



Project Binder

Umut Eser
7.480 kW
116 Sage Thrush Bnd
Holly Springs, NC 27540

Prepared by
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About Your Solar System

Your rated system capacity is **7.480 KW**. The major components used will be:

	Model #	Description	Qty
Solar Module	Canadian Solar	CS6.1-54TM-460H	17
Inverter	Tesla	Powerwall3 1707000-00-J	01
Racking	Pegasus Solar	PSR-B84 Rails (Black)	As required
Mounting Type	Pegasus Solar	Comp Mount Flashing (Black)	As required
PV Monitoring	Tesla Monitoring	Free online monitoring tool to see real time energy production profile	-
Battery	Tesla	Tesla Powerwall 3	01

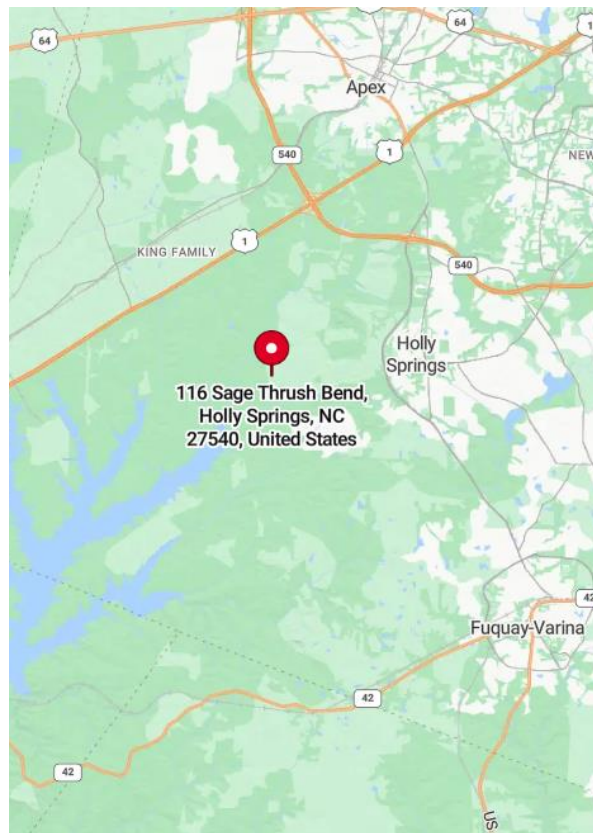
Service & Support

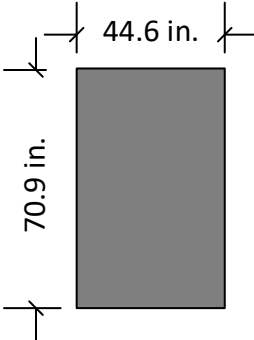
For all service inquiries - please email service@8msolar.com OR call 919-893-4475.

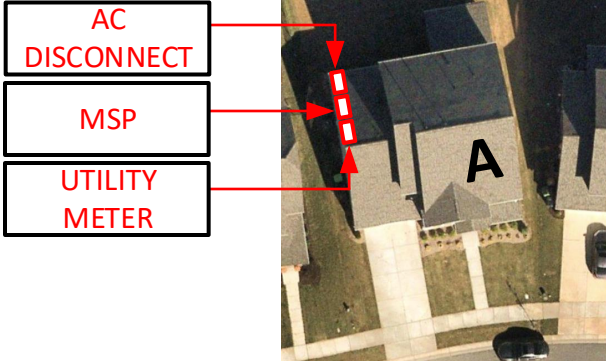
Service Timelines: Please allow the following timelines for the 8MSolar support team to begin the process of fixing your issues.

- Non critical / Monitoring issues: 1 week
- Minor production fault: 1 week
- Critical production fault: 72 working hours

The actual resolution time for a service item can vary depending on availability of spare parts from the manufacturer.

PHOTOVOLTAIC ROOF MOUNT SYSTEM			SR.#	PROJECT INFORMATION	
<u>CODE AND STANDARDS</u> THE INSTALLATION OF SOLAR ARRAYS AND PHOTOVOLTAIC POWER SYSTEMS SHALL COMPLY WITH THE FOLLOWING CODES: 2020 NATIONAL ELECTRICAL CODE 2018 NORTH CAROLINA RESIDENTIAL CODE 2018 NORTH CAROLINA BUILDING CODE - ALL OTHER ORDINANCE ADOPTED BY THE LOCAL GOVERNING AGENCIES <u>SITE NOTES / OSHA REGULATION</u> - A LADDER SHALL BE IN PLACE FOR INSPECTION IN COMPLIANCE WITH OSHA REGULATIONS. - THE SOLAR PV INSTALLATION SHALL NOT OBSTRUCT ANY PLUMBING, MECHANICAL, OR BUILDING ROOF VENTS. - ROOFTOP MOUNTED PHOTOVOLTAIC PANELS AND MODULES SHALL BE TESTED, LISTED AND IDENTIFIED BY RECOGNIZED ELECTRICAL TESTING LABORATORY. - MODULES AND SUPPORT STRUCTURES SHALL BE GROUNDED - SOLAR INVERTER SHALL BE LISTED TO UL1741 - ALL CONDUCTORS SHALL BE COPPER AND SHOULD BE 75 AND 90 DEG RATED - REMOVAL OF AN INTERACTIVE INVERTER OR OTHER EQUIPMENT SHALL NOT DISCONNECT THE BONDING CONNECTION BETWEEN THE GROUNDING ELECTRODE CONDUCTOR, THE PHOTOVOLTAIC SOURCE AND OUTPUT CIRCUIT GROUNDED CONDUCTORS. - LIVE PARTS OF PV SOURCE CIRCUITS AND PV OUTPUT CIRCUITS OVER 150V TO GROUND SHALL NOT BE ACCESSIBLE TO OTHER THAN QUALIFIED PERSONS WHILE ENERGIZED. - ALL PV MODULES AND ASSOCIATED EQUIPMENT AND WIRING SHALL BE PROTECTED FROM PHYSICAL DAMAGE. <u>SOLAR CONTRACTOR</u> - MODULE CERTIFICATIONS INCLUDE UL1703, IEC61646, IEC61370. - IF APPLICABLE, MODULE GROUNDING LUGS MUST BE INSTALLED AT THE MARKED GROUNDING LUG HOLES PER THE MANUFACTURERS INSTALLATION REQUIREMENTS. - AS INDICATED BY DESIGN, OTHER NRTL LISTED MODULE GROUNDING DEVICES MAY BE USED IN PLACE OF STANDARD GROUNDING LUGS AS SHOWN IN MANUFACTURER DOCUMENTATION AND APPROVED BY THE AHJ. - ALL MICROINVERTERS, PHOTOVOLTAIC MODULES, AC COMBINERS, DC-AC CONVERTERS AND SOURCE CIRCUIT COMBINERS INTENDED FOR USE IN A PHOTOVOLTAIC POWER SYSTEM WILL BE IDENTIFIED AND LISTED FOR THE APPLICATION PER NEC690.4(B). - ALL SIGNAGE TO BE INSTALLED IN ACCORDANCE WITH LOCAL BUILDING CODE. - TERMINALS AND LUGS WILL BE TIGHTENED TO MANUFACTURER TORQUE SPECIFICATIONS (WHEN PROVIDED) IN ACCORDANCE WITH NEC CODE 110.14(D) ON ALL ELECTRICAL CONNECTIONS. - MAX DC VOLTAGE CALCULATED USING MANUFACTURER PROVIDED TEMP COEFFICIENT FOR VOC UNLESS NOT AVAILABLE.			1	PV MODULES	17 x Canadian Solar CS6.1-54TM-460H
			2	INVERTER + BATTERY	01 X POWERWALL3
			3	ROOF TYPE	ASPHALT SHINGLES
			4	RACKING	PSR-B84 RAILS (BLACK)
			5	MOUNTING TYPE	COMP MOUNT FLASHING (BLACK)
			6	DC SIZE	7.82 KW
			7	AC SIZE	10.0 KVA
			SR.#	PROJECT INFORMATION	
			1	PV1	DRAWING INDEX
			2	PV2	SITE LAYOUT
			3	PV3	STRING MAPPING
			4	PV4	ELECTRICAL ONE LINE DIAGRAM
			5	PV5	DETAILED ELECTRICAL WIRING SCHEMATIC
			6	PV6	PV LABELS
			7	PV7	BILL OF MATERIALS
			8	PV8	ATTACHMENT DETAILS
					

ROOF DESCRIPTION				MODULE DIMENSIONS	PV System Dead Load (Panel + Racking weight) / PV System Area (No. of panels x Weight of panel(lbs.) +Length of racking(ft.) x 1.15 lb.ft) / (No. of panels x Height x Width) = Total psf				
ROOF	PITCH	AZIMUTH	NO. OF MODULES		ROOF	A			
A	30°	170°	17		DEAD LOAD (PSF)	2.67			
Vent		- Roof A has no vent. - No vents will be covered by PV modules during the installation.		SYSTEM DETAILS NUMBER OF PANELS : 17 PANELS MODEL : CANADIAN SOLAR CS6.1-54TM-460H DC SIZE : 7.82 KW AC SIZE : 10.0 KVA					



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Customer Signature:

Sheet Name:

Site Layout

JOB NUMBER:

25-137-UE

Date:

08/26/2025

Revision:

A

Sheet Size:

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17" X 22"

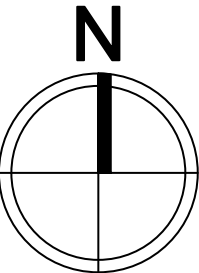
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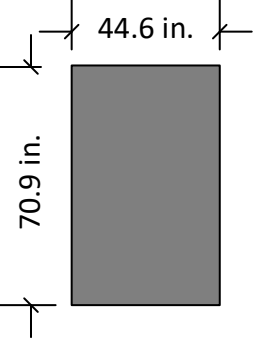
PV2

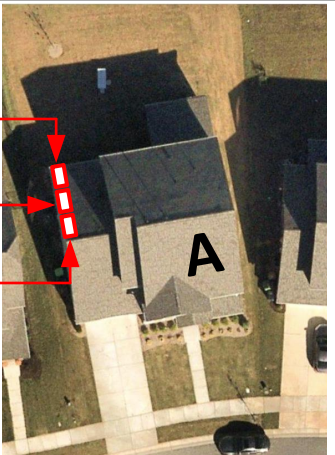
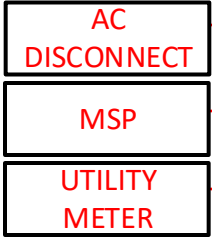


6in setback from
sides of the roof

SITE LAYOUT
SCALE: 1/8" - 1'



ROOF DESCRIPTION				MODULE DIMENSIONS	STRING LAYOUT					
ROOF	PITCH	AZIMUTH	NO. OF MODULES		TESLA POWERWALL3					
A	30°	170°	17		Strings #	No. of Modules	Color	Strings #	No. of Modules	Color
					String 1	10				
					String 2	07				
					String 3					



Tesla MCI (Mid Circuit Interrupter)			
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SYSTEM DETAILS

NUMBER OF PANELS : 17
PANELS MODEL : CANADIAN SOLAR CS6.1-54TM-460H
DC SIZE : 7.82 KW
AC SIZE : 10.0 KVA



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Sheet Name:

String Mapping

JOB NUMBER:

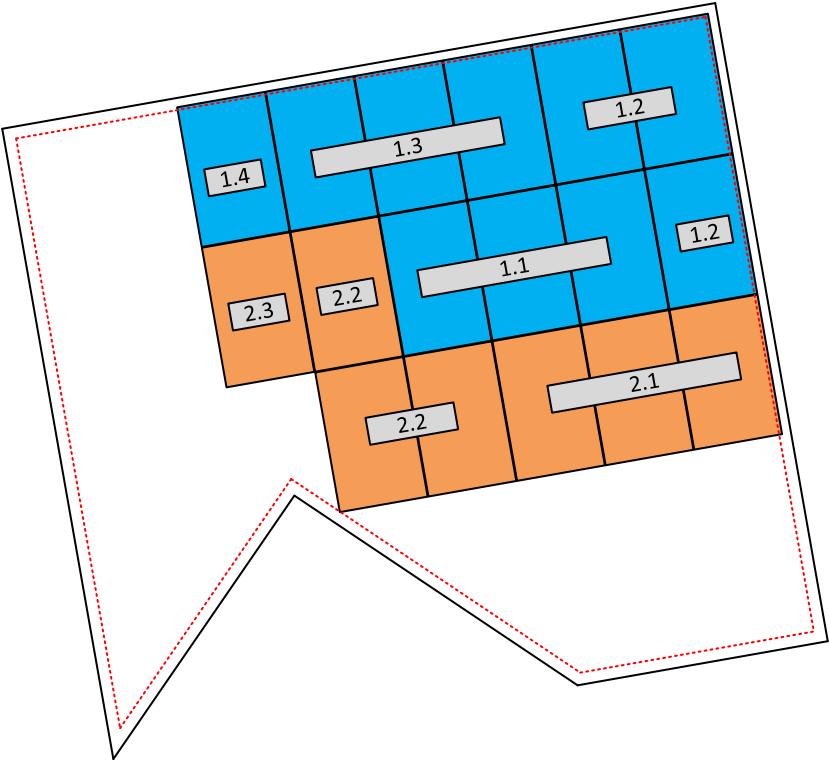
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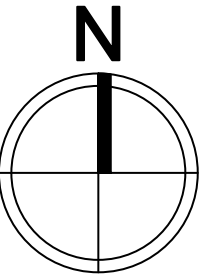


Roof A
17 Modules



STRING MAPPING

SCALE: 1/8" - 1'



STRING CALCULATION

String #	No of Modules	Estimated Power	Imax	Imp	Voc	Vmpp
1	10	4,600 W	21.49 Adc	13.78 Adc	393.0 Vdc	550 Vdc
2	07	3,220 W	21.49 Adc	13.78 Adc	275.1 Vdc	550 Vdc

17 X CANADIAN SOLAR CS6.1-54TM-460H
460W

TESLA MCI-2 HIGH CURRENT
RAPID SHUTDOWN EQUIPPED

String 1

String 2

System Shutdown Switch (E-Stop)

Tesla Powerwall3

Backup Gateway 3

Sub Load Panel

1

2

3

4

5

6

7

8

Sola Deck

Attic

60A NON-FUSIBLE AC DISCONNECT

40A BREAKER CONNECTION INSIDE THE BACKUP GATEWAY 3

FROM UTILITY

UTILITY METER

200A /2P

200A/2P

Note: There will be partial home backup and partial home consumption monitoring.

Note: The output of the powerwall3 will be limited to 7.7kW(32A).

Note: Export Limited to 10.0KW AC by PCS

System Size: 7,820W DC

Battery Total Energy: 13.5 KWh

(17) Canadian Solar CS6.1-54TM-460H

(07) Tesla MCI-2 High Current

(01) Tesla Powerwall3

Inverter Output: 32A max @ 240 VAC (each)

10.0 kVA AC output max

Grounding will be done via Pegasus grounding lugs and mid-clamps to ensure the rail and panels are continuously grounded.

Rapid Shutdown is included in the Mid Circuit Interrupter , refer to Mid Circuit Interrupter and Inverter attached datasheets.

The load center/disconnect will be visible, lockable, accessible to utility linesmen, and properly labeled per NEC requirements. It will be located on the exterior wall next to the utility meter.

Prepare cable in usual manner.

Stretch tape and apply half-lapped to form void-free joint. Degree of stretch is not critical and may vary in different sections of joint to accomplish void-free application.

Protect the joint with two half-lapped layers of any scotch vinyl plastic electrical tape.

Sr.No	#Wire	Conduit Size	Ground Wire	Amperage
1	2 x #10 PV		#10 Bare Cu	21.49
2	4 x #10 THHN Cu	3/4" LFMC	#10 Green Cu	21.49
3	4 x #10 THHN Cu	3/4" EMT	#10 Green Cu	21.49
4	3 x #6 THHN Cu	1" EMT	#6 Green Cu	40
5	3 x #6 THHN Cu	1" LFNC	#6 Green Cu	40
6	3 x #3/0 THHN Cu	2" PVC	#6 Green Cu	200
7	4-conductor shielded (1 twisted pair) 18 AWG			
8	2-conductor shielded (1 twisted pair) 18 AWG	1/2" LFNC		

NEC Code (2020) and UL Standard References

Rapid Shut Down	NEC 690.12 (A-D), UL1741	Grounding	NEC Article 250.30(A)
Disconnecting Means	NEC 690.13	Conduit Fill	NEC Table C.9, 310.15(B)(3)(a)
Feeder Sizing	NEC Table 310, 15(B)(16, 17)	Interconnection	NEC 705.12
Over current Protection	NEC 690.9		

8MSOLAR

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Sheet Name:

Electrical One Line Diagram

JOB NUMBER:

25-137-UE

Date:

08/26/2025

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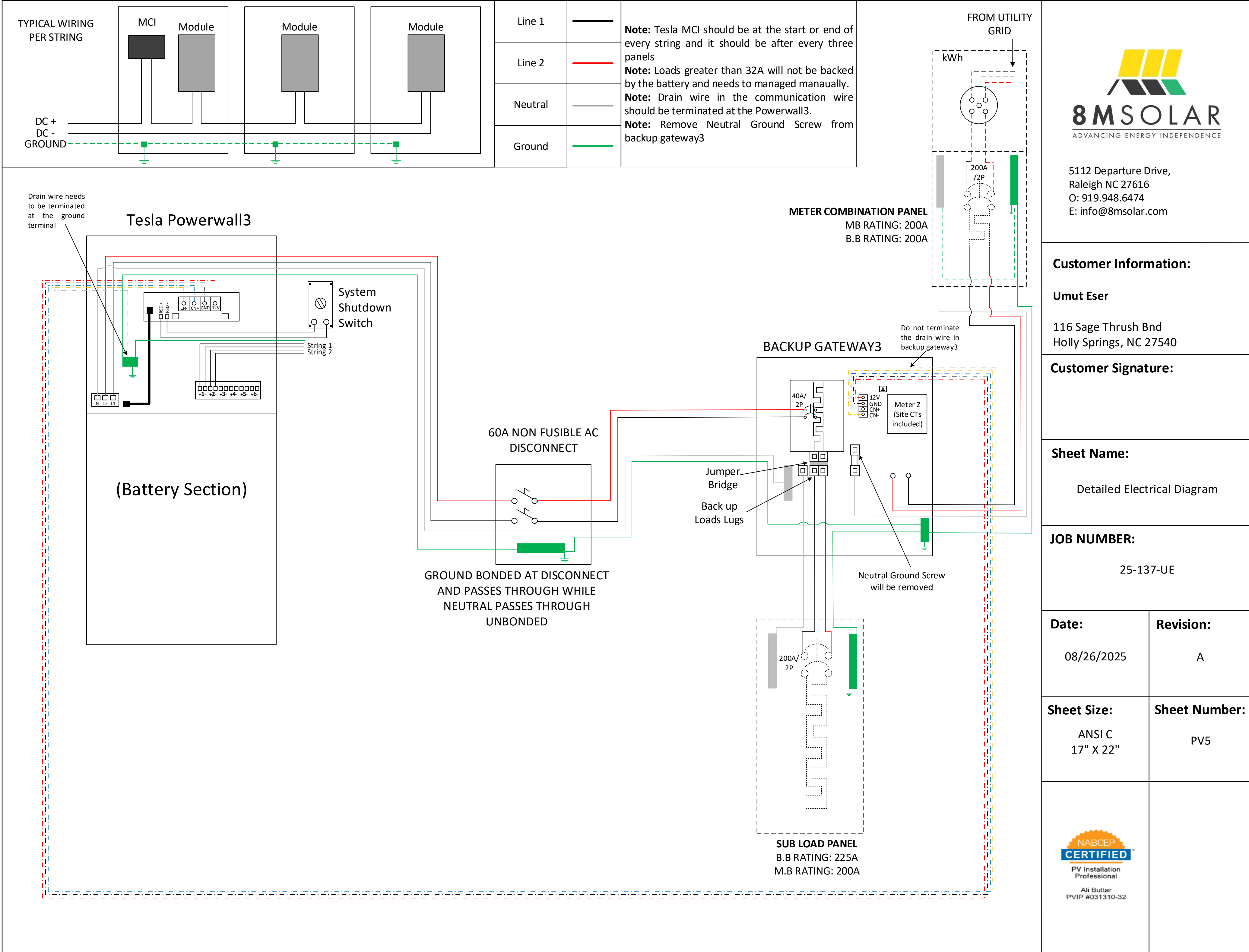
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PV4

NABCEP
CERTIFIED

PV Installation
Professional

Ali Buttar
PVIP #031310-32





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Detailed Electrical Diagram

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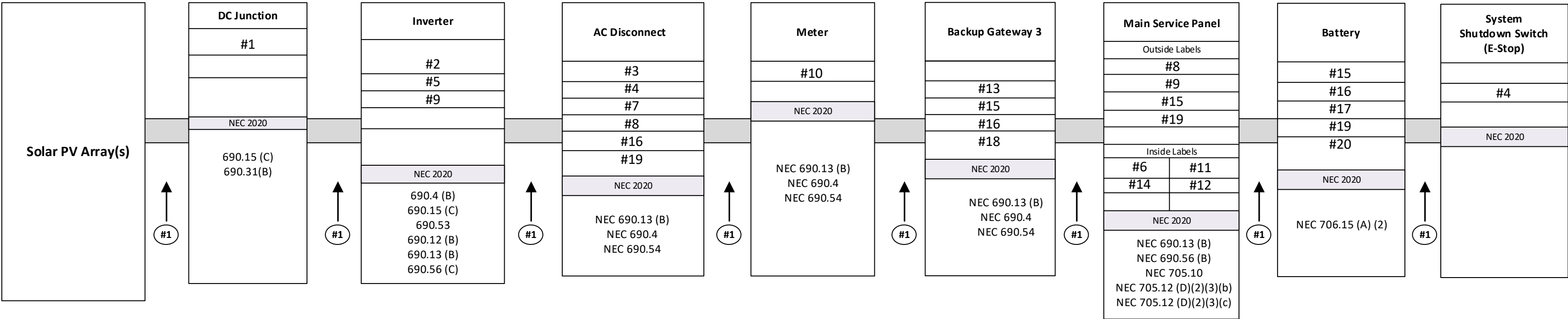
PV5



NABCEP
CERTIFIED

PV Installation
Professional

Ali Buttar
PVIP #031310-32



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LABELING AND WARNING SIGNS: NEC 2020

- A. PURPOSE
PROVIDE EMERGENCY RESPONDERS WITH APPROPRIATE WARNING AND GUIDANCE WITH RESPECT TO ISOLATING THE SOLAR ELECTRIC SYSTEM. THIS CAN FACILITATE IDENTIFYING ENERGIZED ELECTRICAL LINES THAT CONNECT THE SOLAR PANELS TO THE INVERTER, AS SHOULD NOT BE CUT WHEN VENTING FOR SMOKE REMOVAL.
- B. MAIN SERVICE DISCONNECT:
- 1. RESIDENTIAL BUILDINGS- THE MARKING MAY BE PLACED WITHIN THE MAIN SERVICE DISCONNECT. THE MARKING SHALL BE PLACED ON THE OUTSIDE COVER IF THE MAIN SERVICE DISCONNECT IS OPERABLE WITH THE SERVICE PANEL CLOSED.
 - 2. COMMERCIAL BUILDINGS- THE MARKINGS SHALL BE PLACED ADJACENT TO THE MAIN SERVICE DISCONNECT CLEARLY VISIBLE FROM THE LOCATION WHERE THE LEVER IS OPERATED
 - 3. MARKINGS, VERBIAGE, FORMAT AND TYPE OF MATERIAL
 - a. VERBIAGE: CAUTION; SOLAR ELECTRIC SYSTEM CONNECTED
 - b. FORMAT:
 - (1) WHITE LETTERING ON A RED BACKGROUND
 - (2) MINIMUM 3/8 INCH LETTER HEIGHT
 - (3) ALL LETTERS SHALL BE CAPITALIZED
 - (4) ARIAL OR SIMILAR FONT, NON-BOLD
 - c. MATERIAL:
 - (1) REFLECTIVE, WEATHER RESISTANT MATERIAL SUITABLE FOR THE ENVIRONMENT (USE UL-969) AS STANDARD FOR WEATHER RATING): DURABLE ADHESIVE MATERIALS MEET THIS REQUIREMENT.
- C. MARKING REQUIREMENTS ON DC CONDUIT, RACEWAYS, ENCLOSURES, CABLE ASSEMBLIES, DC COMBINERS AND JUNCTION BOXES;
- 1. MARKING: PLACEMENT, VERBIAGE, FORMAT AND TYPE OF MATERIAL
 - a. PLACEMENT: MARKINGS SHALL BE PLACED EVERY 10 (TEN) FEET ON ALL INTERIOR AND EXTERIOR DC CONDUITS, RACEWAYS, ENCLOSURES AND CABLE ASSEMBLIES, AT TURNS ABOVE AND/OR BELOW PENETRATIONS, ALL DC COMBINERS AND JUNCTION BOXES.
 - b. VERBIAGE: CAUTION SOLAR CIRCUIT
 - c. THE FORMAT AND TYPE OF MATERIAL SHALL ADHERE TO SECTION B-3.B & C ABOVE
- D. INVERTERS ARE NOT REQUIRED TO HAVE CAUTION MARKINGS

#1

WARNING:PHOTOVOLATIC
POWER SOURCE

#2

PHOTOVOLATIC

DC DISCONNECT

#3

PHOTOVOLATIC

AC DISCONNECT

#4

RAPID SHUTDOWN
SWITCH FOR
SOLAR PV SYSTEM

#5

MAXIMUM VOLTAGE550Vdc

MAX. RATED CIRCUIT CURRENT13.78 Adc

OF THE CHARGE CONTOLLER OR

DC-TO-DC CONVERTER (IF INSTALLED)

#6

PHOTOVOLTIC POWER SOURCE

OPERATING AC VOLTAGE240 V

MAXIMUN OPERATING
AC OUTPUT CURRENT32 A

#7

AC DISCONNECT

PHOTOVOLTAIC SYSTEM
POWER SOURCE

RATED AC
OUTPUT CURRENT32 AMPS

NOMINAL OPERATING
AC VOLTAGE240 VOLTS

#8

!

WARNING

ELECTRIC SHOCK HAZARD

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

#9

!

WARNING

THREE POWER SOURCES

SOURCES: UTILITY GRID, BATTERY AND
PV SOLAR ELECTRIC SYSTEM

#10

!

WARNING

THREE POWER SOURCES

SOURCES: UTILITY GRID, BATTERY AND
PV SOLAR ELECTRIC SYSTEM

#11

!

WARNING

TURN OFF PHOTOVOLTAIC
AC DISCONNECT PRIOR TO
WORKING INSIDE PANEL

#12

!

WARNING

POWER SOURCE
OUTPUT CONNECTION
DO NOT RELOCATE THIS
OVERCURRENT DEVICE

#13

!

WARNING

SOLAR ELECTRIC
CIRCUIT BREAKER
IS BACKFEED

#14

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

SOLAR ELECTRIC
SYSTEM

#15

SOLAR AC DISCONNECT
LOCATED AT WEST SIDE WALL
OF THE HOUSE BESIDE THE
METER COMBINATION PANEL

#16

SERVICE DISCONNECT LOCATED
IN THE METER COMBINATION
PANEL

#17

BATTERY

#18

MAIN BATTERY
SYSTEM DISCONNECT

#19

BATTERY DISCONNECT LOCATED
IN THE BACKUP GATEWAY3
PANEL

#20

ENERGY STORAGE
SYSTEM DISCONNECT

NOMINAL ESS AC VOLTAGE240V

NOMINAL ESS DC VOLTAGE550V

AVAILABLE FAULT CURRENT
DERIVED FROM THE ESS160A

DATE CALCULATION PERFORMED08/15/2025

Customer Information:

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Holly Springs, NC 27540

Customer Signature:

Sheet Name:

PV Labels

JOB NUMBER:

25-137-UE

Date:

08/26/2025

Revision:

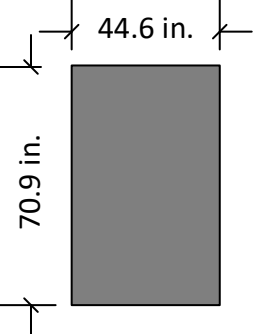
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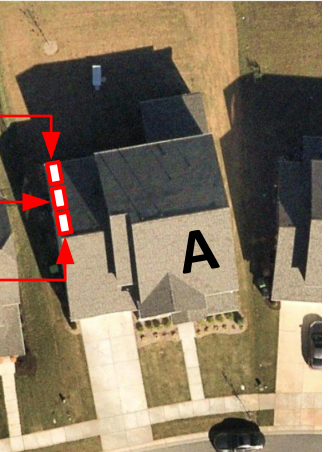
PV6

ROOF DESCRIPTION				MODULE DIMENSIONS		
ROOF	PITCH	AZIMUTH	NO. OF MODULES		Rails and Splices : PSR-B84 (BLACK)	Roof Attachment : Pegasus Comp Mount
A	30°	170°	17		Rafter Spacing : 24 in	There is one layer of shingles Roofing material is asphalt shingles
					Attachment Span: 6ft	The roof is located in 115mph wind zone

AC
DISCONNECT

MSP

UTILITY
METER





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Customer Signature:

Sheet Name:

Bill of Material

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25-137-UE

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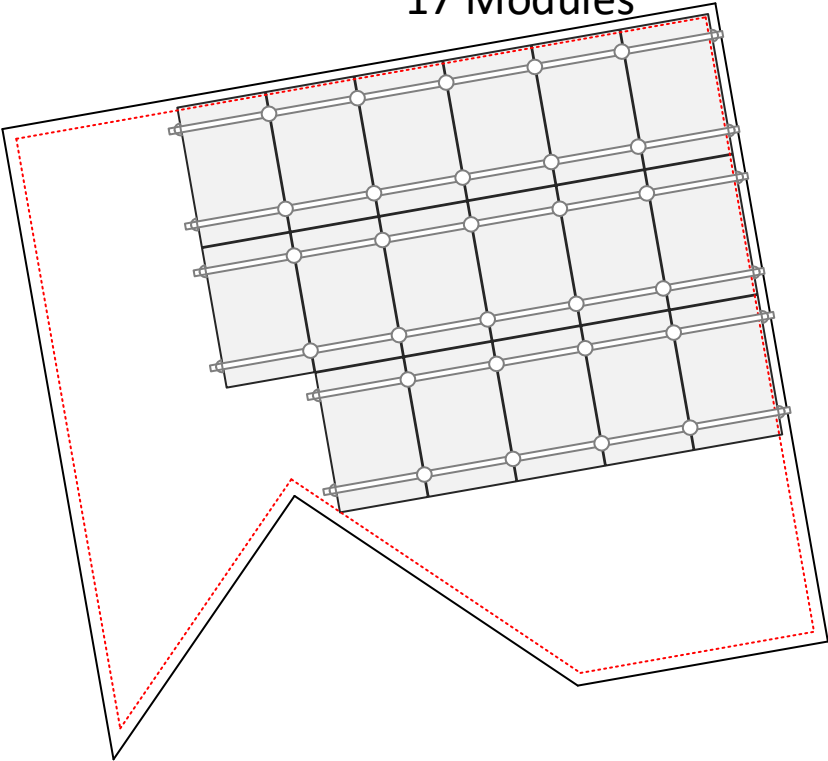
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PV7



PV LABELS		
Sr No	Code	Qty
01	02-314	12
02	03-301	01
03	03-302	01
04	02-316	02
05	03-308	01
06	03-390	01
07	03-306	01
08	05-215	02
09	05-230	02
10	03-230	01
11	05-372	01
12	05-216	01
13	05-342	01
14	07-111	01
15	8M-001	03
16	8M-002	03
17	03-395	01
18	04-304	01
19	8M-004	03
20	03-511	01

Roof A
17 Modules



RAILS AND MOUNTING SYSTEM

- 22 x PSR-B84: Pegasus Rail, Black, 84" (7 Feet)
- 16 x PSR-SPLS: Pegasus - Bonded, Structural Splice
- 28 x PSR-MCB: Pegasus - Multiclamp, Mid/End, 30 to 40 mm, Black
- 12 x PSR-HEC: Pegasus - Hidden End Clamp
- 03 x PSR-LUG: Pegasus - Grounding Lug
- 43 x PSR-WMC: Pegasus - Wire Management Clip
- 03 x PSR-CBG: Pegasus - Cable Grip
- 12 x PSR-CAP: Pegasus - End Cap
- 33 x PSCR-UBBDT: Pegasus Comp Mount - Open Slot, Black L Foot, Black Flashing, Dovetail 3/8" T-Bolt
- 34 x S6405: Heyco Wire Clips
- 03 x GEOC GC66100: SEALANT 2300 10.3OZ CLEAR (20) GEOCEL 230 TRIPOLY CLEAR
- 10 x MULTI 32.0017P0001-UR: PV MC4 MALE (10) [1000]
- 10 x MULTI 32.0016P0001-UR: PV MC4 FEMALE (10) [1000]

SOLAR MODULES

- 17 x Canadian Solar CS6.1-54TM-460H (460W)

INVERTER & SUPPORTING ITEMS

- 01 x 1707000-00-J :Tesla Powerwall3
- 07 x 1879359-15-B: Tesla MCI-2 High Current
- 01 x 1841000-01-C: Backup GateWay 3
- 01 x 1549184-00-X: 02" Conduit Hub Kit

WIRE

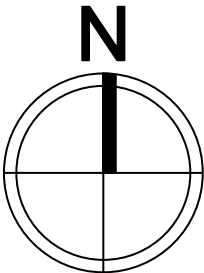
- 01 x WIRPV 2KVPV10STRBLK500: #10 PV WIRE BLK (Cu) 500ft

ELECTRICAL ITEMS

- 01 x BR240: Eaton BR 40/2
- 01 x DG222URB: 250volt/60amp/2pole non fusible disconnect (NEMA 3R)
- 01 x EATON M22PVK01: 22.5MM PB EMG STOP W/ CONTACTOR
- 01 x Eaton M22I1PG: SFC MTG ENC Emergency Stop Enclosure
- 01 x EZSLR JB-1.2: SolaDeck
- 08 x PSCA-0MB0: Roof Flashing Conduit Supports
- 08 x BPT 921S: 3/4" 1H EMT PIPE STRAP STEEL

6in setback from
sides of the roof

BILL OF MATERIAL
SCALE: 1/8" - 1'



L-FOOT

FLASHING

RAFTER

LAG WITH WASHER

ROOF DECKING

L-FOOT

SUPPORT BLOCK

COMP FLASHING

LAG WITH WASHER



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Customer Signature:

Sheet Name:

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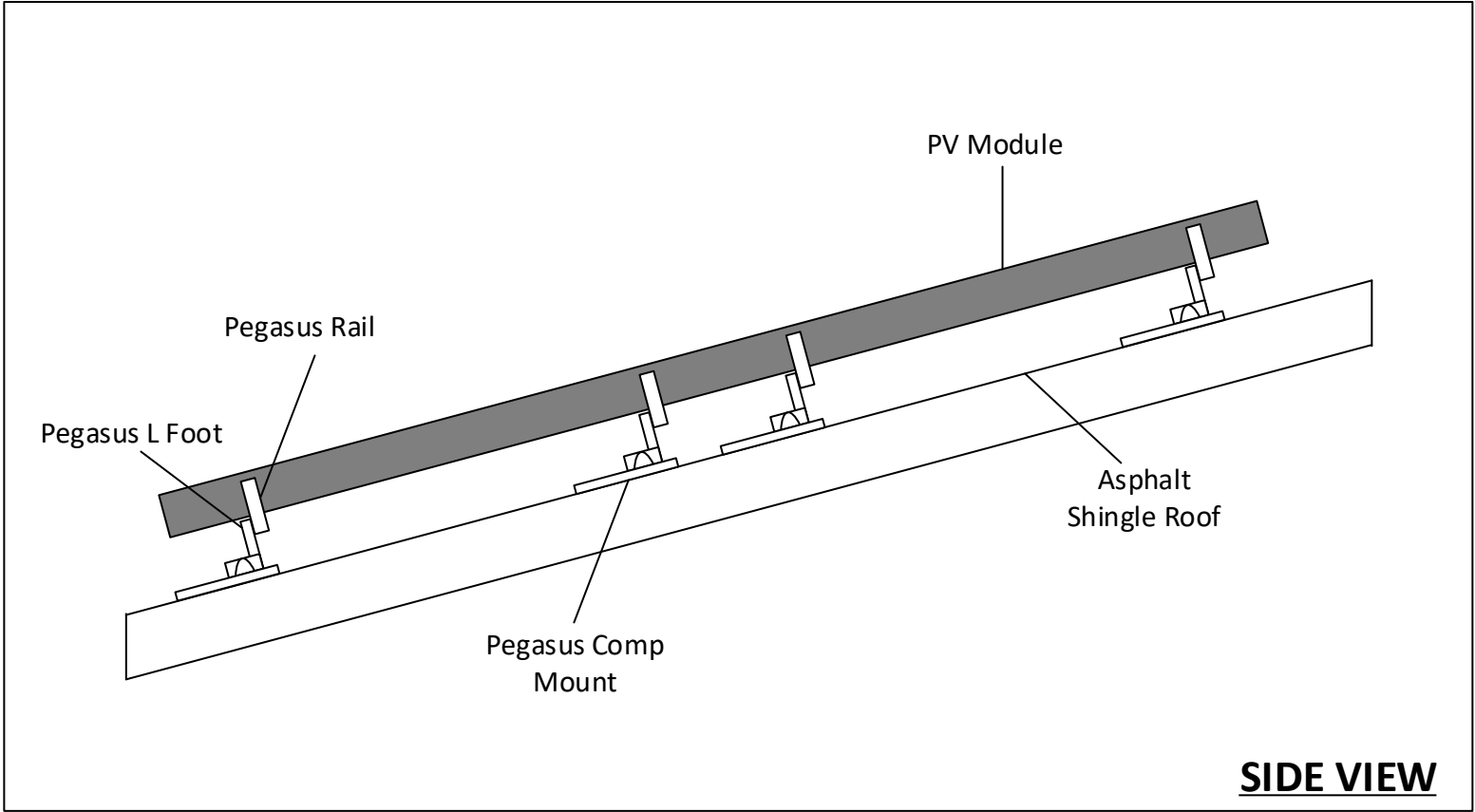
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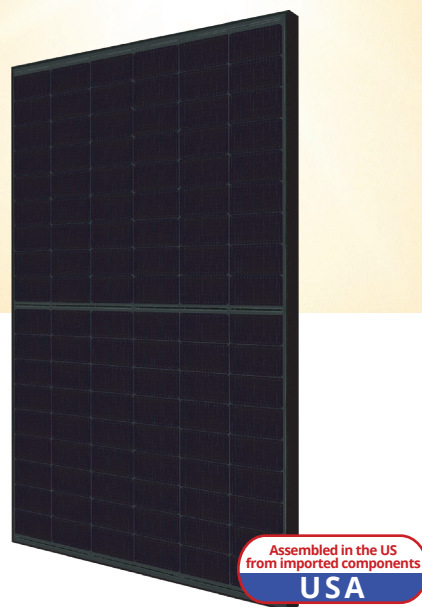
PV8



					
Multi-Clamp	Hidden End Clamp	MLPE Mount	Dovetail T-Bolt	Ground Lug	Cable Grip
Torque Value 100 in-lbs.	Torque Value 135 in-lbs.	Torque Value 135 in-lbs.	Torque Value 300 in-lbs.	Torque Value 135 in-lbs.	Torque Value 135 in-lbs.



PV Dead Load	
Roof A	PV System Dead Load (Panel + Racking weight) / PV System Area (17 panels x 47.2 lbs./panel + 128 ft. of racking x 1.17 lb.ft) / (17 panels x 5.65' x 3.71') = 2.67 psf



TOPHiKu6 (All-Black)

N-type TOPCon Technology

445 W ~ 470 W

CS6.1-54TM-445 | 450 | 455 | 460 | 465 | 470H

MORE POWER



Module power up to 470 W
Module efficiency up to 23.0 %



Excellent anti-LeTID & anti-PID performance.
Low power degradation, high energy yield



Lower temperature coefficient (Pmax): $-0.29\%/^{\circ}\text{C}$,
increases energy yield in hot climate



Lower LCOE & system cost

MORE RELIABLE



Minimizes micro-crack impacts



Heavy snow load up to 8100 Pa,
wind load up to 6000 Pa*



Industry Leading Product Warranty on Materials and Workmanship*



Linear Power Performance Warranty*

1st year power degradation no more than 1%

Subsequent annual power degradation no more than 0.4%

*Subject to the terms and conditions contained in the applicable Canadian Solar Limited Warranty Statement. Also this 25-year limited product warranty is available only for products installed and operating on rooftops in certain regions.

MANAGEMENT SYSTEM CERTIFICATES*

ISO 9001:2015 / Quality management system
ISO 14001:2015 / Standards for environmental management system
ISO 45001: 2018 / International standards for occupational health & safety
IEC62941: 2019 / Photovoltaic module manufacturing quality system

PRODUCT CERTIFICATES*

IEC 61215 / IEC 61730
IEC 61701 / IEC 62716 / IEC 60068-2-68
Take-e-way



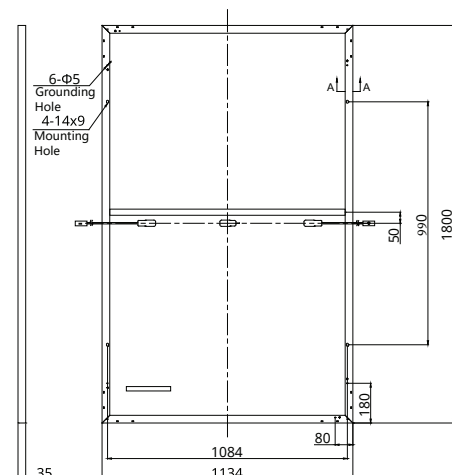
* The specific certificates applicable to different module types and markets will vary, and therefore not all of the certifications listed herein will simultaneously apply to the products you order or use. Please contact your local Canadian Solar sales representative to confirm the specific certificates available for your Product and applicable in the regions in which the products will be used.

CSI Solar Co., Ltd. is committed to providing high quality solar photovoltaic modules, solar energy and battery storage solutions to customers. The company was recognized as the No. 1 module supplier for quality and performance/price ratio in the IHS Module Customer Insight Survey. Over the past 22 years, it has successfully delivered over 100 GW of premium-quality solar modules across the world.

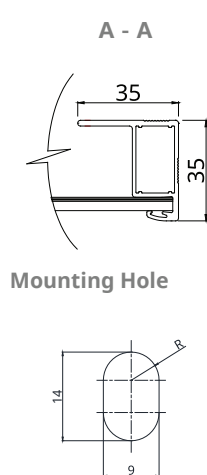
* For detailed information, please refer to the Installation Manual.

ENGINEERING DRAWING (mm)

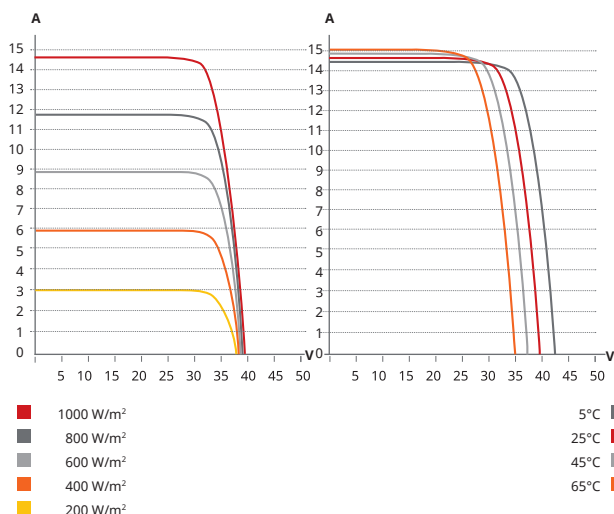
Rear View



Frame Cross Section



CS6.1-54TM-455H / I-V CURVES



ELECTRICAL DATA | STC*

CS6.1-54TM	445H	450H	455H	460H	465H	470H
Nominal Max. Power (Pmax)	445 W	450 W	455 W	460 W	465 W	470 W
Opt. Operating Voltage (Vmp)	32.8 V	33.0 V	33.2 V	33.4 V	33.6 V	33.8 V
Opt. Operating Current (Imp)	13.59 A	13.66 A	13.72 A	13.78 A	13.85 A	13.91 A
Open Circuit Voltage (Voc)	38.7 V	38.9 V	39.1 V	39.3 V	39.5 V	39.7 V
Short Circuit Current (Isc)	14.48 A	14.55 A	14.61 A	14.69 A	14.77 A	14.86 A
Module Efficiency	21.8%	22.0%	22.3%	22.5%	22.8%	23.0%
Operating Temperature	-40°C ~ +85°C					
Max. System Voltage	1500V (IEC/UL) or 1000V (IEC/UL)					
Module Fire Performance	TYPE 1 (UL 61730 1500V) or TYPE 2 (UL 61730 1000V) or CLASS C (IEC 61730)					
Max. Series Fuse Rating	25 A					
Application Classification	Class A					
Power Tolerance	0 ~ + 10 W					

* Under Standard Test Conditions (STC) of irradiance of 1000 W/m², spectrum AM 1.5 and cell temperature of 25°C.

MECHANICAL DATA

Specification	Data
Cell Type	TOPCon cells
Cell Arrangement	108 [2 X (9 X 6)]
Dimensions	1800 × 1134 × 35 mm (70.9 × 44.6 × 1.38 in)
Weight	23 kg (50.7 lbs)
Front Cover	3.2 mm tempered glass with anti-ref-lective coating
Frame	Anodized aluminium alloy
J-Box	IP68, 3 bypass diodes
Cable	4 mm ² (IEC), 12 AWG (UL)
Connector	T6, MC4, MC4-EVO2 or MC4- EVO2A
Cable Length (Including Connector)	1550 mm (61.0 in) (+) / 1100 mm (43.3 in) (-)
Per Pallet	30 pieces
Per Container (40' HQ)	720 pieces

ELECTRICAL DATA | NMOT*

CS6.1-54TM	445H	450H	455H	460H	465H	470H
Nominal Max. Power (Pmax)	335 W	339 W	343 W	347 W	351 W	354 W
Opt. Operating Voltage (Vmp)	30.9 V	31.1 V	31.3 V	31.5 V	31.7 V	31.9 V
Opt. Operating Current (Imp)	10.85 A	10.91 A	10.96 A	11.02 A	11.07 A	11.12 A
Open Circuit Voltage (Voc)	36.5 V	36.7 V	36.9 V	37.1 V	37.3 V	37.5 V
Short Circuit Current (Isc)	11.68 A	11.74 A	11.79 A	11.85 A	11.92 A	11.99 A

* Under Nominal Module Operating Temperature (NMOT), irradiance of 800 W/m² spectrum AM 1.5, ambient temperature 20°C, wind speed 1 m/s.

TEMPERATURE CHARACTERISTICS

Specification	Data
Temperature Coefficient (Pmax)	-0.29 % / °C
Temperature Coefficient (Voc)	-0.25 % / °C
Temperature Coefficient (Isc)	0.05 % / °C
Nominal Module Operating Temperature	42 ± 3°C

PARTNER SECTION



* The specifications and key features contained in this datasheet may deviate slightly from our actual products due to the on-going innovation and product enhancement. CSI Solar Co., Ltd. reserves the right to make necessary adjustment to the information described herein at any time without further notice. Please be kindly advised that PV modules should be handled and installed by qualified people who have professional skills and please carefully read the safety and installation instructions before using our PV modules.

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 11.5 kW AC of continuous power per unit. It has the ability to start heavy loads up to 150 A LRA, meaning a single unit can support the power needs of most homes. Powerwall 3 is designed for mass production, fast and efficient installations, easy 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
Overcurrent Protection Device	Configurable up to 60 A
Solar to Battery to Grid Round Trip Efficiency	89% ^{1,2}
Solar to Grid Efficiency	97% ³
Supported Islanding Devices	Backup Gateway 2, Backup Switch
Connectivity	Wi-Fi (2.4 and 5 GHz), Dual-port switched Ethernet, Cellular (LTE/4G ⁴)
Hardware Interface	Dry contact relay, Rapid Shutdown (RSD) certified switch and 2-pin connector, RS-485 for meters
AC Metering	Revenue Grade (+/- 0.5%)
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

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	150 — 480 V DC
MPPTs	6
Maximum Current per MPPT (I_{mp})	13 A ⁵
Maximum Short Circuit Current per MPPT (I_{sc})	15 A ⁵

Battery Technical Specifications

Nominal Battery Energy	13.5 kWh AC ²
Maximum Continuous Discharge Power	11.5 kW AC
Maximum Continuous Charge Power	5 kW AC
Output Power Factor Rating	0 - 1 (Grid Code configurable)
Maximum Continuous Current	48 A
Maximum Output Fault Current	10 kA
Load Start Capability (1 s)	150 A LRA
Power Scalability	Up to 4 Powerwall 3 units supported

¹ Typical solar shifting use case.

² Values provided for 25°C (77°F), at beginning of life. 3.3 kW charge/discharge power.

³ Tested using CEC weighted efficiency methodology.

⁴ Cellular connectivity subject to network service coverage and signal strength.

⁵ Where 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} .

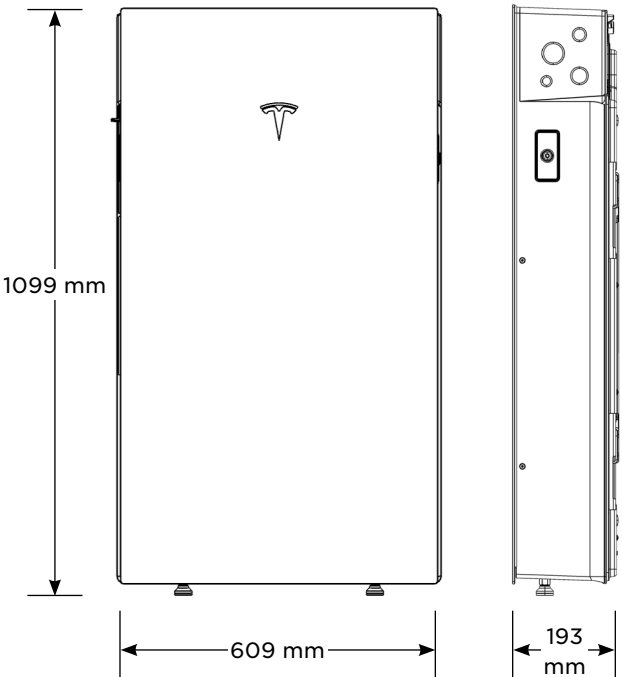
Powerwall 3 Technical Specifications

Environmental Specifications	Operating Temperature	-20°C to 50°C (-4°F to 122°F) ⁶
	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	IPX7 (Battery & Power Electronics) IPX5 (Wiring Compartment)
	Pollution Rating	PD3
	Operating Noise @ 1 m	< 50 db(A) typical < 62 db(A) maximum

⁶ Performance may be de-rated at operating temperatures above 40°C (104°F).

Compliance Information	Certifications	UL 1642, UL 1699B, UL 1741, UL 1741 SA, UL 1741 SB, UL 3741, UL 1973, UL 1998, UL 9540, IEEE 1547-2018, IEEE 1547.1, UN 38.3
	Grid Connection	United States
	Emissions	FCC Part 15 Class B
	Environmental	RoHS Directive 2011/65/EU
	Seismic	AC156, IEEE 693-2005 (high)
	Fire Testing	Meets the unit level performance criteria of UL 9540A

Mechanical Specifications	Dimensions	1099 x 609 x 193 mm (43.25 x 24 x 7.6 in)
	Weight	130 kg (287 lb)
	Mounting Options	Floor or wall mount



Solar Shutdown Device Technical Specifications

The Solar Shutdown Device is a Mid-Circuit Interrupter (MCI) and is part of the PV system rapid shutdown (RSD) function in accordance with Article 690 of the applicable NEC. When paired with Powerwall 3, solar array shutdown is initiated by any loss of AC power.

Electrical Specifications	Model	MCI-1	MCI-2
	Nominal Input DC Current Rating (I_{MP})	12 A	13 A
	Maximum Input Short Circuit Current (I_{SC})	19 A	17 A
	Maximum System Voltage (PVHCS)	600 V DC	1000 V DC ⁷
⁷ Maximum System Voltage is limited by Powerwall to 600 V DC.			
RSD Module Performance	Maximum Number of Devices per String	5	5
	Control	Power Line Excitation	Power Line Excitation
	Passive State	Normally Open	Normally Open
	Maximum Power Consumption	7 W	7 W
	Warranty	25 years	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	NEMA 4X / IP65
Mechanical Specifications	Electrical Connections	MC4 Connector	MC4 Connector
	Housing	Plastic	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

The following categories of solar module meet the UL 3741 PVHCS listing when installed with Powerwall 3 and Solar Shutdown Devices.

Tesla Solar Roof	PV Hazard Control System: BIPV compliance document
Tesla or Hanwha (Q.Peak Duo BLK or BLK-G6+) Modules certified for use with ZEP racking	PV Hazard Control System: ZS PVHCS compliance document
Other module and racking combinations	PV Hazard Control System: Generic PV Array compliance document

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	Revenue accurate (+/- 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 ¹	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		

¹Only Eaton CSR or BWH main breakers are 25 kA rated

Environmental Specifications

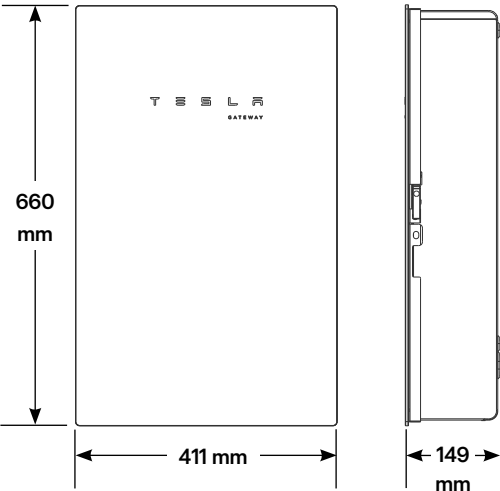
Operating Temperature	–20°C to 50°C (–4°F to 122°F)
Operating Humidity (RH)	Up to 100%, condensing
Maximum Elevation	3000 m (9843 ft)
Environment	Indoor and outdoor rated
Enclosure Type	NEMA 3R

Compliance Information

Certifications	UL 67, UL 869A, UL 916, UL 1741 PCS, CSA 22.2 107.1, CSA 22.2 29
Emmissions	FCC Part 15, 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



Backup Switch

The Tesla Backup Switch controls connection to the grid in a Powerwall system, and can be easily installed behind the utility meter or in a standalone meter panel downstream of the utility meter.

The Backup Switch automatically detects grid outages, providing a seamless transition to backup power. It communicates directly with Powerwall, allowing home energy usage monitoring from any mobile device with the Tesla app.

Performance Specifications	Model Number	1624171-xx-y
	Continuous Load Rating	200 A, 120/240 V split phase
	Maximum Supply Short Circuit Current	22 kA with breaker ¹⁰
	Communication	CAN
	AC Meter	Revenue accurate (+/- 0.5%)
	Expected Service Life	21 years
	Warranty	10 years

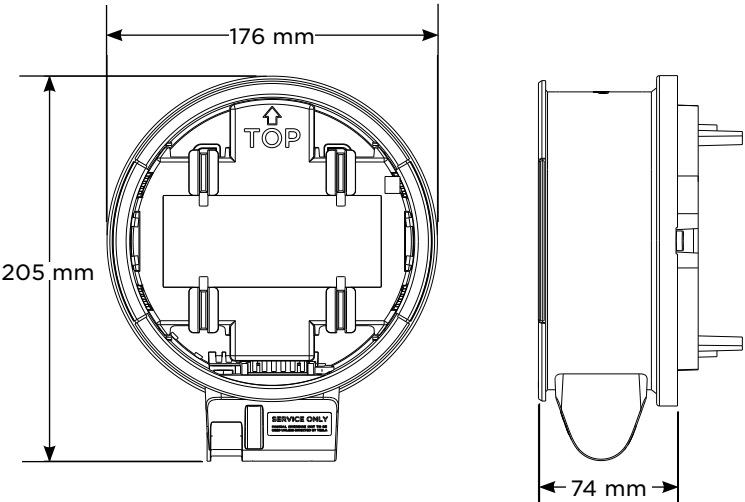
¹⁰ Breaker maximum supply short circuit current rating must be equal to or greater than the available fault current.

Environmental Specifications	Operating Temperature	-40°C to 50°C (-40°F to 122°F)
	Storage Temperature	-40°C to 85°C (-40°F to 185°F)
	Enclosure Rating	NEMA 3R
	Pollution Rating	PD3

Compliance Information	Safety Standards	USA: UL 414, UL 2735, UL 916, CA Prop 65
	Emmissions	FCC, ICES

Mechanical Specifications	Dimensions	176 x 205 x 74 mm (6.9 x 8.1 x 2.9 in)
	Weight	2.8 lb
	Meter and Socket Compatibility	ANSI Type 2S, ringless or ring type
	External Service Interface	Contactor manual override ¹¹ Reset button
	Conduit Compatibility	1/2-inch NPT

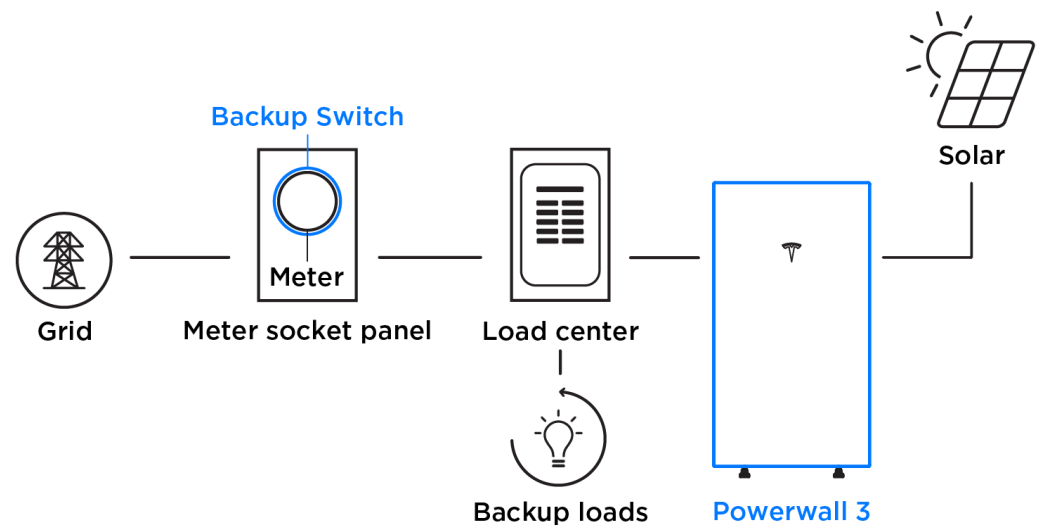
¹¹ Manually overrides the contactor position during a service event.



Powerwall 3 Example System Configurations

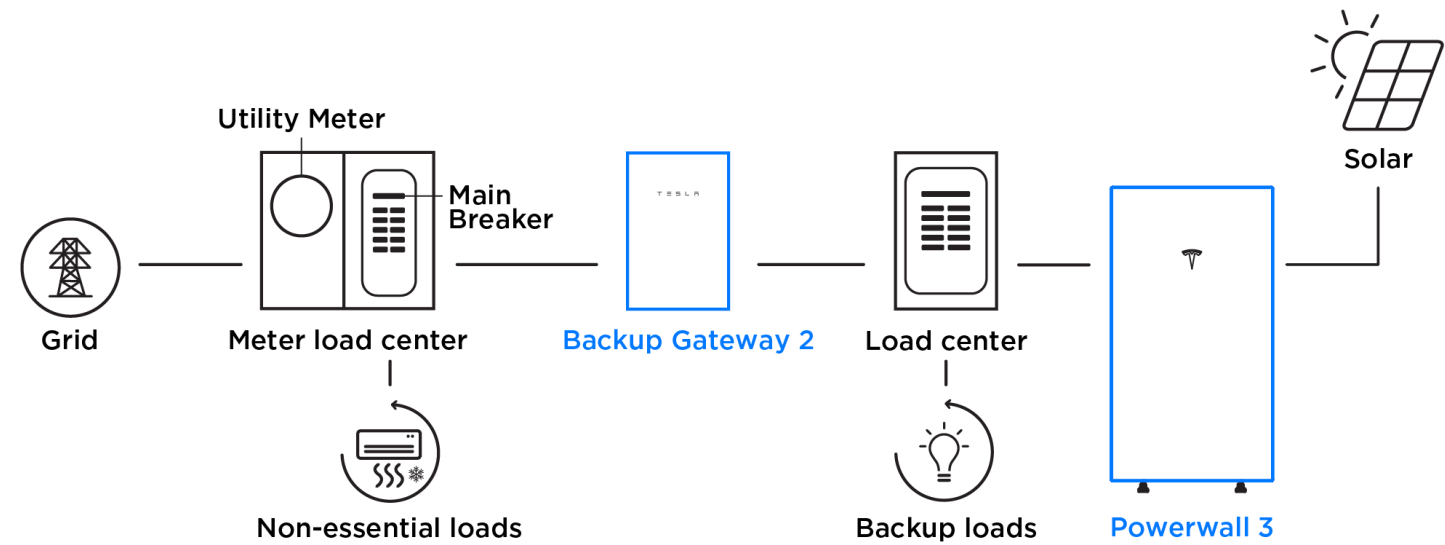
Powerwall 3 with Backup Switch

Whole Home Backup



Powerwall 3 with Backup Gateway 2

Partial Home Backup



RAIL SYSTEM

One Clamp Anywhere

The Multi-Clamp works as mid- or end-clamp, and fits standard 30-40mm frames.

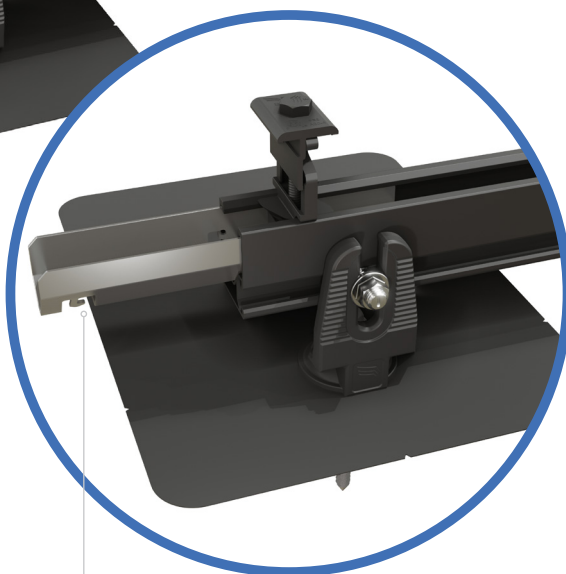
Instant Bonding

The N-S Bonding Jumper bonds row to row with no tools.



Lifetime Wire Management

Open rail channel holds and protects wires. Clamps won't pinch wires after tightening.



Bonding Structural Splice

Connect rails instantly, without tools, interference or limitations.

Next-Level Solar Mounting

A complete system for hassle-free rooftop installation, from watertight mounts to lifetime wire management.



Simplicity

1/2" socket for everything.
One clamp for mid or end.
No tool splicing and bonding.
Easy wire management.



Code Compliant

UL 2703 listed
LTR-AE-001-2012 listed
Class A fire rating for any slope
ASCE 7-16 PE Certified



Premium Aesthetics

The narrowest panel gap available. Optional Hidden End Clamps and End Caps provide a flush look on the edge of the array.



Watertight for Life

Secured on industry-leading Pegasus Mounts, for composite shingle and tile roofs. Backed by a 25-year warranty.



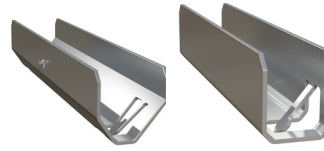
Pegasus Rail

Available in 14' and 7' lengths for easy layout and shipping.
Open-channel design holds MC4 connectors, PV wire and trunk cables.
Black and Mill finish



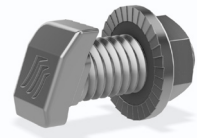
Pegasus Max Rail

Maximum-strength design.
Meets specifications for high snow-load and hurricane zones.
Black and Mill finish



Splice and Max Splice

Installs by hand.
Works over mounts.
Structurally connects and bonds rails automatically; UL2703 listed as reusable.



Dovetail T-bolt

Dovetail shape for extra strength.
Uses 1/2" socket.



Multi-Clamp

Fits 30-40mm PV frames, as mid- or end-clamp.
Twist-locks into position; doesn't pinch wires in rail.
Bonds modules to rail; UL2703 listed as reusable



Hidden End Clamp

Offers premium edge appearance.
Preinstalled pull-tab grips rail edge, allowing easy, one-hand installation.
Tucks away for reuse.



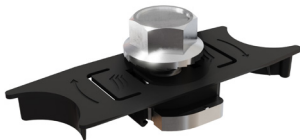
Ground Lug

Holds 6 or 8 AWG wire.
Mounts on top or side of rail.
Assembled on MLPE Mount.
UL2703 listed as reusable.



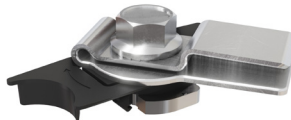
N-S Bonding Jumper

Installs by hand, eliminates row-to-row copper wire.
UL2703 listed as reusable only with Pegasus Rail.



MLPE Mount

Secures and bonds most micro-inverters and optimizers to rail.
Connectors and wires easily route underneath after installation.
UL2703 listed as reusable.



Cable Grip

Secures four PV wires or two trunk cables.
Stainless-steel backing provides durable grip.
Eliminates sagging wires.



Wire Clip

Hand operable.
Holds wires in channel.
Won't slip.



End Cap and Max End Cap

Fits flush to PV module and hides raw or angled cuts.
Hidden drain quickly clears water from rail.

Certifications:

- UL 2703, Edition 1
- LTR-AE-001-2012
- ASCE 7-16 PE certified
- Class A fire rating for any slope roof



FREE
PEGASUS SOLAR
Design Tool

Quickly calculate the most efficient layout, spans and materials needed to suit your job. Visit the Pegasus Customer Portal. [pegasussolar.com/portal](https://www.pegasussolar.com/portal)

Patents pending. All rights reserved. ©2021 Pegasus Solar Inc.

LOAD		SPAN			
SNOW (PSF)	WIND (MPH)	32"	4'	6'	8'
0	120	PEGASUS RAIL			
	160				
	190				
15	140	PEGASUS RAIL			
	160				
	190				
30	160	PEGASUS RAIL			
	190				
45	190	PEGASUS RAIL			
70	190	PEGASUS RAIL			
110	190	PEGASUS RAIL			

For reference only. Spans above are calculated using ASCE 7-16 for a Gable Roof, Exposure Category B, 7-20deg roof angle, 30ft mean roof height with non-exposed modules. For PE certified span tables, visit www.pegasussolar.com/spans.