PD3
Operating Noise @ 1 m	< 50 db(A) typical < 62 db(A) maximum

⁸Performance may be de-rated at operating temperatures above 40°C (104°F).

Compliance Information

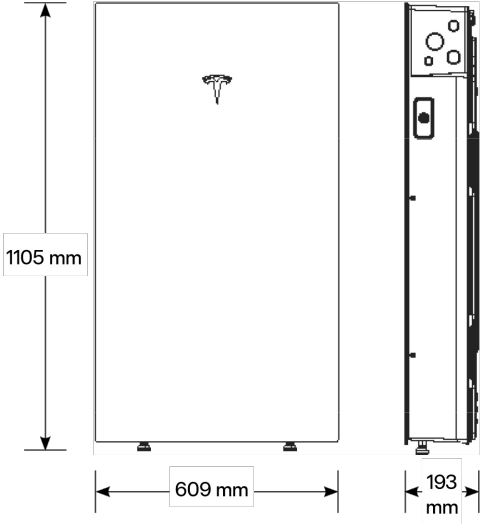
Certifications	UL 1741, UL 9540, UL 9540A, UL 3741, UL 1741 PCS, UL 1741 SA, UL 1741 SB, UL 1973, UL 1699B, UL 1998, CSA C22.2 No. 0.8, CSA C22.2 No. 107.1, CSA C22.2 No. 330, CSA 22.3 No. 9, IEEE 1547, IEEE 1547A, IEEE 1547.1, CA Rule No.21
Grid Connection	United States and Canada
Emissions	FCC Part 15 Class B, ICES 003
Environmental	RoHS Directive 2011/65/EU
Seismic	AC156, IEEE 693-2005 (high)
Fire Testing	Meets the unit level performance criteria of UL 9540A

Powerwall 3 Technical Specifications

Mechanical Specifications

Dimensions	1105 x 609 x 193 mm (43.5 x 24 x 7.6 in) ⁹
Total Weight of Installed Unit	132 kg (291.2 lb)
Weight of Powerwall 3	124 kg (272.5 lb)
Weight of Glass Front Cover	6.5 kg (14.5 lb)
Weight of Wall Bracket	1.9 kg (4.2 lb)
Mounting Options	Floor or wall mount

⁹These dimensions include the glass front cover being installed on Powerwall 3.



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TERRACE,
LAKE CITY, FL 32055

DRAWN BY
ESR

SHEET NAME
EQUIPMENT
SPECIFICATION

SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
PV-13

Solar Shutdown Device Technical Specifications

The Solar Shutdown Device is a Mid-Circuit Interrupter (MCI) and is integral to the rapid shutdown (RSD) function required for rooftop PV systems in accordance with Article 690 of the NEC. When paired with Powerwall 3, solar array shutdown is initiated by an External System Shutdown Switch or the On/Off Enable switch located on Powerwall 3. Systems not subject to rapid shutdown requirements must still install one or more MCIs for functional purposes; see the Powerwall 3 installation manual for details.

Electrical Specifications

Model	MCI-1	MCI-2	MCI-2 High Current
Nominal Input DC Current Rating (I_{MP})	13 A	13 A	15 A
Maximum Input Short Circuit Current (I_{SC})	19 A	17 A	19 A
Maximum System Voltage	600 V DC	1000 V DC ¹⁴	1000 V DC ¹⁴
Maximum Disconnect Voltage ¹⁵	600 V DC	165 V DC	165 V DC

¹⁴ Maximum System Voltage is limited by Powerwall to 600 V DC.

¹⁵ Maximum Disconnect Voltage is the maximum voltage allowed across each MCI in the open position (Rapid Shutdown Initiated). An individual MCI-2 has a voltage rating of 165V but in combination (connected in the same string) their voltage ratings are additive.

RSD Module Performance

Maximum Number of Devices per String	5
Control	Power Line Excitation
Passive State	Normally Open
Maximum Power Consumption	7 W
Warranty	25 years

Environmental Specifications

Operating Temperature	-40°C to 50°C (-40°F to 122°F)	-45°C to 70°C (-49°F to 158°F)
Storage Temperature	-30°C to 70°C (-22°F to 158°F)	-30°C to 70°C (-22°F to 158°F)
Enclosure Rating	NEMA 4X / IP65	

Mechanical Specifications

Electrical Connections	MC4 Connector	
Housing	Plastic	
Dimensions	125 x 150 x 22 mm (5 x 6 x 1 in)	173 x 45 x 22 mm (6.8 x 1.8 x 1 in)
Weight	350 g (0.77 lb)	120 g (0.26 lb)
Mounting Options	ZEP Home Run Clip M4 Screw (#10) M8 Bolt (5/16") Nail / Wood screw	Wire Clip

Compliance Information

Certifications	UL 1741 PVRSE, UL 3741, PVRSA (Photovoltaic Rapid Shutdown Array)
RSD Initiation Method	External System Shutdown Switch or Powerwall 3 Enable Switch

UL 3741 PV Hazard Control (and PVRSA) Compatibility

See [UL 3741 Application Addendum](#)



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ESR

SHEET NAME
EQUIPMENT
SPECIFICATION

SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
PV-14

Gateway 3

Tesla Gateway 3 controls connection to the grid in a Powerwall system, automatically detecting outages and providing seamless transition to backup power. It provides energy monitoring that is used by Powerwall for solar self-consumption, time-based control, and backup operation.

Performance Specifications

Model Number	1841000-01-y	AC Meter	+/- 0.5%
Nominal Grid Voltage	120/240 V AC	Communication	CAN
Grid Configuration	Split phase	User Interface	Tesla App
Grid Frequency	60 Hz	Backup Transition	Automatic disconnect for seamless backup
Continuous Current Rating	200 A	Overcurrent Protection Device	100–200 A Service entrance rated Eaton CSR, BWH, or BW, or Square D QOM breakers
Maximum Supply Short Circuit Current	22 kA with Square D or Eaton main breaker 25 kA with Eaton main breaker ^a	Internal Panelboard	200 A 8-space/16 circuit breakers Eaton BR, Siemens QP, or Square D HOM breakers rated to 10–125A
IEC Protective Class	Class I	Warranty	10 years
Overvoltage Category	Category IV		

^aOnly Eaton CSR or BWH main breakers are 25 kA rated.

Environmental Specifications

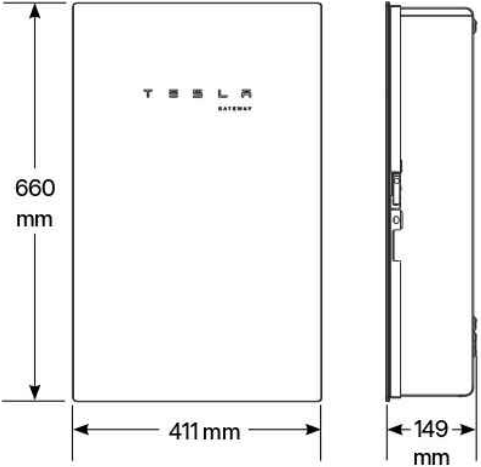
Operating Temperature	–20°C to 50°C (–4°F to 122°F)
Operating Humidity (RH)	Up to 100%, condensing
Maximum Elevation	3000 m (9843 ft)
Environment	Indoor and outdoor rated
Enclosure Type	NEMA 3R

Compliance Information

Certifications	UL 67, UL 869A, UL 916, UL 1741 PCS, CSA 22.2 107.1, CSA 22.2 29
Emissions	FCC Part 15, Class B, ICES 003

Mechanical Specifications

Dimensions	660 x 411 x 149 mm (26 x 16 x 6 in)
Weight	16.3 kg (36 lb)
Mounting options	Wall mount



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SHEET NAME
EQUIPMENT
SPECIFICATION

SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
PV-15

S-5!®

The Right Way!

ProteaBracket™

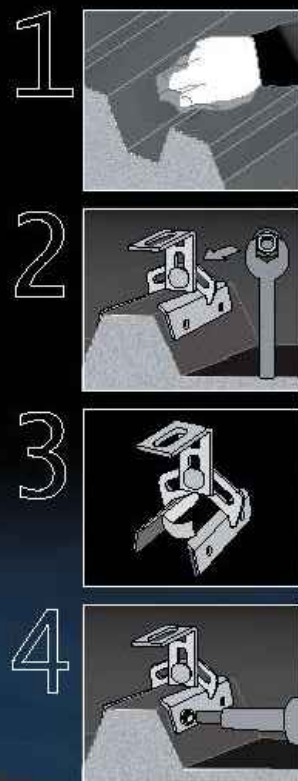
ProteaBracket™ is the most versatile standing seam metal roof attachment solution on the market, fitting most trapezoidal sheet profiles with and without intermediate insulation. It features an adjustable attachment base and multiple solar module attachment options (illustrated on back) to accommodate varying widths and heights. There are no messy sealants to apply and no chance for leaks; the ProteaBracket comes with factory-applied, adhesive rubber sealant to ensure quick installation and a weather-proof fit.

Installation is simple! The ProteaBracket is mounted directly onto the crown of the panel, straddling the profile. No surface preparation is necessary; simply wipe away excess oil and debris, align, and apply. Secure ProteaBracket through its pre-punched holes, using the hardened drill point S-5!® screws.

ProteaBracket is the perfect match for our S-5-PV Kit and spares you the hassle of cold-bridging! For a solar attachment solution that is both economical and easy to use, choose ProteaBracket.*

*When ProteaBracket is used in conjunction with the S-5-PV Kit, an additional nut is required during installation.

S-5!® ProteaBracket™ is a versatile bracket that adjusts easily to most trapezoidal roof profiles.



ProteaBracket™

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S-5!®

The Right Way!

ProteaBracket™ is the perfect solar attachment solution for most trapezoidal exposed-fastened metal roof profiles! No messy sealants to apply. The factory-applied adhesive rubber sealant weather-proofs and makes installation easy!

Each ProteaBracket™ comes with a factory-applied, adhesive rubber sealant on the base. A structural A2 stainless steel bimetal attachment bracket, ProteaBracket is compatible with most common metal roofing materials. All four pre-punched holes must be used to achieve tested strength. Mounting hardware is furnished with the ProteaBracket. For design assistance, ask your distributor, or visit www.S-5.com for the independent lab test data that can be used for load-critical designs and applications. Also, please visit our website for more information including metallurgical compatibilities and specifications. S-5!® holding strength is unmatched in the industry.

Multiple Attachment Options:

Side Rail Option



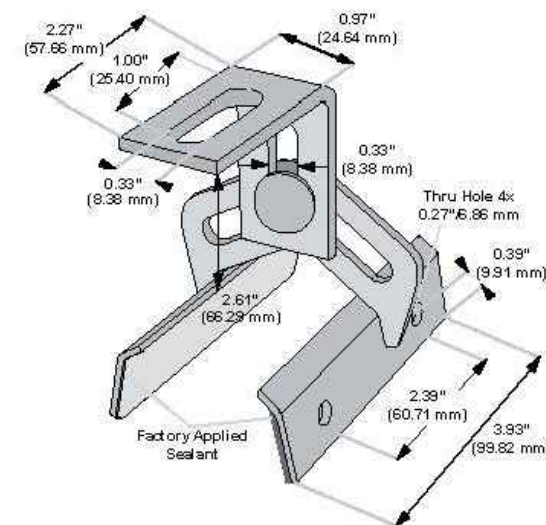
Top Rail Option



S-5-PV Kit Option



ProteaBracket™



Please note: All measurements are rounded to the second decimal place.

Example Applications



S-5-PV Kit demonstrated with a ProteaBracket on a trapezoidal profile.

Example Profile



S-5!® Warning! Please use this product responsibly!

Products are protected by multiple U.S. and foreign patents. For published data regarding holding strength, bolt torque, patents, and trademarks, visit the S-5! website at www.S-5.com. Copyright 2015, Metal Roof Innovations, Ltd. S-5! products are patent protected. S-5! aggressively protects its patents, trademarks, and copyrights. Version 052115.

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LAKE CITY, FL 32055

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SHEET NAME
EQUIPMENT
SPECIFICATION

SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
PV-16



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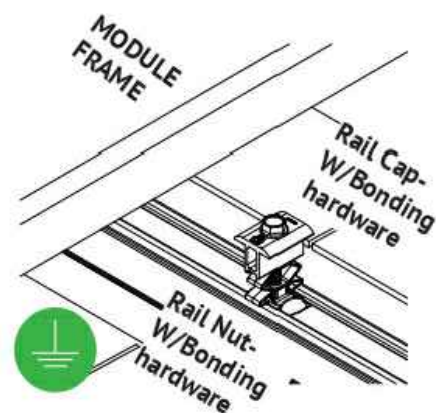
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SHEET NAME
EQUIPMENT
SPECIFICATION

SHEET SIZE
ANSI B
11" X 17"

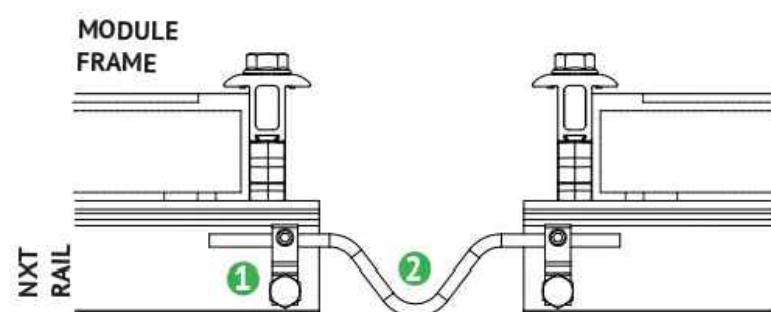
SHEET NUMBER
PV-17



BONDING COMBO MID-END CLAMP ASSEMBLY

- 1 Aluminum combo mid-end clamp cap with stainless steel bonding pins that pierce module frame anodization to bond module to module through clamp
- 2 Stainless steel bolt bonds aluminum clamp to stainless steel Hex bolt
- 3 Aluminum combo mid-end clamp rail nut with stainless steel bonding pins that pierce rail anodization to bond module to module through clamp

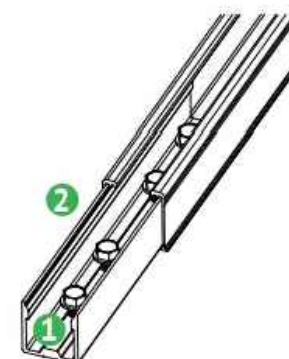
NOTE: See Page 19 for installation details.



BONDING BETWEEN THERMAL BREAKS

- 1 Lug is connected at the end of each thermal break to the rail.
- 2 Solid copper wire is connected across the gap to bond the two ends.

NOTE: See Page 5 for installation details.

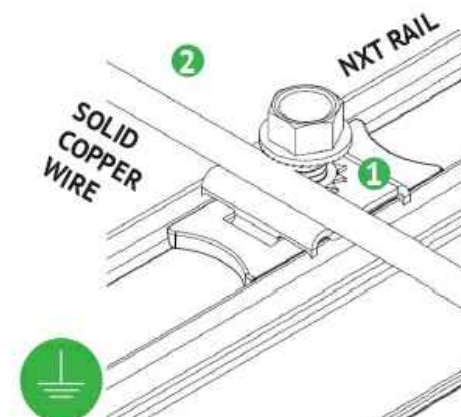


BONDING RAIL SPLICE

- 1 Bonding Hardware creates bond between Splice bar and each rail section.
- 2 Aluminum splice bar spans across rail gap to create rail to rail bond. Rail on at least one side of splice will be grounded.

NOTE:

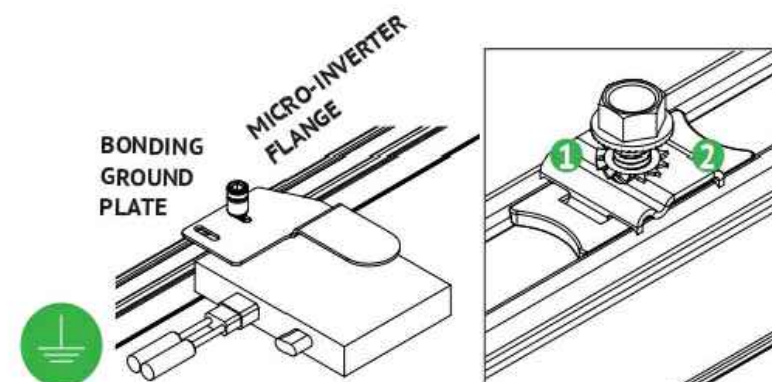
- See Page 15 for installation details
- Splice certified for single-use only



RACK SYSTEM GROUNDING

- 1 Tabs on the stainless-steel washer pierce anodization on the rail to bond rail to ground wire.
- 2 Solid copper wire connected to lug is routed to provide final system ground connection.

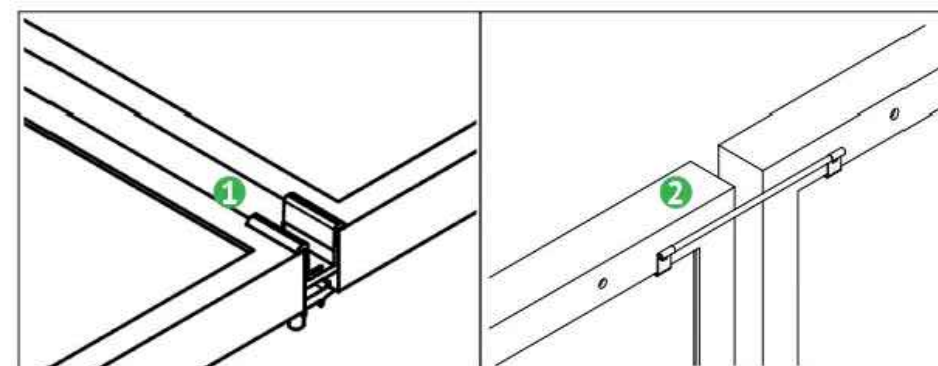
NOTE: See Page 16 for installation details and alternate racking system grounding methods.



BONDING MICROINVERTER MOUNT

- 1 Stainless steel Tooth lock washer beneath the MLPE flange remove anodization on the MLPE and bonds.
- 2 Tabs on the stainless steel washer remove anodization on the rail and bonds.

NOTE: See Page 17 for installation details



ALTERNATE ROW-TO-ROW BONDING PATHS

- 1 Row-to-row module bonding is accomplished with bonding clamp with 2 integral bonding pins.
- 2 Alternate method by connecting clips on either module to complete the bonding path.

NOTE:

- See Page 16 for installation details
- Row-to-row module bonding certified for single-use only

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SHEET NAME
EQUIPMENT
SPECIFICATION

SHEET SIZE

ANSI B
11" X 17"

SHEET NUMBER

PV-18

A. System Specifications and Ratings

- Maximum Voltage: 1,000 Volts
- Maximum Current: 80 Amps
- Allowable Wire: 14 AWG – 6 AWG
- Spacing: Please maintain a spacing of at least ½” between uninsulated live parts and fittings for conduit, armored cable, and uninsulated live parts of opposite polarity.
- Enclosure Rating: Type 3R
- Roof Slope Range: 2.5 – 12:12
- Max Side Wall Fitting Size: 1”
- Max Floor Pass-Through Fitting Size: 1”
- Ambient Operating Conditions: (-35°C) - (+75°C)
- Compliance:
 - JB-3: UL1741, CSA C22.2 No. 290
 - Approved wire connectors: must conform to UL1741
- System Marking: **Intertek Symbol and File #5025824**
- Periodic Re-inspections: If re-inspections yield loose components, loose fasteners, or any corrosion between components, components that are found to be affected are to be replaced immediately.

Table 1: Typical Wire Size, Torque Loads and Ratings

	1 Conductor	2 Conductor	Torque				
			Type	NM	Inch Lbs	Voltage	Current
ABB ZS6 terminal block	10-24 awg	16-24 awg	Sol/Str	0.5-0.7	6.2-8.85	600V	30 amp
ABB ZS10 terminal block	6-24 awg	12-20 awg	Sol/Str	1.0-1.6	8.85-14.16	600V	40 amp
ABB ZS16 terminal block	4-24 awg	10-20 awg	Sol/Str	1.6-2.4	14.6-21.24	600V	60 amp
ABB M6/8 terminal block	8-22 awg		Sol/Str	.08-1	8.85	600V	50 amp
Ideal 452 Red <small>WING-NUT Wire Connector</small>	8-18 awg		Sol/Str	Self-Torque	Self-Torque	600V	
Ideal 451 Yellow <small>WING-NUT Wire Connector</small>	10-18 awg		Sol/Str	Self-Torque	Self-Torque	600V	
Ideal, In-Sure <small>Push-In Connector Part #99</small>	10-14 awg		Sol/Str	Self-Torque	Self-Torque	600V	
WAGO, 2204-1201	10-20 awg	16-24 awg	Sol/Str	Self-Torque	Self-Torque	600V	30 amp
WAGO, 221-612	10-20 awg	10-24 awg	Sol/Str	Self-Torque	Self-Torque	600V	30 amp
Dottie DRC75	6-12 awg		Sol/Str	Snap-In	Snap-In		
ESP NG-53	4-6 awg		Sol/Str		45	2000V	
	10-14 awg		Sol/Str		35		
ESP NG-717	4-6 awg		Sol/Str		45	2000V	
	10-14 awg		Sol/Str		35		
Brumall 4-5,3	4-6 awg		Sol/Str		45	2000V	
	10-14 awg		Sol/Str		35		

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

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



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11" X 17"

SHEET NUMBER

PV-19