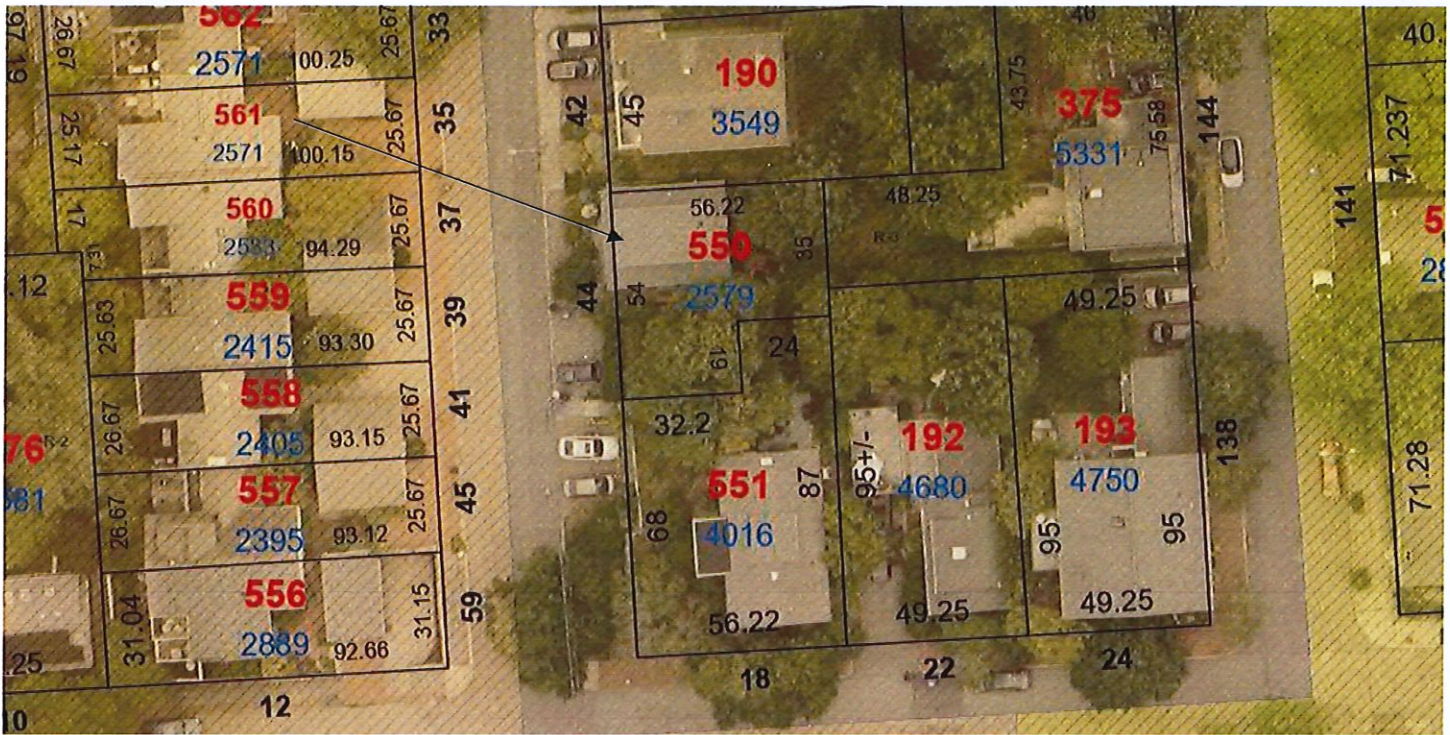


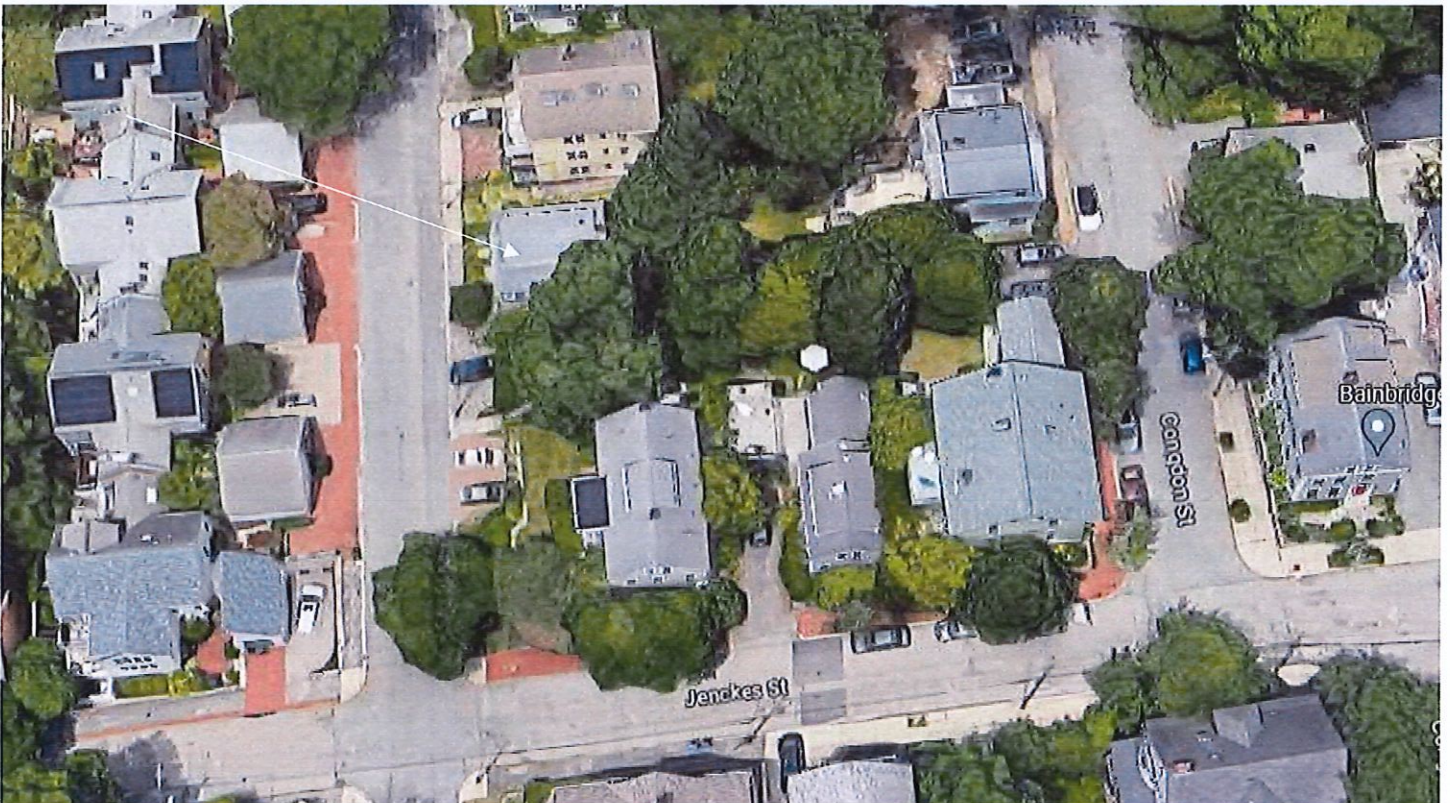
7. CASE 23.054, 44 PRATT STREET, House, c1800 (COLLEGE HILL)

Federal/Greek Revival; 1½-stories; flank gable; clapboard: entrance on south side through two-panel front door in center of five-bay facade; street entrance in full basement.

CONTRIBUTING



Arrow indicates 44 Pratt Street.



Arrow indicates project location, looking north.

Applicant/Contractor: Tesla Energy Operations, Inc., 125 John Hancock Road, Taunton, MA 02780

Owner: Anna MacGregor Robin, 44 Pratt Street, Providence, RI 02906

Proposal: The scope of work proposed consists of Minor Alterations and includes:

- the installation of twelve solar panels to the end-gable and dormer roofs.

Issues: The following issues are relevant to this application:

- Some of the modifications as proposed will be (minimally) visible from the public rights-of-way. The house is sited into the hill, with entry doors on Pratt Street and the south elevation. Staff discussed with the applicant the removal of the panels from the slower soul gable slope. This was investigated, but the system does not meet performance standards with these panels removed. It is Staff's opinion that the siting of the house as well as the overall character of Pratt Street, the panels on the lower gable roof, south slope, while visible, will be minimally noticeable, and not uncharacteristic for the streetscape;
- The modifications as proposed meets Minor Alterations: Solar Energy Systems Guidelines, Section 2, in the following manner: Panel layout shall be sympathetic or appropriate to design and scale of building. Rectangular configurations are preferred, with ample setback from edge of roof, dormers, chimneys, etc. (2.A); Panels shall be installed parallel to the existing roof slope and matched as closely as possible to the roof plane (2.B); Panels shall be installed without destroying or replacing original or historic materials or significantly compromising or altering the building's structural integrity (2.C); Panels shall be compatible in color to existing roofing insofar as possible (2.D); Installation of panels shall be as inconspicuous as possible when viewed from public right-of-way (2.E); Installation shall be reversible. Panels shall be removed when no longer viable or functioning and roofing restored to pre-existing conditions (2.F); and,
- Plans, specifications and pictures have been submitted.

Recommendations: The staff recommends the PHDC make the following findings of fact:

- a) 44 Pratt Street is a structure of historical and architectural significance that contributes to the significance of the College Hill local historic district, having been recognized as a contributing structure to the College Hill National Historic Landmarks District;
- b) The modifications as proposed meets Minor Alterations: Solar Energy Systems Guidelines, Section 2, and the application is considered complete; and,
- c) The work as proposed is in accord with PHDC Standards 8 & 9 as follows: 8) the work will be done so that it does not destroy the historic character of the property or the district as they are not on the primary elevation and will be minimally-to-not visible from the public rights-of-way; and, 9) Whenever possible... alterations to structures shall be done in such a manner that if removed in the future, the essential form and integrity of the structure and the site will be unimpaired.

Staff recommends a motion be made stating that: The application is considered complete. 44 Pratt Street is a structure of historical and architectural significance that contributes to the significance of the College Hill local historic district, having been recognized as a contributing structure to the College Hill National Historic Landmarks District. The Commission grants Final Approval of the proposal as submitted as the proposed alteration is appropriate having determined that the proposed alteration does not destroy the historic character of the property or the district and are historically and architecturally compatible with the property and district as the proposed alteration meets Minor Alterations: Solar Energy Systems Guidelines, Section 2, is reversible and will not have an adverse effect on the property or district as they are not on the primary elevation and will be minimally visible from the public rights-of-way (Standards 8 & 9), and the recommendations in the staff report, with staff to review any additional required details.

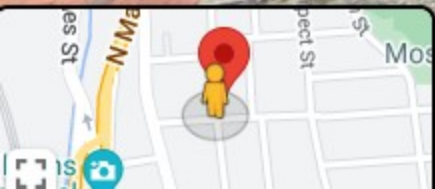
47 Pratt St

Providence, Rhode Island

Google Street View

Dec 2022

See more dates



Google

40 Pratt St

Providence, Rhode Island

Google Street View

Dec 2022

See more dates

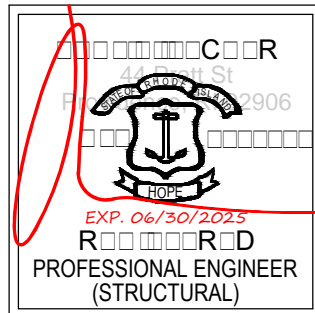


Google

ABBREVIATIONS

A AMPERE AC ALTERNATING CURRENT BLDG BUILDING CONC CONCRETE DC DIRECT CURRENT EGC EQUIPMENT GROUNDING CONDUCTOR (E) EXISTING EMT ELECTRICAL METALLIC TUBING FSB FIRE SET-BACK GALV GALVANIZED GEC GROUNDING ELECTRODE CONDUCTOR GND GROUND HDG HOT DIPPED GALVANIZED I CURRENT Imp CURRENT AT MAX POWER Isc SHORT CIRCUIT CURRENT kVA KILOVOLT AMPERE kW KILOWATT LBW LOAD BEARING WALL MIN MINIMUM (N) NEW NEUT NEUTRAL NTS NOT TO SCALE OC ON CENTER PL PROPERTY LINE POI POINT OF INTERCONNECTION PV PHOTOVOLTAIC SCH SCHEDULE S STAINLESS STEEL STC STANDARD TESTING CONDITIONS TYP TYPICAL UPS UNINTERRUPTIBLE POWER SUPPLY V VOLT Vmp VOLTAGE AT MAX POWER Voc VOLTAGE AT OPEN CIRCUIT W WATT 3R NEMA 3R, RAIN TIGHT

DIGITALLY SEALED



184.07562
04/12/2023

ELECTRICAL NOTES

1. THIS SYSTEM IS GRID-INTERTIED VIA A UL-LISTED POWER-CONDITIONING INVERTER.
2. A NATIONALLY - RECOGNIZED TESTING LABORATORY SHALL LIST ALL EQUIPMENT IN COMPLIANCE WITH ART. 110.3.
3. WHERE ALL TERMINALS OF THE DISCONNECTING MEANS MAY BE ENERGIZED IN THE OPEN POSITION, A SIGN WILL BE PROVIDED WARNING OF THE HAZARDS PER ART. 690.17.
4. EACH UNGROUNDED CONDUCTOR OF THE MULTIWIRED BRANCH CIRCUIT WILL BE IDENTIFIED BY PHASE AND SYSTEM PER ART. 210.5.
5. CIRCUITS OVER 250V TO GROUND SHALL COMPLY WITH ART. 250.97, 250.92(B).
6. DC CONDUCTORS EITHER DO NOT ENTER BUILDING OR ARE RUN IN METALLIC RACEWAYS OR ENCLOSURES TO THE FIRST ACCESSIBLE DC DISCONNECTING MEANS PER ART. 690.31(E).
7. ALL WIRES SHALL BE PROVIDED WITH STRAIN RELIEF AT ALL ENTRY INTO BOXES AS REQUIRED BY UL LISTING.
8. MODULE FRAMES SHALL BE GROUNDED AT THE UL - LISTED LOCATION PROVIDED BY THE MANUFACTURER USING UL LISTED GROUNDING HARDWARE.
9. MODULE FRAMES, RAIL, AND POSTS SHALL BE BONDED WITH EQUIPMENT GROUND CONDUCTORS.

JURISDICTION NOTES

LICENSE

MODULE GROUNDING METHOD: ZEP SOLAR

AHJ: Providence

UTILITY: Rhode Island Energy

GENERAL NOTES

1. ALL WORK SHALL COMPLY WITH THE 2018 IBC AND 2018 IRC. 2. ALL ELECTRICAL WORK SHALL COMPLY WITH THE 2020 NATIONAL ELECTRIC CODE.

VICINITY MAP



INDEX

Sheet 1	COVER SHEET
Sheet 2	SITE PLAN
Sheet 3	STRUCTURAL VIEWS
Sheet 4	UPLIFT CALCULATIONS
Sheet 5	THREE LINE DIAGRAM
Cutsheets Attached	

REV BY DATE COMMENTS

REV	BY	DATE	COMMENTS
REV A	AM	4/6/2023	BOS location updated
*	*	*	*
*	*	*	*
*	*	*	*
*	*	*	*

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JOB NUMBER: JB-0291138 00

MOUNTING SYSTEM: ZS Comp V4 w Flashing-Insert

MODULES: (12) Hanwha # Q.PEAK DUO BLK ML-G10.a+/TS 400

INVERTER: Powerwall+ [240V] #1850000-00-C / PVI Assy. 1538000-25-F

CUSTOMER: Anna MacGregor Robin
44 Pratt St
Providence, RI 02906

4012411573

DESCRIPTION: 4.8 KW PV ARRAY
13.5 KWH ENERGY STORAGE SYSTEM

PAGE NAME: COVER SHEET

DESIGN: Akash Mallick

SHEET: 1 REV: A DATE: 4/6/2023



"LOCKABLE AND 24/7 ACCESSIBLE A/C DISCONNECT"

A. POWERWALL CHARACTERISTICS

- MAKE: TESLA
- MODEL: AC-DC POWERWALL+ INVERTER
- MAX. CAPACITY: 5.0KW AC
- OUTPUT VOLTAGE: 240V
- PHASING: SINGLE PHASE

B. TOTAL AC SIZE OF PV INVERTER: 7.6 KW

C. TOTAL AC SIZE OF POWERWALLS: 0 KW

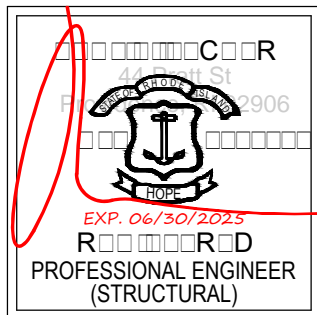
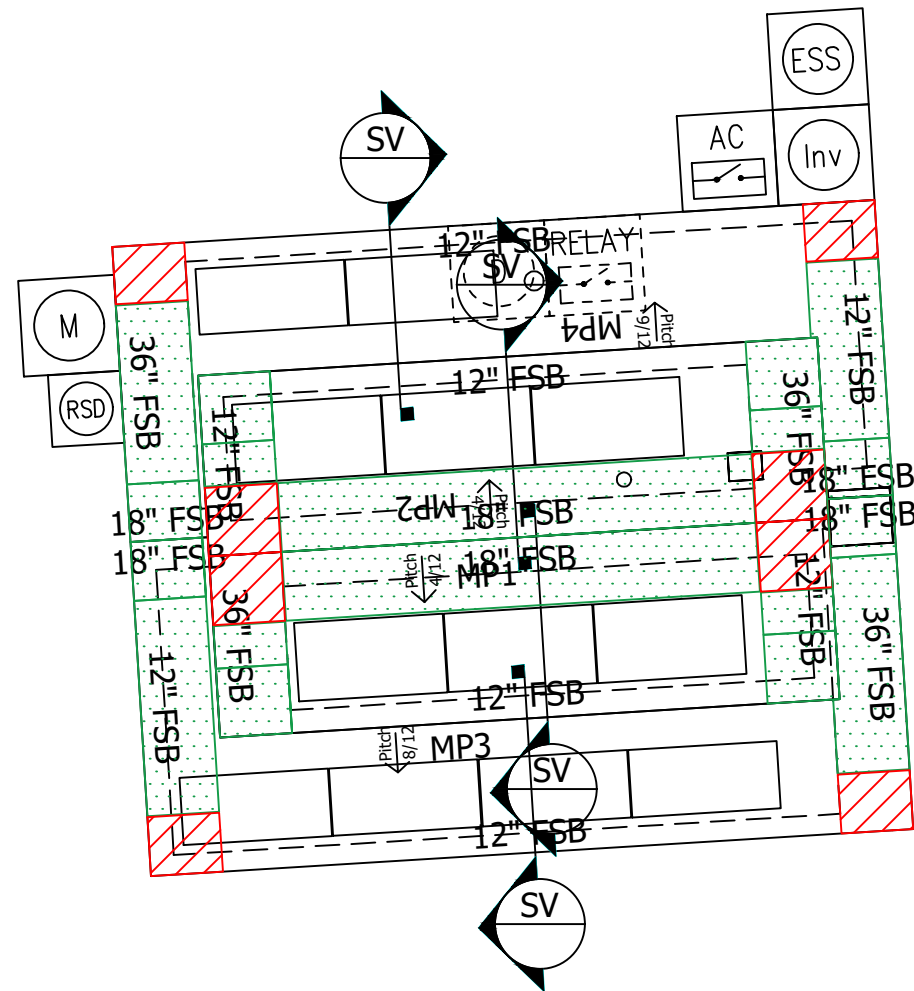
D. TOTAL AC SIZE OF SYSTEM (B+C): 7.6 KW

E. TOTAL DC SIZE OF PV: 4.8 KW

"BASIC POWERWALL BEHAVIOR UNDER NORMAL CONDITIONS IS TO CHARGE FROM ONSITE SOLAR AND TO NOT EXPORT TO THE GRID. SOME POWERWALL CUSTOMERS WHO CHOSE TO PARTICIPATE IN THE CONNECTEDSOLUTIONS DEMAND RESPONSE PROGRAM WILL EXPORT DURING DEMAND RESPONSE EVENTS, BUT THE CHARGING BEHAVIOR WILL BE THE SAME."

MAJOR STREET CROSSINGS: N MAIN ST & BENEFIT ST

Front Of House



184.07562
04/12/2023

MP1	PITCH: 17° (4:12) ARRAY PITCH: 17° (4:12) AZIMUTH: 176 ARRAY AZIMUTH: 176 MATERIAL: Comp Shingle STORY: 2 Stories
MP2	PITCH: 17° (4:12) ARRAY PITCH: 17° (4:12) AZIMUTH: 356 ARRAY AZIMUTH: 356 MATERIAL: Comp Shingle STORY: 2 Stories
MP3	PITCH: 35° (8:12) ARRAY PITCH: 35° (8:12) AZIMUTH: 176 ARRAY AZIMUTH: 176 MATERIAL: Comp Shingle STORY: 2 Stories
MP4	PITCH: 37° (9:12) ARRAY PITCH: 37° (9:12) AZIMUTH: 356 ARRAY AZIMUTH: 356 MATERIAL: Comp Shingle STORY: 2 Stories

LEGEND

- (M) (E) UTILITY METER & WARNING LABEL
- (Inv) INVERTER W/ INTEGRATED DC DISCO & WARNING LABELS
- RELAY AUTOMATIC RELAY
- DC DC DISCONNECT & WARNING LABELS
- AC AC DISCONNECT & WARNING LABELS
- (B) DC JUNCTION/COMBINER BOX & LABELS
- (ESS) ENERGY STORAGE SYSTEM FOR STAND ALONE OPERATION
- (D) DISTRIBUTION PANEL & LABELS
- (LC) LOAD CENTER & WARNING LABELS
- (M) DEDICATED PV SYSTEM METER
- (RSD) RAPID SHUTDOWN
- STANDOFF LOCATIONS
- CONDUIT RUN ON EXTERIOR
- - - CONDUIT RUN ON INTERIOR
- GATE/FENCE
- HEAT PRODUCING VENTS ARE RED
- - - INTERIOR EQUIPMENT IS DASHED

SITE PLAN

Scale: 1/8" = 1'



TOTAL ARRAY AREA (SF): 260
TOTAL ROOF AREA (SF): 958
TOTAL ARRAY AREA IS ≈ 27.15 PERCENT OF TOTAL ROOF AREA

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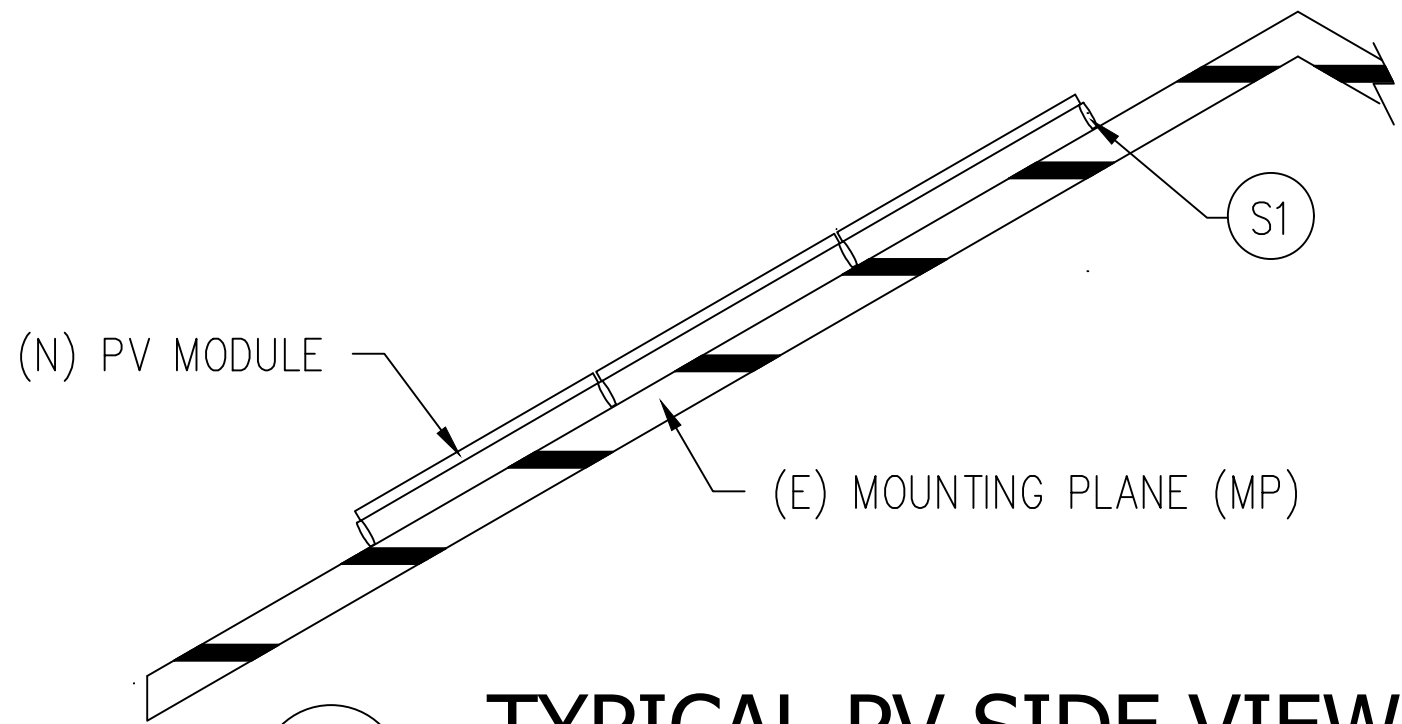
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MOUNTING SYSTEM: ZS Comp V4 w Flashing-Insert
MODULES: (12) Hanwha # Q.PEAK DUO BLK ML-G10.a+/TS 400
INVERTER: Powerwall+ [240V] #1850000-00-C / PVI Assy. 1538000-25-F

CUSTOMER: Anna MacGregor Robin
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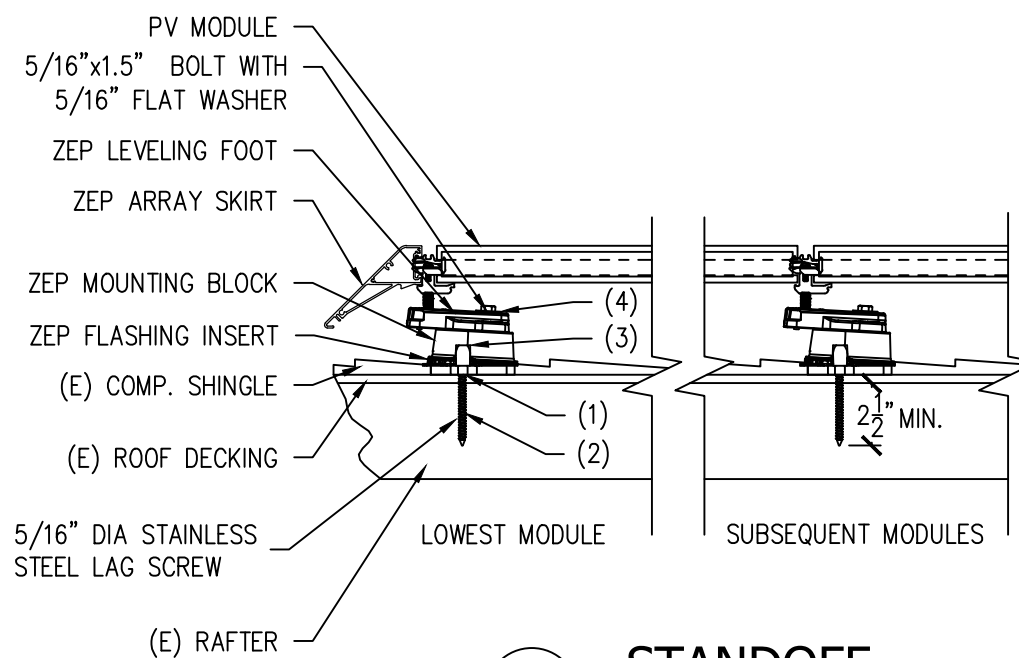
DESCRIPTION: 4.8 KW PV ARRAY
13.5 KWH ENERGY STORAGE SYSTEM
PAGE NAME: SITE PLAN

DESIGN: Akash Mallick
SHEET: 2 REV: A DATE: 4/6/2023



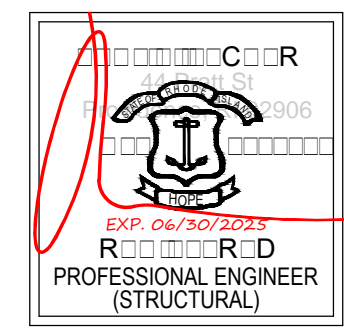


SV TYPICAL PV SIDE VIEW
NTS



- INSTALLATION ORDER**
- (1) LOCATE RAFTER, MARK HOLE LOCATION, AND DRILL PILOT HOLE.
 - (2) ATTACH FLASHING INSERT TO MOUNTING BLOCK AND ATTACH TO RAFTER USING LAG SCREW.
 - (3) INJECT SEALANT INTO FLASHING INSERT PORT, WHICH SPREADS SEALANT EVENLY OVER THE ROOF PENETRATION.
 - (4) INSTALL LEVELING FOOT ON TOP OF MOUNTING BLOCK & SECURELY FASTEN WITH BOLT.

S1 STANDOFF
Scale: 1 1/2" = 1'



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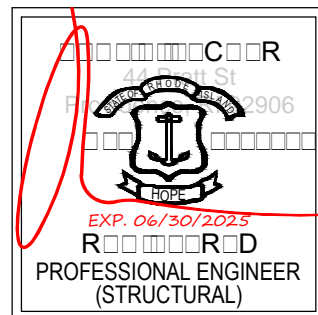
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DESCRIPTION:
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 PAGE NAME:
 STRUCTURAL VIEWS

DESIGN:
 Akash Mallick
 SHEET: 3 REV: A DATE: 4/6/2023





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Jobsite Specific Design Criteria			
Design Code		ASCE 7-16	
Risk Category		II	Table 1.5-1
Ultimate Wind Speed	V-Ult	135	Fig. 1609A
Exposure Category		C	Section 26.7
Ground Snow Load	pg	35	Table 7-1
Edge Zone Width	a	3 ft	Fig. 30.3-2A to I

MP Specific Design Information				
MP Name	MP1	MP2	MP3	MP4
Roofing	Comp Shingle	Comp Shingle	Comp Shingle	Comp Shingle
Standoff	ZS Comp V4 w Flashing-Insert	ZS Comp V4 w Flashing-Insert	ZS Comp V4 w Flashing-Insert	ZS Comp V4 w Flashing-Insert
Pitch	17	17	35	37
SL/RLL: PV	26.5	26.5	17.5	16.5
SL/RLL: Non-PV	30.0	30.0	30.0	30.0

Standoff Spacing and Layout				
MP Name	MP1	MP2	MP3	MP4
Applied Wind Zones	1, 2e	1, 2e	1, 2e, 2r	1, 2e, 2r
Wind Pressue	-30.86	-30.86	-23.39	-23.39
Landscape X-Spacing	30	30	60	60
Landscape X-Cantilever	18	18	24	24
Landscape Y-Spacing	41	41	41	41
Landscape Y-Cantilever	-	-	-	-
Portrait X-Spacing	30	30	30	30
Portrait X-Cantilever	10	10	13	13
Portrait Y-Spacing	74	74	74	74
Portrait Y-Cantilever	-	-	-	-
Layout	Staggered	Staggered	Staggered	Staggered

Applied Wind Zones	2n, 2r, 3e	2n, 2r, 3e	2n, 3r	2n, 3r
Wind Pressue	-40.21	-40.21	-27.77	-27.77
Landscape X-Spacing	30	30	60	60
Landscape X-Cantilever	14	14	20	20
Landscape Y-Spacing	41	41	41	41
Landscape Y-Cantilever	-	-	-	-
Portrait X-Spacing	DQ	DQ	30	30
Portrait X-Cantilever	DQ	DQ	11	11
Portrait Y-Spacing	DQ	DQ	74	74
Portrait Y-Cantilever	DQ	DQ	-	-
Layout	Staggered	Staggered	Staggered	Staggered

Applied Wind Zones	3r	3r	3e	3e
Wind Pressue	-47.82	-47.82	-34.34	-34.34
Landscape X-Spacing	30	30	30	30
Landscape X-Cantilever	12	12	16	16
Landscape Y-Spacing	41	41	41	41
Landscape Y-Cantilever	-	-	-	-
Portrait X-Spacing	DQ	DQ	DQ	DQ
Portrait X-Cantilever	DQ	DQ	DQ	DQ
Portrait Y-Spacing	DQ	DQ	DQ	DQ
Portrait Y-Cantilever	DQ	DQ	DQ	DQ
Layout	Staggered	Staggered	Staggered	Staggered

X and Y are maximums that are always relative to the structure framing that supports the PV. X is across rafters and Y is along rafters.

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DESIGN:
Akash Mallick

SHEET: 4 REV: A DATE: 4/6/2023

TESLA

LOCKABLE AND 24/7 ACCESSIBLE A/C DISCONNECT

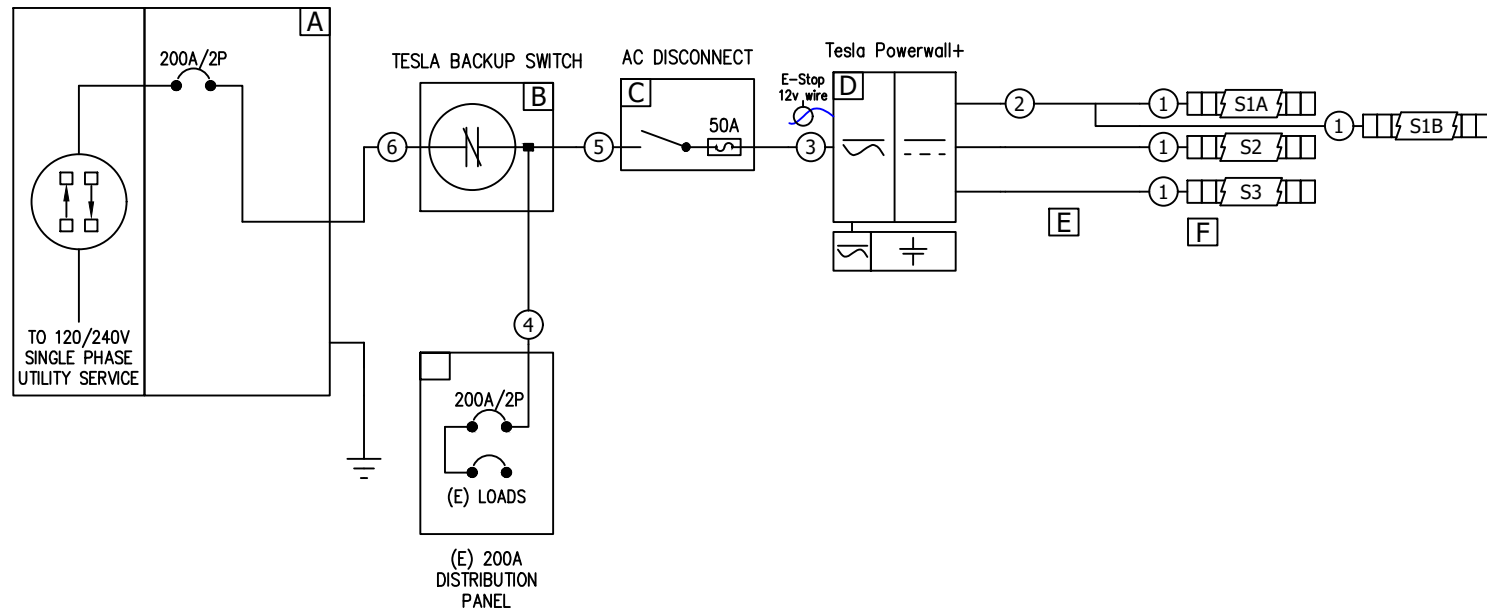
STORAGE CHARGING CAPABILITY:
GENERATION ONLY

STORAGE DISCHARGING CAPABILITY:
RESTRICTED ELECTRIC GRID OR ON-SITE LOAD

"BASIC POWERWALL BEHAVIOR UNDER NORMAL CONDITIONS IS TO CHARGE FROM ONSITE SOLAR AND TO NOT EXPORT TO THE GRID. SOME POWERWALL CUSTOMERS WHO CHOSE TO PARTICIPATE IN THE CONNECTEDSOLUTIONS DEMAND RESPONSE PROGRAM WILL EXPORT DURING DEMAND RESPONSE EVENTS, BUT THE CHARGING BEHAVIOR WILL BE THE SAME."

A. POWERWALL CHARACTERISTICS

- MAKE: TESLA
- MODEL: AC-DC POWERWALL+ INVERTER
- MAX. CAPACITY: 5.0KW AC
- OUTPUT VOLTAGE: 240V
- PHASING: SINGLE PHASE
- B. TOTAL AC SIZE OF PV INVERTER: 7.6 KW
- C. TOTAL AC SIZE OF POWERWALLS: 0 KW
- D. TOTAL AC SIZE OF SYSTEM (B+C): 7.6 KW
- E. TOTAL DC SIZE OF PV: 4.8 KW



Panel Limit feature for Powerwall unit(s) to be utilized

Field label to be at the point of interconnection:
"PCS Controlled Current Setting: 200A"

The maximum output current from this system towards the main panel is controlled electronically. Refer to manufacturer's instructions for more information."

G Emergency Stop Button (E-Stop)

- Rapid Shutdown Initiation Device per Article 690.12(c) of the NEC
- Disconnecting Means as defined in Article 100 of the NEC
- Connection to generation sources with 12V, 1A communication wire

1. CONDUIT RUNS MAY BE CONDENSED DUE TO SITE CONDITIONS AND/OR INSTALLATION EASE. ALL CONDUIT FILL DERATES AND PROPER CALCULATIONS HAVE BEEN COMPLETED PER NEC CHAPTER 9, TABLE 4.
2. SOLAR SHUTDOWN DEVICE TO BE INSTALLED FOR SYSTEM RAPID SHUTDOWN (RSD) IN ACCORDANCE WITH ARTICLE 690 OF THE APPLICABLE NEC.
3. CONDUIT TYPE CAN CHANGE DUE TO SITE CONDITIONS AND WILL FOLLOW THE NEC REQUIREMENTS FOR THAT CONDUIT TYPE.

PARTS			DC CONDUCTOR TABLE							STRING TABLE																																																																																																																																																																																									
Ref	Qty	Description	Ref	Type	Qty	Size (AWG, Cu)	EGC (AWG, Cu)	Conduit	Isc (ADC)	Imp (ADC)	Product Ref	String Ref	Module per String	MCI per String	Voc* (VDC)	Vmp (VDC)	Mounting Plane																																																																																																																																																																																		
B	3	Insulation Piercing Connector; Main 4/0-4, Tap 6-14	1	PV Wire	2	#10	#10	3/4" EMT	11.14	10.77	D	S1A	3	1	154.25	111.39	MP1																																																																																																																																																																																		
B	1	Eaton 204 MS68: B-Line Meter Socket, 200A, AW Hub top, Overhead, 4 jaws, Ring type	2	PV Wire	2	#10	#10	3/4" EMT	22.28	21.54		S1B	3	1	154.25	111.39	MP2																																																																																																																																																																																		
B	1	1624171-00-G: Backup Switch	<table border="1"> <thead> <tr> <th colspan="10">AC CONDUCTOR TABLE</th> </tr> <tr> <th>Ref</th> <th>Type</th> <th>Qty</th> <th colspan="2">Size (AWG)</th> <th>Min EGC (AWG, Cu)</th> <th colspan="2">Conduit</th> <th>Length (ft)</th> <th>Imp (AAC)</th> <th>Vmp (VAC)</th> </tr> <tr> <td></td> <td></td> <td></td> <th>(Cu)</th> <th>(Al)</th> <td></td> <th>(Cu)</th> <th>(Al)</th> <td></td> <td></td> <td></td> </tr> </thead> <tbody> <tr> <td>C</td> <td>1</td> <td>Disconnect; 60A, 240Vac, Fusible, NEMA 3R: 2P, 3W, Lockable</td> <td>3</td> <td>THWN-2</td> <td>3</td> <td>#08</td> <td>#06</td> <td>#10</td> <td>PVC Jacketed MC</td> <td>3/4" EMT</td> <td>5ft</td> <td>32</td> <td>240</td> </tr> <tr> <td>C</td> <td>1</td> <td>Ground/Neutral Kit; 60-100A, General Duty (DG)</td> <td>4</td> <td>THWN-2</td> <td>3</td> <td>#2/0</td> <td>#4/0</td> <td>#06</td> <td>2" PVC</td> <td>2" PVC</td> <td>2ft</td> <td>-</td> <td>240</td> </tr> <tr> <td>C</td> <td>2</td> <td>Fuse; 50A, 250V, Class RK5: Time Delay, 200kA I.R.</td> <td>5</td> <td>THWN-2</td> <td>3</td> <td>#06</td> <td>#04</td> <td>#10</td> <td>3/4" EMT</td> <td>1" EMT</td> <td>5ft</td> <td>-</td> <td>240</td> </tr> <tr> <td>D</td> <td>1</td> <td>CUTLER-HAMMER #DS16FK: Class R Fuse Kit: Use with 30A 600V DH, 60A 240V DH, 60A DG Disconnects only</td> <td>6</td> <td>THWN-2</td> <td>3</td> <td>#2/0</td> <td>#4/0</td> <td>#06</td> <td>2" PVC</td> <td>2" PVC</td> <td>5ft</td> <td>-</td> <td>240</td> </tr> <tr> <td>D</td> <td>1</td> <td>Powerwall+ [240V] #1850000-00-C / PVI Assy. 1538000-25-F</td> <td colspan="16"></td> </tr> <tr> <td>E</td> <td>1</td> <td>EE-000550-001 MC4 Y-Connector, Receptacle</td> <td colspan="16"></td> </tr> <tr> <td>E</td> <td>1</td> <td>EE-000550-000 MC4 Y-Connector, Plug</td> <td colspan="16"></td> </tr> <tr> <td>F</td> <td>5</td> <td>Tesla MCI, 650V, 12A</td> <td colspan="16"></td> </tr> <tr> <td>G</td> <td>1</td> <td>UL 508 Emergency Stop Device - NEMA 4X</td> <td colspan="16"></td> </tr> </tbody> </table>									AC CONDUCTOR TABLE										Ref	Type	Qty	Size (AWG)		Min EGC (AWG, Cu)	Conduit		Length (ft)	Imp (AAC)	Vmp (VAC)				(Cu)	(Al)		(Cu)	(Al)				C	1	Disconnect; 60A, 240Vac, Fusible, NEMA 3R: 2P, 3W, Lockable	3	THWN-2	3	#08	#06	#10	PVC Jacketed MC	3/4" EMT	5ft	32	240	C	1	Ground/Neutral Kit; 60-100A, General Duty (DG)	4	THWN-2	3	#2/0	#4/0	#06	2" PVC	2" PVC	2ft	-	240	C	2	Fuse; 50A, 250V, Class RK5: Time Delay, 200kA I.R.	5	THWN-2	3	#06	#04	#10	3/4" EMT	1" EMT	5ft	-	240	D	1	CUTLER-HAMMER #DS16FK: Class R Fuse Kit: Use with 30A 600V DH, 60A 240V DH, 60A DG Disconnects only	6	THWN-2	3	#2/0	#4/0	#06	2" PVC	2" PVC	5ft	-	240	D	1	Powerwall+ [240V] #1850000-00-C / PVI Assy. 1538000-25-F																	E	1	EE-000550-001 MC4 Y-Connector, Receptacle																	E	1	EE-000550-000 MC4 Y-Connector, Plug																	F	5	Tesla MCI, 650V, 12A																	G	1	UL 508 Emergency Stop Device - NEMA 4X																	
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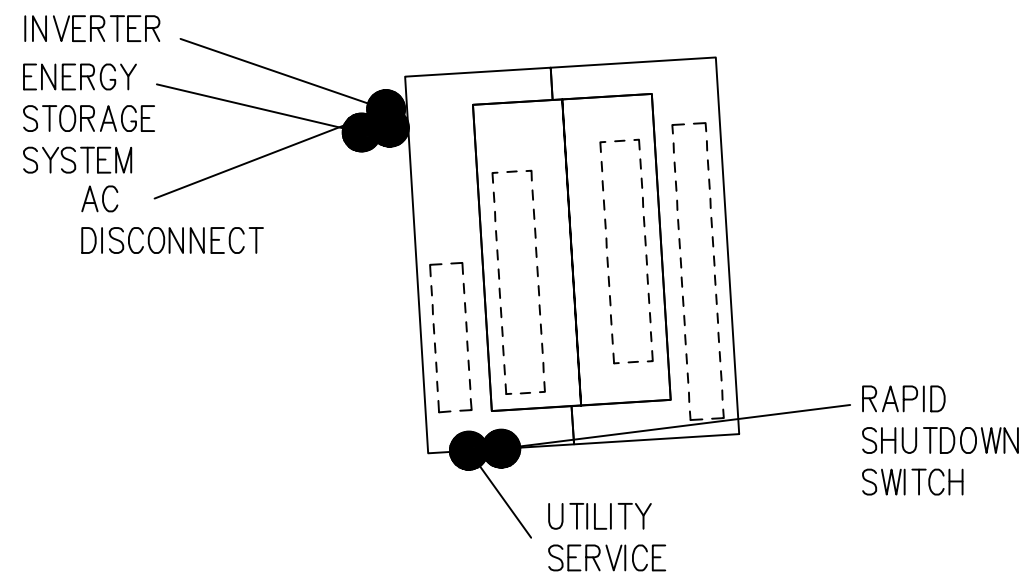
SITE SPECIFICATIONS		MODULE SPECIFICATIONS	
Main Panel Rating	(E) 200A	Hanwha # Q.PEAK DUO BLK ML-G10.a+/TS 400: PV Module, 400W, 371.5WPTC, ZEP, Black Frame, MC4, 1000V	
Main Breaker Rating	(E) 200A	Qty	12
General Notes	DC Ungrounded Inverters	Voc	45.30
Panel Number		Vmp	37.13
Meter Number	10 419 130	Isc and Imp are in the DC Conductor Table	
Service Entrance	Overhead		

CONFIDENTIAL - THE INFORMATION HEREIN CONTAINED SHALL NOT BE USED FOR THE BENEFIT OF ANYONE EXCEPT TESLA INC., NOR SHALL IT BE DISCLOSED IN WHOLE OR IN PART TO OTHERS OUTSIDE THE RECIPIENT'S ORGANIZATION, EXCEPT IN CONNECTION WITH THE SALE AND USE OF THE RESPECTIVE TESLA EQUIPMENT, WITHOUT THE WRITTEN PERMISSION OF TESLA INC.	JOB NUMBER: JB-0291138 00	CUSTOMER: Anna MacGregor Robin 44 Pratt St Providence, RI 02906 4012411573	DESCRIPTION: 4.8 KW PV ARRAY 13.5 KWH ENERGY STORAGE SYSTEM PAGE NAME: THREE LINE DIAGRAM	DESIGN: Akash Mallick SHEET: 5 REV: A DATE: 4/6/2023	
	MOUNTING SYSTEM: ZS Comp V4 w Flashing-Insert				
	MODULES: (12) Hanwha # Q.PEAK DUO BLK ML-G10.a+/TS 400 INVERTER: Powerwall+ [240V] #1850000-00-C / PVI Assy. 1538000-25-F				

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

- Address: 44 Pratt St



OPERATING VOLTAGE = 240V

JB-0291138-00

CONFIDENTIAL - THE INFORMATION HEREIN CONTAINED SHALL NOT BE USED FOR THE BENEFIT OF ANYONE EXCEPT TESLA INC., NOR SHALL IT BE DISCLOSED IN WHOLE OR IN PART TO OTHERS OUTSIDE THE RECIPIENT'S ORGANIZATION, EXCEPT IN CONNECTION WITH THE SALE AND USE OF THE RESPECTIVE TESLA EQUIPMENT, WITHOUT THE WRITTEN PERMISSION OF TESLA INC.

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INVERTER:
Powerwall+ [240V] #1850000-00-C / PVI Assy. 1538000-25-F

CUSTOMER:
Anna MacGregor Robin
44 Pratt St
Providence, RI 02906

4012411573

DESCRIPTION:
4.8 KW PV ARRAY
13.5 KWH ENERGY STORAGE SYSTEM

PAGE NAME:
SITE PLAN PLACARD

DESIGN:
Akash Mallick

SHEET: 6 REV: A DATE: 4/6/2023

TESLA

WARNING: PHOTOVOLTAIC POWER SOURCE

Label Location:
(C)(IC)(CB)
Per Code:
690.31.D.2

CAUTION
DUAL POWER SOURCE
SECOND SOURCE IS
PHOTOVOLTAIC SYSTEM

Label Location:
(POI)
Per Code:
705.12.C

MAXIMUM DC VOLTAGE OF PV

Label Location:
(DC) (INV)
Per Code:
690.53

**PHOTOVOLTAIC
SYSTEM DISCONNECT**

Label Location:
(AC) (POI)(DC) (INV)
Per Code:
690.13.B

PHOTOVOLTAIC POINT OF
INTERCONNECTION
WARNING: ELECTRIC SHOCK
HAZARD. DO NOT TOUCH
TERMINALS. TERMINALS ON
BOTH THE LINE AND LOAD SIDE
MAY BE ENERGIZED IN THE OPEN
POSITION. FOR SERVICE
DE-ENERGIZE BOTH SOURCE
AND MAIN BREAKER.
PV POWER SOURCE
MAXIMUM AC A
OPERATING CURRENT
MAXIMUM AC V
OPERATING VOLTAGE

Label Location:
(POI)
Per Code:
690.54; 690.13.B

MAXIMUM AC A
OPERATING CURRENT
MAXIMUM AC V
OPERATING VOLTAGE

Label Location:
(AC) (POI)
Per Code:
690.54

WARNING

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

Label Location:
(DC)(CB)
Per Code:
690.13.B

**RAPID SHUTDOWN
SWITCH FOR
SOLAR PV SYSTEM**

Label Location:
RSD Switch
Per Code:
690.56.C.2

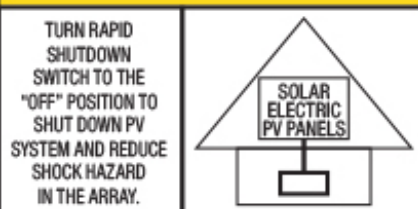
WARNING

POWER SOURCE
OUTPUT CONNECTION
DO NOT RELOCATE
THIS OVERCURRENT
DEVICE

Label Location:
(POI)
Per Code:
705.12.B.3.2

**SOLAR PV SYSTEM
EQUIPPED WITH RAPID
SHUTDOWN**

Label Location:
(INV)
Per Code:
690.56.C



WARNING

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

Per Code:
705.12.B.3.3

(AC): AC Disconnect
(C): Conduit
(CB): Combiner Box
(D): Distribution Panel
(DC): DC Disconnect
(IC): Interior Run Conduit
(INV): Inverter With Integrated DC Disconnect
(LC): Load Center
(M): Utility Meter
(POI): Point of Interconnection

BACKUP LOAD CENTER

Label Location:
(BLC)
Per Code:
408.4

WARNING

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

Per Code:
705.12.B.3.3

CAUTION

DO NOT ADD NEW LOADS

Label Location:
(BLC)
Per Code:
220

CAUTION

THIS PANEL HAS SPICED FEED-
THROUGH CONDUCTORS.
LOCATION OF DISCONNECT AT ENERGY
STORAGE BACKUP LOAD PANEL

Label Location:
(MSP)
Per Code:
312.8.A.3

CAUTION

TRI POWER SOURCE
SECOND SOURCE IS PHOTOVOLTAIC SYSTEM
THIRD SOURCE IS ENERGY STORAGE SYSTEM

Label Location:
(MSP)
Per Code:
705.12.C

CAUTION

DUAL POWER SOURCE
SECOND SOURCE IS
ENERGY STORAGE SYSTEM

Label Location:
(MSP)
Per Code:
705.12.C

Tesla Energy
Customer Care 888-765-2489
Powerwall team

Label Location:
(MSP)
Per Code:
R328.11

WARNING

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

Label Location:
(AC)
Per Code:
706.15.c

**ENERGY STORAGE
SYSTEM DISCONNECT**

NOMINAL ESS AC VOLTAGE:
MAXIMUM ESS DC VOLTAGE:

Label Location:
(MSP)
Per Code:
706.15.C

WARNING

POWER SOURCE
OUTPUT CONNECTION
DO NOT RELOCATE
THIS OVERCURRENT
DEVICE

Label Location:
(POI)
Per Code:
705.12.B.3.2

(AC): AC Disconnect
(BLC): Backup Load Center
(MSP): Main Service Panel

Label Set

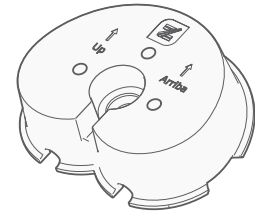
ROOFING SYSTEM SPECIFICATIONS



DESCRIPTION	PV mounting solution for composition shingle roofs.
	Works with all Zep Compatible Modules.
	Auto bonding UL-listed hardware creates structural and electrical bond.
SPECIFICATIONS	Designed for pitched roofs.
	Installs in portrait and landscape orientations.
	Engineered for spans up to 72" and cantilevers up to 24".
	ZS Comp has a UL 1703 Class "A" Fire Rating when installed using modules from any manufacturer certified as "Type 1" or "Type 2".
	Attachment method UL listed to UL 2582 for Wind Driven Rain.
	ZS Comp supports 50 psf (2400 Pa) front and up to 72 psf (3450 Pa) rear side design load rating for Portrait module orientation per UL 2703.
	ZS Comp supports 50 psf (2400 Pa) front side and up to 72 psf (3450 Pa) rear side design load rating for Landscape module orientation.
	Engineered for compliance with ASCE 7-05, 7-10, and 7-16 wind load requirements.
	Zep wire management products listed to UL 1565 for wire positioning devices.
	ZS Comp grounding products are listed to UL 2703 and UL 467.
ZS Comp bonding products are listed to UL 2703.	

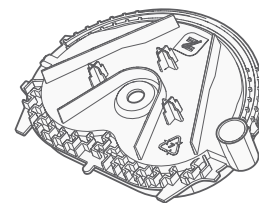
MOUNTING BLOCK

Listed to UL 2703
Part #850-1633



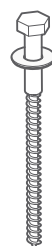
FLASHING INSERT

Listed to UL 2703 and UL 2582 for Wind Driven Rain
Part #850-1628



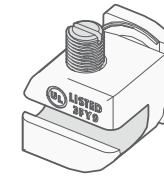
CAPTURED WASHER LAG

Part #850-1631-002 and #850-1631-004



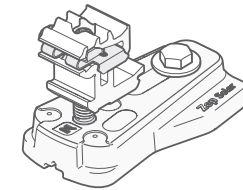
GROUND ZEP

Listed to UL 2703
Part #850-1511



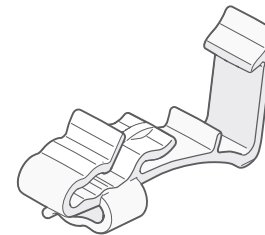
LEVELING FOOT

Listed to UL 2703
Part #850-1397



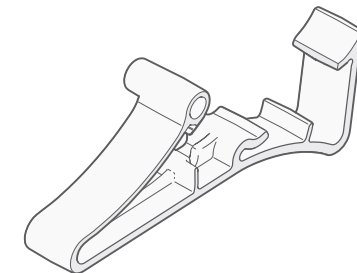
DC WIRE CLIP

Listed to UL 1565
Part #850-1509



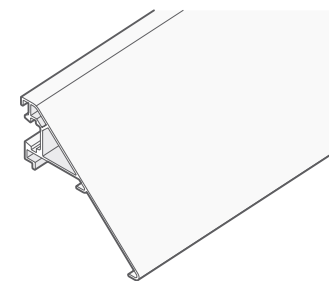
HOME RUN CLIP

Listed to UL 1565
Part #850-1510



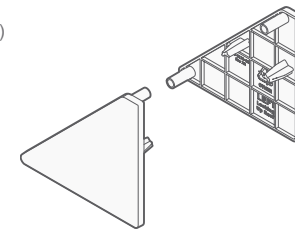
ARRAY SKIRT

Listed to UL 2703
Part #850-1608



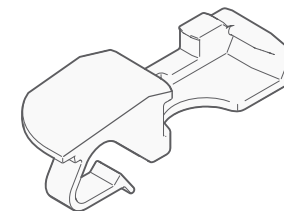
END CAP

Listed to UL 2703
Part #850-1586 (Left)
Part #850-1588 (Right)



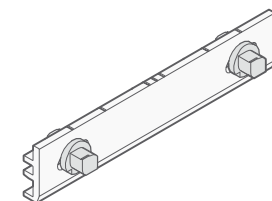
SKIRT GRIP

Listed to UL 2703
Part #850-1606



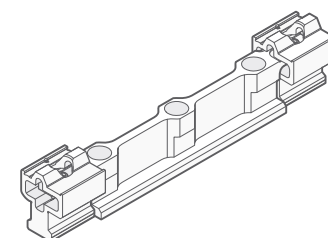
INTERLOCK

Listed to UL 2703
Part #850-1613



HYBRID INTERLOCK

Listed to UL 2703
Part #850-1281



MCI WIRING DETAIL

GENERAL NOTES

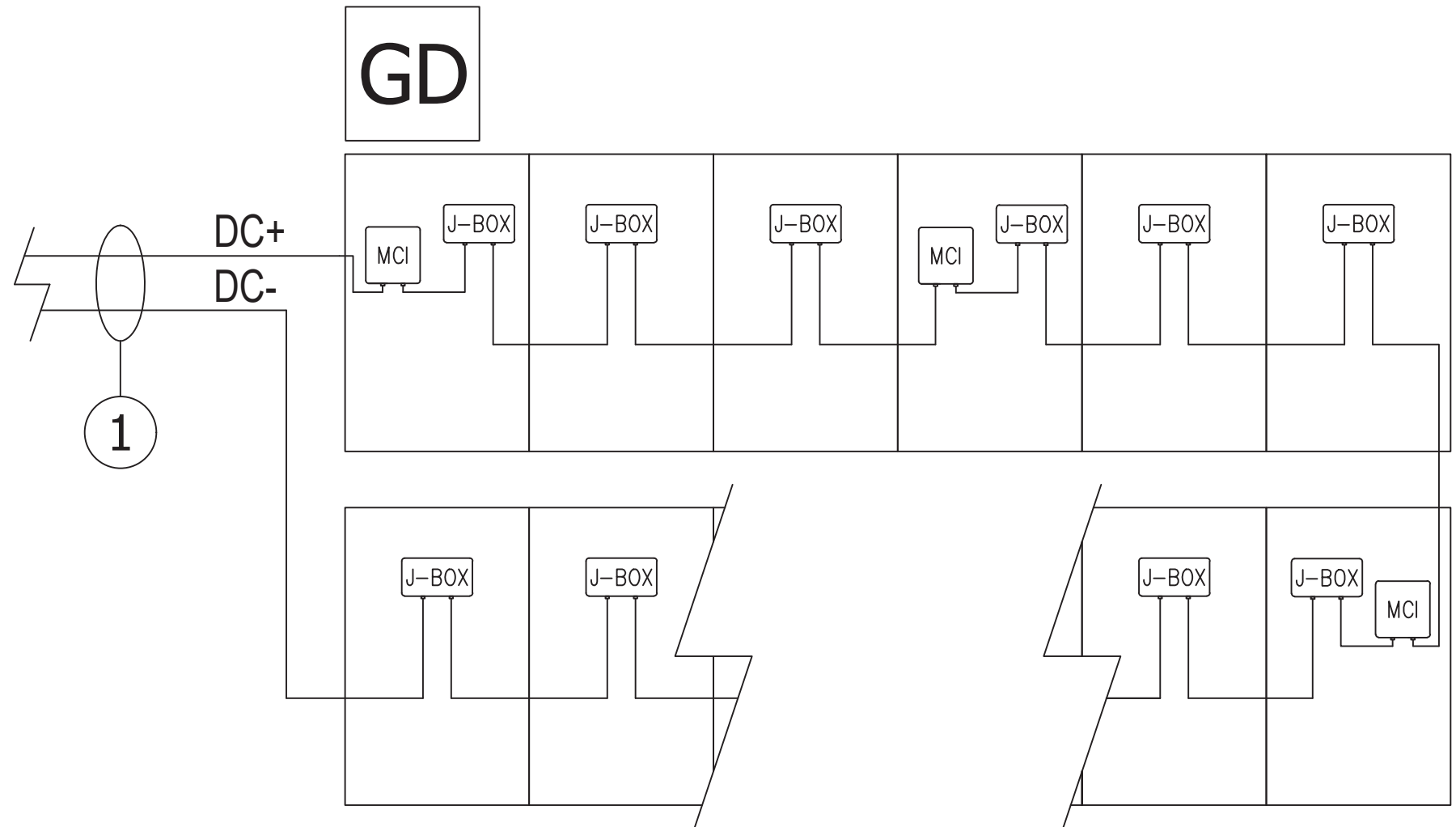
- DRAWING OF STANDARD MCI WIRING DETAIL FOR ANY GIVEN STRING LENGTH
- IF INITIATED, RAPID SHUTDOWN OCCURS WITHIN 30 SECONDS OF ACTIVATION AND LIMITS VOLTAGE ON THE ROOF TO NO GREATER THAN 165V (690.12.B.2.1)
- MID CIRCUIT INTERRUPTER (MCI) IS A UL 1741 PVRSE CERTIFIED RAPID SHUTDOWN DEVICE (RSD)

RETROFIT PV MODULES

- MCIS ARE LOCATED AT ROOF LEVEL, JUST UNDER THE PV MODULES IN ACCORDANCE WITH 690.12 REQUIREMENTS
- THE QUANTITY OF MCIS PER STRING IS DETERMINED BY STRING LENGTH
 - NUMBER OF MODULES BETWEEN MCI UNITS = 0-3
 - MAXIMUM NUMBER OF MODULES PER MCI UNIT = 3
 - MINIMUM NUMBER MCI UNITS = MODULE COUNT/3

*Exception: Tesla (Longi) modules installed in locations where the max Voc for 3 modules at low design temperature exceeds 165V shall be limited to 2 modules between MCIs.

PLEASE REFER TO MCI CUTSHEET AND PVRSA INSERT FOR MORE INFORMATION



① (2)AWG, PV Wire, 600V, Black

DC

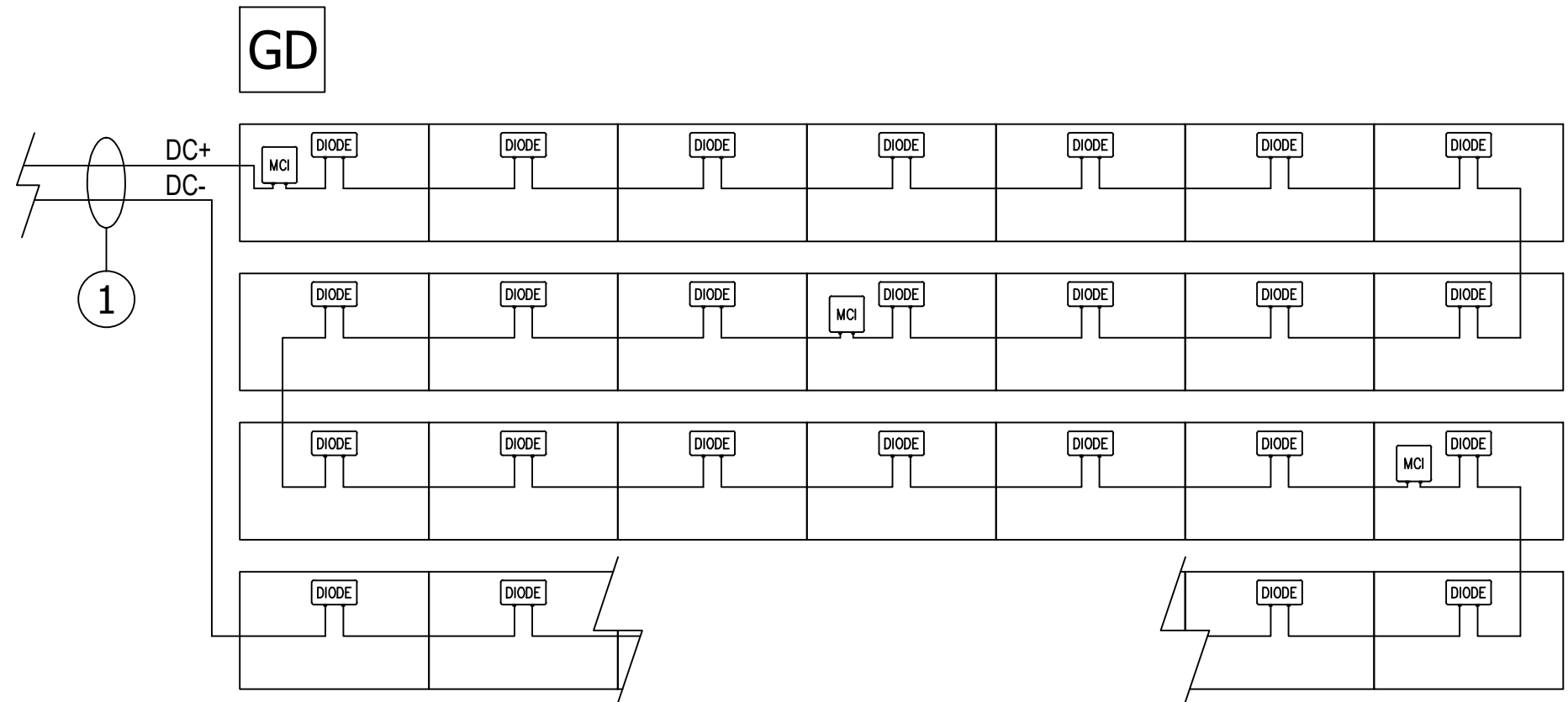
MCI WIRING DETAIL

GENERAL NOTES

- DRAWING OF STANDARD MCI WIRING DETAIL FOR ANY GIVEN STRING LENGTH
- IF INITIATED, RAPID SHUTDOWN OCCURS WITHIN 30 SECONDS OF ACTIVATION AND LIMITS VOLTAGE ON THE ROOF TO NO GREATER THAN 165V (690.12.B.2.1)
- MID CIRCUIT INTERRUPTER (MCI) IS A UL 1741 PVRSE CERTIFIED RAPID SHUTDOWN DEVICE (RSD)

SOLAR ROOF TILES

- MCIS ARE LOCATED AT DECK LEVEL, JUST UNDER THE TILES IN ACCORDANCE WITH 690.12 REQUIREMENTS
- THE QUANTITY OF MCIS PER STRING IS DETERMINED BY STRING LENGTH
 - NUMBER OF TILES BETWEEN MCI UNITS = 0-10
 - MAXIMUM NUMBER OF TILES PER MCI UNIT = 10
 - MINIMUM NUMBER MCI UNITS = TILE COUNT/10



PLEASE REFER TO MCI CUTSHEET AND PVRSA INSERT FOR MORE INFORMATION

① (2)AWG, PV Wire, 600V, Black

DC

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	200A, 120/240V Split phase
Short Circuit Current Rating	22 kA with breaker ¹
Communication	CAN
Product Compatibility	Powerwall 2 with Backup Gateway 2, Powerwall+
Expected Service Life	21 years
Warranty	10 years

¹ Breaker size must be equal to or greater than the available fault current.

COMPLIANCE INFORMATION

Safety Standards	USA: UL 414, UL 2735, UL 916 CA Prop 65
Emissions	FCC, ICES

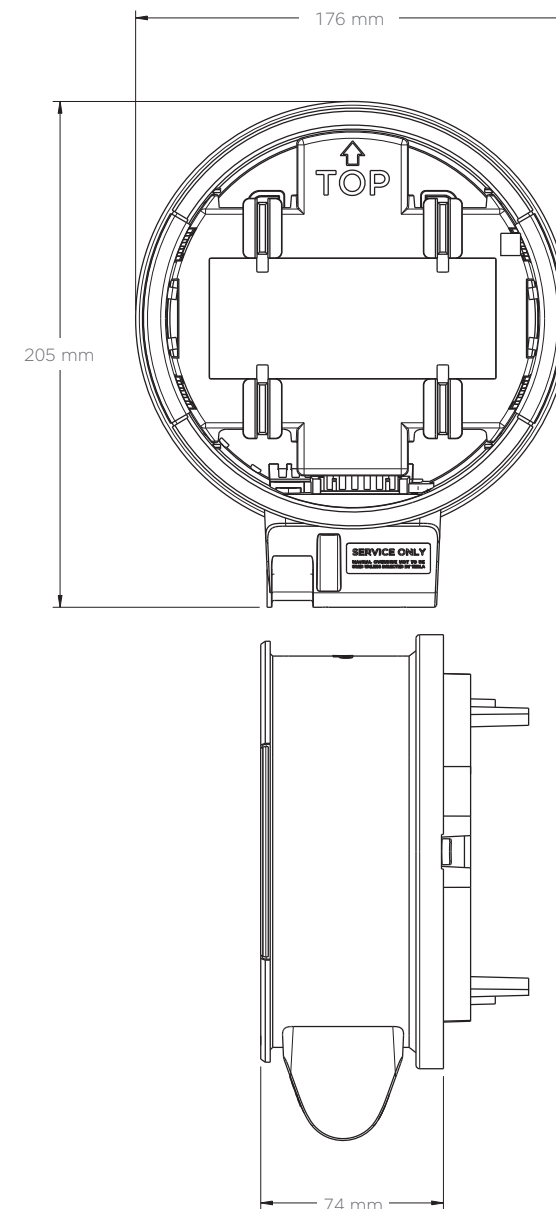
ENVIRONMENTAL SPECIFICATIONS

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

MECHANICAL SPECIFICATIONS

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

² Manually overrides the contactor position during a service event.





POWERWALL+

Powerwall+ is an integrated solar battery system that stores energy from solar production. Powerwall+ has two separate inverters, one for battery and one for solar, that are optimized to work together. Its integrated design and streamlined installation allow for simple connection to any home, and improved surge power capability brings whole home backup in a smaller package. Smart system controls enable owners to customize system behavior to suit their renewable energy needs.

KEY FEATURES

- Integrated battery, inverter, and system controller for a more compact install
- A suite of application modes, including self-powered, time-based control, and backup modes
- Wi-Fi, Ethernet, and LTE connectivity with easy over-the-air updates

NA 2023-01-09

POWERWALL+

PHOTOVOLTAIC (PV) AND BATTERY ENERGY STORAGE SYSTEM (BESS) SPECIFICATIONS

Powerwall+ Model Number	1850000-xx-y
Solar Assembly Model Number	1538000-xx-y
Nominal Battery Energy	13.5 kWh ¹
Nominal Grid Voltage (Input / Output)	120/240 VAC
Grid Voltage Range	211.2 - 264 VAC
Frequency	60 Hz
Phase	240 VAC: 2W+N+GND
Maximum Continuous Power On-Grid	7.6 kVA full sun / 5.8 kVA no sun ¹
Maximum Continuous Power Off-Grid	9.6 kW full sun / 7 kW no sun ¹
Peak Off-Grid Power (10 s)	22 kW full sun / 10 kW no sun ¹
Maximum Continuous Current On-Grid	32 A output
Maximum Continuous Current Off-Grid	40 A output
Load Start Capability	98 - 118 A LRA ²
PV Maximum Input Voltage	600 VDC
PV DC Input Voltage Range	60 - 550 VDC
PV DC MPPT Voltage Range	60 - 480 VDC
MPPTs	4
Input Connectors per MPPT	1-2-1-2
Maximum Current per MPPT (I_{mp})	13 A ³
Maximum Short Circuit Current per MPPT (I_{sc})	17 A ³
Allowable DC/AC Ratio	1.7
Overcurrent Protection Device	50 A breaker
Maximum Supply Fault Current	10 kA
Output Power Factor Rating	+/- 0.9 to 1 ⁴
Round Trip Efficiency	90% ^{1,5}
Solar Generation CEC Efficiency	97.5% at 208 V 98.0% at 240 V
Customer Interface	Tesla Mobile App
Internet Connectivity	Wi-Fi, Ethernet, Cellular LTE/4G ⁶
PV AC Metering	Revenue grade (+/-0.5%)
Protections	Integrated arc fault circuit interrupter (AFCI), PV Rapid Shutdown
Warranty	10 years

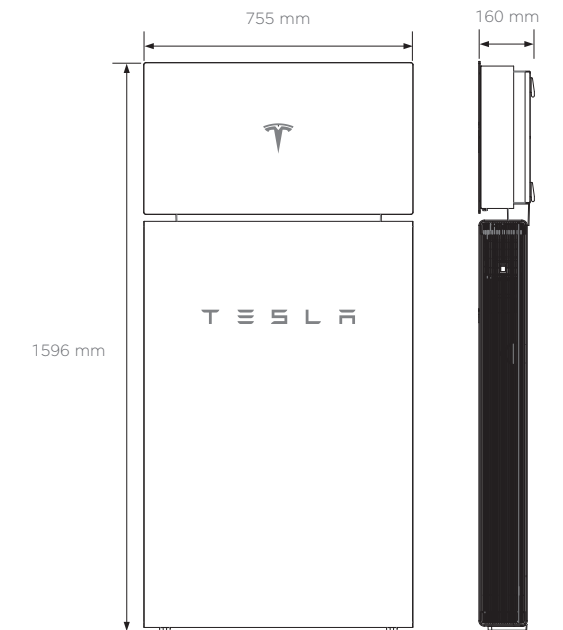
COMPLIANCE INFORMATION

PV Certifications	UL 1699B, UL 1741, UL 3741, UL 1741 SA, UL 1741 SB, UL 1998 (US), IEEE 1547, IEEE 1547.1
Battery Energy Storage System Certifications	UL 1642, UL 1741, UL 1741 PCS, UL 1741 SA, UL 1741 SB, UL 1973, UL 9540, IEEE 1547, 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)

TESLA

MECHANICAL SPECIFICATIONS

Dimensions	1596 x 755 x 160 mm (62.8 x 29.7 x 6.3 in)
Total Weight	140 kg (310 lb) ⁷
Battery Assembly	118 kg (261 lb)
Solar Assembly	22 kg (49 lb)
Mounting options	Floor or wall mount



ENVIRONMENTAL SPECIFICATIONS

Operating Temperature	-20°C to 50°C (-4°F to 122°F) ⁸
Recommended Temperature	0°C to 30°C (32°F to 86°F)
Operating Humidity (RH)	Up to 100%, condensing
Storage Conditions	-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 Type	Type 3R
Solar Assembly Ingress Rating	IP55 (Wiring Compartment)
Battery Assembly Ingress Rating	IP56 (Wiring Compartment) IP67 (Battery & Power Electronics)
Noise Level @ 1 m	< 40 db(A) optimal, < 50 db(A) maximum

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

²Load start capability may vary.

³Where the DC input current exceeds an MPPT rating, jumpers can be used to allow a single MPPT to intake additional DC current up to 26 A I_{mp} / 34 A I_{sc} .

⁴Power factor rating at max real power.

⁵AC to battery to AC, at beginning of life.

⁶Cellular connectivity subject to network service coverage and signal strength.

⁷The total weight does not include the Powerwall+ bracket, which weighs an additional 9 kg (20 lb).

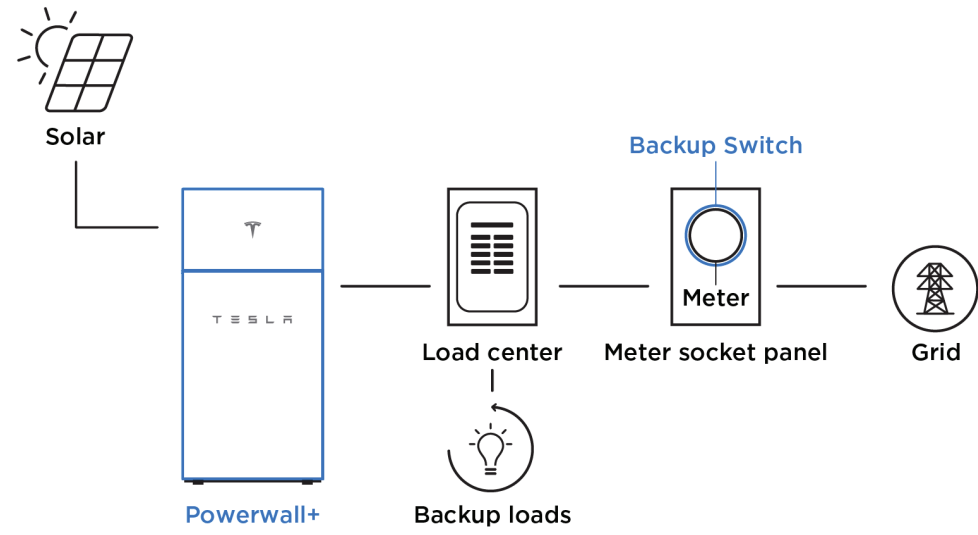
⁸Performance may be de-rated at operating temperatures below 10°C (50°F) or greater than 43°C (109°F).

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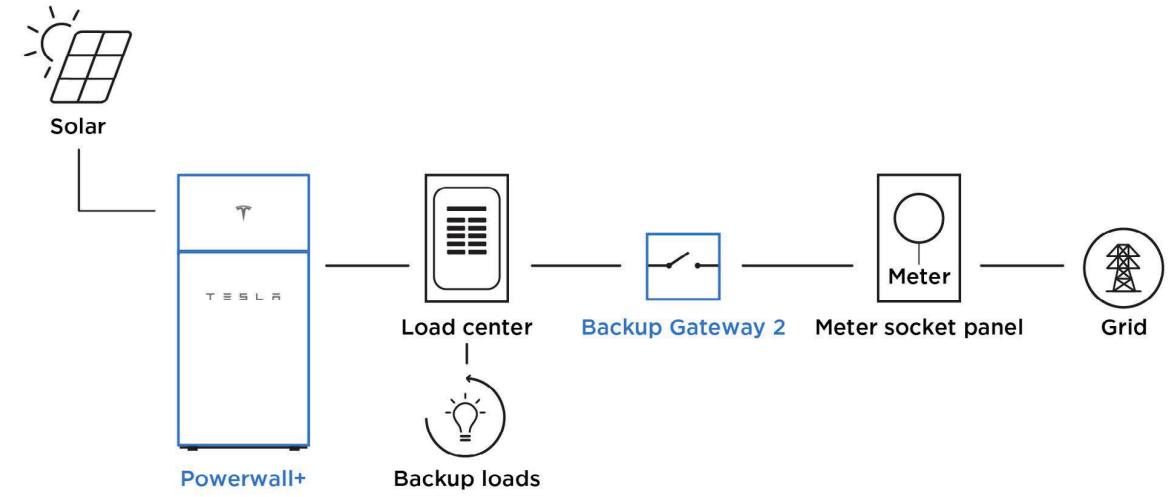
TESLA.COM/ENERGY

SYSTEM LAYOUTS

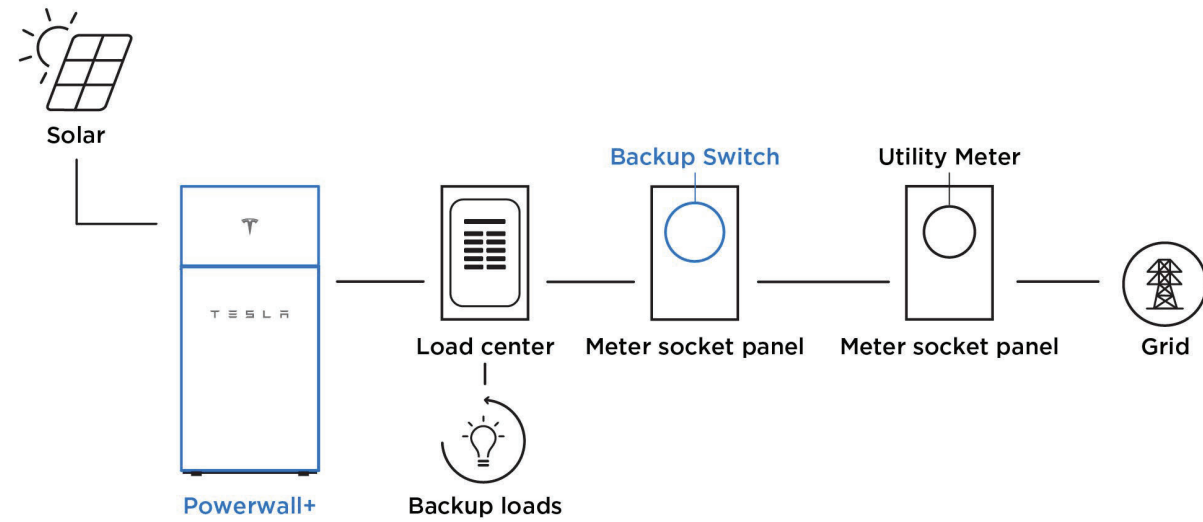
Powerwall+ with Backup Switch Installed Behind Utility Meter



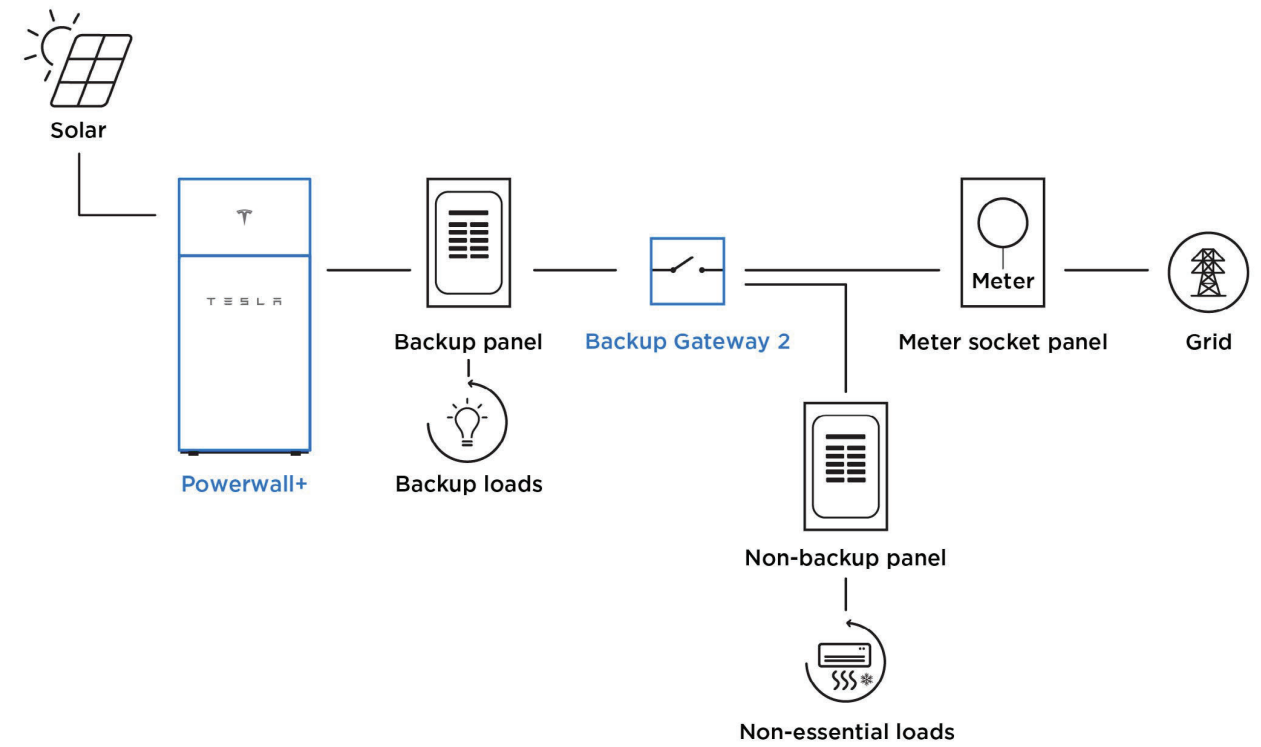
Powerwall+ with Backup Gateway 2 for Whole Home Backup



Powerwall+ with Backup Switch Installed Downstream of Utility Meter



Powerwall+ with Backup Gateway 2 for Partial Home Backup



Q.PEAK DUO BLK ML-G10.a+/TS

385-405

ENDURING HIGH PERFORMANCE



BREAKING THE 20% EFFICIENCY BARRIER

Q.ANTUM DUO Z Technology with zero gap cell layout boosts module efficiency up to 20.7%.



THE MOST THOROUGH TESTING PROGRAMME IN THE INDUSTRY

Q CELLS is the first solar module manufacturer to pass the most comprehensive quality programme in the industry: The new "Quality Controlled PV" of the independent certification institute TÜV Rheinland.



INNOVATIVE ALL-WEATHER TECHNOLOGY

Optimal yields, whatever the weather with excellent low-light and temperature behavior.



ENDURING HIGH PERFORMANCE

Long-term yield security with Anti LID Technology, Anti PID Technology¹, Hot-Spot Protect and Traceable Quality Tra.Q™.



ZEP COMPATIBLE™ FRAME DESIGN

High-tech black Zep Compatible™ frame, for improved aesthetics, easy installation and increased safety.



A RELIABLE INVESTMENT

Inclusive 25-year product warranty and 25-year linear performance warranty².

¹ APT test conditions according to IEC/TS 62804-1:2015, method A (-1500V, 96h)

² See data sheet on rear for further information.

THE IDEAL SOLUTION FOR:

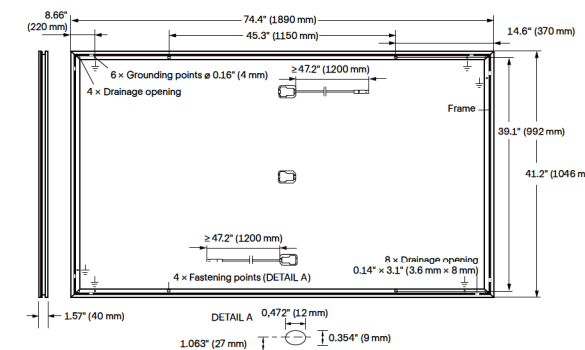


Rooftop arrays on residential buildings



Rooftop arrays on commercial/industrial buildings

MECHANICAL SPECIFICATION	
Format	74.4 in × 41.2 in × 1.57 in (including frame) (1890 mm × 1046 mm × 40 mm)
Weight	51.8 lbs (23.5 kg)
Front Cover	0.13 in (3.2 mm) thermally pre-stressed glass with anti-reflection technology
Back Cover	Composite film
Frame	Black anodized aluminum
Cell	6 × 22 monocrystalline Q.ANTUM solar half cells
Junction Box	2.09-3.98 in × 1.26-2.36 in × 0.59-0.71 in (53-101 mm × 32-60 mm × 15-18 mm), IP67, with bypass diodes
Cable	4 mm ² Solar cable; (+) ≥ 47.2 in (L2000 mm), (-) ≥ 47.2 in (L2000 mm)
Connector	Stäubli MC4; IP68



ELECTRICAL CHARACTERISTICS		385	390	395	400	405	
MINIMUM PERFORMANCE AT STANDARD TEST CONDITIONS, STC ¹ (POWER TOLERANCE +5 W / -0 W)							
Minimum	Power at MPP ¹	P _{MPP} [W]	385	390	395	400	405
	Short Circuit Current ²	I _{SC} [A]	11.04	11.07	11.10	11.14	11.17
	Open Circuit Voltage ²	V _{OC} [V]	45.19	45.23	45.27	45.30	45.34
	Current at MPP	I _{MPP} [A]	10.59	10.65	10.71	10.77	10.83
	Voltage at MPP	V _{MPP} [V]	36.36	36.62	36.88	37.13	37.39
	Efficiency ³	η [%]	≥ 19.5	≥ 19.7	≥ 20.0	≥ 20.2	≥ 20.5
MINIMUM PERFORMANCE AT NORMAL OPERATING CONDITIONS, NMOT ²							
Minimum	Power at MPP	P _{MPP} [W]	288.8	292.6	296.3	300.1	303.8
	Short Circuit Current	I _{SC} [A]	8.90	8.92	8.95	8.97	9.00
	Open Circuit Voltage	V _{OC} [V]	42.62	42.65	42.69	42.72	42.76
	Current at MPP	I _{MPP} [A]	8.35	8.41	8.46	8.51	8.57
	Voltage at MPP	V _{MPP} [V]	34.59	34.81	35.03	35.25	35.46

¹ Measurement tolerances P_{MPP} ± 3%; I_{SC}; V_{OC} ± 5% at STC: 1000 W/m², 25 ± 2 °C, AM 1.5 according to IEC 60904-3 • *800 W/m², NMOT, spectrum AM 1.5

Q CELLS PERFORMANCE WARRANTY	PERFORMANCE AT LOW IRRADIANCE
<p>At least 98% of nominal power during first year. Thereafter max. 0.5% degradation per year. At least 93.5% of nominal power up to 10 years. At least 86% of nominal power up to 25 years.</p> <p>All data within measurement tolerances. Full warranties in accordance with the warranty terms of the Q CELLS sales organisation of your respective country.</p>	<p>Typical module performance under low irradiance conditions in comparison to STC conditions (25 °C, 1000 W/m²)</p>

TEMPERATURE COEFFICIENTS					
Temperature Coefficient of I _{SC}	α [%/K]	+0.04	Temperature Coefficient of V _{OC}	β [%/K]	-0.27
Temperature Coefficient of P _{MPP}	γ [%/K]	-0.34	Nominal Module Operating Temperature	NMOT [°F]	109 ± 5.4 (43 ± 3 °C)

PROPERTIES FOR SYSTEM DESIGN				
Maximum System Voltage V _{sys}	[V]	1000 (IEC)/1000 (UL)	PV module classification	Class II
Maximum Series Fuse Rating	[A DC]	20	Fire Rating based on ANSI / UL 61730	TYPE 2
Max. Design Load, Push / Pull ³	[lbs/ft ²]	85 (4080 Pa) / 85 (4080 Pa)	Permitted Module Temperature on Continuous Duty	-40 °F up to +185 °F (-40 °C up to +85 °C)
Max. Test Load, Push / Pull ³	[lbs/ft ²]	128 (6120 Pa) / 128 (6120 Pa)		

³ See Installation Manual

QUALIFICATIONS AND CERTIFICATES

UL 61730, CE-compliant, Quality Controlled PV - TÜV Rheinland; IEC 61215:2016, IEC 61730:2016, U.S. Patent No. 9,893,215 (solar cells)

Note: Installation instructions must be followed. See the installation and operating manual or contact our technical service department for further information on approved installation and use of this product.

Solar Shutdown Device 1 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+ or Tesla Solar Inverter, solar array shutdown is initiated by any loss of AC power.

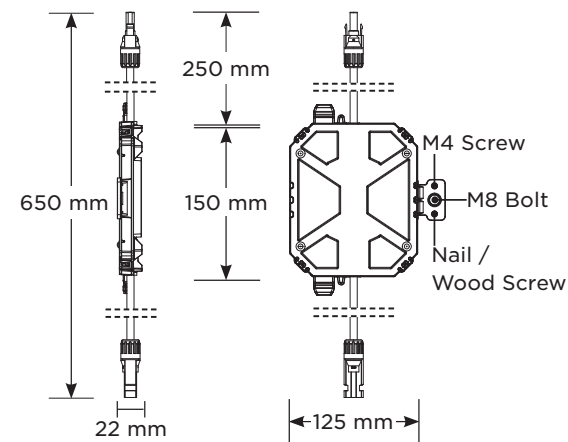
Electrical Specifications	Nominal Input DC Current Rating (I_{MP})	12 A
	Maximum Input Short Circuit Current (I_{SC})	19 A
	Maximum System Voltage (PVHCS)	600 V DC

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

Compliance Information	Certifications	UL 1741 PVRSE, UL 3741, PVRSA (Photovoltaic Rapid Shutdown Array)
	RSD Initiation Method	PV System AC Breaker or Switch
	Compatible Equipment	See Compatibility Table below

Mechanical Specifications	Model Number	MCI-1
	Electrical Connections	MC4 Connector
	Housing	Plastic
	Dimensions	125 mm x 150 mm x 22 mm (5 in x 6 in x 1 in)
	Weight	350 g (0.77 lb)
	Mounting Options	ZEP Home Run Clip
		M4 Screw (#10) M8 Bolt (5/16") Nail / Wood screw



UL 3741 PV Hazard Control (and PVRSA) Compatibility

Tesla Solar Roof and Tesla/Zep ZS Arrays using the following modules are certified to UL 3741 and UL 1741 PVRSA when installed with Powerwall+ or Tesla Solar Inverter and Solar Shutdown Devices. See [Powerwall+ / Tesla Solar Inverter Rapid Shutdown: Module Selection Based on PV Hazard Control System Listing](#) for guidance on installing other modules.

Brand	Model	Required Solar Shutdown Devices
Tesla	Solar Roof V3	1 Solar Shutdown Device per 10 modules
Tesla	Tesla TxxxS (where xxx = 405 to 450 W, increments of 5) Tesla TxxxH (where xxx = 395 to 415 W, increments of 5)	1 Solar Shutdown Device per 3 modules ¹
Hanwha	Q.PEAK DUO BLK-G5 or Q.PEAK DUO BLK-G6+	1 Solar Shutdown Device per 3 modules

¹ **Exception:** Tesla solar modules installed in locations where the max Voc for three modules at low design temperatures exceeds 165 V shall be limited to two modules between Solar Shutdown Devices.

PV HAZARD CONTROL SYSTEM | BIPV

UL 3741 REPORT DATE 01-27-23

PV RAPID SHUTDOWN ARRAY

WARNING: To reduce the risk of injury, read all instructions.

PV HAZARD CONTROL EQUIPMENT AND COMPONENTS

Function	Manufacturer	Model No.	Firmware Versions and Checksums	Certification Standard
PVRSE Mid Circuit Interrupter (MCI)	Tesla	MCI-1, MCI-2	N/A	UL 1741 PVRSE
Inverter, Powerwall+, or Powerwall 3	Tesla	7.6 kW: 1538000 ¹ 3.8 kW: 1534000 ¹ 7.6 kW: 1850000 ¹ 11.5 kW: 1707000 ¹	V4, CEA4F802 V4, FF7BE4E1 V4, CEA4F802 V1, 0x3282A1	UL 1741, 1998 PVRSS/PVRSE
PV Module	Tesla	SR60T1, SR72T1, SR72T2, SR72T3R	N/A	UL 61730
PVHCS Initiator (PV Inverter)	Dedicated PV system AC circuit breaker or AC disconnect switch, labeled per NEC 690.12 requirements.			N/A
PVHCS Initiator (Powerwall+, Powerwall 3)	Emergency stop device (NISD)- Listed "Emergency Stop Button" or "Emergency Stop Device" or "Emergency Stop Unit".			UL 508 or UL 60947 Parts 1, 5-1 and 5-5
PVHCS Initiator (Powerwall 3)	On/Off Enable switch located on Powerwall 3, when labeled as Rapid Shutdown initiator per NEC 690.12 requirements			UL 1741

¹ Applies to variations of this part number with suffix of two numbers and one letter.

Note: PVHCS installation requirements may reduce the effective equipment and component ratings below the individual equipment and component PVRSE ratings in order to achieve PVHCS shock hazard reduction requirements.

PVHCS INSTALLATION REQUIREMENTS

Max System Voltage	600 Vdc
PVHCS Maximum Circuit Voltage (Array Internal Voltage After Actuation)	165 Vdc (cold weather open circuit)
Max Series-Connected Panels Between MCIs:	10

OTHER INSTALLATION INSTRUCTIONS

1. An MCI must be connected to one end of each series string or mounting plane sub-array string.
2. Verification that MCIs are installed with 10 or fewer modules between MCIs shall be documented for inspection, by voltage measurement logs and/or as-built string layout diagrams.
3. For PV Inverter: The PVHCS initiator (AC breaker or switch) shall be sized and installed in accordance with NEC requirements. The specific part shall be identified on the as-built system drawings.
4. For Powerwall+ or Powerwall 3: The PVHCS emergency stop initiator shall have the following minimum ratings: Outdoor (Type 3R or higher), 12V, 1A, and shall be installed in accordance with NEC requirements. The specific part shall be identified on the as-built system drawings. Refer to the Powerwall installation manual for further details.

PV HAZARD CONTROL SYSTEM | ZS PVHCS

UL 3741 REPORT DATE 01-27-23

PV RAPID SHUTDOWN ARRAY

WARNING: To reduce the risk of injury, read all instructions.

PV HAZARD CONTROL EQUIPMENT AND COMPONENTS

Function	Manufacturer	Model No.	Firmware Versions and Checksums	Certification Standard
PVRSE Mid Circuit Interrupter (MCI)	Tesla	MCI-1, MCI-2	N/A	UL 1741 PVRSE
Inverter, Powerwall+, or Powerwall 3	Tesla	7.6 kW: 1538000 ¹ 3.8 kW: 1534000 ¹ 7.6 kW: 1850000 ¹ 11.5 kW: 1707000 ¹	V4, CEA4F802 V4, FF7BE4E1 V4, CEA4F802 V1, 0x3282A1	UL 1741, 1998 PVRSS/PVRSE
PV Module	Hanwha/ Q-CELLS Tesla	Q.PEAK DUO BLK-G5/SC310-320 Q.PEAK DUO BLK G6+/SC330-345 Tesla TxxxS (xxx = 405 to 450) Tesla TxxxH (xxx = 395 to 415)	N/A	UL 1703 UL 61730
PVHCS Initiator (PV Inverter)	Dedicated PV system AC circuit breaker or AC disconnect switch, labeled per NEC 690.12 requirements.			N/A
PVHCS Initiator (Powerwall+, Powerwall 3)	Emergency stop device (NISD)- Listed "Emergency Stop Button" or "Emergency Stop Device" or "Emergency Stop Unit".			UL 508 or UL 60947 Parts 1, 5-1 and 5-5
PVHCS Initiator (Powerwall 3)	On/Off Enable switch located on Powerwall 3, when labeled as Rapid Shutdown initiator per NEC 690.12 requirements			UL 1741

¹ Applies to variations of this part number with suffix of two numbers and one letter.

Note: PVHCS installation requirements may reduce the effective equipment and component ratings below the individual equipment and component PVRSE ratings in order to achieve PVHCS shock hazard reduction requirements.

PVHCS INSTALLATION REQUIREMENTS

Max System Voltage	600 Vdc
PVHCS Maximum Circuit Voltage (Array Internal Voltage After Actuation)	165 Vdc (cold weather open circuit)
Max Series-Connected Modules Between MCIs: *Exception: Tesla S-Series (TxxxS) modules installed in locations where the max VOC for 3 modules at low design temperature exceeds 165V shall be limited to 2 modules between MCIs.	3*

OTHER INSTALLATION INSTRUCTIONS

1. An MCI must be connected to one end of each series string or mounting plane sub-array string.
2. Verification that MCIs are installed with 3 or fewer modules between MCIs shall be documented for inspection, by voltage measurement logs and/or as-built string layout diagrams.
3. For PV Inverter: The PVHCS initiator (AC breaker or switch) shall be sized and installed in accordance with NEC requirements. The specific part shall be identified on the as-built system drawings.
4. For Powerwall+ or Powerwall 3: The PVHCS emergency stop initiator shall have the following minimum ratings: Outdoor (Type 3R or higher), 12V, 1A, and shall be installed in accordance with NEC requirements. The specific part shall be identified on the as-built system drawings. Refer to the Powerwall installation manual for further details.