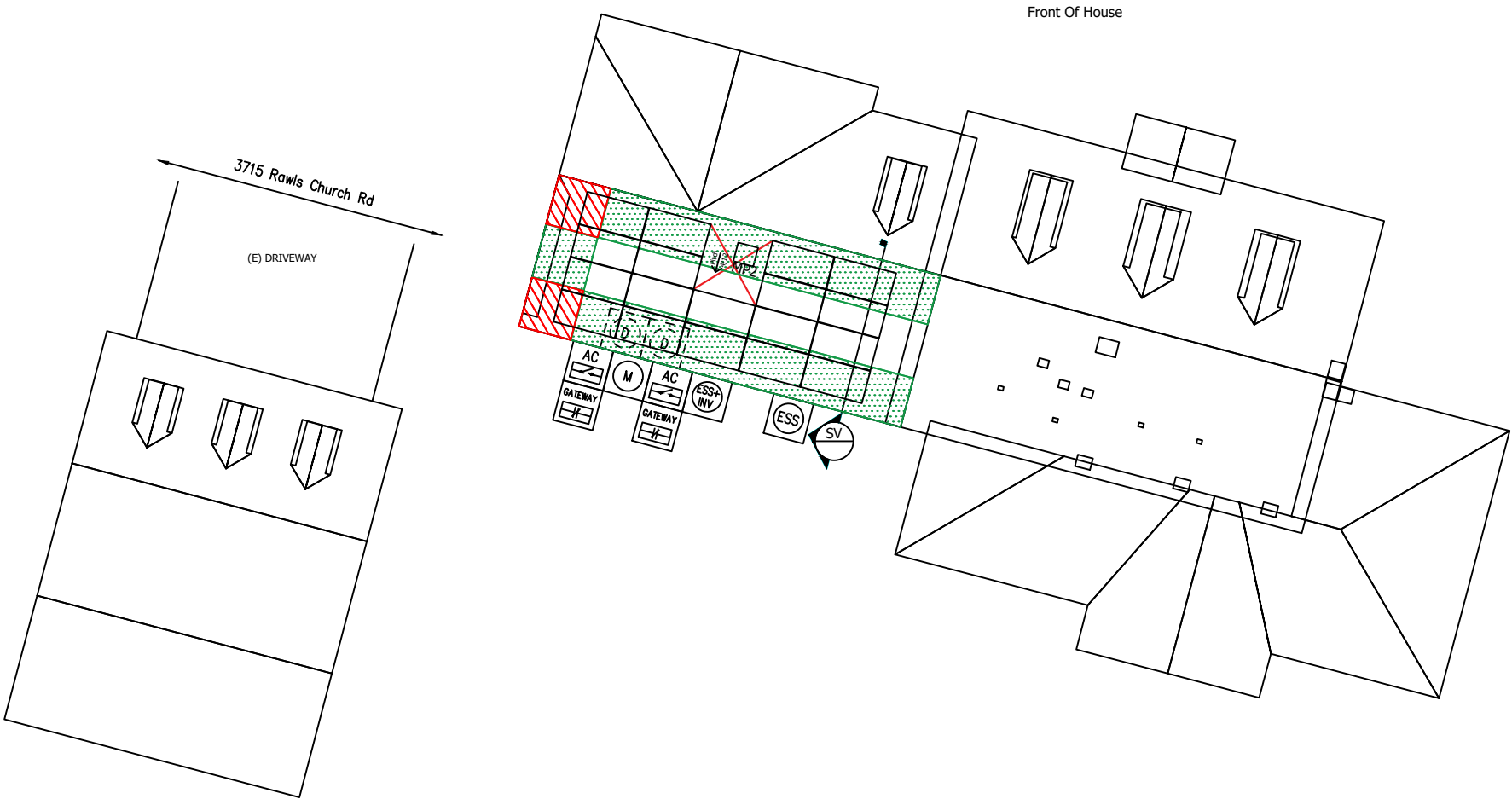


ABBREVIATIONS A AMPERE AC ALTERNATING CURRENT BLDG BUILDING CONC CONCRETE DC DIRECT CURRENT EGC EQUIPMENT GROUNDING CONDUCTOR (E) EXISTING EMT ELECTRICAL METALLIC TUBING FSB FIRE SET-BACK GALV GALVANIZED GEC GROUNDING ELECTRODE CONDUCTOR GND GROUND HDG HOT DIPPED GALVANIZED I CURRENT Imp CURRENT AT MAX 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		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 MULTI-WIRE 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		GENERAL NOTES 1. ALL WORK SHALL COMPLY WITH THE 2018 NORTH CAROLINA RESIDENTIAL CODE. 2. ALL ELECTRICAL WORK SHALL COMPLY WITH THE 2017 NATIONAL ELECTRIC CODE.		VICINITY MAP  Map data ©2025 Imagery ©2025 Airbus, Maxar Technologies		INDEX Sheet 1COVER SHEET Sheet 2SITE PLAN Sheet 3STRUCTURAL VIEWS Sheet 4UPLIFT CALCULATIONS Sheet 5THREE LINE DIAGRAM Sheet 6THREE LINE DIAGRAM Cutsheets Attached <table><tr><th>REV</th><th>BY</th><th>DATE</th><th>COMMENTS</th></tr><tr><td>REV A</td><td>GJG</td><td>8/27/2025</td><td>AHJ updated , Snow load updated</td></tr><tr><td>*</td><td>*</td><td>*</td><td>*</td></tr><tr><td>*</td><td>*</td><td>*</td><td>*</td></tr><tr><td>*</td><td>*</td><td>*</td><td>*</td></tr><tr><td>*</td><td>*</td><td>*</td><td>*</td></tr></table>		REV	BY	DATE	COMMENTS	REV A	GJG	8/27/2025	AHJ updated , Snow load updated	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
REV	BY	DATE	COMMENTS																												
REV A	GJG	8/27/2025	AHJ updated , Snow load updated																												
*	*	*	*																												
*	*	*	*																												
*	*	*	*																												
*	*	*	*																												
MODULE GROUNDING METHOD: ZEP SOLAR AHJ: Harnett County UTILITY: Duke Energy Progress (NC) 		JOB NUMBER: JB-2752828 00 MOUNTING SYSTEM: ZS Comp V4 w Flashing-Insert MODULES: (18) Hanwha Q Cells Q.PEAK DUO BLK ML-G10+/TS 410 INVERTER: Tesla Powerwall 3 [240V] # 1707000-XX-Y 5.8 kW / 13.5 kWh		CUSTOMER: Nick Lucchesi 3715 Rawls Church Rd Fuquay-Varina, NC 27526 5164559725 DESCRIPTION: 7.38 KW PV ARRAY 5.8 KW (AC NAMEPLATE) PV ARRAY 27 KWH ENERGY STORAGE SYSTEM PAGE NAME: COVER SHEET		DESIGN: gjimenezgomez SHEET: 1 REV: A DATE: 8/27/2025 																									

PV ARRAY DEAD LOAD = 3 LBS/SF

HATCHING INDICATES WIND PRESSURE ZONES. SEE THE STANDOFF SPACING AND LAYOUT TABLE FOR MORE INFORMATION.



Yong Heng Zhu
NORTH CAROLINA
PROFESSIONAL
SEAL
051417
ENGINEER
YONG HENG ZHU
Structural Only
NC Firm D-0427
Digitally signed by
Henry Zhu
Date: 2025-08-28
11:21:23 -07:00

MP2 PITCH: 18° (4:12) ARRAY PITCH: 18° (4:12)
AZIMUTH: 195 ARRAY AZIMUTH: 195
MATERIAL: COMP SHINGLE STORY: 2 STORIES

LEGEND

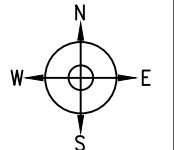
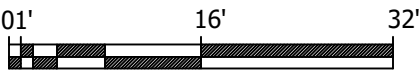
- (M) (E) UTILITY SERVICE METER
- (D) DISTRIBUTION PANEL
- AC AC DISCONNECT
- GATEWAY GATEWAY
- ESS ENERGY STORAGE SYSTEM
- ESS+INV ENERGY STORAGE SYSTEM W/ SOLAR INVERTER

WARNING LABELS PROVIDED AT APPLICABLE EQUIPMENT

- STANDOFF LOCATIONS
- CONDUIT RUN
- GATE/FENCE
- HEAT PRODUCING VENTS ARE RED
- INTERIOR EQUIPMENT / CONDUIT IS DASHED

SITE PLAN

Scale: 1/16" = 1'



TOTAL ARRAY AREA (SF): 390
TOTAL ROOF AREA (SF): 4474
TOTAL ARRAY AREA IS $\approx$ 8.72
PERCENT OF TOTAL ROOF AREA

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JOB NUMBER: JB-2752828 00
MOUNTING SYSTEM:
ZS Comp V4 w Flashing-Insert
MODULES:
(18) Hanwha Q Cells Q.PEAK DUO BLK ML-G10+/TS 410
INVERTER:
Tesla Powerwall 3 [240V] # 1707000-XX-Y 5.8 kW / 13.5 kWh

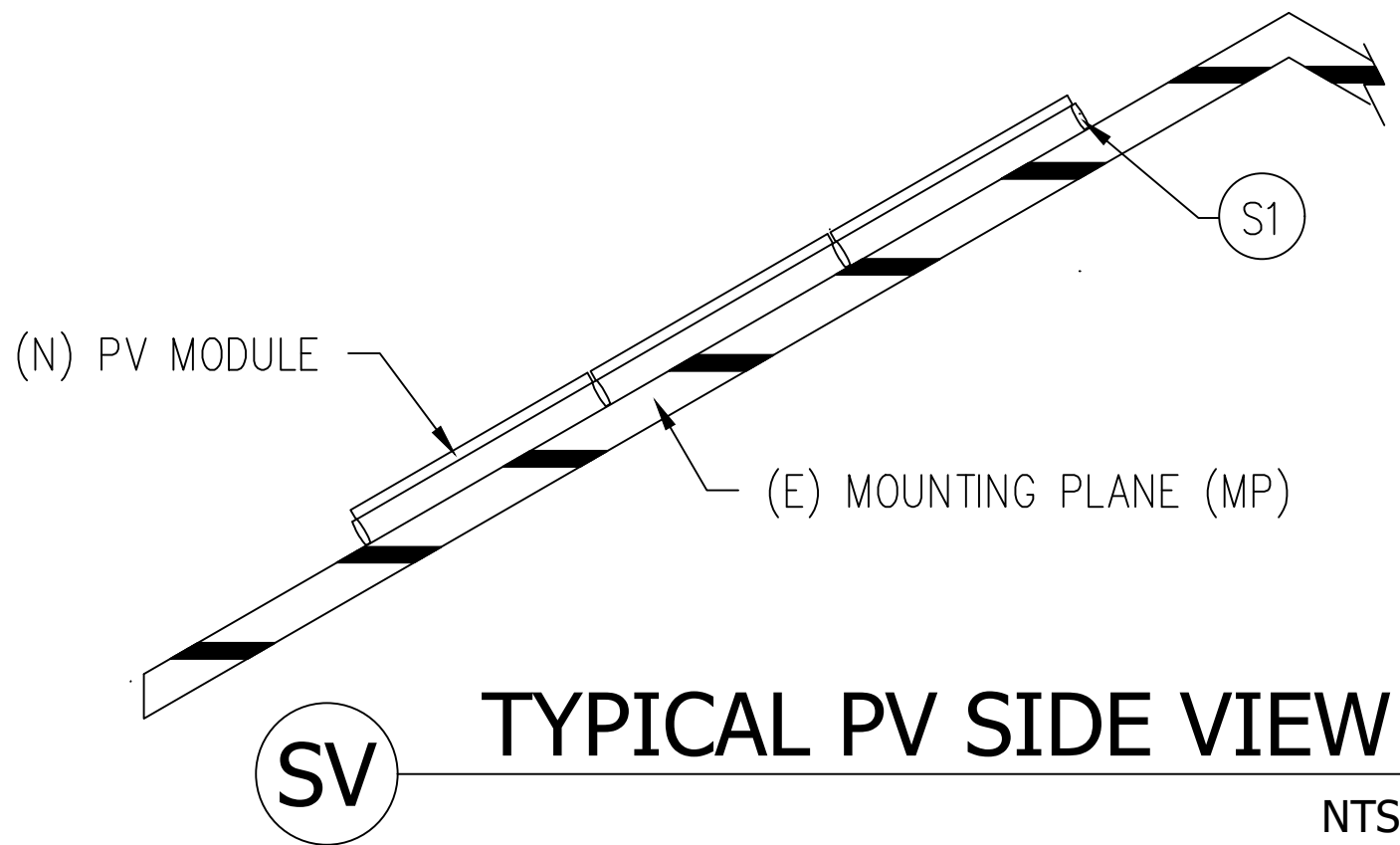
CUSTOMER:
Nick Lucchesi
3715 Rawls Church Rd
Fuquay-Varina, NC 27526
5164559725

DESCRIPTION:
7.38 KW PV ARRAY
5.8 KW (AC NAMEPLATE) PV ARRAY
27 KWH ENERGY STORAGE SYSTEM
PAGE NAME:
SITE PLAN

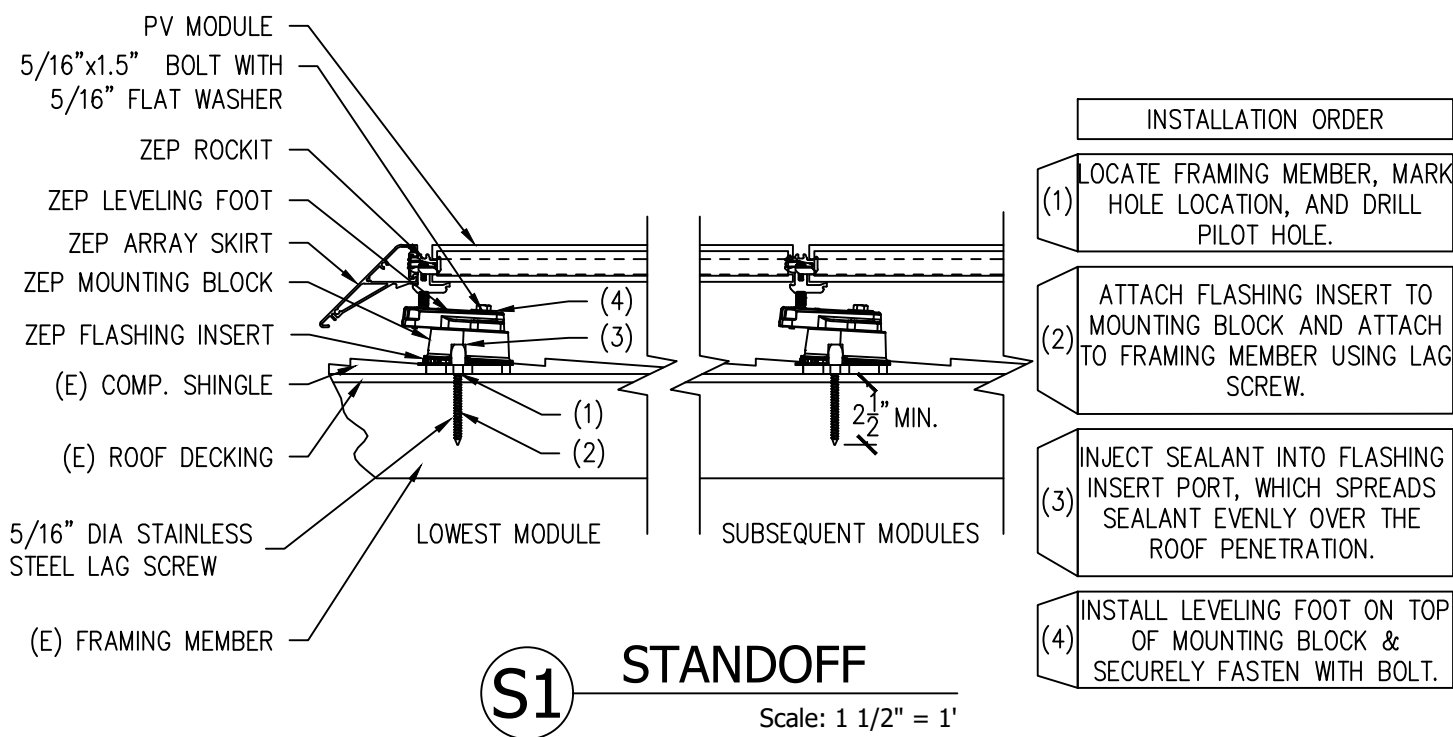
DESIGN:
gjimenezgomez

SHEET: 2
REV: A
DATE: 8/27/2025





Yong Heng Zhu
NORTH CAROLINA
PROFESSIONAL
SEAL
051417
ENGINEER
YONG HENG ZHU
Structural Only
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Digitally signed by
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27 KWH ENERGY STORAGE SYSTEM
PAGE NAME:
STRUCTURAL VIEWS

DESIGN:
gjimenezgomez
SHEET: 3 REV: A DATE: 8/27/2025

TESLA

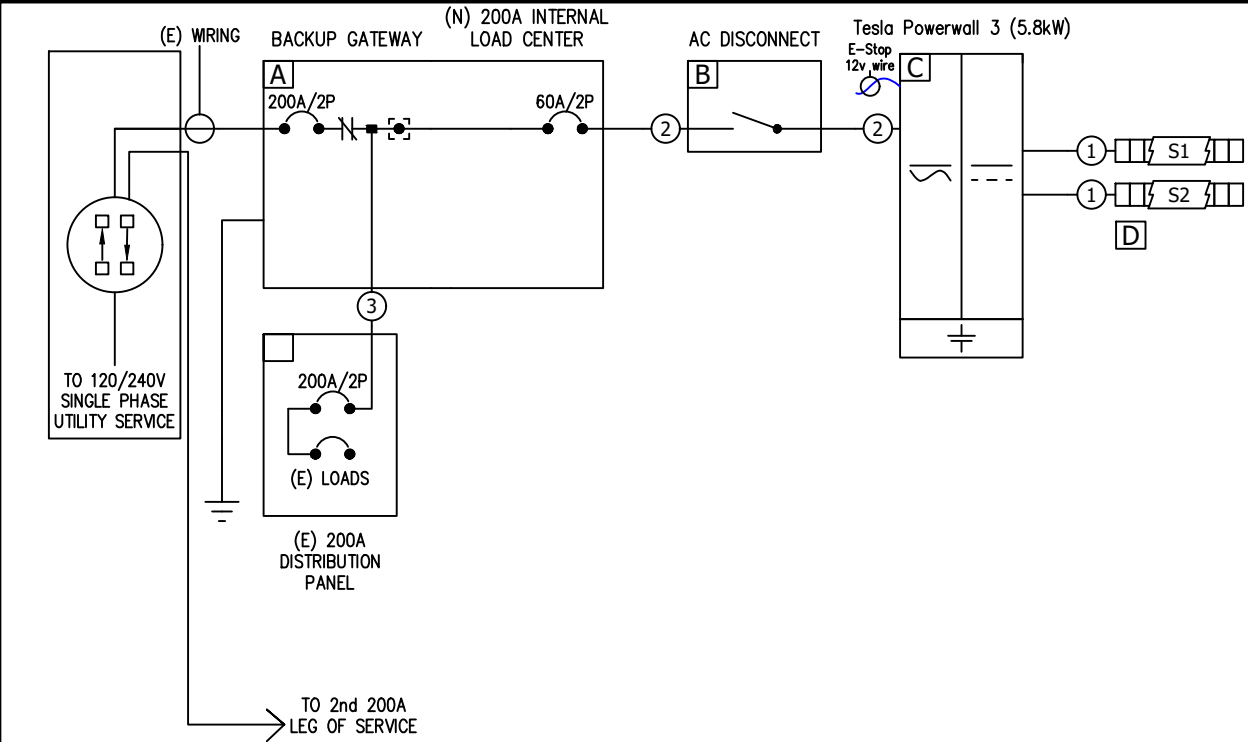


Structural Only
NC Firm D-0427
Digitally signed by
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Date: 2025-08-28
11:21:23 -07:00

a

Jobsite Specific Design Criteria			
Design Code		ASCE 7-10	
Risk Category		II	Table 1.5-1
Ultimate Wind Speed	V-Ult	120	Fig. 1609A
Exposure Category		C	Section 26.7
Ground Snow Load	pg	20	Table 7-1

MP Specific Design Information	
MP Name	MP2
Roofing	Comp Shingle
Standoff	ZS Comp V4 w Flashing-Insert
Pitch	18
SL/RLL: PV	12.0
SL/RLL: Non-PV	20.0
Edge Zone Width	5.2 ft
Azimuth	195
Stories	2
Rafter Size/Spacing	2x6 @16" OC
CJ Size/Spacing	2x6 @16" OC
Standoff Spacing and Layout	
MP Name	MP2
Applied Wind Zones ₁	1
Wind Pressure	-16.34
Landscape X-Spacing	64
Landscape X-Cantilever	24
Landscape Y-Spacing	41
Landscape Y-Cantilever	-
Portrait X-Spacing	48
Portrait X-Cantilever	16
Portrait Y-Spacing	74
Portrait Y-Cantilever	-
Layout	Staggered
Applied Wind Zones ₁	2
Wind Pressure	-28.95
Landscape X-Spacing	48
Landscape X-Cantilever	20
Landscape Y-Spacing	41
Landscape Y-Cantilever	-
Portrait X-Spacing	32
Portrait X-Cantilever	11
Portrait Y-Spacing	74
Portrait Y-Cantilever	-
Layout	Staggered
Applied Wind Zones ₁	3
Wind Pressure	-45.29
Landscape X-Spacing	32
Landscape X-Cantilever	12
Landscape Y-Spacing	41
Landscape Y-Cantilever	-
Portrait X-Spacing	DQ
Portrait X-Cantilever	DQ
Portrait Y-Spacing	DQ
Portrait Y-Cantilever	DQ
Layout	Staggered
Notes: 1. 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. 2. Hatching in Applied Wind Zone rows corresponds to hatching on Site Plan.	



CONDUIT MATERIAL TYPE AND SIZE TO BE DETERMINED IN THE FIELD TO NEC 2017 STANDARDS.

BRANCH 1

Panel Limit feature for Powerwall unit(s) to be utilized
PCS Controlled Current Setting:
(Panel Rating * 0.8) = 160A
(200A Busbar)

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



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. GROUND NEUTRAL BOND TO BE COMPLETED IN SERVICE EQUIPMENT (A)
2. 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.
3. SOLAR SHUTDOWN DEVICE TO BE INSTALLED FOR SYSTEM RAPID SHUTDOWN (RSD) IN ACCORDANCE WITH ARTICLE 690 OF THE APPLICABLE NEC.
4. CONDUIT TYPE CAN CHANGE DUE TO SITE CONDITIONS AND WILL FOLLOW THE NEC REQUIREMENTS FOR THAT CONDUIT TYPE.

SITE SPECIFICATIONS		MODULE SPECIFICATIONS	
Main Panel Rating	(E) 2x200A	Hanwha Q Cells Q.PEAK DUO BLK ML-G10+/TS 410: PV Mod, 410W, 385.9PTC, ZEP, Blk Frm, Blk Backsht, MC4, 1kV	
Main Breaker Rating	(E) 2x200A		
General Notes	DC Ungrounded Inverters	Qty	18
Panel Number	No match	Voc	45.37
Meter Number	329626032	Vmp	37.64
Service Entrance	Underground	Isc and Imp are in the DC Conductor Table	

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JOB NUMBER: JB-2752828 00

MOUNTING SYSTEM: ZS Comp V4 w Flashing-Insert

MODULES: (18) Hanwha Q Cells Q.PEAK DUO BLK ML-G10+/TS 410

INVERTER: Tesla Powerwall 3 [240V] # 1707000-XX-Y 5.8 kW / 13.5 kWh

CUSTOMER: Nick Lucchesi
3715 Rawls Church Rd
Fuquay-Varina, NC 27526

5164559725

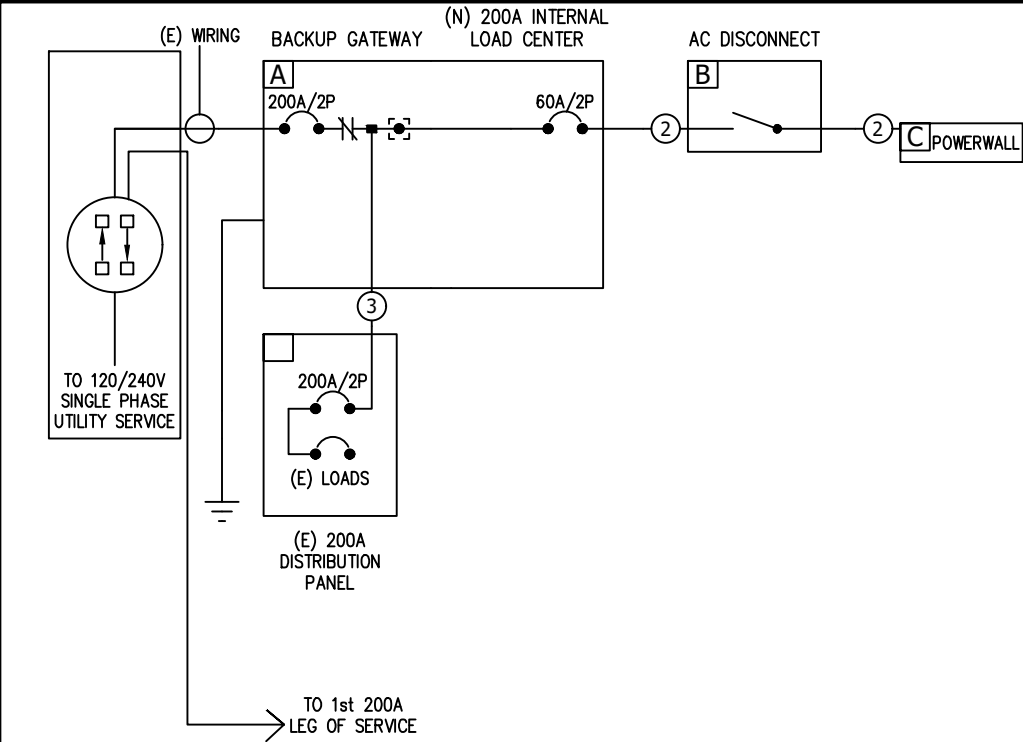
DESCRIPTION: 7.38 KW PV ARRAY
5.8 KW (AC NAMEPLATE) PV ARRAY
27 KWH ENERGY STORAGE SYSTEM

PAGE NAME: THREE LINE DIAGRAM

DESIGN: gjimenezgomez

SHEET: 5 REV: A DATE: 8/27/2025





CONDUIT MATERIAL TYPE AND SIZE TO BE DETERMINED IN THE FIELD TO NEC 2017 STANDARDS.

BRANCH 2

Panel Limit feature for Powerwall unit(s) to be utilized
PCS Controlled Current Setting:
(Panel Rating * 0.8) = 160A
(200A Busbar)

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

- 1. GROUND NEUTRAL BOND TO BE COMPLETED IN SERVICE EQUIPMENT (A)
- 2. 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.
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SITE SPECIFICATIONS		MODULE SPECIFICATIONS	
Main Panel Rating	(E) 2x200A	Hanwha Q Cells Q.PEAK DUO BLK ML-G10+/TS 410: PV Mod, 410W, 385.9PTC, ZEP, Blk Frm, Blk Backsht, MC4, 1kV	
Main Breaker Rating	(E) 2x200A		
General Notes	DC Ungrounded Inverters	Qty	18
		Voc	45.37
Panel Number	No match	Vmp	37.64
Meter Number	329626032	Isc and Imp are in the DC Conductor Table	
Service Entrance	Underground		

PARTS			DC CONDUCTOR TABLE										
Ref	Qty	Description	Ref	Type	Qty	Size (AWG, Cu)		EGC (AWG, Cu)		Conduit	Isc (ADC)	Imp (ADC)	
A	1	Breaker; 60A/2P, 2 Spaces	1	PV Wire	2	#10		#10		3/4" EMT	11.20	10.89	
	1	Eaton # CSR2200N: 200A MB ONLY; 2-Pole, 120V/240V, 25kAIC, Bolt On	AC CONDUCTOR TABLE										
	1	Tesla # 1841000-XX-Y: Back-up Gateway 3.0 NA for PW											
B	1	Disconnect; 60A, 240Vac, Non-Fusible, NEMA 3R: 2P, 2W, Lockable	Ref	Type	Qty	Size (AWG)		Min EGC (AWG, Cu)	Conduit		Length (ft)	Imp (AAC)	Vmp (VAC)
	1	Ground/Neutral Kit; 60-100A, General Duty (DG)				(Cu)	(Al)		(Cu)	(Al)			
C	1	Tesla Powerwall 3 [240V] # 1707000-XX-Y 11.5 kW / 13.5 kWh	2	THWN-2	3	#06	#04	#10	PVC Jacketed MC	1" EMT	5ft	48	240
D	7	ASY, MCI-2, 1000V	3	THWN-2	3	#2/0	#4/0	#06	2" PVC	2" PVC	2ft	—	240
E	1	UL 508 Emergency Stop Device – NEMA 4X											

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JOB NUMBER: JB-2752828 00

MOUNTING SYSTEM: ZS Comp V4 w Flashing-Insert

MODULES: (18) Hanwha Q Cells Q.PEAK DUO BLK ML-G10+/TS 410

INVERTER: Tesla Powerwall 3 [240V] # 1707000-XX-Y 5.8 kW / 13.5 kWh

CUSTOMER: Nick Lucchesi
3715 Rawls Church Rd
Fuquay-Varina, NC 27526

5164559725

DESCRIPTION: 7.38 KW PV ARRAY
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27 KWH ENERGY STORAGE SYSTEM

PAGE NAME: THREE LINE DIAGRAM

DESIGN: gjimenezgomez

SHEET: 6 REV: A DATE: 8/27/2025

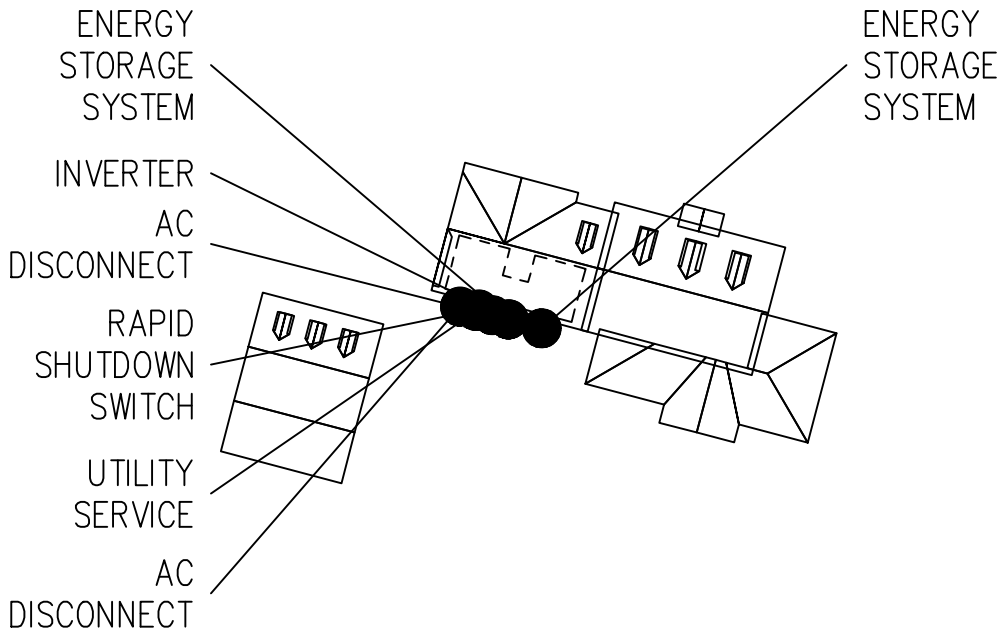
TESLA

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

CAUTION: MULTIPLE SOURCES OF POWER

- Address: 3715 Rawls Church Rd



OPERATING VOLTAGE = 240V

JB-2752828-00

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27 KWH ENERGY STORAGE SYSTEM

PAGE NAME:
SITE PLAN PLACARD

DESIGN:
gjimenezgomez

SHEET: 7 REV: A DATE: 8/27/2025

TESLA

WARNING: PHOTOVOLTAIC POWER SOURCE

Label Location:
(C)(CB)(JB)
Per Code:
NEC 690.31.G.3

DC PHOTOVOLTAIC
DISCONNECT

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

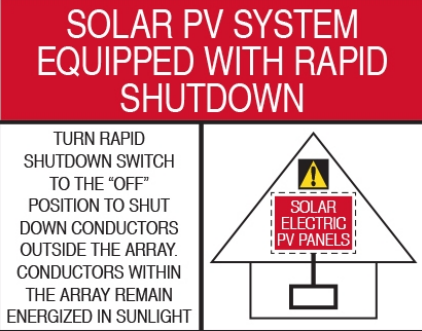
⚠ WARNING

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

Label Location:
(MSP)
Per Code:
NEC 705.12.B.2.3.C

MAXIMUM POWER-
POINT CURRENT (Imp) A
MAXIMUM POWER-
POINT VOLTAGE (Vmp) V
MAXIMUM SYSTEM
VOLTAGE (Voc) V
SHORT-CIRCUIT
CURRENT (Isc) A

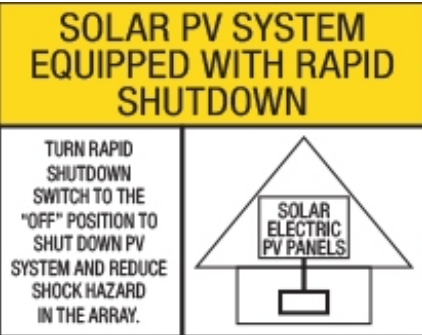
Label Location:
(DC) (INV)
Per Code:
NEC 690.53



Label Location:
ABB/Delta Solivia Inverter
Per Code:
690.56(C)(1)(b)

AC PHOTOVOLTAIC
DISCONNECT

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



Label Location:
SolarEdge and,Delta M-Series and,Telsa Inverter
Per Code:
690.56(C)(1)(a)

⚠ WARNING

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

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

⚠ WARNING

INVERTER OUTPUT
CONNECTION
DO NOT RELOCATE
THIS OVERCURRENT
DEVICE

Label Location:
(POI)
Per Code:
NEC 705.12.B.2.3.B

(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

CAUTION
DO NOT ADD NEW LOADS

Label Location:
(BLC)
Per Code:
220

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

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

CAUTION
DUAL POWER SOURCE
SECOND SOURCE IS
ENERGY STORAGE SYSTEM

Label Location:
(MSP)
Per Code:
705.12.B.3

ENERGY STORAGE SYSTEM ON SITE
LOCATED WITHIN LINE OF SIGHT

Label Location:
(MSP)
Per Code:
706.7.E

ENERGY STORAGE SYSTEM ON SITE
LOCATED ON ADJACENT WALL

Label Location:
(MSP)
Per Code:
706.7.E

ENERGY STORAGE SYSTEM ON SITE
LOCATED ON OPPOSITE WALL

Label Location:
(MSP)
Per Code:
706.7.E

ENERGY STORAGE SYSTEM ON SITE
LOCATED INSIDE

Label Location:
(MSP)
Per Code:
706.7.E

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

Label Location:
(MSP)
Per Code:
705.12.B.3

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.

Label Location:
(MSP)
Per Code:
705.12.B.2.3.c

NOMINAL ESS VOLTAGE: 120/240V
MAX AVAILABLE SHORT-
CIRCUIT FROM ESS: 32A
ARC FAULT CLEARING
TIME FROM ESS: 67ms
DATE OF
CALCULATION:

Label Location:
(MSP)
Per Code:
706.7.D (Label to be marked in field per code)

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

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

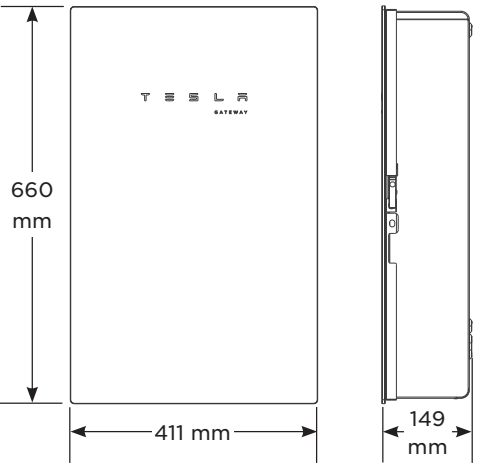
Operating Temperature	–20°C to 50°C (–4°F to 122°F)
Operating Humidity (RH)	Up to 100%, condensing
Maximum Elevation	3000 m (9843 ft)
Environment	Indoor and outdoor rated
Enclosure Type	NEMA 3R

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	16.4 kg (36 lb)
Mounting options	Wall mount



Q.PEAK DUO BLK ML-G10+ SERIES

385-415 Wp | 132 Cells
21.0% Maximum Module Efficiency

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



Breaking the 21 % efficiency barrier
Q.ANTUM DUO Z Technology with zero gap cell layout boosts module efficiency up to 21.0 %.



A reliable investment
Inclusive 25-year product warranty and 25-year linear performance warranty¹.



Enduring high performance
Long-term yield security with Anti LeTID Technology, Anti PID Technology² and Hot-Spot Protect.



Innovative all-weather technology
Optimal yields, whatever the weather with excellent low-light and temperature behaviour.



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



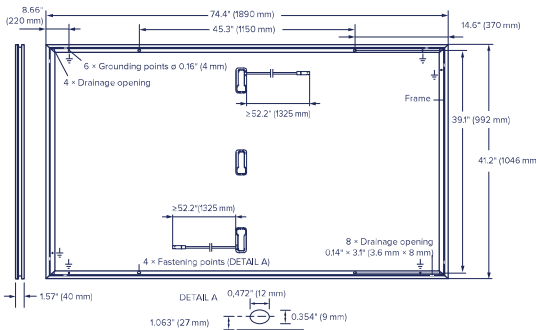
The most thorough testing programme in the industry
Qcells is the first solar module manufacturer to pass the most comprehensive quality programme in the industry: The new “Quality Controlled PV” of the independent certification institute TÜV Rheinland.

¹ See data sheet on rear for further information.
² APT test conditions according to IEC / TS 62804-1:2015, method A (–1500V, 96 h)

Q.PEAK DUO BLK ML-G10+ SERIES

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 anodised aluminium
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; (+) ≥ 52.2 in (1325 mm), (–) ≥ 52.2 in (1325 mm)
Connector	Stäubli MC4; IP68

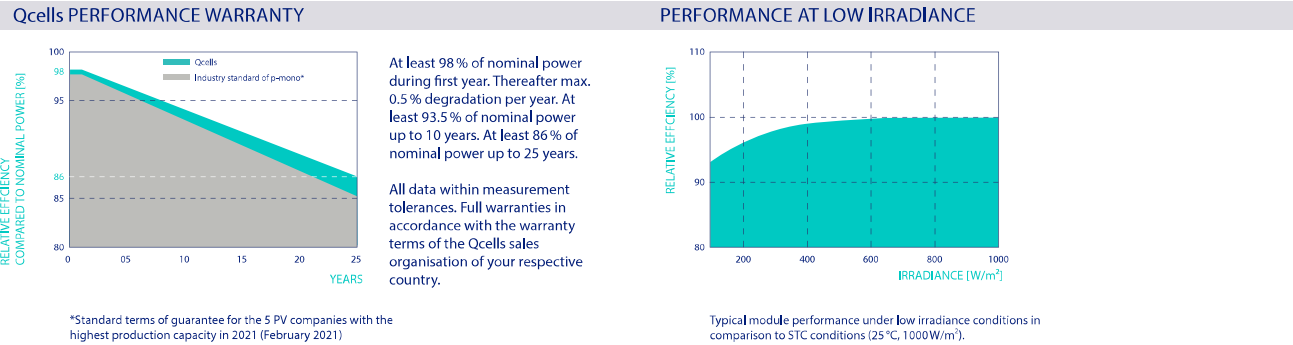


Electrical Characteristics

POWER CLASS		385	390	395	400	405	410	415
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	415
	Short Circuit Current ¹	I _{SC}	[A]	11.04	11.07	11.10	11.14	11.23
	Open Circuit Voltage ¹	V _{OC}	[V]	45.19	45.23	45.27	45.3	45.41
	Current at MPP	I _{MPP}	[A]	10.59	10.65	10.71	10.77	10.95
	Voltage at MPP	V _{MPP}	[V]	36.36	36.62	36.88	37.13	37.89
Efficiency ¹		η	[%]	≥ 19.5	≥ 19.7	≥ 20.0	≥ 20.2	≥ 21.0

MINIMUM PERFORMANCE AT NORMAL OPERATING CONDITIONS, NMOT ²								
Minimum	Power at MPP	P _{MPP}	[W]	288.8	292.6	296.3	300.1	311.3
	Short Circuit Current	I _{SC}	[A]	8.90	8.92	8.95	8.97	9.05
	Open Circuit Voltage	V _{OC}	[V]	42.62	42.65	42.69	42.72	42.83
	Current at MPP	I _{MPP}	[A]	8.35	8.41	8.46	8.51	8.68
	Voltage at MPP	V _{MPP}	[V]	34.59	34.81	35.03	35.25	35.89

¹Measurement 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 • ²800 W/m², NMOT, spectrum AM 1.5



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

UL61730-1 & UL61730-2, CE-compliant,
Quality Controlled PV – TÜV Rheinland,
IEC 61215:2016, IEC 61730:2016,
U.S. Patent No. 9,893,215 (solar cells),



*Contact your Qcells Sales Representative for details regarding the module's eligibility to be Buy American Act (BAA) compliant.

Qcells pursues minimizing paper output in consideration of the global environment.
Note: Installation instructions must be followed. Contact our technical service for further information on approved installation of this product.
Hanwha Q CELLS America Inc. 400 Spectrum Center Drive, Suite 1400, Irvine, CA 92618, USA | TEL +1 949 748 59 96 | EMAIL hqc-inquiry@qcells.com | WEB www.qcells.com



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 _e)			
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.

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
⁷ 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} .		

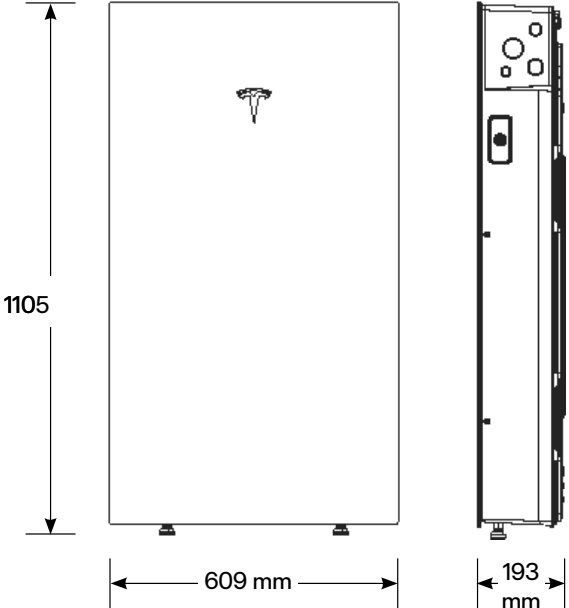
Environmental Specifications	Operating Temperature	–20°C to 50°C (–4°F to 122°F) ⁸
	Operating Humidity (RH)	Up to 100%, condensing
	Storage Temperature	–20°C to 30°C (–4°F to 86°F), up to 95% RH, non-condensing, State of Energy (SOE): 25% initial
	Maximum Elevation	3000 m (9843 ft)
	Environment	Indoor 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
⁸ Performance 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

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



Powerwall 3 Expansion Technical Specifications

Battery Technical Specifications

Model Number	1807000-xx-y
Nominal Battery Energy	13.5 kWh
Voltage Range	52 – 92 V DC ¹¹

¹¹Powerwall 3 Expansion units are connected in parallel and are not field serviceable.

Environmental Specifications

Operating Temperature	–20°C to 50°C (–4°F to 122°F) ¹²
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
Pollution Rating	PD3

¹²Performance may be de-rated at operating temperatures above 40°C (104°F).

Compliance Information

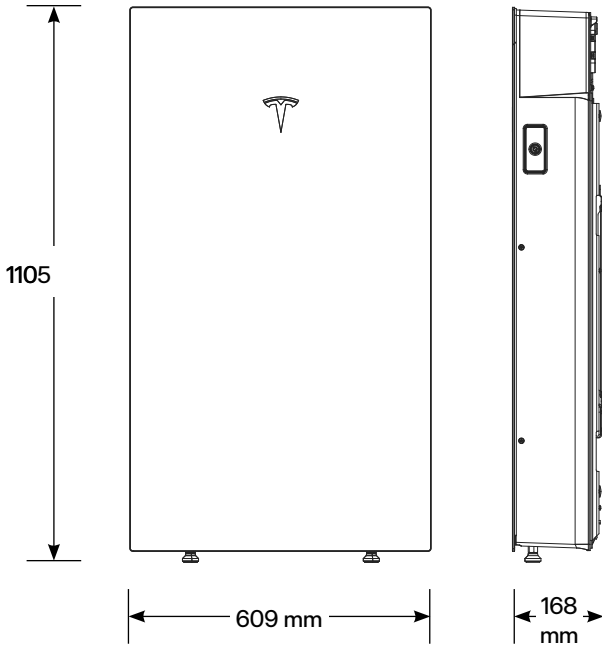
Certifications	UL 1973, UL 9540
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Mechanical Specifications

Dimensions	1105 x 609 x 168 mm (43.5 x 24 x 6.6 in) ¹³
Total Weight of Wall-Mounted Expansion Unit	118.5 kg (261.2 lb)
Weight of Expansion Unit	110 kg (242.5 lb)
Weight of Glass Front Cover	6.5 kg (14.5 lb)
Weight of Wall Bracket	1.9 kg (4.2 lb)
Weight of Expansion Accessories	0.7 kg (1.5 lb)
Mounting Options	Floor or wall mount
Stacking Capability (Floor Mount Only)	Up to (3) Expansion units behind a Powerwall 3
Compatibility with Other Systems	Only compatible with Powerwall 3
Connection to Powerwall 3 or Expansions	Powerwall 3 Expansion harness ¹⁴

¹³These dimensions include the glass front cover being installed on Powerwall 3 Expansion.

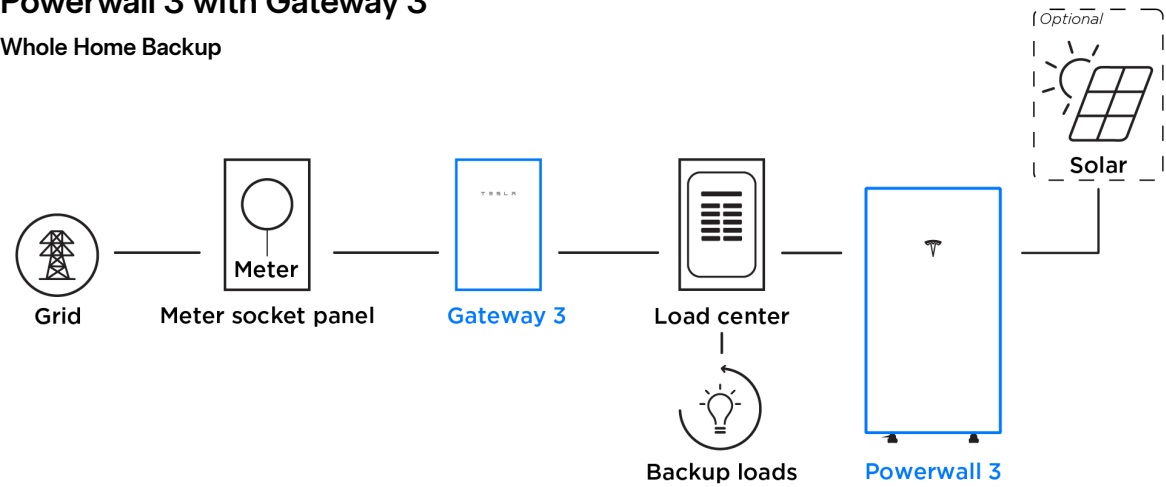
¹⁴The Powerwall 3 Expansion harness is a listed component of the UL 9540 certification.



Powerwall 3 Example System Configurations

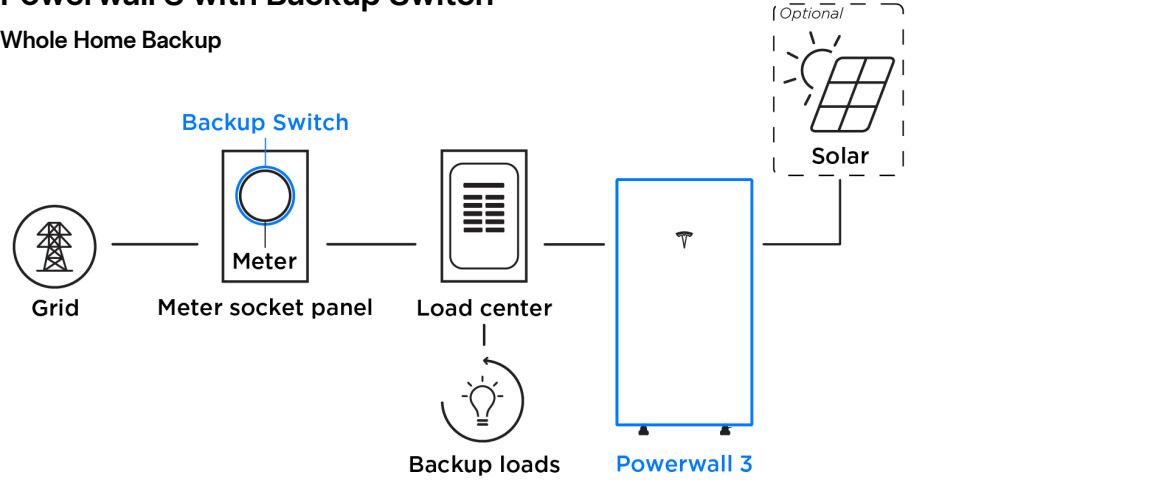
Powerwall 3 with Gateway 3

Whole Home Backup



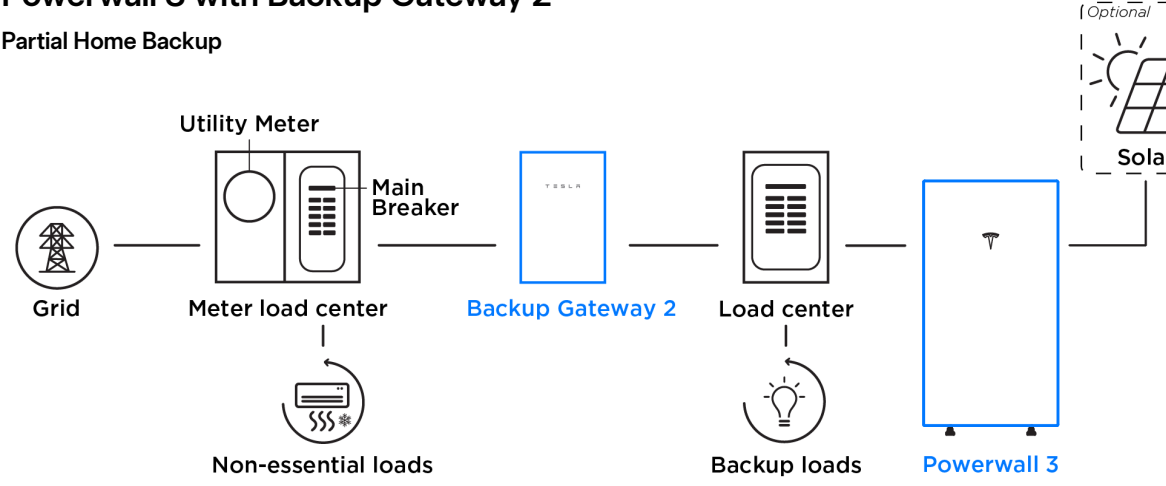
Powerwall 3 with Backup Switch

Whole Home Backup



Powerwall 3 with Backup Gateway 2

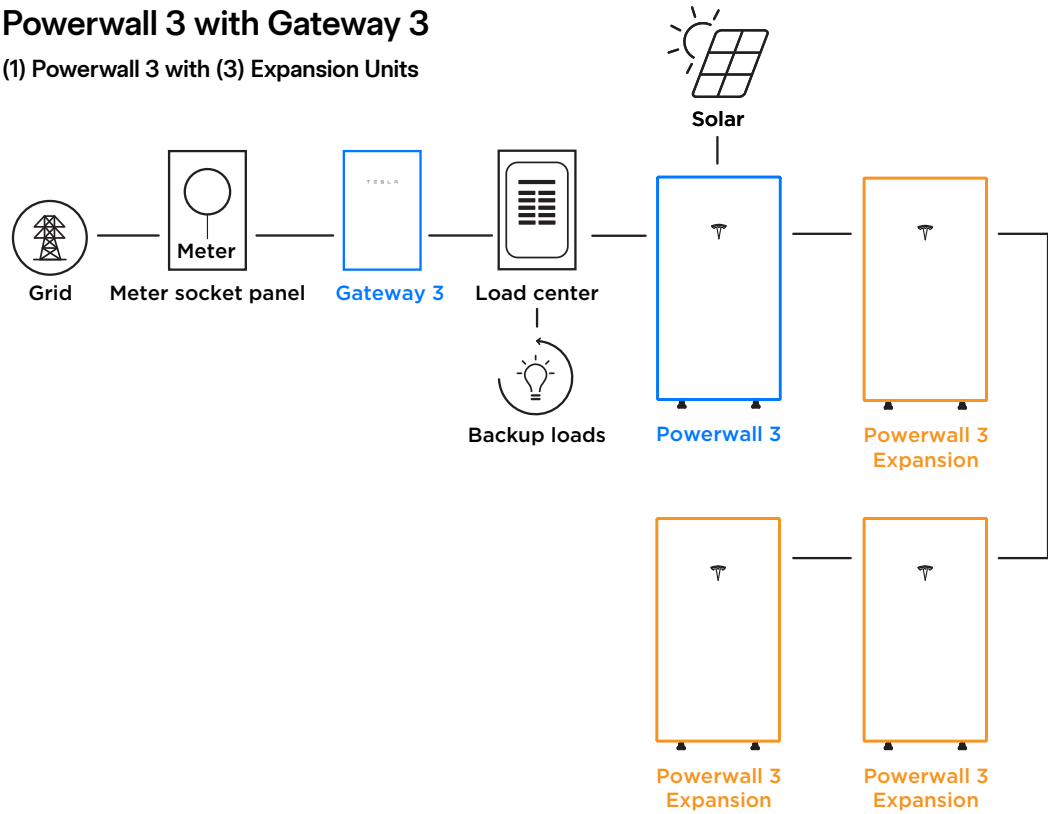
Partial Home Backup



Powerwall 3 Example System Configurations

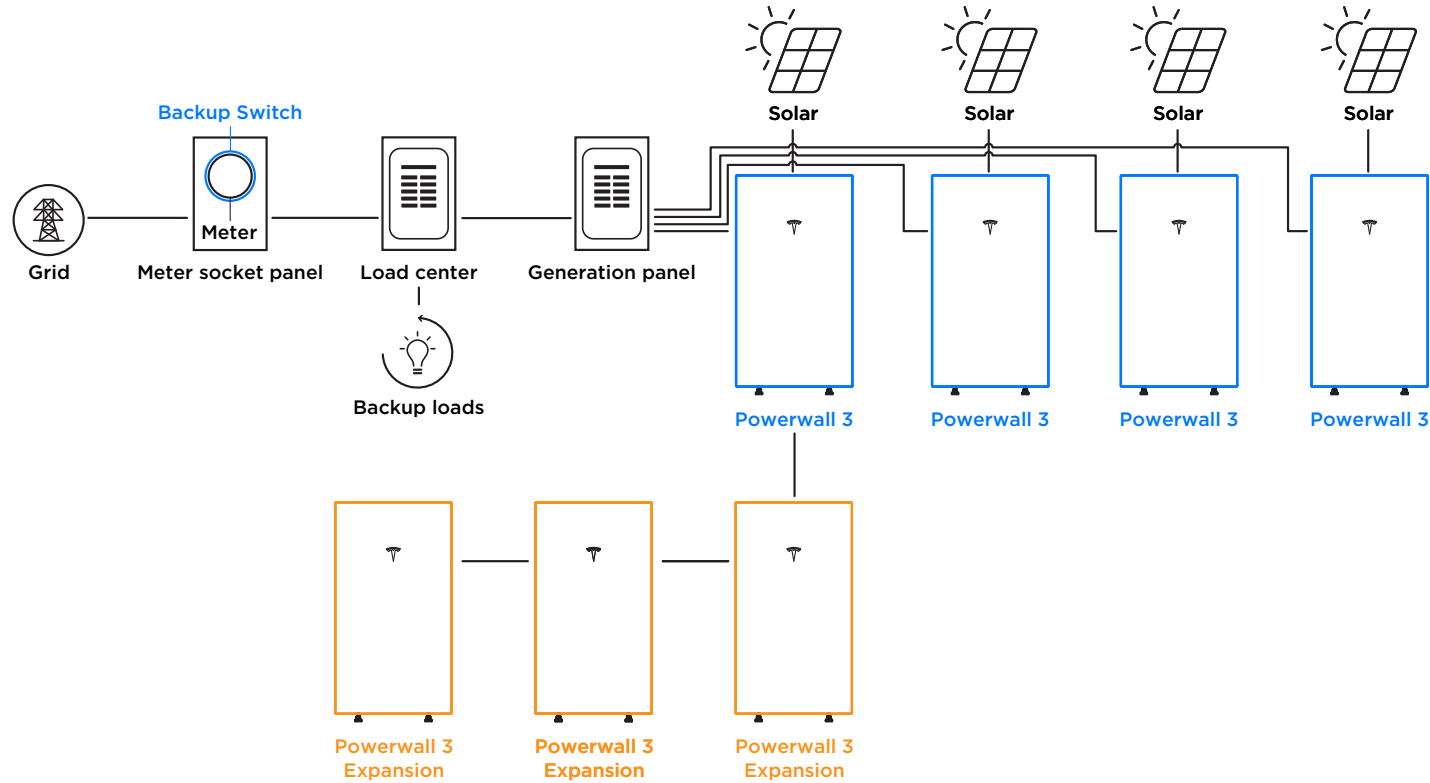
Powerwall 3 with Gateway 3

(1) Powerwall 3 with (3) Expansion Units



Powerwall 3 with Backup Switch

(4) Powerwall 3 Units with (3) Expansion Units (Maximum System Size)



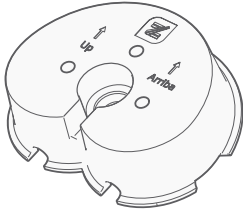
ROOFING SYSTEM SPECIFICATIONS



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, 7-16, and 7-22 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



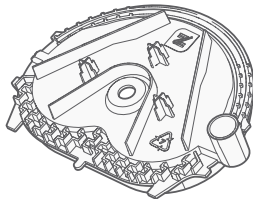
CAPTURED WASHER LAG

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



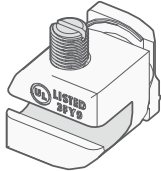
FLASHING INSERT

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



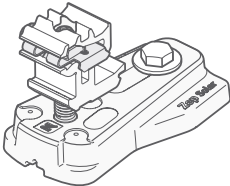
GROUND ZEP

Listed to UL 2703
Part #850-1511



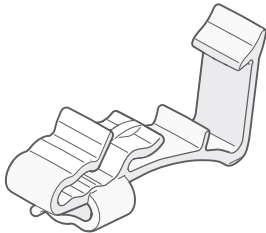
LEVELING FOOT

Listed to UL 2703
Part #850-1397



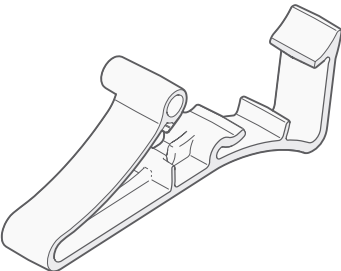
DC WIRE CLIP

Listed to UL 1565
Part #850-1509



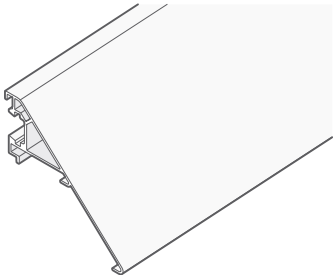
HOME RUN CLIP

Listed to UL 1565
Part #850-1510



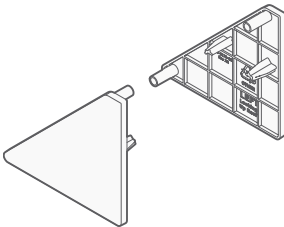
ARRAY SKIRT

Listed to UL 2703
Part #850-1608



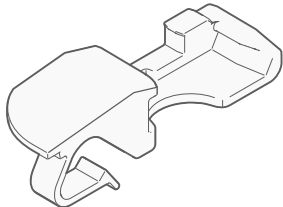
END CAP

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



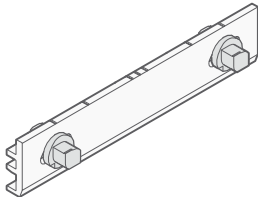
SKIRT GRIP

Listed to UL 2703
Part #850-1606



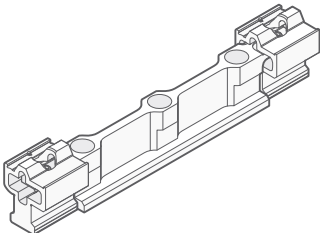
INTERLOCK

Listed to UL 2703
Part #850-1613



HYBRID INTERLOCK

Listed to UL 2703
Part #850-1281



MCI WIRING DETAIL



GENERAL NOTES

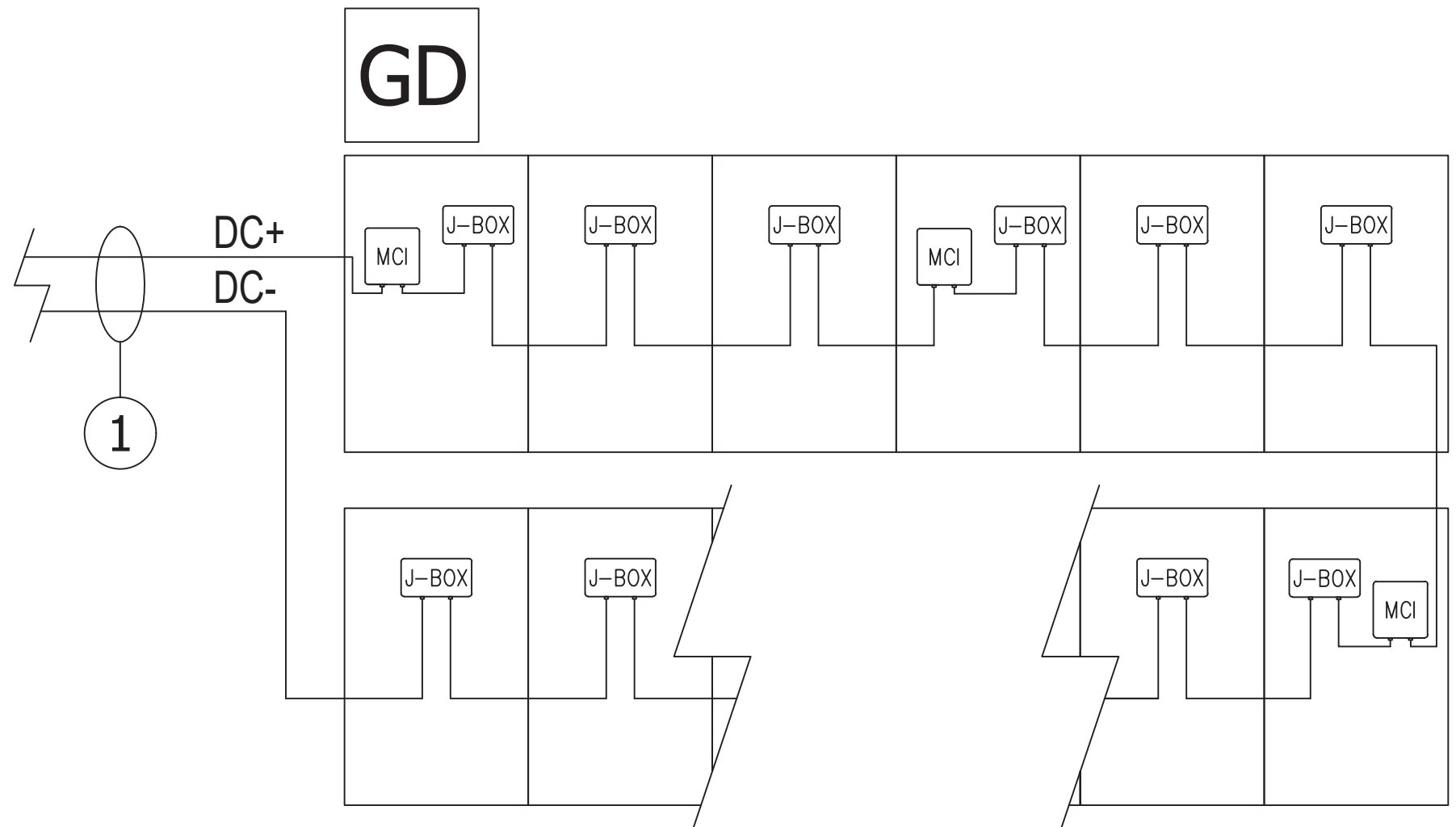
- DRAWING OF STANDARD MCI WIRING DETAIL FOR ANY GIVEN STRING LENGTH
- IF INITIATED, RAPID SHUTDOWN OCCURS WITHIN 30 SECONDS OF ACTIVATION AND LIMITS VOLTAGE ON THE ROOF TO NO GREATER THAN 165V (690.12.B.2.1)
- MID CIRCUIT INTERRUPTER (MCI) IS A UL 1741 PVRSE CERTIFIED RAPID SHUTDOWN DEVICE (RSD)

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 = $\text{MODULE COUNT} / 3$

*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

Solar Shutdown Device 2 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.

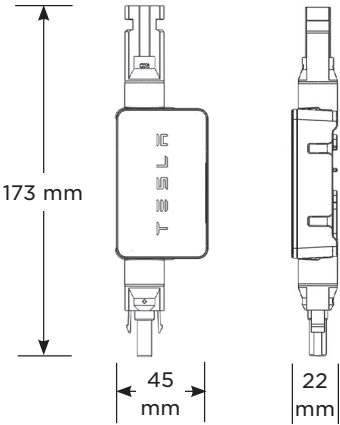
Electrical Specifications	Nominal Input DC Current Rating (I_{MP})	13 A
	Maximum Input Short Circuit Current (I_{SC})	17 A
	Maximum System Voltage (PVHCS)	1000 V DC

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	-45°C to 70°C (-49°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-2
	Electrical Connections	MC4 Connector
	Housing	Plastic
	Dimensions	173 x 45 x 22 mm (6.8 x 1.8 x 0.9 in)
	Weight	120 g (0.26 lb)



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

¹Exception: 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.