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, RAINTIGHT

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 MULTIWIRE 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: Harnett County

UTILITY: Central Electric Membership Corp. (NC)

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

INDEX

REV BY DATE COMMENTS

REV A	NAME	DATE	COMMENTS
*	*	*	*
*	*	*	*
*	*	*	*
*	*	*	*

JOB NUMBER: JB-283301 00

MOUNTING SYSTEM: ZS Comp V4 w Flashing-Insert

MODULES: (30) Tesla # T425S

INVERTER: Powerwall+ Tesla Inc [240V] # 1850000-00-B 7.6 kW / 13.5 kWh

CUSTOMER:
Brent Ely
1195 Micahs Way N
Spring Lake, NC 28390

3344983272

DESCRIPTION:
12.75 KW PV ARRAY
27 KWH ENERGY STORAGE SYSTEM

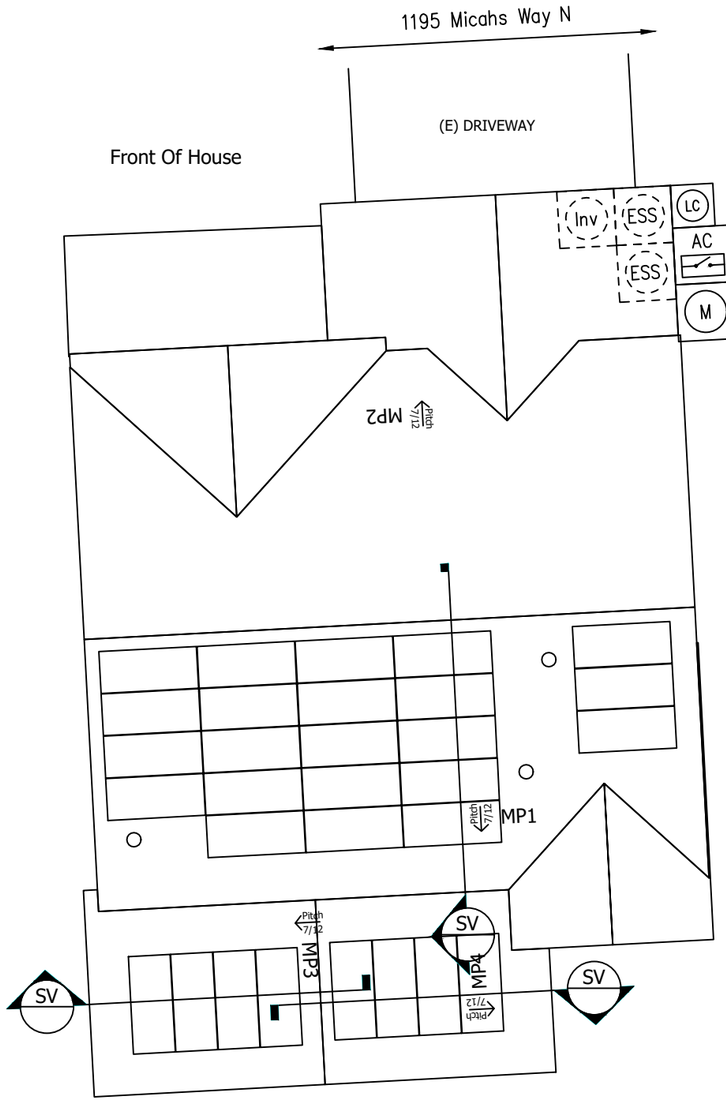
PAGE NAME: COVER SHEET

DESIGN: Zachary Rosen

SHEET: 1 REV: a DATE: 10/5/2021

TESLA

PV ARRAY DEAD LOAD = 3 LBS/SF



MP1	PITCH: 30° (7:12) ARRAY PITCH: 30° (7:12) AZIMUTH: 177 ARRAY AZIMUTH: 177 MATERIAL: Comp Shingle STORY: 2 Stories
MP2	PITCH: 30° (7:12) ARRAY PITCH: 30° (7:12) AZIMUTH: 357 ARRAY AZIMUTH: 357 MATERIAL: Comp Shingle STORY: 2 Stories
MP3	PITCH: 30° (7:12) ARRAY PITCH: 30° (7:12) AZIMUTH: 267 ARRAY AZIMUTH: 267 MATERIAL: Comp Shingle STORY: 2 Stories
MP4	PITCH: 30° (7:12) ARRAY PITCH: 30° (7:12) AZIMUTH: 87 ARRAY AZIMUTH: 87 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 DISCONNECT & WARNING LABELS
- 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: 3/32" = 1'

0 1' 10' 21'

N W E S

JOB NUMBER: JB–283301 00

MOUNTING SYSTEM: ZS Comp V4 w Flashing–Insert

MODULES: (30) Tesla # T425S

INVERTER: Powerwall+ Tesla Inc [240V] # 1850000–00–B 7.6 kW / 13.5 kWh

CUSTOMER:
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1195 Micahs Way N
Spring Lake, NC 28390

3344983272

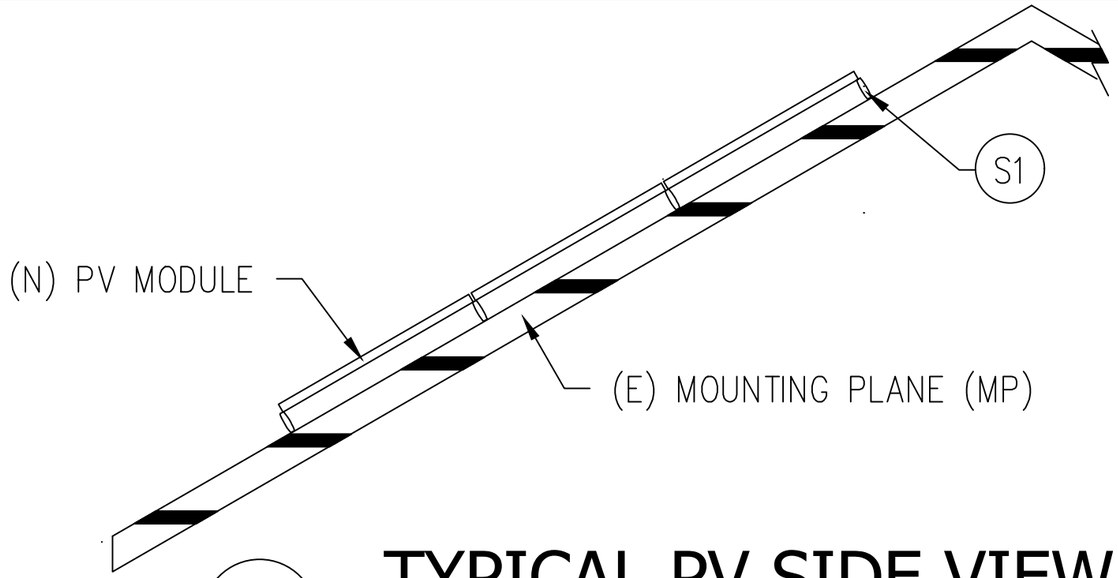
DESCRIPTION:
12.75 KW PV ARRAY
27 KWH ENERGY STORAGE SYSTEM

PAGE NAME: SITE PLAN

DESIGN: Zachary Rosen

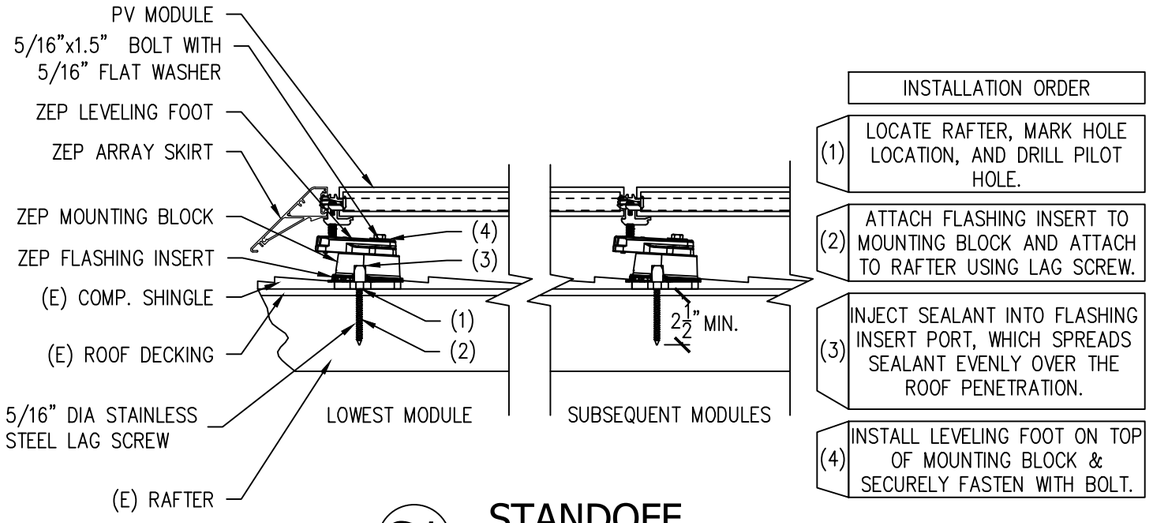
SHEET: 2 REV: a DATE: 10/5/2021

TESLA



SV TYPICAL PV SIDE VIEW

NTS



S1 STANDOFF

Scale: 1 1/2" = 1'

JOB NUMBER: JB-283301 00

MOUNTING SYSTEM: ZS Comp V4 w Flashing-Insert

MODULES: (30) Tesla # T425S

INVERTER: Powerwall+ Tesla Inc [240V] # 1850000-00-B 7.6 kW / 13.5 kWh

CUSTOMER:
Brent Ely
1195 Micahs Way N
Spring Lake, NC 28390

3344983272

DESCRIPTION:
12.75 KW PV ARRAY
27 KWH ENERGY STORAGE SYSTEM

PAGE NAME: STRUCTURAL VIEWS

DESIGN: Zachary Rosen

SHEET: 3 REV: a DATE: 10/5/2021

TESLA

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
Edge Zone Width	a	6.4 ft	Fig. 30.4-2A to 30.4-2C

MP Specific Design Information			
MP Name	MP1	MP3	MP4
Roofing	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
Pitch	30	30	30
SL/RLL: PV	9.2	9.2	9.2
SL/RLL: Non-PV	17.0	17.0	17.0

Standoff Spacing and Layout			
MP Name	MP1	MP3	MP4
Landscape X-Spacing	72	72	72
Landscape X-Cantilever	24	24	24
Landscape Y-Spacing	41	41	41
Landscape Y-Cantilever	-	-	-
Portrait X-Spacing	48	48	48
Portrait X-Cantilever	18	18	18
Portrait Y-Spacing	82	82	82
Portrait Y-Cantilever	-	-	-
Layout	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.			

JOB NUMBER: JB-283301 00

MOUNTING SYSTEM: ZS Comp V4 w Flashing-Insert

MODULES: (30) Tesla # T425S

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CUSTOMER:
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1195 Micahs Way N
Spring Lake, NC 28390

3344983272

DESCRIPTION:
12.75 KW PV ARRAY
27 KWH ENERGY STORAGE SYSTEM

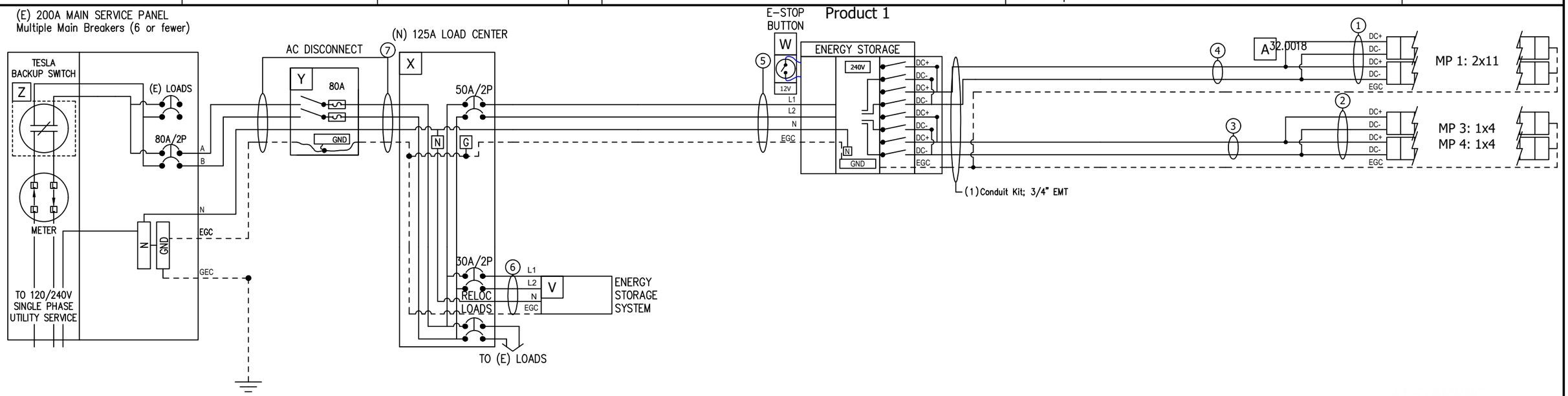
PAGE NAME: UPLIFT CALCULATIONS

DESIGN: Zachary Rosen

SHEET: 4 REV: a DATE: 10/5/2021

TESLA

GROUND SPECS	MAIN PANEL SPECS	GENERAL NOTES	PRODUCT SPECS	MODULE SPECS	LICENSE
BOND (N) AWG #6 TO (N) GROUND ROD AT PANEL WITH IRREVERSIBLE CRIMP	Panel Number: QC12L200C Meter Number: 15921818 Underground Service Entrance	Inv 1: DC Ungrounded	1 – (1) Powerwall+ Tesla Inc [240V] # 1850000-00-B 7.6 kW / 13.5 kWh 2 3	– (30) Tesla # T425S PV Module, 425W, 397 PTC, 40MM, Black Frame, MC4/MC4-EVO2, ZEP, 1000V Voc: 48.65 Vpmax: 41.05 Isc AND Imp ARE SHOWN IN THE DC STRINGS IDENTIFIER	



Voc* = MAX VOC AT MIN TEMP

Z
- (1) 1624171-00-F
  Backup Switch

POI
- (1) Ground Rod
  5/8" x 8', Copper
- (1) SQUARE D # QO280
  Breaker; 80A/2P, 2 Spaces, Plug-On

Y
- (1) CUTLER-HAMMER #DS16FK
  Class R Fuse Kit
- (2) FERRAZ SHAWMUT # TR80R
  Fuse; 80A, 250V, Class RK5
- (1) CUTLER-HAMMER # DG100NB
  Ground/Neutral Kit; 60-100A, General Duty (DG)
- (1) CUTLER-HAMMER # DG223NRB
  Disconnect; 100A, 240Vac, Fusible, NEMA 3R

X
- (1) SQUARE D #HOM1224L125PRB
  Load Center;125A,Convertible,NEMA3R,12sp/24Cir,120v/240v,10kAIC,Surface
- (1) SQUARE D # HOM250
  Breaker; 50A/2P, 2 Spaces
- (1) SQUARE D # HOM230
  Breaker; 30A/2P, 2 Spaces

W
- (1) Eaton M22-PVT-K01 Emergency Stop Button

V
- (1) 3012170-05-B
  ASY,AC POWERWALL2.1,5KW,13.5KWH,M48

AC

6 — 2" Conduit
- (1) AWG #10, THWN-2, Black
- (1) AWG #10, THWN-2, Red
- (1) AWG #10, THWN-2, White
- (1) AWG #10, THWN-2, Green — (1) Conduit Kit; 3/4" EMT

7 — 2" Conduit
- (1) AWG #4, THWN-2, Black
- (1) AWG #4, THWN-2, White
- (1) AWG #8, THWN-2, Green — (1) Conduit Kit; 1-1/4" EMT

5 — 1" Conduit
- (1) AWG #8, THWN-2, Black — (1) AWG #8, THWN-2, White
- (1) AWG #8, THWN-2, Red
- (1) AWG #10, THWN-2, Green EGC — Vmp = 240 VAC Imp= 32 AAC
- (1) Conduit Kit; 3/4" EMT

DC

GD — Please see MCI wiring detail page for more information

A
- (2) MULTI-CONTACT PV-AZB4
  32.0018; Branch Socket; MC4 U-Joint Connector, Female
- (2) MULTI-CONTACT PV-AZS4
  32.0019; Branch Plug; MC4 U-Joint Connector, Male

PV
- (12) 1550379-00-D
  MCI, TESLA, 600V, 13A

3 — 1" Conduit
- (2) PV Wire, AWG 10, Black — Voc* = 366.23 VDC Isc = 22.48 ADC
- (1) AWG #10, Solid Bare Copper EGC — Vmp = 287.35 VDC Imp= 20.72 ADC
- (1) Conduit Kit; 3/4" EMT

4 — 1" Conduit
- (2) PV Wire, AWG 10, Black — Voc* = 418.55 VDC Isc = 22.48 ADC
- (1) AWG #10, Solid Bare Copper EGC — Vmp = 328.4 VDC Imp= 20.72 ADC
- (1) Conduit Kit; 3/4" EMT

1 — 1" Conduit
- (4) PV Wire, AWG 10, Black — Voc* = 418.55 VDC Isc = 11.24 ADC
- (1) AWG #10, THHN/THWN-2, Green EGC — Vmp = 328.4 VDC Imp= 10.36 ADC
- (1) Conduit Kit; 3/4" EMT

2 — 1" Conduit
- (4) PV Wire, AWG 10, Black — Voc* = 366.23 VDC Isc = 11.24 ADC
- (1) AWG #10, THHN/THWN-2, Green EGC — Vmp = 287.35 VDC Imp= 10.36 ADC
- (1) Conduit Kit; 3/4" EMT

JOB NUMBER: JB-283301 00

MOUNTING SYSTEM: ZS Comp V4 w Flashing-Insert

MODULES: (30) Tesla # T425S

INVERTER: Powerwall+ Tesla Inc [240V] # 1850000-00-B 7.6 kW / 13.5 kWh

CUSTOMER:
Brent Ely
1195 Micahs Way N
Spring Lake, NC 28390

3344983272

DESCRIPTION:
12.75 KW PV ARRAY
27 KWH ENERGY STORAGE SYSTEM

PAGE NAME: THREE LINE DIAGRAM

DESIGN: Zachary Rosen

SHEET:	REV:	DATE:
5	a	10/5/2021

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

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

AC PHOTOVOLTAIC DISCONNECT

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

MAXIMUM AC OPERATING CURRENT ____ A
MAXIMUM AC OPERATING VOLTAGE ____ V

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

⚠ 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

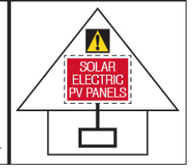
⚠ WARNING

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

SOLAR PV SYSTEM EQUIPPED WITH RAPID SHUTDOWN

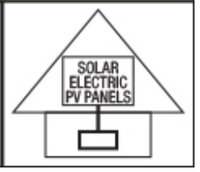
TURN RAPID SHUTDOWN SWITCH TO THE "OFF" POSITION TO SHUT DOWN CONDUCTORS OUTSIDE THE ARRAY. CONDUCTORS WITHIN THE ARRAY REMAIN ENERGIZED IN SUNLIGHT



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

SOLAR PV SYSTEM EQUIPPED WITH RAPID SHUTDOWN

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



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

(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

	Label Set		

BACKUP LOAD CENTER

Label Location:
(BLC)
Per Code:
NEC 408.4

CAUTION
DO NOT ADD NEW LOADS

Label Location:
(BLC)
Per Code:
NEC 220

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

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

CAUTION
DUAL POWER SOURCE
SECOND SOURCE IS
ENERGY STORAGE SYSTEM

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

ENERGY STORAGE SYSTEM ON SITE
LOCATED WITHIN LINE OF SIGHT

Label Location:
(MSP)
Per Code:

ENERGY STORAGE SYSTEM ON SITE
LOCATED ON ADJACENT WALL

Label Location:
(MSP)
Per Code:

ENERGY STORAGE SYSTEM ON SITE
LOCATED ON OPPOSITE WALL

Label Location:
(MSP)
Per Code:

ENERGY STORAGE SYSTEM ON SITE
LOCATED INSIDE

Label Location:
(MSP)
Per Code:

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

Label Location:
(MSP)
Per Code:
NEC 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:
NEC 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:
Per 706.7(D) label to be marked in field

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

	Label Set		

POWERWALL

Tesla Powerwall is a fully-integrated AC battery system for residential or light commercial use. Its rechargeable lithium-ion battery pack provides energy storage for solar self-consumption, time-based control, and backup.

Powerwall's electrical interface provides a simple connection to any home or building. Its revolutionary compact design achieves market-leading energy density and is easy to install, enabling owners to quickly realize the benefits of reliable, clean power.

PERFORMANCE SPECIFICATIONS

AC Voltage (Nominal)	120/240 V
Feed-In Type	Split Phase
Grid Frequency	60 Hz
Total Energy[1]	14 kWh
Usable Energy[1]	13.5 kWh
Real Power, max continuous	5 kW (charge and discharge)
Real Power, peak (10s, off-grid/backup)	7 kW (charge and discharge)
Apparent Power, max continuous	5.8 kVA (charge and discharge)
Apparent Power, peak (10s, off-grid/backup)	7.2 kVA (charge and discharge)
Load Start Capability	106 A LRA for each Powerwall
Maximum Supply Fault Current	10 kA
Maximum Output Fault Current	32 A
Overcurrent Protection Device	30 A
Imbalance for Split-Phase Loads	100%
Power Factor Output Range	+/– 1.0 adjustable
Power Factor Range (full-rated power)	+/– 0.85
Internal Battery DC Voltage	50 V
Round Trip Efficiency[1,2]	90%
Warranty	10 years

[1]Values provided for 25°C (77°F), 3.3 kW charge/discharge power.
[2]AC to battery to AC, at beginning of life.

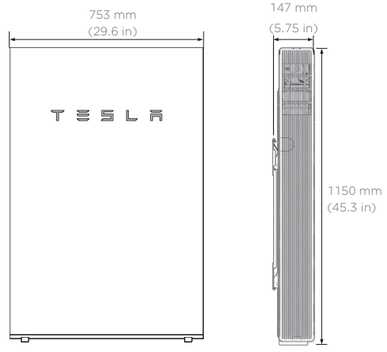
COMPLIANCE INFORMATION

Certifications	UL 1642, UL 1741, UL 1973, UL 9540, IEEE 1547, UN 38.3
Grid Connection	Worldwide Compatibility
Emissions	FCC Part 15 Class B, ICES 003
Environmental	RoHS Directive 2011/65/EU
Seismic	AC156, IEEE 693-2005 (high)

MECHANICAL SPECIFICATIONS

Dimensions[3]	1150 mm x 753 mm x 147 mm (45.3 in x 29.6 in x 5.75 in)
Weight[3]	114 kg (251.3 lbs)
Mounting options	Floor or wall mount

[3]Dimensions and weight differ slightly if manufactured before March 2019. Contact Tesla for additional information.

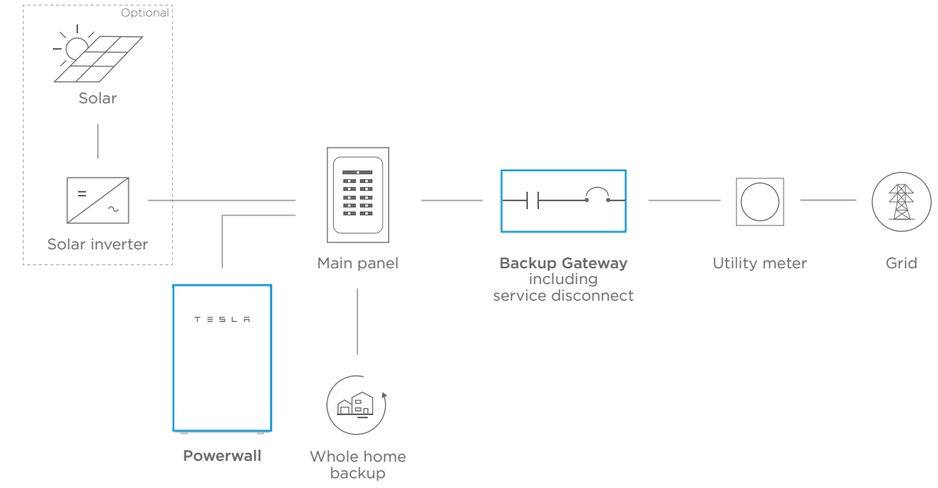


ENVIRONMENTAL SPECIFICATIONS

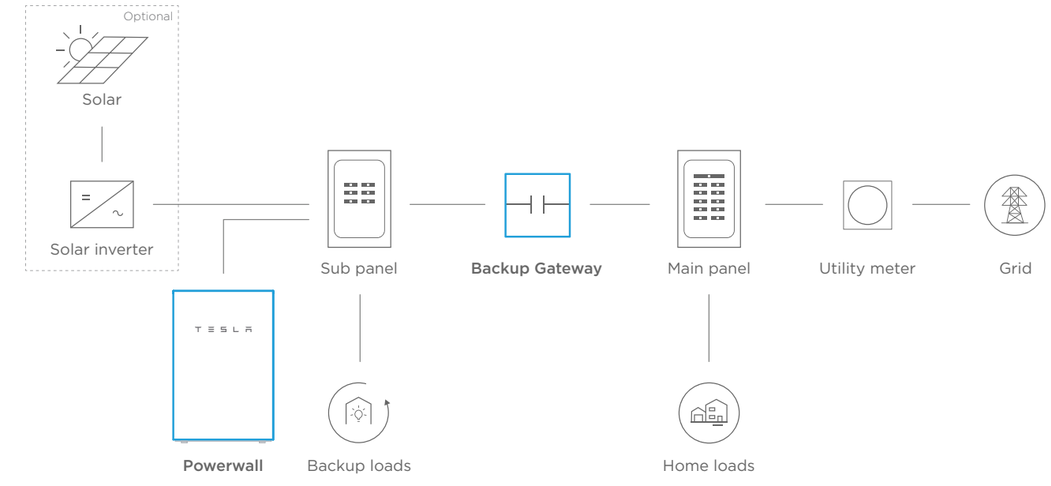
Operating Temperature	–20°C to 50°C (–4°F to 122°F)
Recommended Temperature	0°C to 30°C (32°F to 86°F)
Operating Humidity (RH)	Up to 100%, condensing
Storage Conditions	–20°C to 30°C (–4°F to 86°F) Up to 95% RH, non-condensing State of Energy (SoE): 25% initial
Maximum Elevation	3000 m (9843 ft)
Environment	Indoor and outdoor rated
Enclosure Type	NEMA 3R
Ingress Rating	IP67 (Battery & Power Electronics) IP56 (Wiring Compartment)
Wet Location Rating	Yes
Noise Level @ 1m	< 40 dBA at 30°C (86°F)

TYPICAL SYSTEM LAYOUTS

WHOLE HOME BACKUP



PARTIAL HOME BACKUP



MCI WIRING DETAIL

GENERAL NOTES

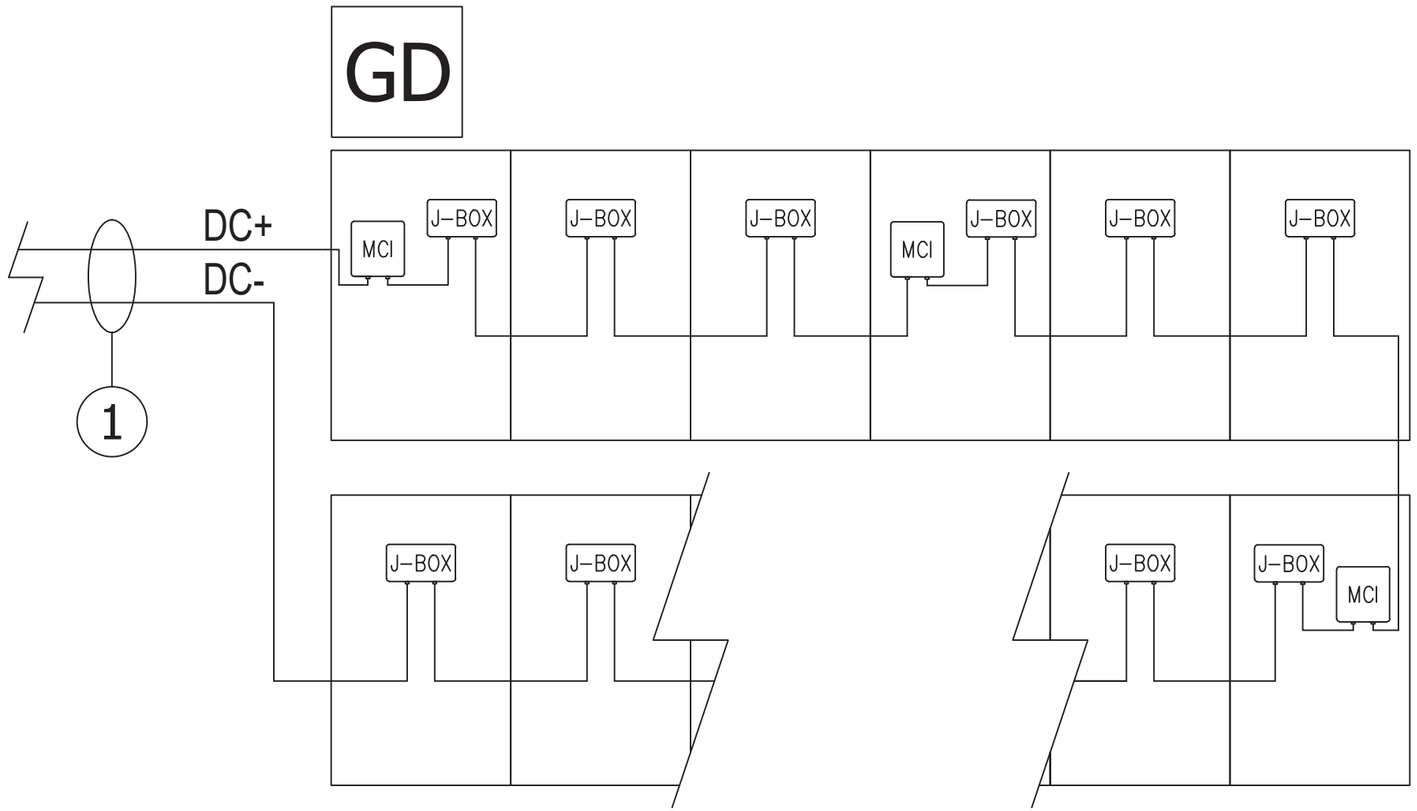
- DRAWING OF STANDARD MCI WIRING DETAIL FOR ANY GIVEN STRING LENGTH
- IF INITIATED, RAPID SHUTDOWN OCCURS WITHIN 30 SECONDS OF ACTIVATION AND LIMITS VOLTAGE ON THE ROOF TO NO GREATER THAN 165V (690.12.B.2.1)
- MID CIRCUIT INTERRUPTER (MCI) IS A UL 1741 PVRSE CERTIFIED RAPID SHUTDOWN DEVICE (RSD)

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

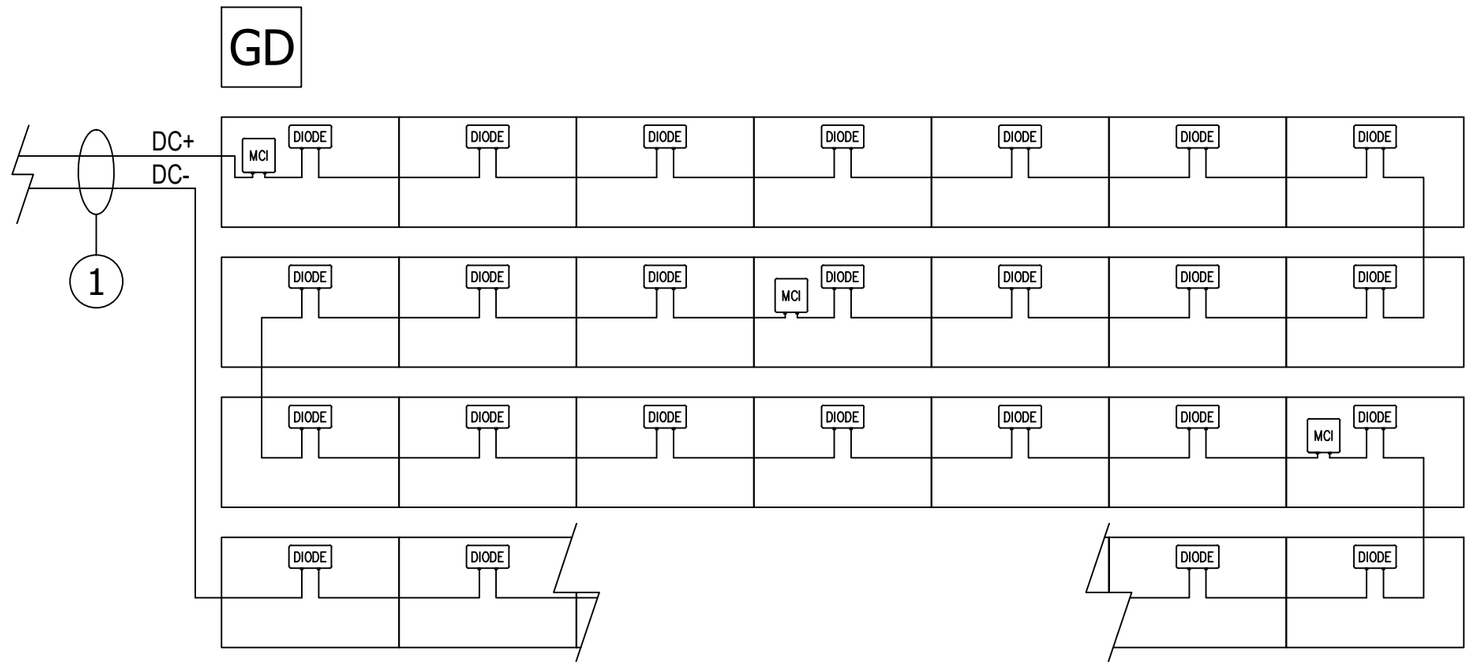
GENERAL NOTES

- 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 and easily installs behind the utility meter, providing whole home backup with Powerwall.

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	10 kA with any breaker[1] 22 kA with minimum 22 kA breaker[1]
Communication	CAN
Product Compatibility	Powerwall 2 with Backup Gateway 2, Powerwall+
Expected Service Life	21 years
Warranty	10 years

[1] See section 27.12.4 in UL 414.

COMPLIANCE INFORMATION

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

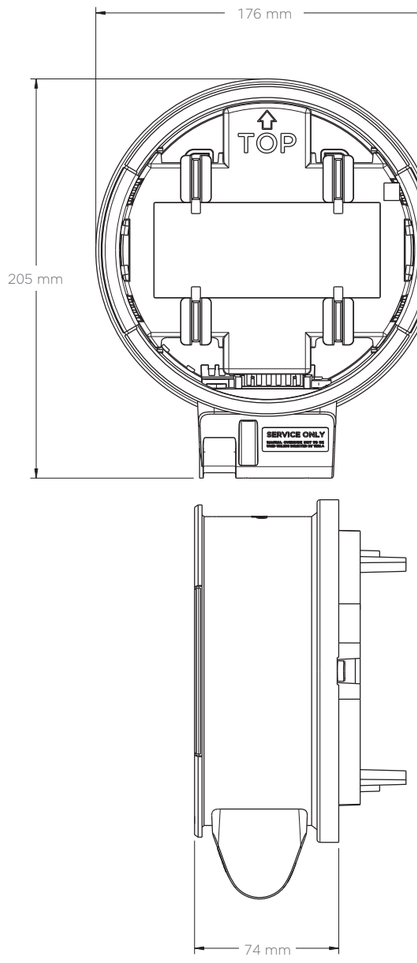
ENVIRONMENTAL SPECIFICATIONS

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	Contactor 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. 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

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

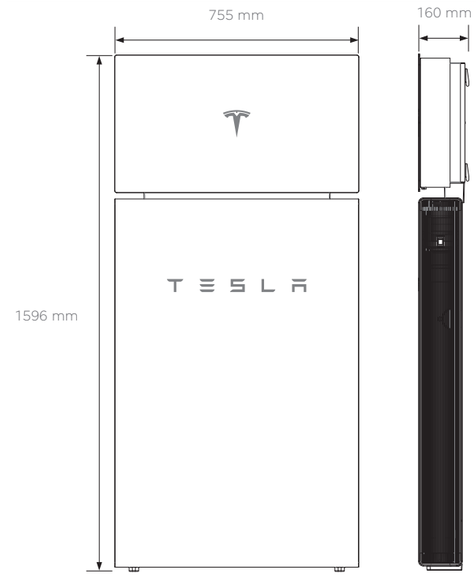
Model Number	1850000-xx-y
Nominal Battery Energy	13.5 kWh
Nominal Grid Voltage (Input / Output)	120/240 VAC
Grid Voltage Range	211.2 - 264 VAC
Frequency	60 Hz
Phase	240 VAC: 2W+N+GND
Maximum Continuous Power On-Grid	7.6 kW full sun / 5.8 kW no sun[1]
Maximum Continuous Power Off-Grid	9.6 kW full sun / 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	118 A LRA
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
Maximum Short Circuit Current per MPPT (I_{sc})	15 A
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
Round Trip Efficiency	90%[2]
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)[3]
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 1998 (US), IEEE 1547, IEEE 1547.1
Battery Energy Storage System Certifications	UL 1642, UL 1741, UL 1741 PCS, UL 1741 SA, 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)

MECHANICAL SPECIFICATIONS

Dimensions	1596 x 755 x 160 mm (62.8 x 29.7 x 6.3 in)
Total Weight	140 kg (310 lb)[4]
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)[5]
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
Noise Level @ 1 m	< 40 db(A) optimal, < 50 db(A) maximum

[1]Values provided for 25°C (77°F).

[2]AC to battery to AC, at beginning of life.

[3]Cellular connectivity subject to network service coverage and signal strength.

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

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

SOLAR SHUTDOWN DEVICE

The Tesla Solar Shutdown Device is part of the PV system rapid shutdown (RSD) function in accordance with Article 690 of the applicable NEC. When paired with Powerwall+, solar array shutdown is initiated by turning the Powerwall+ Enable switch off, or by pushing the System Shutdown Switch if one is present.

ELECTRICAL SPECIFICATIONS

Nominal Input DC Current Rating (I_{MP})	12 A
Maximum Input Short Circuit Current (I_{SC})	15 A
Maximum System Voltage	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

COMPLIANCE INFORMATION

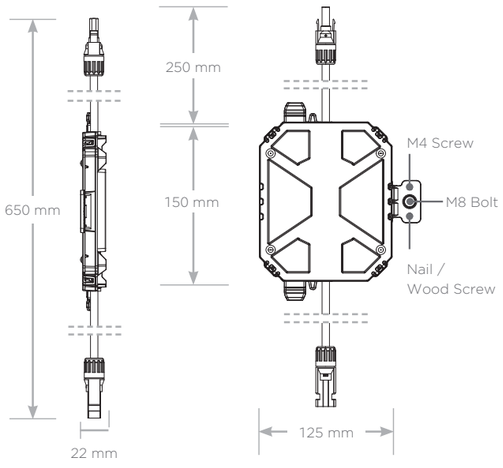
Certifications	UL 1741 PVRSE, UL 3741, PVRSA (Photovoltaic Rapid Shutdown Array)
RSD Initiation Method	External System Shutdown Switch
Compatible Equipment	*See Compatibility Table below*

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 4 / IP65

MECHANICAL SPECIFICATIONS

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

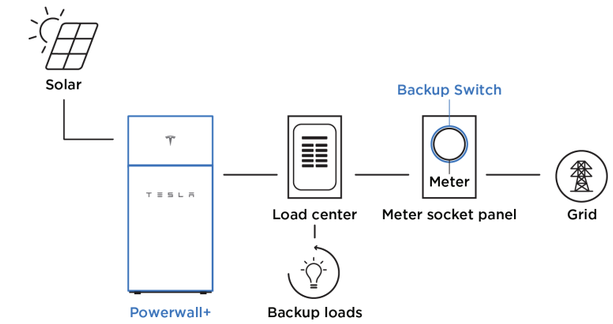
Tesla Solar Roof and Tesla/Zep ZS Arrays using the following modules are certified to UL 3741 and UL 1741 PVRSA when installed with the Powerwall+ and Solar Shutdown Devices. See the Powerwall+ Installation Manual for detailed instructions and for guidance on installing Powerwall+ and Solar Shutdown Devices with 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)	1 Solar Shutdown Device per 3 modules[1]
Hanwha	Q.PEAK DUO BLK-G5	1 Solar Shutdown Device per 3 modules
Hanwha	Q.PEAK DUO BLK-G6+	1 Solar Shutdown Device per 3 modules

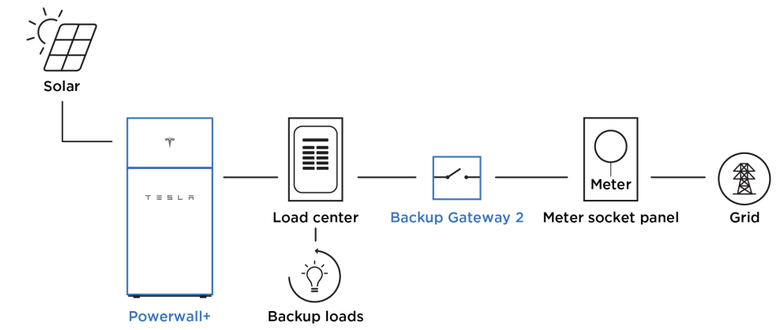
[1]**Exception**: Tesla solar modules installed in locations where the max Voc for three modules at low design temperatures exceeds 165 V shall be limited to two modules between MCIs.

SYSTEM LAYOUTS

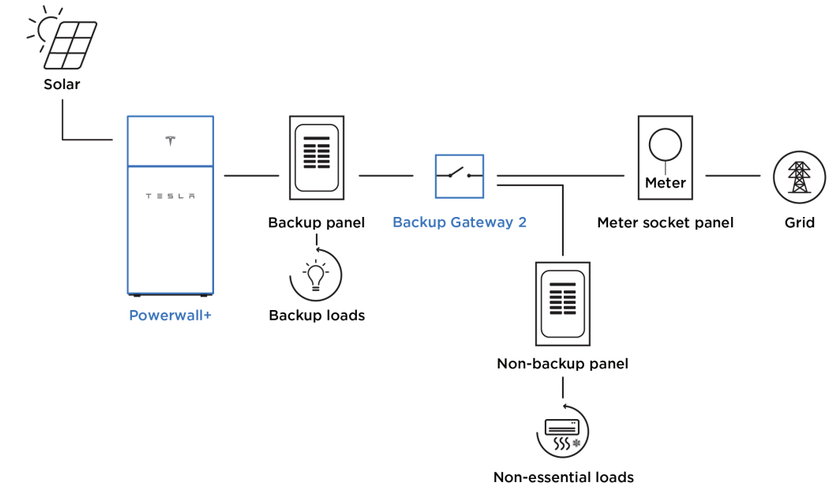
Powerwall+ with Backup Switch for Whole Home Backup



Powerwall+ with Backup Gateway 2 for Whole Home Backup



Powerwall+ with Backup Gateway 2 for Partial Home Backup



Tesla
Photovoltaic Module

T420S, T425S, and T430S

Maximum Power
The Tesla module is one of the most powerful residential photovoltaic modules available. Our system requires up to 20 percent fewer modules to achieve the same power as a standard system. The module boasts a high conversion efficiency and a half-cell architecture that improves shade tolerance.

Beautiful Solar
Featuring our proprietary Zep Groove design, the all-black module connects easily with Tesla ZS components to keep panels close to your roof and close to each other for a blended aesthetic with simple drop-in and precision quarter-turn connections.

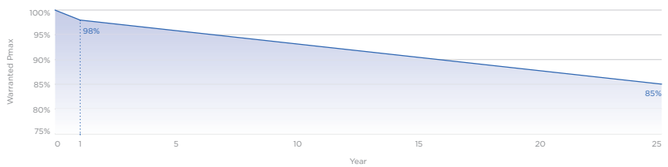
Reliability
Tesla modules are subject to automotive-grade engineering scrutiny and quality assurance, far exceeding industry standards. Modules are certified to IEC / UL 61730 - 1, IEC / UL 61730 - 2 and IEC 61215.

Limited Warranty

Materials and Processing	25 years
Extra Linear Power Output	25 years

The maximum Pmax degradation is 2% in the 1st year and 0.54% annually from the 2nd to 25th year.

Linear Power Warranty



Module Specifications

Electrical Characteristics

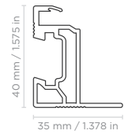
Power Class	T420S		T425S		T430S	
Test Method	STC	NOCT	STC	NOCT	STC	NOCT
Max Power, P_{MAX} (W)	420	313.7	425	317.4	430	321.1
Open Circuit Voltage, V_{OC} (V)	48.5	45.47	48.65	45.61	48.8	45.75
Short Circuit Current, I_{SC} (A)	11.16	9.02	11.24	9.09	11.32	9.15
Max Power Voltage, V_{MP} (V)	40.90	38.08	41.05	38.22	41.20	38.36
Max Power Current, I_{MP} (A)	10.27	8.24	10.36	8.3	10.44	8.37
Module Efficiency (%)	19.3		19.6		19.8	
STC	1000 W/m², 25°C, AM1.5					
NOCT	800 W/m², 20°C, AM1.5, wind speed 1m/s					

Mechanical Loading

Front Side Test Load	6120 Pa | 128 lb/ft²
Rear Side Test Load	5190 Pa | 108 lb/ ft²
Front Side Design Load	4080 Pa | 85 lb/ft²
Rear Side Design Load	3460 Pa | 72 lb/ft²
Hailstone Test	25 mm Hailstone at 23 m/s

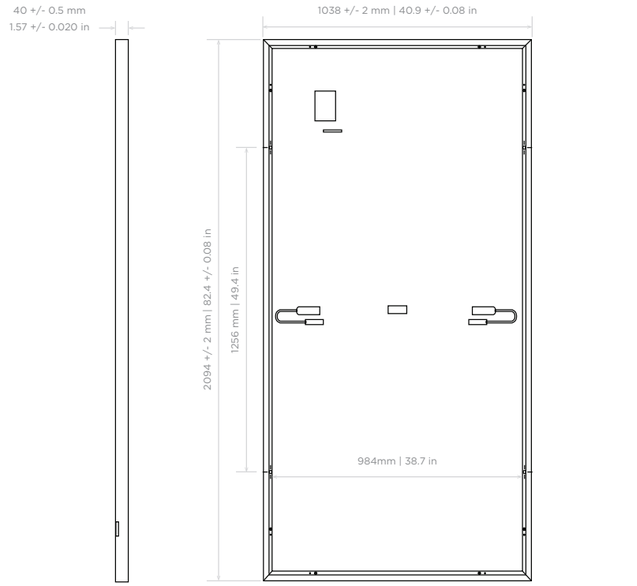
Temperature Rating (STC)

Temperature Coefficient of Isc	+0.040% / °C
Temperature Coefficient of V_{OC}	-0.260% / °C
Temperature Coefficient of P_{MAX} (W)	-0.331% / °C



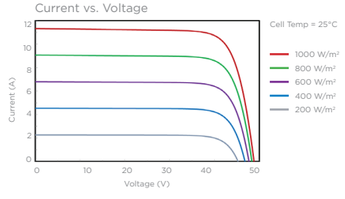
Mechanical Parameters

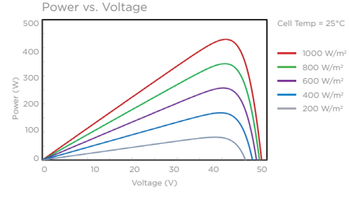
Cell Orientation	144 (6 x 24)
Junction Box	IP68, 3 diodes
Cable	4 mm² | 12 AWG, 1400 mm | 55.1 in. Length
Connector	Staubli MC4 or EVO2
Glass	3.2 mm ARC Glass
Frame	Black Anodized Aluminum Alloy
Weight	25.3 kg | 55.8 lb
Dimension	2094 mm x 1038 mm x 40 mm 82.4 in x 40.9 in x 1.57 in

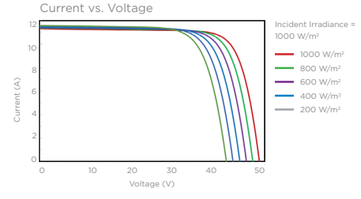


Operation Parameters

Operational Temperature	-40°C up to +85°C
Power Output Tolerance	-0 /+5 W
V_{OC} & I_{SC} Tolerance	+/- 3%
Max System Voltage	DC 1000 V (IEC/UL)
Max Series Fuse Rating	20 A
NOCT	45.7 +/- 2°C
Safety Class	Class II
Fire Rating	UL Type 1 or 2







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.

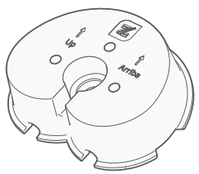
Zep wire management products listed to UL 1565 for wire positioning devices.

ZS Comp grounding products are listed to UL 2703 and UL 467.

ZS Comp bonding products are listed to UL 2703.

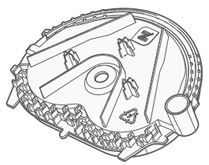
MOUNTING BLOCK

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

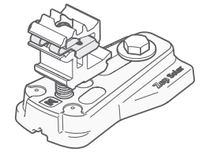
Part #850-1631-002 and #850-1631-004

GROUND ZEP

Listed to UL 2703
Part #850-1511

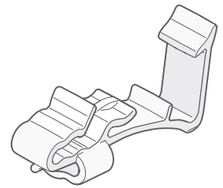
LEVELING FOOT

Listed to UL 2703
Part #850-1397



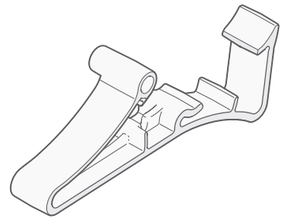
DC WIRE CLIP

Listed to UL 1565
Part #850-1509



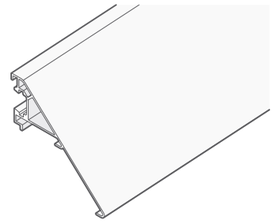
HOME RUN CLIP

Listed to UL 1565
Part #850-1510



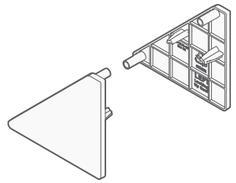
ARRAY SKIRT

Listed to UL 2703
Part #850-1608



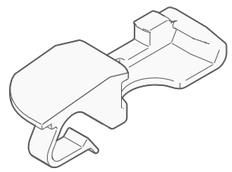
END CAP

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



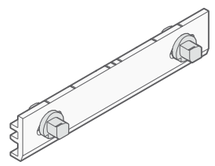
SKIRT GRIP

Listed to UL 2703
Part #850-1606



INTERLOCK

Listed to UL 2703
Part #850-1613



HYBRID INTERLOCK

Listed to UL 2703
Part #850-1281