APPLICATION FOR BUILDING PERMIT

The Village of Irvington | 85 Main St | Irvington NY 10533

Application Number:	638	Date:	04/13/2023
Job Location:	12 MAPLE ST	Parcel ID:	2.80-35-7
Property Owner:	Teresa Forster	Property Class:	1 FAMILY RES
Occupancy:	One/ Two Family	Zoning:	
Common Name:			

Applicant	**Contractor**
Stacie Varian	Stacie Varian
Tesla Energy Operations	Tesla Energy Operations
1073 Rt 94 Unit 4New Windsor NY 12553	1073 Rt 94 Unit 4 New Windsor NY 12553
8452756011	8452756011

Description of Work

Type of Work:	Solar Panels	Applicant is:	Contractor
Work Requested by:	The Owner	In association with:	
Cost of Work (Est.):	26753.00	Property Class:	1 FAMILY RES

Description of Work

New 6.8 kw solar PV array consisting of 16 panels plus 13.5 kWh Energy Storage System.

Please Note: Completing the application does not constitute a permit to commence construction. To obtain your permit follow the instructions on the instruction page provided on page 3.

Job Location: 12 MAPLE ST Parcel Id: 2.80-35-7

AFFIDAVIT OF APPLICANT

I **Stacie Varian** being duly sworn, depose and says: That s/he does business as: **Tesla Energy Operations** with offices at: **1073 Rt 94 Unit 4 New Windsor NY 12553** and that s/he is:

- ☐ The owner of the property described herein.
- ☐ The _____ of the New York Corporation _____ with offices at: _____ duly authorized by resolution of the Board of Directors, and that said corporation is duly authorized by the owner to make this application.
- ☐ A general partner of _____ with offices _____ and that said Partnership is duly authorized by the Owner to make this application.
- ☐ The Lessee of the premises, duly authorized by the owner to make this application.
- ☐ The Architect of Engineer duly authorized by the owner to make this application.
- ☒ The contractor authorized by the owner to make this application.

That the information contained in this application and on the accompanying drawings is true to the best of his knowledge and belief. The undersigned hereby agrees to comply with all the requirements of the New York State Uniform Fire Prevention and Building Code, the Village of Irvington Building Code, Zoning Ordinance and all other laws pertaining to same, in the construction applied for, whether or not shown on plans or specify in this application.

Sworn to before me this 13th day of July of 2023

Notary Public / Commission of Deeds

PATRICIA M. ZULLO
NOTARY PUBLIC-STATE OF NEW YORK
No. 01ZU0001589
Qualified in Suffolk County
My Commission Expires 02-15-2027

Applicant's Signature / Tesla Energy

OWNER'S AUTHORIZATION

I **Teresa Forster** as the owner of the subject premises and have authorized the contractor named above to perform the work under the subject application.

Owner phone number 914-646-4414 Owner email address treeforster@gmail.com

☑ Teresa Forster I hereby acknowledge that it is my responsibility as the **property owner** to ensure that if the permit (if issued) receives a Final Certificate of Approval from the Building Department and further that if a Final Certificate of Approval is not obtained upon completion of the construction, a property violation may be placed on the property for which this permit is being requested.

Sworn to before me this 13th day of July of 2023

Notary Public / Commission of Deeds

PATRICIA M. ZULLO
NOTARY PUBLIC-STATE OF NEW YORK
No. 01ZU0001589
Qualified in Suffolk County
My Commission Expires 02-15-2027

Applicant's Signature

Homeowner

VILLAGE OF IRVINGTON
BUILDING DEPARTMENT
85 MAIN STREET
IRVINGTON, NEW YORK 10533
TEL: (914) 591-8335 • FAX: (914) 591-5870

PHOTOVOLTAIC (PV SOLAR) RESIDENTIAL SYSTEMS PERMIT APPLICATION CHECK LIST

Revised June 7, 2017

It is suggested that all applicants applying for a permit read and understand the manufacture installation instructions prior to applying for a building permit and attached ARB guide lines and Village code for Solar Energy Equipment.

REQUIREMENTS TO APPLY FOR A PHOTOVOLTAIC (PV SOLAR) SYSTEM PERMIT

- ✓ 1) Apply on line at www.irvingtonny.gov for a mechanical permit, under building permits and along with your application, submit to the building department the following;
- ✓ 2) Owners phone number and email address entered in the online permit application
- ✓ 3) Evidence of Workers Compensation Insurance (on a C-105 or equivalent)
- ✓ 4) Evidence of Liability Insurance naming the Village of Irvington additional insured
- ✓ 5) A copy of the contractors Westchester County Department of Consumer Protection License
- ✓ 6) Pursuant to 9-12-A. provide evidence of notice to adjacent properties owners not less than 10 days prior to the meeting (see attached code section for more details)
- ✓ 7) Submit permit fee: (all fees must be paid at time of submission)
  - ✓ $85 application fee
  - ___ $200 for systems up to 5 kilowatts
  - ✓ $450 for systems above 5 kilowatts and less than 10 kilowatts
  - ___ $700 for systems above 10 kilowatts and less than 20 kilowatts
  - ___ $700 plus $250 per additional 10 kilowatts above 20 for systems above 20 kilowatts
  - ✓ $75 Certificate of Completion inspection and fee
- ✓ 8) An affidavit from a NYS licensed professional detailing and certifying that the existing structure meets or exceeds the minimum load requirement's as per TABLE R301.2(1) for wind and load before and after installation of the proposed equipment or the proposed upgrades to the existing structure to accomplish the aforesaid.
- ✓ 9) Drawings (signed and sealed by a NYS licensed professional) of the roof plan showing the following criteria;
  - a. ✓ Showing all proposed PV panels on all proposed roof surfaces.
  - b. ✓ Showing all equipment on all elevations including
  - c. ✓ Show / list all roof connectors and flashing details
  - d. ✓ Show compliance with section R902.4 (fire classification in accordance with UL1703 and 3' from any lot line)
  - e. ✓ Show compliance with sections R324.3.1 through R324.7.2.5 and NFPA 70 (installation)
  - f. ✓ Show compliance with section R324.7 (access and pathways) (see attachment)
  - g. ✓ Show compliance with section R324.7.2.1-6. (roof access points) (see attachment)
  - h. ✓ Show compliance with section R324.7.3 (ground access areas) (see attachment)
  - i. ✓ Show compliance with section R324.7.4 (single ridge roofs *when applicable*) (see attachment)
  - j. ✓ Show compliance with section R324.7.5 (hip roofs *when applicable*) (see attachment)
  - k. ✓ Show compliance with section R324.7.6 (roof with valleys *when applicable*) (see attachment)
  - l. ✓ Show compliance with section R324.7.7 (allowance for smoke ventilation operations) (see attachment)
  - m. ✓ Show a Fire Department AC disconnect, located outside by the Utility meter on all systems.
- ✓ 10) Provide a drawing or manufactures cut sheets of array mounting hardware and interconnection diagram and specifications.
- ✓ 11) Provide a drawing or manufactures cut sheets of the unit mount and roof penetration's flashing system.
- ✓ 12) 3 wire diagram showing all proposed equipment as governed by the National Electrical Code (NEC)
- ✓ 13) Provide a diagram showing all proposed labels and labeling locations including; Solar AC Disconnect, Inverter Output, Connection Warning, Duel Power Source Warning, Solar AC Combiner Panel, Solar PV Circuits Only, Solar Production meter. (see attachment)
- ✓ 14) Provide snow guards on panels were snow has the potential of sliding of the panel into a neighbor's property
- ✓ 15) Pictures of dwelling showing photo shopped arrays on the structure.
- ✓ 16) Provide a drawing or photo shop picture of all proposed equipment on all effected elevations (including FD emergency disconnect switch)
- ✓ 17) A Fire Department AC disconnect, located outside by the Utility meter on all systems.

VILLAGE OF IRVINGTON
BUILDING DEPARTMENT
85 MAIN STREET
IRVINGTON, NEW YORK 10533
TEL: (914) 591-8335 • **FAX:** (914) 591-5870

✓ 18) Separate Electrical Permit application by a Westchester County Department of Licensing, licensed Electrician with required insurances and the appropriate fee (must be filed by the licensed contractor, see village application for further details).
✓ 19) Submit signed check list with submission and appropriate building permit fee.
✓ 20) Applicant has provided seven copies of the entire submittal for Architectural Review Board approval.

Applicant Affidavit:
Applicants Name: Stacie Varian of Tesla Energy Operations
Applicants Address: 1073 Rt 94 Unit 4
New Windsor, NY 12553
Applicants Phone # 845-275-6011
Applicants Email svarian@tesla.com

Applicant Name: Stacie Varian of Tesla Energy Operations **Signature:** Stacie Varian **Date:** 7/27/23 **By signing this affidavit I attest to have read the attached Solar Energy Equipment Code and the Solar Equipment Guidelines manufactures installation instructions and that all information asked for above has been submitted and that the submitted information is correct.**

General Contractor Affidavit:
Contractors Name: Tesla Energy Operations
Contractors Address: 1073 Rt 94 Unit 4
New Windsor, NY 12553
Contractors Phone # 845-275-6011
Contractors Email svarian@tesla.com

General Contractor Name: Tesla Energy Operations **Signature:** Stacie Varian **Date:** 7/27/23 **By signing this affidavit I attest to being the general contractor of record for this application and will be responsible for oversite and direct supervision of same, and will maintain a valid Westchester County Department of Consumer Protection License, a valid for Workers Compensation Policy and a General Liability Policy listing the Village of Irvington as Certificate Holder and additional insured with no conditions until such time I apply for and receive a Certificate of Completion.**

Electrical Contractor Affidavit:
Electrical Contractors Name: Frank Saladino of Tesla Energy Operations
Electrical Contractors Address: 1073 Rt 94 Unit 4
New Windsor, NY 12553
Electrical Contractors Phone # 845-275-6011
Electrical Contractors Email fsaladino@tesla.com

Electrical Contractor Name: Frank Saladino of Tesla Energy Operations **Signature:** **Date:** 7/27/23 **By signing this affidavit I attest to being the electrical contractor of record for this application and will be responsible for oversite and direct supervision of same, and will maintain a valid Westchester County Electrical License, a valid for Workers Compensation Policy and a General Liability Policy listing the Village of Irvington as Certificate Holder and additional insured with no conditions until such time I apply for and receive a Certificate of Completion.**

Note: Applications for all exterior elevation changes including photovoltaic solar systems are required to apply for, make a presentation in front of, and receive approval from the Village of Irvington Architectural Review Board (ARB) prior to issuance of a building permit. The ARB meetings are the second and fourth Mondays of the month, with a deadline for submissions one week prior to the meetings (see village web site for confirmation of meetings). Seven sets of copies of the entire application are required to be submitted at the deadline with appropriate fee at the time of submission.

Note: The following list above is given to assist in the application process. It is not intended to be a replacement for the Building or Zoning Code, County or State Regulations, or Consolidate Edison Requirements. Unique and Special projects may require additional information.

Hours of Construction: Monday-Friday 7AM-7PM; Saturday 9AM-5PM; Sunday and holiday's construction is prohibited
Only completed applications will be accepted with attached insurance certificates and County license

NOTICE OF APPLICATION AND HEARING

Board of Architectural Review
Clerk's Office
Village of Irvington
Westchester County, New York

CERTIFIED MAIL

Date of Mailing 7/31/23

NOTICE:
Pursuant to 9-12 of the code of the Village of Irvington notice to adjacent neighbors (as defined below) is required 10 days prior a meeting where an application for Solar Panels to the Village of Irvington Architectural Board is asking to be heard.

Date of Meeting: 9/5/23
Time of Meeting: Meeting starts at 8pm
Location of Meeting: Trustees Meeting Room
85 Main St. Irvington, NY 10533

Applicant Name	Stacie Varian of Tesla Energy Operations	Owners Name	Teresa Forster
Applicant Mailing Address	1073 Rt 94 Unit 4 New Windsor, NY 12553	Owner Mailing Address	12 Maple St. Irvington, NY 10533
Applicant Phone Number	845-275-6011	Owners Phone Number	914-646-4414
Applicant Email Address	svarian@tesla.com	Owners Email Address	treeforster@gmail.com

Address of Proposed Solar Panels:
Street Address 12 Maple St. Irvington, NY 10533

To Adjacent Neighbors of: Teresa Forster
12 Maple St. Irvington, NY 10533

Please take notice that the applicant named above is requesting the Board of Architectural Review of the Village of Irvington to grant a permit for the installation of **Solar Energy Equipment** to the address listed above.
Plans of the proposed work are available in the office of the Irvington Building Department for public inspection during regular business hours 5 days prior to the scheduled meeting.

9-12. Solar Energy Equipment.
For any application for a building permit for solar energy equipment, written notice of the application and the date, time and place of the meeting at which it will be considered must be given to all adjacent property owners not less than 10 days prior to the meeting date. Notice shall be by a method of mail or a delivery service company providing proof of mailing or delivery or by personal service of such notice on the property owners, evidenced by their signature as acknowledgment of receipt of such notice on a form supplied or similar to one supplied by the Village Clerk. Proof of service of the notice shall be filed prior to or at the meeting at which the application is considered.*
("Adjacent property" refers to any neighbor that shares a property line with the subject property as well as neighbors across any street from the subject property.)

U.S. Postal Service **Certified Mail Receipt**

ARTICLE NUMBER: 9407 1112 0620 3275 0310 59

ARTICLE ADDRESSED TO:

Stefan Bohdanowycz
20 Maple St
Irvington NY 10533-2110

FEES

Postage Per Piece	$0.630
Certified Fee	4.350
Total Postage & Fees	4.980

Postmark Here

U.S. Postal Service **Certified Mail Receipt**

ARTICLE NUMBER: 9407 1112 0620 3275 0314 00

ARTICLE ADDRESSED TO:

Francis O'Shea
8 Maple St
Irvington NY 10533-2110

FEES

Postage Per Piece	$0.630
Certified Fee	4.350
Total Postage & Fees:	4.980

Postmark Here

U.S. Postal Service **Certified Mail Receipt**

ARTICLE NUMBER: 9407 1112 0620 3275 0197 43

ARTICLE ADDRESSED TO:

Sean Tooley
15 Maple St
Irvington NY 10533-2109

FEES

Postage Per Piece	$0.630
Certified Fee	4.350
Total Postage & Fees	4.980

Postmark Here

VILLAGE OF IRVINGTON
BUILDING DEPARTMENT
85 MAIN STREET
IRVINGTON, NEW YORK 10533
TEL: (914) 591-8335 • FAX: (914) 591-5870
Web Site: www.Irvingtonny.gov

LICENSED PROFESSIONAL AFFIDAVIT for RESIDENTIAL SOLAR SYSTEMS

TO BE SUBMITTED AS PART OF THE PERMIT APPLICATION

AFFIDAVIT OF ARCHITECT OR ENGINEER

State of Pennsylvania ss.:
County of Montgomery

I the undersigned, under penalty of perjury, do hereby affirm:

1. I am an the (architect/engineer) duly licensed in the State of New York

2. I am the NYS licensed design professional named in the Application for which a Building Permit for a residential solar system located at 12 Maple St., Irvington, New York 10533.

3. I have inspected the existing building and structure and find that the existing structure with the proposed solar panel installation and connections to the existing roof meet the minimum criteria set forth in;
   Applicable Codes: 2020 ~~2015~~ Residential Code of New York State
   Design Roof Load: 30 psf live load, 115 psf dead load, 45 psf total load
   Design Wind Load: 120 mph, 35psf
   OR have proposed additional measures to insure compliance with above.

4. I have reviewed the following submitted drawings and/or manufacture specifications as part of the submission
   List applicable plans with revision dates:

Teresa Forster	(rev date)	4/25/2023
N/A	(rev date)	N/A
N/A	(rev date)	N/A
N/A	(rev date)	N/A
N/A	(rev date)	N/A
N/A	(rev date)	N/A

5. The plans, drawings and specifications which the Building Permit is requested and listed above, as submitted (a)-were prepared by me or under my supervision, and (b)-to the best of my knowledge comply with the requirements of the Residential Building Code of New York State as adopted by the Village of Irvington, applicable design loads and all other applicable laws, rules and regulations governing building construction.

Chris Kim Digitally signed by Chris Kim Date: 2023.07.24 11:22:06 -04'00'

Signature

Chris Kim, P.E.

(Architect) (Engineer)

Sworn to before me this
24h day of July, 2023

esther

Notary Public

Commonwealth of Pennsylvania - Notary Seal
ESTHER Y KIM - Notary Public
Montgomery County
My Commission Expires December 22, 2025
Commission Number 1409619

TESLA

Version #96.9 - 3

July 18, 2023

Certification Letter

Project/Job # 1056256
Project Address: Forster Residence
12 Maple St
Irvington, NY 10533

AHJ Irvington Village
Tesla Operations Center New Windsor

Design Criteria:

- Applicable Codes = 2020 RCNYS/BCNYS/EBCNYS with 2020 NYSUCS, ASCE 7-16, and 2018 NDS
- Risk Category = II
- Wind Speed = 120 mph (3-s Gust - Vult), Exposure Category C, Partially/Fully Enclosed Method
- Ground Snow Load = 35 psf
- MP1: 2x6 Finished Attic @ 24" OC, Comp Roof, Roof DL = 12.5 psf, Roof LL/SL = 24.3 psf (Non-PV), Roof LL/SL = 14.6 psf (PV)
- MP2: 2x6 Finished Attic @ 24" OC, Comp Roof, Roof DL = 12.5 psf, Roof LL/SL = 20.2 psf (Non-PV), Roof LL/SL = 11 psf (PV)
- MP3: 2x12 Stick Frame @ 16" OC, Comp Roof, Roof DL = 12 psf, Roof LL/SL = 24.3 psf (Non-PV), Roof LL/SL = 15 psf (PV)

Note: Per IBC 1613.1; Seismic check is not required because Ss = 0.297 < 0.4g and Seismic Design Category (SDC) = B < D

To Whom It May Concern,

A jobsite survey of the existing framing system of the address indicated above was performed by a site survey team from Tesla. Structural evaluation was based on site observations and the design criteria listed above.

Based on this evaluation, I certify that the alteration to the existing structure by installation of the PV system meets the prescriptive compliance requirements of the applicable existing building and/or new building provisions adopted/referenced above.

Additionally, I certify that the PV module assembly including all standoffs supporting it have been reviewed to be in accordance with the manufacturer's specifications and to meet and/or exceed all requirements set forth by the referenced codes for loading.

The PV assembly hardware specifications are contained in the plans/docs submitted for approval.

Chris Kim
Digitally signed by Chris Kim
Date: 2023.07.19 10:20:28 -04'00'

STRUCTURE ANALYSIS - LOADING SUMMARY AND MEMBER CHECK - MP1

Member Properties Summary					
MP1		Horizontal Member Spans		Rafter Properties	
		Overhang	1.20 ft	Actual W	1.50"
Roof System Properties		Span 1	10.70 ft	Actual D	5.50"
Number of Spans (w/o Overhang)	1	Span 2		Nominal	Yes
Roofing Material	Comp Roof	Span 3		A (in^2)	8.25
Re-Roof	No	Span 4		Sx (in.^3)	7.56
Plywood Sheathing	Yes	Span 5		Ix (in^4)	20.80
Board Sheathing	None	Total Rake Span	14.35 ft	TL Defl'n Limit	120
Vaulted Ceiling	Yes	PV 1 Start	1.83 ft	Wood Species	SPF
Ceiling Finish	1/2" Gypsum Board	PV 1 End	10.25 ft	Wood Grade	#2
Rafter Slope	34°	PV 2 Start		Fb (psi)	875
Rafter Spacing	24" O.C.	PV 2 End		Fv (psi)	135
Top Lat Bracing	Full	PV 3 Start		E (psi)	1,400,000
Bot Lat Bracing	Full	PV 3 End		E-min (psi)	510,000

Member Loading Summary					
Roof Pitch	8/12	Initial	Pitch Adjust	Non-PV Areas	PV Areas
Roof Dead Load	DL	12.5 psf	x 1.21	15.1 psf	15.1 psf
PV Dead Load	PV-DL	3.0 psf	x 1.21		3.6 psf
Roof Live Load	RLL	20.0 psf	x 0.80	16.0 psf	
Snow Load	SL[1,2]	35.0 psf	x 0.69 I x 0.42	24.3 psf	14.6 psf
Total Load (Governing LC)	TL			39.4 psf	33.3 psf

Notes: 1. ps = Cs*pf; Cs -roof, Cs -pv per ASCE 7 [Figure 7.4-1]; 2. pf = 0.7 (Ce) (Ct) (Is) pg ; Ce=0.9, Ct=1.1, Is=1.0;

Member Analysis Results Summary					
Governing Analysis	Pre-PV	Load (psf)	Post-PV	Net Impact	Result
Gravity Loading Check	39.4		33.3	-15%	Pass

LOAD ITEMIZATION - MP1

Net PV System Load		
PV Module Weight		2.5 psf
Hardware Assembly Weight (psf)		0.5 psf
Net PV System Weight		**3.0 psf**

Roof Dead Load	Non-PV Areas	Material	PV Areas
Roof Category Description		MP1	
Original/Existing Roofing Material	5.0 psf	Comp Roof (2 Layers)	5.0 psf
Re-Roof (Under PV Assembly)		No	
Underlayment	0.5 psf	Roofing Paper	0.5 psf
Plywood Sheathing	1.5 psf	Yes	1.5 psf
Board Sheathing		None	
Rafter Size and Spacing	1.1 psf	2 x 6 @ 24 in. O.C.	1.1 psf
Vaulted Ceiling	3.0 psf	Yes	3.0 psf
Miscellaneous	1.4 psf	Miscellaneous Items	1.4 psf
Total Roof Dead Load	**12.5 psf**	**(MP1)**	**12.5 psf**

Reduced Roof LL	Non-PV Areas	Value	ASCE 7-16
Roof Live Load	L_o	20.0 psf	Table 4.3-1
Member Tributary Area	A_t	$\leq$ 200 sf	
Roof Slope		8/12	
Tributary Area Reduction	R_1	1	Section 4.8
Sloped Roof Reduction	R_2	0.8	Section 4.8
Reduced Roof Live Load	Lr	$L_r = L_o (R_1) (R_2)$	Equation 4.8-1
Reduced Roof Live Load	**Lr**	**16 psf (MP1)**	**16.0 psf**

Reduced Ground/Roof Live/Snow Loads			Code
Ground Snow Load	p_g	35.0 psf	Table 7-1
Snow Load Reductions Allowed?		Yes	
Snow Guards to be Installed?		No	
Effective Roof Slope		34°	
Horiz. Distance from Eve to Ridge	W	11.9 ft	
Snow Importance Factor	I_s	1.0	Table 1.5-2
Snow Exposure Factor	C_e	Fully Exposed 0.9	Table 7-2
Snow Thermal Factor	C_t	Structures kept just above freezing 1.1	Table 7-3
Minimum Flat Roof Snow Load (w/ Rain-on-Snow Surcharge)	$p_{f\text{-}min}$	24.3 psf	7.3.4 & 7.10
Flat Roof Snow Load	p_f	$p_f = 0.7 (C_e) (C_t) (I) pg$; $p_f \geq$ pf-min 24.3 psf	Eq: 7.3-1 **69%**

ASCE Design Sloped Roof Snow Load Over Surrounding Roof			
Surface Condition of Surrounding Roof	$C_{s\text{-}roof}$	All Other Surfaces 1.0	Figure 7-2
Design Roof Snow Load Over Surrounding Roof	$p_{s\text{-}roof}$	$p_{s\text{-}roof} = (C_{s\text{-}roof}) p_f$ **24.3 psf**	**ASCE Eq: 7.4-1** **69%**

ASCE Design Sloped Roof Snow Load Over PV Modules			
Surface Condition of PV Modules	$C_{s\text{-}pv}$	Unobstructed Slippery Surfaces 0.6	Figure 7-2
Design Snow Load Over PV Modules	$p_{s\text{-}pv}$	$p_{s\text{-}pv} = (C_{s\text{-}pv}) p_f$ **14.6 psf**	**ASCE Eq: 7.4-1** **42%**

ZEP HARDWARE DESIGN CALCULATIONS - MP1

Mounting Plane Information			
Roofing Material		Comp Roof	
Roof Slope		34°	
Framing Type / Direction		Y-Y Rafters	
PV System Type		SolarCity SleekMount™	
Zep System Type		ZS Comp	
Standoff (Attachment Hardware)		ZS Comp V4 with Flashing Insert	
Spanning Vents		No	

Wind Design Criteria			
Design Standard		ASCE 7-16	
Wind Design Method		Partially/Fully Enclosed Method	
Ultimate Wind Speed	V-Ult	120 mph	Fig. 26.5-1B
Exposure Category		C	Section 26.7
Roof Style		Hip Roof	Fig. 30.3-2A/B/C/D/E/G/H-5A/B
Mean Roof Height	h	25 ft	Section 26.2

Notes: 1. Risk Category = II

Wind Pressure Calculation Coefficients			
Wind Pressure Exposure	K_z	0.95	Table 26.10-1
Topographic Factor	K_{zt}	1.00	Section 26.8
Wind Directionality Factor	K_d	0.85	Section 26.6-1
Ground Elevation Factor	Ke	1.00	Table 26.9-1
Velocity Pressure	**q_h**	**qh = 0.00256 (Kz) (Kzt) (Kd) (Ke) (V^2) 29.7 psf**	**Equation 26.10-1**

		Wind Pressure			
Ext. Pressure Coefficient (Up)	GCp (Up)	-1.11	-1.46	-1.50	Fig. 30.3-2A/B/C/D/E/G/H-5A/B
Ext. Pressure Coefficient (Down)	GCp (Down)	0.54	0.56	0.56	Fig. 30.3-2A/B/C/D/E/G/H-5A/B
Design Wind Pressure	p	p = qh (yE) (ya) (GCp); yE = 1.15, yA = 0.60			Equation 29.4-7
Wind Pressure Up (Design | Ult)	**$p_{(up)}$**	**-13.7 | -22.8 psf**	**-18 | -30 psf**	**-18.5 | -30.9 psf**	
Wind Pressure Down (Design | Ult)	**$p_{(down)}$**	**9.6 | 16 psf**	**9.6 | 16 psf**	**9.6 | 16 psf**	

Notes: 1. Wind Zone Perimeter Width (a) = 3.0 ft.; Effective Wind Area (A) = 21.3 sf

2. yE = Array Edge Factor and yA = Solar Panel Pressure Equalization Factor per SEAoC PV2-2017

ALLOWABLE STANDOFF SPACINGS

		X-Direction			Y-Direction
		WZ1	WZ2e, 2r	WZ3	All WZs
Max Allowable Standoff Spacing	Landscape	72"	72"	72"	41" | 41" | 41"
Max Allowable Cantilever	Landscape	24"	24"	24"	NA | NA | NA
Standoff Configuration	Landscape	Staggered	Staggered	Staggered	
Max Standoff Tributary Area (Interior)	Trib	21 sf	21 sf	21 sf	
PV Assembly Dead Load	W-PV	3.0 psf	3.0 psf	3.0 psf	
Net Wind Uplift at Standoff (Interior)	T-actual	-251 lbs	-340 lbs	-351 lbs	
Uplift Capacity of Standoff	T-allow	456 lbs	456 lbs	456 lbs	
Standoff Demand/Capacity (Interior)	DCR	55.2%	74.6%	76.9%	

		X-Direction			Y-Direction
		WZ1	WZ2e, 2r	WZ3	All WZs
Max Allowable Standoff Spacing	Portrait	48"	48"	48"	74" | 74" | 74"
Max Allowable Cantilever	Portrait	21"	18"	17"	NA | NA | NA
Standoff Configuration	Portrait	Staggered	Staggered	Staggered	
Max Standoff Tributary Area (Interior)	Trib	25 sf	25 sf	25 sf	
PV Assembly Dead Load	W-PV	3.0 psf	3.0 psf	3.0 psf	
Net Wind Uplift at Standoff (Interior)	T-actual	-303 lbs	-410 lbs	-422 lbs	
Uplift Capacity of Standoff	T-allow	456 lbs	456 lbs	456 lbs	
Standoff Demand/Capacity (Interior)	DCR	66.4%	89.8%	92.6%	

Notes: 1. X and Y are maximums that are always relative to the structure framing that supports the PV. X is across framing members and Y is along framing members.

STRUCTURE ANALYSIS - LOADING SUMMARY AND MEMBER CHECK - MP2

Member Properties Summary					
MP2		Horizontal Member Spans		Rafter Properties	
		Overhang	1.20 ft	Actual W	1.50"
Roof System Properties		Span 1	3.04 ft	Actual D	5.50"
Number of Spans (w/o Overhang)	2	Span 2	10.70 ft	Nominal	Yes
Roofing Material	Comp Roof	Span 3		A (in^2)	8.25
Re-Roof	No	Span 4		Sx (in.^3)	7.56
Plywood Sheathing	Yes	Span 5		Ix (in^4)	20.80
Board Sheathing	None	Total Rake Span	20.42 ft	TL Defl'n Limit	180
Vaulted Ceiling	Yes	PV 1 Start	10.83 ft	Wood Species	SPF
Ceiling Finish	1/2" Gypsum Board	PV 1 End	13.33 ft	Wood Grade	#2
Rafter Slope	43°	PV 2 Start		Fb (psi)	875
Rafter Spacing	24" O.C.	PV 2 End		Fv (psi)	135
Top Lat Bracing	Full	PV 3 Start		E (psi)	1,400,000
Bot Lat Bracing	Full	PV 3 End		E-min (psi)	510,000

Member Loading Summary					
Roof Pitch	11/12	Initial	Pitch Adjust	Non-PV Areas	PV Areas
Roof Dead Load	DL	12.5 psf	x 1.37	17.1 psf	17.1 psf
PV Dead Load	PV-DL	3.0 psf	x 1.37		4.1 psf
Roof Live Load	RLL	20.0 psf	x 0.65	13.0 psf	
Snow Load	SL[1,2]	35.0 psf	x 0.58 I x 0.31	20.2 psf	11.0 psf
Total Load (Governing LC)	TL			37.3 psf	32.2 psf

Notes: 1. ps = Cs*pf; Cs -roof, Cs -pv per ASCE 7 [Figure 7.4-1]; 2. pf = 0.7 (Ce) (Ct) (Is) pg ; Ce=0.9, Ct=1.1, Is=1.0;

Member Analysis Results Summary					
Governing Analysis	Pre-PV	Load (psf)	Post-PV	Net Impact	Result
Gravity Loading Check	37.3		32.2	-14%	Pass

LOAD ITEMIZATION - MP2

Net PV System Load		
PV Module Weight		2.5 psf
Hardware Assembly Weight (psf)		0.5 psf
Net PV System Weight		**3.0 psf**

Roof Dead Load	Non-PV Areas	Material	PV Areas
Roof Category Description		MP2	
Original/Existing Roofing Material	5.0 psf	Comp Roof (2 Layers)	5.0 psf
Re-Roof (Under PV Assembly)		No	
Underlayment	0.5 psf	Roofing Paper	0.5 psf
Plywood Sheathing	1.5 psf	Yes	1.5 psf
Board Sheathing		None	
Rafter Size and Spacing	1.1 psf	2 x 6 @ 24 in. O.C.	1.1 psf
Vaulted Ceiling	3.0 psf	Yes	3.0 psf
Miscellaneous	1.4 psf	Miscellaneous Items	1.4 psf
Total Roof Dead Load	**12.5 psf**	**(MP2)**	**12.5 psf**

Reduced Roof LL	Non-PV Areas	Value	ASCE 7-16
Roof Live Load	L_o	20.0 psf	Table 4.3-1
Member Tributary Area	A_t	$\leq$ 200 sf	
Roof Slope		11/12	
Tributary Area Reduction	R_1	1	Section 4.8
Sloped Roof Reduction	R_2	0.65	Section 4.8
Reduced Roof Live Load	Lr	$L_r = L_o (R_1) (R_2)$	Equation 4.8-1
Reduced Roof Live Load	**Lr**	**13 psf (MP2)**	**13.0 psf**

Reduced Ground/Roof Live/Snow Loads			Code
Ground Snow Load	p_g	35.0 psf	Table 7-1
Snow Load Reductions Allowed?		Yes	
Snow Guards to be Installed?		No	
Effective Roof Slope		43°	
Horiz. Distance from Eve to Ridge	W	14.9 ft	
Snow Importance Factor	I_s	1.0	Table 1.5-2
Snow Exposure Factor	C_e	Fully Exposed 0.9	Table 7-2
Snow Thermal Factor	C_t	Structures kept just above freezing 1.1	Table 7-3
Minimum Flat Roof Snow Load (w/ Rain-on-Snow Surcharge)	$p_{f\text{-}min}$	24.3 psf	7.3.4 & 7.10
Flat Roof Snow Load	p_f	$p_f = 0.7 (C_e) (C_t) (I) pg$; $p_f \geq$ pf-min 24.3 psf	Eq: 7.3-1 **69%**

ASCE Design Sloped Roof Snow Load Over Surrounding Roof			
Surface Condition of Surrounding Roof	$C_{s\text{-}roof}$	All Other Surfaces 0.8	Figure 7-2
Design Roof Snow Load Over Surrounding Roof	**$p_{s\text{-}roof}$**	**$p_{s\text{-}roof} = (C_{s\text{-}roof}) p_f$** **20.2 psf**	**ASCE Eq: 7.4-1** **58%**

ASCE Design Sloped Roof Snow Load Over PV Modules			
Surface Condition of PV Modules	$C_{s\text{-}pv}$	Unobstructed Slippery Surfaces 0.5	Figure 7-2
Design Snow Load Over PV Modules	**$p_{s\text{-}pv}$**	**$p_{s\text{-}pv} = (C_{s\text{-}pv}) p_f$** **11.0 psf**	**ASCE Eq: 7.4-1** **31%**

ZEP HARDWARE DESIGN CALCULATIONS - MP2

Mounting Plane Information			
Roofing Material		Comp Roof	
Roof Slope		43°	
Framing Type / Direction		Y-Y Rafters	
PV System Type		SolarCity SleekMount™	
Zep System Type		ZS Comp	
Standoff (Attachment Hardware)		ZS Comp V4 with Flashing Insert	
Spanning Vents		No	

Wind Design Criteria			
Design Standard		ASCE 7-16	
Wind Design Method		Partially/Fully Enclosed Method	
Ultimate Wind Speed	V-Ult	120 mph	Fig. 26.5-1B
Exposure Category		C	Section 26.7
Roof Style		Gable Roof	Fig. 30.3-2A/B/C/D/E/G/H-5A/B
Mean Roof Height	h	25 ft	Section 26.2

Notes: 1. Risk Category = II

Wind Pressure Calculation Coefficients			
Wind Pressure Exposure	K_z	0.95	Table 26.10-1
Topographic Factor	K_{zt}	1.00	Section 26.8
Wind Directionality Factor	K_d	0.85	Section 26.6-1
Ground Elevation Factor	Ke	1.00	Table 26.9-1
Velocity Pressure	q_h	**qh = 0.00256 (Kz) (Kzt) (Kd) (Ke) (V^2) 29.7 psf**	**Equation 26.10-1**

		Wind Pressure			
Ext. Pressure Coefficient (Up)	GCp (Up)	-1.47	-1.75	-2.16	Fig. 30.3-2A/B/C/D/E/G/H-5A/B
Ext. Pressure Coefficient (Down)	GCp (Down)	0.77	0.77	0.77	Fig. 30.3-2A/B/C/D/E/G/H-5A/B
Design Wind Pressure	p	p = qh (yE) (ya) (GCp); yE = 1.15, yA = 0.60			Equation 29.4-7
Wind Pressure Up (Design | Ult)	$p_{(up)}$	**-18.2 | -30.3 psf**	**-21.6 | -36 psf**	**-26.7 | -44.5 psf**	
Wind Pressure Down (Design | Ult)	$p_{(down)}$	**9.6 | 16 psf**	**9.6 | 16 psf**	**9.6 | 16 psf**	

Notes: 1. Wind Zone Perimeter Width (a) = 3.0 ft.; Effective Wind Area (A) = 21.3 sf
2. yE = Array Edge Factor and yA = Solar Panel Pressure Equalization Factor per SEAoC PV2-2017

ALLOWABLE STANDOFF SPACINGS

		X-Direction			Y-Direction
		WZ1, 2e, 2r	WZ2n, 3r	WZ3e	All WZs
Max Allowable Standoff Spacing	Landscape	72"	72"	48"	41" | 41" | 41"
Max Allowable Cantilever	Landscape	24"	24"	21"	NA | NA | NA
Standoff Configuration	Landscape	Staggered	Staggered	Staggered	
Max Standoff Tributary Area (Interior)	Trib	21 sf	21 sf	14 sf	
PV Assembly Dead Load	W-PV	3.0 psf	3.0 psf	3.0 psf	
Net Wind Uplift at Standoff (Interior)	T-actual	-347 lbs	-417 lbs	-348 lbs	
Uplift Capacity of Standoff	T-allow	456 lbs	456 lbs	456 lbs	
Standoff Demand/Capacity (Interior)	DCR	76.1%	91.5%	76.4%	

		X-Direction			Y-Direction
		WZ1, 2e, 2r	WZ2n, 3r	WZ3e	All WZs
Max Allowable Standoff Spacing	Portrait	48"	24"	24"	74" | 74" | 74"
Max Allowable Cantilever	Portrait	17"	15"	12"	NA | NA | NA
Standoff Configuration	Portrait	Staggered	Staggered	Staggered	
Max Standoff Tributary Area (Interior)	Trib	25 sf	12 sf	12 sf	
PV Assembly Dead Load	W-PV	3.0 psf	3.0 psf	3.0 psf	
Net Wind Uplift at Standoff (Interior)	T-actual	-418 lbs	-251 lbs	-315 lbs	
Uplift Capacity of Standoff	T-allow	456 lbs	456 lbs	456 lbs	
Standoff Demand/Capacity (Interior)	DCR	91.7%	55.1%	69.0%	

Notes: 1. X and Y are maximums that are always relative to the structure framing that supports the PV. X is across framing members and Y is along framing members.

STRUCTURE ANALYSIS - LOADING SUMMARY AND MEMBER CHECK - MP3

Member Properties Summary					
MP3		Horizontal Member Spans		Rafter Properties	
		Overhang	1.20 ft	Actual W	1.50"
Roof System Properties		Span 1	8.06 ft	Actual D	11.25"
Number of Spans (w/o Overhang)	1	Span 2		Nominal	Yes
Roofing Material	Comp Roof	Span 3		A (in^2)	16.88
Re-Roof	No	Span 4		Sx (in.^3)	31.64
Plywood Sheathing	Yes	Span 5		Ix (in^4)	177.98
Board Sheathing	None	Total Rake Span	11.04 ft	TL Defl'n Limit	120
Vaulted Ceiling	No	PV 1 Start	1.17 ft	Wood Species	SPF
Ceiling Finish	1/2" Gypsum Board	PV 1 End	6.67 ft	Wood Grade	#2
Rafter Slope	33°	PV 2 Start		Fb (psi)	875
Rafter Spacing	16" O.C.	PV 2 End		Fv (psi)	135
Top Lat Bracing	Full	PV 3 Start		E (psi)	1,400,000
Bot Lat Bracing	At Supports	PV 3 End		E-min (psi)	510,000

Member Loading Summary					
Roof Pitch	8/12	Initial	Pitch Adjust	Non-PV Areas	PV Areas
Roof Dead Load	DL	12.0 psf	x 1.19	14.3 psf	14.3 psf
PV Dead Load	PV-DL	3.0 psf	x 1.19		3.6 psf
Roof Live Load	RLL	20.0 psf	x 0.80	16.0 psf	
Snow Load	SL[1,2]	35.0 psf	x 0.69 I x 0.43	24.3 psf	15.0 psf
Total Load (Governing LC)	**TL**			**38.6 psf**	**32.9 psf**

Notes: 1. ps = Cs*pf; Cs -roof, Cs -pv per ASCE 7 [Figure 7.4-1]; 2. pf = 0.7 (Ce) (Ct) (Is) pg ; Ce=0.9, Ct=1.1, Is=1.0;

Member Analysis Results Summary					
Governing Analysis	Pre-PV	Load (psf)	Post-PV	Net Impact	Result
Gravity Loading Check	**38.6**		**32.9**	**-15%**	**Pass**

LOAD ITEMIZATION - MP3

Net PV System Load		
PV Module Weight		2.5 psf
Hardware Assembly Weight (psf)		0.5 psf
Net PV System Weight		**3.0 psf**

Roof Dead Load	Non-PV Areas	Material	PV Areas
Roof Category Description		MP3	
Original/Existing Roofing Material	5.0 psf	Comp Roof (2 Layers)	5.0 psf
Re-Roof (Under PV Assembly)		No	
Underlayment	0.5 psf	Roofing Paper	0.5 psf
Plywood Sheathing	1.5 psf	Yes	1.5 psf
Board Sheathing		None	
Rafter Size and Spacing	3.5 psf	2 x 12 @ 16 in. O.C.	3.5 psf
Vaulted Ceiling		No	
Miscellaneous	1.5 psf	Miscellaneous Items	1.5 psf
Total Roof Dead Load	**12.0 psf**	**(MP3)**	**12.0 psf**

Reduced Roof LL	Non-PV Areas	Value	ASCE 7-16
Roof Live Load	L_o	20.0 psf	Table 4.3-1
Member Tributary Area	A_t	$\leq$ 200 sf	
Roof Slope		8/12	
Tributary Area Reduction	R_1	1	Section 4.8
Sloped Roof Reduction	R_2	0.8	Section 4.8
Reduced Roof Live Load	Lr	$L_r = L_o (R_1) (R_2)$	Equation 4.8-1
Reduced Roof Live Load	**Lr**	**16 psf (MP3)**	**16.0 psf**

Reduced Ground/Roof Live/Snow Loads			Code
Ground Snow Load	p_g	35.0 psf	Table 7-1
Snow Load Reductions Allowed?		Yes	
Snow Guards to be Installed?		No	
Effective Roof Slope		33°	
Horiz. Distance from Eve to Ridge	W	9.3 ft	
Snow Importance Factor	I_s	1.0	Table 1.5-2
Snow Exposure Factor	C_e	Fully Exposed 0.9	Table 7-2
Snow Thermal Factor	C_t	Structures kept just above freezing 1.1	Table 7-3
Minimum Flat Roof Snow Load (w/ Rain-on-Snow Surcharge)	$p_{f\text{-}min}$	24.3 psf	7.3.4 & 7.10
Flat Roof Snow Load	p_f	$p_f = 0.7 (C_e) (C_t) (I) pg$; $p_f \geq$ pf-min 24.3 psf	Eq: 7.3-1 **69%**

ASCE Design Sloped Roof Snow Load Over Surrounding Roof			
Surface Condition of Surrounding Roof	$C_{s\text{-}roof}$	All Other Surfaces 1.0	Figure 7-2
Design Roof Snow Load Over Surrounding Roof	$p_{s\text{-}roof}$	$p_{s\text{-}roof} = (C_{s\text{-}roof}) p_f$ **24.3 psf**	**ASCE Eq: 7.4-1** **69%**

ASCE Design Sloped Roof Snow Load Over PV Modules			
Surface Condition of PV Modules	$C_{s\text{-}pv}$	Unobstructed Slippery Surfaces 0.6	Figure 7-2
Design Snow Load Over PV Modules	$p_{s\text{-}pv}$	$p_{s\text{-}pv} = (C_{s\text{-}pv}) p_f$ **15.0 psf**	**ASCE Eq: 7.4-1** **43%**

ZEP HARDWARE DESIGN CALCULATIONS - MP3

Mounting Plane Information			
Roofing Material		Comp Roof	
Roof Slope		33°	
Framing Type / Direction		Y-Y Rafters	
PV System Type		SolarCity SleekMount™	
Zep System Type		ZS Comp	
Standoff (Attachment Hardware)		ZS Comp V4 with Flashing Insert	
Spanning Vents		No	

Wind Design Criteria			
Design Standard		ASCE 7-16	
Wind Design Method		Partially/Fully Enclosed Method	
Ultimate Wind Speed	V-Ult	120 mph	Fig. 26.5-1B
Exposure Category		C	Section 26.7
Roof Style		Gable Roof	Fig. 30.3-2A/B/C/D/E/G/H-5A/B
Mean Roof Height	h	25 ft	Section 26.2

Notes: 1. Risk Category = II

Wind Pressure Calculation Coefficients			
Wind Pressure Exposure	K_z	0.95	Table 26.10-1
Topographic Factor	K_{zt}	1.00	Section 26.8
Wind Directionality Factor	K_d	0.85	Section 26.6-1
Ground Elevation Factor	Ke	1.00	Table 26.9-1
Velocity Pressure	q_h	**qh = 0.00256 (Kz) (Kzt) (Kd) (Ke) (V^2) 29.7 psf**	**Equation 26.10-1**

		Wind Pressure			
Ext. Pressure Coefficient (Up)	GCp (Up)	-1.47	-1.75	-2.16	Fig. 30.3-2A/B/C/D/E/G/H-5A/B
Ext. Pressure Coefficient (Down)	GCp (Down)	0.77	0.77	0.77	Fig. 30.3-2A/B/C/D/E/G/H-5A/B
Design Wind Pressure	p	p = qh (yE) (ya) (GCp); yE = 1.15, yA = 0.60			Equation 29.4-7
Wind Pressure Up (Design | Ult)	$p_{(up)}$	**-18.2 | -30.3 psf**	**-21.6 | -36 psf**	**-26.7 | -44.5 psf**	
Wind Pressure Down (Design | Ult)	$p_{(down)}$	**9.6 | 16 psf**	**9.6 | 16 psf**	**9.6 | 16 psf**	

Notes: 1. Wind Zone Perimeter Width (a) = 3.0 ft.; Effective Wind Area (A) = 21.3 sf

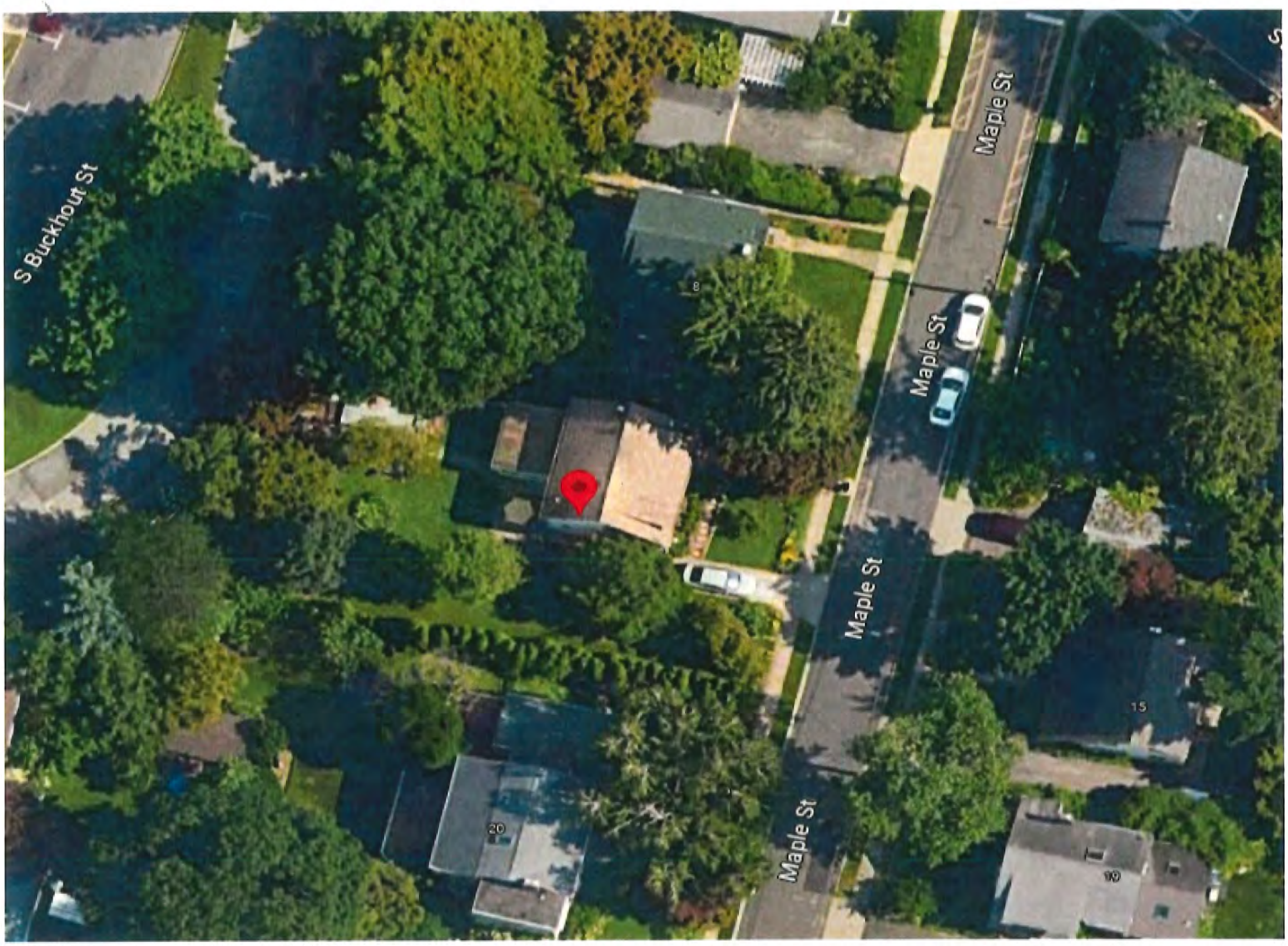
2. yE = Array Edge Factor and yA = Solar Panel Pressure Equalization Factor per SEAoC PV2-2017

ALLOWABLE STANDOFF SPACINGS

		X-Direction			Y-Direction
		WZ1, 2e, 2r	WZ2n, 3r	WZ3e	All WZs
Max Allowable Standoff Spacing	Landscape	64"	64"	48"	41" | 41" | 41"
Max Allowable Cantilever	Landscape	24"	24"	21"	NA | NA | NA
Standoff Configuration	Landscape	Staggered	Staggered	Staggered	
Max Standoff Tributary Area (Interior)	Trib	18 sf	18 sf	14 sf	
PV Assembly Dead Load	W-PV	3.0 psf	3.0 psf	3.0 psf	
Net Wind Uplift at Standoff (Interior)	T-actual	-305 lbs	-367 lbs	-346 lbs	
Uplift Capacity of Standoff	T-allow	456 lbs	456 lbs	456 lbs	
Standoff Demand/Capacity (Interior)	DCR	66.9%	80.6%	75.8%	

		X-Direction			Y-Direction
		WZ1, 2e, 2r	WZ2n, 3r	WZ3e	All WZs
Max Allowable Standoff Spacing	Portrait	48"	32"	32"	74" | 74" | 74"
Max Allowable Cantilever	Portrait	18"	15"	12"	NA | NA | NA
Standoff Configuration	Portrait	Staggered	Staggered	Staggered	
Max Standoff Tributary Area (Interior)	Trib	25 sf	17 sf	17 sf	
PV Assembly Dead Load	W-PV	3.0 psf	3.0 psf	3.0 psf	
Net Wind Uplift at Standoff (Interior)	T-actual	-413 lbs	-332 lbs	-416 lbs	
Uplift Capacity of Standoff	T-allow	456 lbs	456 lbs	456 lbs	
Standoff Demand/Capacity (Interior)	DCR	90.6%	72.8%	91.3%	

Notes: 1. X and Y are maximums that are always relative to the structure framing that supports the PV. X is across framing members and Y is along framing members.



S Buckhout St
Maple St
Maple St
Maple St
Maple St
8
15
20
19


Maple St


Maple St

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

ALL WORK TO COMPLY WITH SECTION R327 OF THE 2020 RESIDENTIAL CODE OF NYS.

LICENSE

MODULE GROUNDING METHOD: ZEP SOLAR

AHJ: Irvington Village

UTILITY: Consolidated Edison

GENERAL NOTES

1. ALL WORK SHALL COMPLY WITH THE 2020 NYS UNIFORM CODE.
2. ALL ELECTRICAL WORK SHALL COMPLY WITH THE 2017 NATIONAL ELECTRIC CODE.
3. ALL WORK SHALL COMPLY WITH THE 2020 NYS FIRE CODE.
4. ALL WORK SHALL COMPLY WITH THE 2020 BUILDING CODE OF NYS.
5. ALL WORK SHALL COMPLY WITH THE 2020 RESIDENTIAL CODE OF NYS.
6. ALL WORK SHALL COMPLY WITH THE 2020 EXISTING BUILDING CODE OF NYS.

VICINITY MAP

INDEX

REV	BY	DATE	COMMENTS
REV A	JV	4/25/2023	AHJ updated, renderings added
*	*	*	*
*	*	*	*
*	*	*	*
*	*	*	*

JOB NUMBER: JB-1056256 00

MOUNTING SYSTEM: ZS Comp V4 w Flashing-Insert

MODULES: (16) Hanwha # Q.PEAK DUO BLK ML-G10.a+/TS 400

INVERTER: 7.6 kW Tesla Inc 1538000-45-A (240V)

CUSTOMER:
Teresa Forster
12 Maple St
Irvington, NY 10533

9146464414

DESCRIPTION:
6.4 KW PV ARRAY
13.5 KWH ENERGY STORAGE SYSTEM

PAGE NAME: COVER SHEET

DESIGN: Justin Very

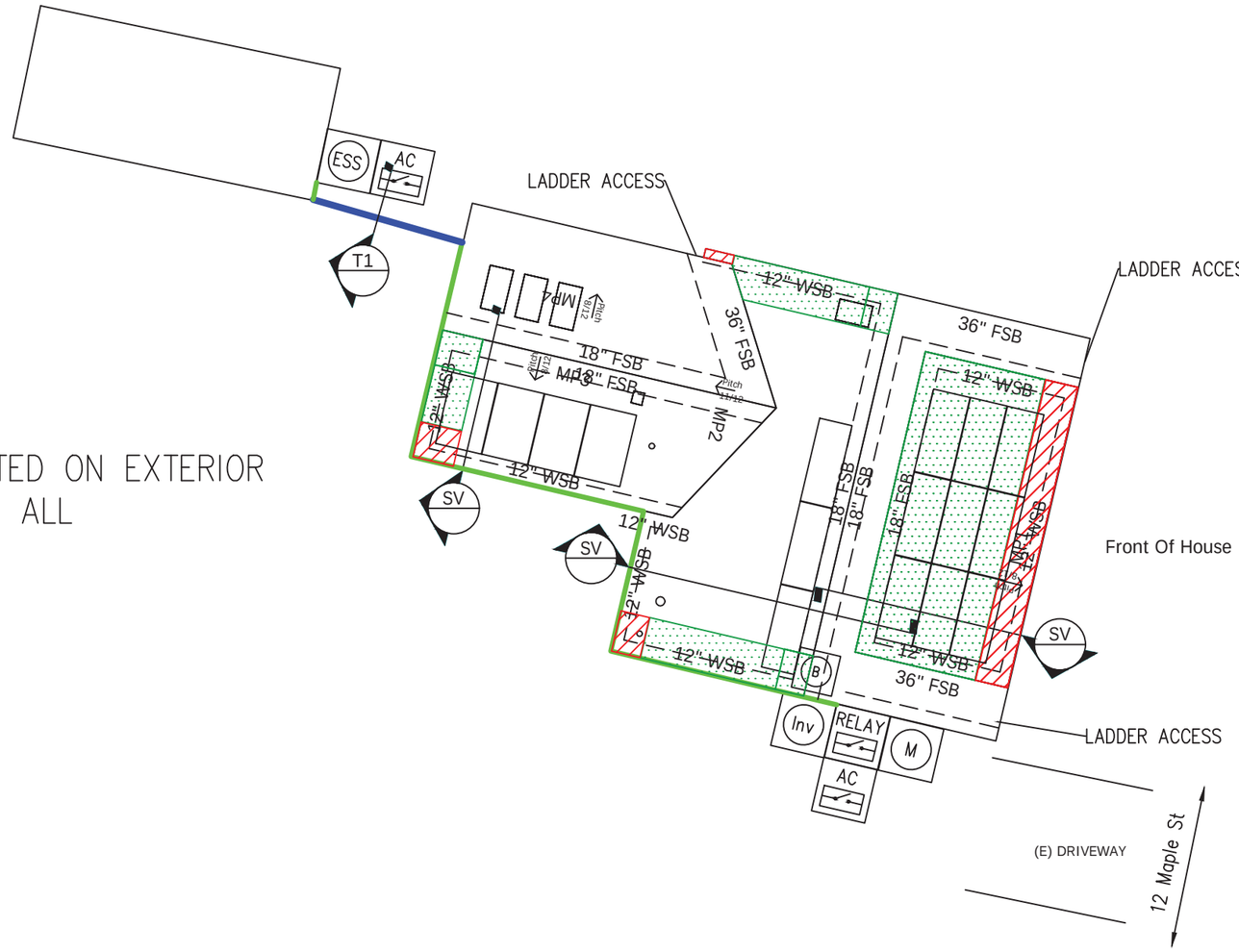
SHEET: 1 REV: A DATE: 4/25/2023

TESLA

PV CIRCUIT BREAKER OR SWITCH
MUST BE
LABELED '89L' OR 'GENERATOR
DISCONNECT SWITCH'

ACCOUNT NUMBER:
511701577000024

ESS TO BE MOUNTED ON EXTERIOR WALL, 3 FT. FROM ALL DOORS/WINDOWS.



MP1	PITCH: 34° (8:12) ARRAY PITCH: 34° (8:12) AZIMUTH: 103 ARRAY AZIMUTH: 103 MATERIAL: Comp Shingle STORY: 2 Stories
MP2	PITCH: 43° (11:12) ARRAY PITCH: 43° (11:12) AZIMUTH: 283 ARRAY AZIMUTH: 283 MATERIAL: Comp Shingle STORY: 2 Stories
MP3	PITCH: 33° (8:12) ARRAY PITCH: 33° (8:12) AZIMUTH: 193 ARRAY AZIMUTH: 193 MATERIAL: Comp Shingle STORY: 2 Stories
MP4	PITCH: 30° (7:12) ARRAY PITCH: 30° (7:12) AZIMUTH: 13 ARRAY AZIMUTH: 180 MATERIAL: Comp Shingle STORY: 2 Stories

STATE OF NEW YORK
CHRIS H. KIM
096407
LICENSED PROFESSIONAL ENGINEER

Chris Kim
Digitally signed by Chris Kim
Date: 2023.07.19 10:20:14 -04'00'

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

TOTAL ARRAY AREA (SF): 347
TOTAL ROOF AREA (SF): 1554

TOTAL ARRAY AREA IS ≈ 22.33
PERCENT OF TOTAL ROOF AREA

SITE PLAN

Scale: 3/32" = 1'

0 1' 10' 21'

N W E S

JOB NUMBER: JB–1056256 00
MOUNTING SYSTEM: ZS Comp V4 w Flashing–Insert
MODULES: (16) Hanwha # Q.PEAK DUO BLK ML–G10.a+/TS 400
INVERTER: 7.6 kW Tesla Inc 1538000–45–A (240V)

CUSTOMER:
Teresa Forster
12 Maple St
Irvington, NY 10533

9146464414

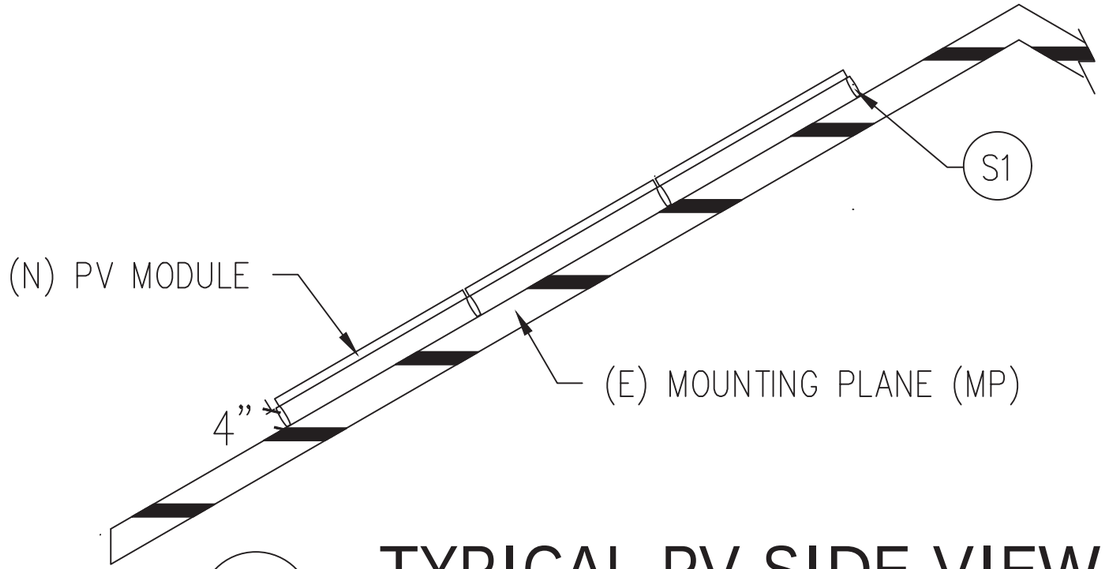
DESCRIPTION:
6.4 KW PV ARRAY
13.5 KWH ENERGY STORAGE SYSTEM

PAGE NAME:
SITE PLAN

DESIGN:
Justin Very

SHEET: 2 REV: A DATE: 4/25/2023

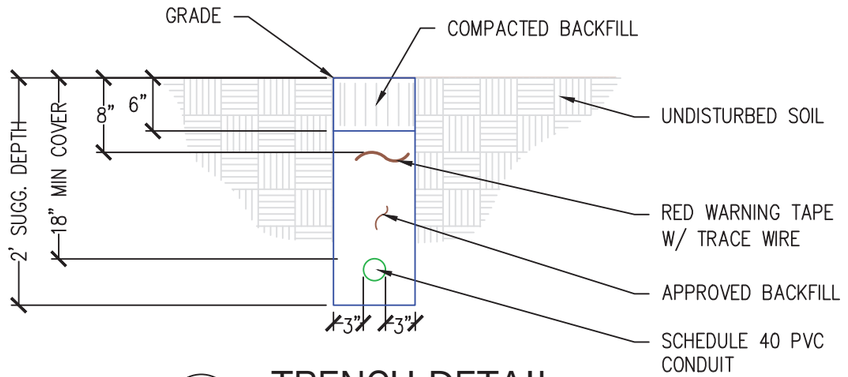
TESLA



SV

TYPICAL PV SIDE VIEW

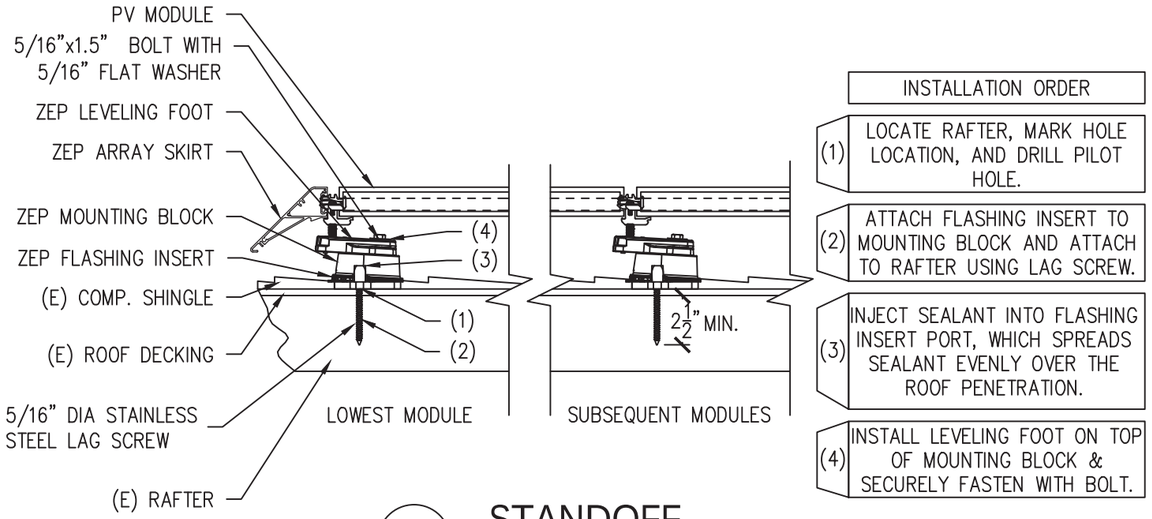
NTS



T1

TRENCH DETAIL

Scale: 3/4"=1'-0"



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'

JOB NUMBER: JB-1056256 00

MOUNTING SYSTEM: ZS Comp V4 w Flashing-Insert

MODULES: (16) Hanwha # Q.PEAK DUO BLK ML-G10.a+/TS 400

INVERTER: 7.6 kW Tesla Inc 1538000-45-A (240V)

CUSTOMER:
Teresa Forster
12 Maple St
Irvington, NY 10533

9146464414

DESCRIPTION:
6.4 KW PV ARRAY
13.5 KWH ENERGY STORAGE SYSTEM

PAGE NAME: STRUCTURAL VIEWS

DESIGN: Justin Very

SHEET: 3 REV: A DATE: 4/25/2023

TESLA

Jobsite Specific Design Criteria			
Design Code		ASCE 7-16	
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	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
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	34	43	33
SL/RLL: PV	14.6	10.9	15.0
SL/RLL: Non-PV	24.3	20.1	24.3

Standoff Spacing and Layout			
MP Name	MP1	MP2	MP3
Applied Wind Zones$_2$	1	1, 2e, 2r	1, 2e, 2r
Wind Pressue	-13.71	-18.18	-18.18
Landscape X-Spacing	72	72	64
Landscape X-Cantilever	24	24	24
Landscape Y-Spacing	41	41	41
Landscape Y-Cantilever	-	-	-
Portrait X-Spacing	48	48	48
Portrait X-Cantilever	21	17	18
Portrait Y-Spacing	74	74	74
Portrait Y-Cantilever	-	-	-
Layout	Staggered	Staggered	Staggered
Applied Wind Zones$_2$	2e, 2r	2n, 3r	2n, 3r
Wind Pressue	-17.41	-21.58	-21.58
Landscape X-Spacing	72	72	64
Landscape X-Cantilever	24	24	24
Landscape Y-Spacing	41	41	41
Landscape Y-Cantilever	-	-	-
Portrait X-Spacing	48	24	32
Portrait X-Cantilever	18	15	15
Portrait Y-Spacing	74	74	74
Portrait Y-Cantilever	-	-	-
Layout	Staggered	Staggered	Staggered
Applied Wind Zones$_2$	3	3e	3e
Wind Pressue	-18.52	-26.69	-26.69
Landscape X-Spacing	72	48	48
Landscape X-Cantilever	24	21	21
Landscape Y-Spacing	41	41	41
Landscape Y-Cantilever	-	-	-
Portrait X-Spacing	48	24	32
Portrait X-Cantilever	17	12	12
Portrait Y-Spacing	74	74	74
Portrait Y-Cantilever	-	-	-
Layout	Staggered	Staggered	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.

JOB NUMBER: JB-1056256 00

MOUNTING SYSTEM: ZS Comp V4 w Flashing-Insert

MODULES: (16) Hanwha # Q.PEAK DUO BLK ML-G10.a+/TS 400

INVERTER: 7.6 kW Tesla Inc 1538000-45-A (240V)

CUSTOMER:
Teresa Forster
12 Maple St
Irvington, NY 10533

9146464414

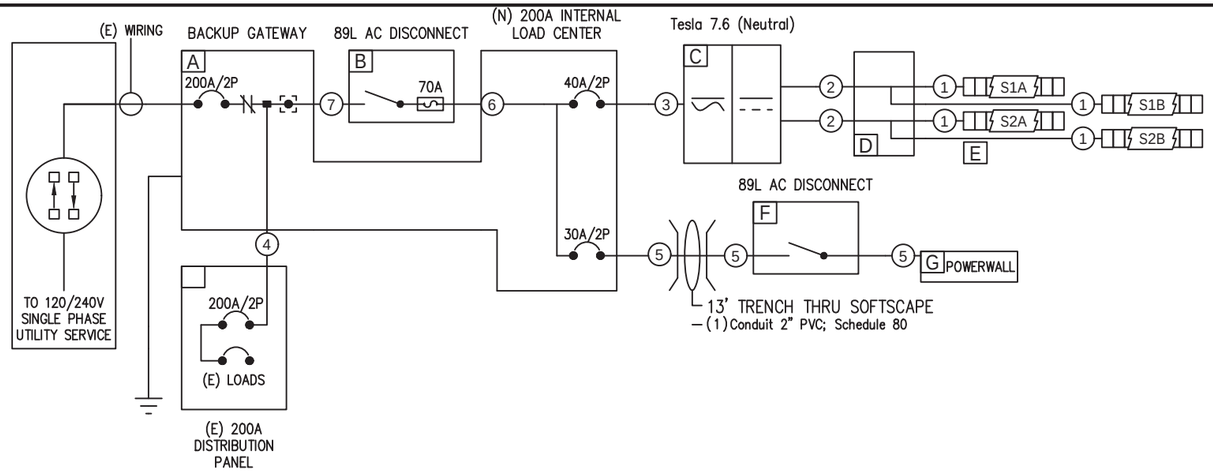
DESCRIPTION:
6.4 KW PV ARRAY
13.5 KWH ENERGY STORAGE SYSTEM

PAGE NAME: UPLIFT CALCULATIONS

DESIGN: Justin Very

SHEET: 4 REV: A DATE: 4/25/2023

TESLA



THE GATEWAY WILL REMAIN OPEN WHEN THE SYSTEM LOSES CONTACT WITH THE UTILITY GRID

EGC ON ROOF TO BE ROUTED WHERE NOT SUBJECT TO PHYSICAL DAMAGE. WHEN ROUTED SUBJECT TO PHYSICAL DAMAGE THE SIZE MUST BE INCREASED TO #6 SOLID BARE COPPER.

POWERWALL MODES OF OPERATION ARE TIME BASED CONTROL OR BACK UP ONLY.

MAIN SERVICE PANEL ENERGIZED FROM UTILITY AND BATTERY STORAGE

AC POWERWALL HAS A BUILT IN INVERTER TESTED TO UL 1741 STANDARDS

William K Lou Digitally signed by William K Lou
Date: 2023.04.25 15:42:44 -07'00'

ACCOUNT NUMBER:
511701577000024

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.
5. ON/OFF ENABLE SWITCH LOCATED ON POWERWALL 3 TO ACT AS THE RAPID SHUTDOWN INITIATION DEVICE PER ARTICLE 690.12(C) OF THE APPLICABLE NEC.

SITE SPECIFICATIONS	
Main Panel Rating	(E) 200A
Main Breaker Rating	(E) 200A
General Notes	DC Ungrounded Inverters
Panel Number	No Match
Meter Number	009670000
Service Entrance	Overhead

MODULE SPECIFICATIONS	
Hanwha # Q.PEAK DUO BLK ML-G10.a+/TS 400: PV Module, 400W, 371.5WPTC, ZEP, Black Frame, MC4, 1000V	
Qty	16
Voc	45.30
Vmp	37.13
Isc and Imp are in the DC Conductor Table	

PARTS

Ref	Qty	Description
A	1	Panelboard Accessory Kit for GW 2.0 NA: 200A, 6sp/12cir, 120/240V, 1PH
	1	Breaker; 40A/2P, 2 Spaces
	1	Breaker; 30A/2P, 2 Spaces
	1	200A Main Circuit Breaker; 2-Pole, 240V, 10kAIC
	1	Tesla # 1232100-00-G: Back-up Gateway 2.0 NA for AC PW 2.0
B	1	Disconnect; 100A, 240Vac, Fusible, NEMA 3R: 2P, 3W, Lockable
	1	Ground/Neutral Kit; 60-100A, General Duty (DG)
	2	Fuse; 70A, 250V, Class RK5: Time Delay, 200kA I.R.
	1	CUTLER-HAMMER # DG100RB: Class R Fuse Kit: Use with 100A, DG Disconnects only
C	1	7.6 kW Tesla Inc 1538000-45-A (240V)
D	1	Tesla 4J 4-String Combiner Box: UNFUSED, GROUNDED, Black, Diag DIN Rail with Bracket/ Cord Grip
E	8	Tesla MCI, 650V, 12A
F	1	Disconnect; 30A, 240Vac, Non-Fusible, NEMA 3R: 2P, 2W, Lockable
	1	Ground/Neutral Kit; 30A, General Duty (DG)
G	1	AC Powerwall 3012170-05-E; ASY, AC POWERWALL2.2, 50F

DC CONDUCTOR TABLE

Ref	Type	Qty	Size (AWG, Cu)	EGC (AWG, Cu)	Conduit	Isc (ADC)	Imp (ADC)
1	PV Wire	2	#10	SBC #06	3/4" EMT	11.14	10.77
2	THWN-2/THWN	2	#08	#10	3/4" EMT	22.28	21.54

AC CONDUCTOR TABLE

Ref	Type	Qty	Size (AWG)		Min EGC (AWG, Cu)	Conduit		Length (ft)	Imp (AAC)	Vmp (VAC)
			(Cu)	(Al)		(Cu)	(Al)			
3	THWN-2	3	#08	#08	#10	3/4" EMT	3/4" EMT	5ft	32	240
4	THWN-2	3	#2/0	#4/0	#06	2" PVC	2" PVC	2ft	–	240
5	THWN-2	3	#10	#08	#10	PVC Jacketed MC	3/4" EMT	2ft	–	240
6	THWN-2	3	#01	#1/0	#06	1 1/4" EMT	2" PVC	2ft	–	240
7	THWN-2	3	#04	#03	#08	1" EMT	1" EMT	5ft	–	240

STRING TABLE

Product Ref	String Ref	Module per String	MCI per String	Voc* (VDC)	Vmp (VDC)	Mounting Plane
C	S1A	4	2	204.68	148.52	
	S1B	4	2	204.68	148.52	
	S2A	4	2	204.68	148.52	
	S2B	4	2	204.68	148.52	

JOB NUMBER: JB-1056256 00

MOUNTING SYSTEM:
ZS Comp V4 w Flashing-Insert

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

INVERTER:
7.6 kW Tesla Inc 1538000-45-A (240V)

CUSTOMER:
Teresa Forster
12 Maple St
Irvington, NY 10533

9146464414

DESCRIPTION:
6.4 KW PV ARRAY
13.5 KWH ENERGY STORAGE SYSTEM

PAGE NAME:
THREE LINE DIAGRAM

DESIGN:
Justin Very

SHEET: 5 REV: A DATE: 4/25/2023

TESLA

STATE OF NEW YORK
WILLIAM KEGANG LOU
EXP 1/31/24
095002-1
LICENSED PROFESSIONAL ENGINEER

ESS TO BE MOUNTED ON EXTERIOR WALL, 3 FT. FROM ALL DOORS/WINDOWS.

ESS LOCATION

JOB NUMBER: JB–1056256 00

MOUNTING SYSTEM: ZS Comp V4 w Flashing–Insert

MODULES: (16) Hanwha # Q.PEAK DUO BLK ML–G10.a+/TS 400

INVERTER: 7.6 kW Tesla Inc 1538000–45–A (240V)

CUSTOMER:
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12 Maple St
Irvington, NY 10533

9146464414

DESCRIPTION:
6.4 KW PV ARRAY
13.5 KWH ENERGY STORAGE SYSTEM

PAGE NAME: ESS LOCATION

DESIGN: Justin Very

SHEET:	REV:	DATE:
6	A	4/25/2023

TESLA

JOB NUMBER: JB–1056256 00

MOUNTING SYSTEM: ZS Comp V4 w Flashing–Insert

MODULES: (16) Hanwha # Q.PEAK DUO BLK ML–G10.a+/TS 400

INVERTER: 7.6 kW Tesla Inc 1538000–45–A (240V)

CUSTOMER:
Teresa Forster
12 Maple St
Irvington, NY 10533

9146464414

DESCRIPTION:
6.4 KW PV ARRAY
13.5 KWH ENERGY STORAGE SYSTEM

PAGE NAME: BOS LOCATION

DESIGN: Justin Very

SHEET: 7 REV: A DATE: 4/25/2023

TESLA

JOB NUMBER: JB–1056256 00

MOUNTING SYSTEM: ZS Comp V4 w Flashing–Insert

MODULES: (16) Hanwha # Q.PEAK DUO BLK ML–G10.a+/TS 400

INVERTER: 7.6 kW Tesla Inc 1538000–45–A (240V)

CUSTOMER:
Teresa Forster
12 Maple St
Irvington, NY 10533

9146464414

DESCRIPTION:
6.4 KW PV ARRAY
13.5 KWH ENERGY STORAGE SYSTEM

PAGE NAME: RENDERING

DESIGN: Justin Very

SHEET: 8 REV: A DATE: 4/25/2023

TESLA

WARNING: PHOTOVOLTAIC POWER SOURCE

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

PHOTOVOLTAIC DC 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

WARNING
ELECTRIC SHOCK HAZARD
IF A GROUND FAULT IS INDICATED
NORMALLY GROUNDED
CONDUCTORS MAY BE
UNGROUNDED AND ENERGIZED

Label Location:
(DC) (INV)
Per Code:
690.41.B

WARNING
ELECTRICAL SHOCK HAZARD
DO NOT TOUCH TERMINALS
TERMINALS ON BOTH LINE AND
LOAD SIDES MAY BE ENERGIZED
IN THE OPEN POSITION
DC VOLTAGE IS
ALWAYS PRESENT WHEN
SOLAR MODULES ARE
EXPOSED TO SUNLIGHT

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

PHOTOVOLTAIC AC 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 OPEN POSITION

Label Location:
(AC)(POI)
Per Code:
NEC 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 OPERATING CURRENT ____ A
MAXIMUM AC OPERATING VOLTAGE ____ V

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

CAUTION
DUAL POWER SOURCE
SECOND SOURCE IS
PHOTOVOLTAIC SYSTEM

Label Location:
(POI)
Per Code:
NEC 705.12.B.3

CAUTION
PHOTOVOLTAIC SYSTEM
CIRCUIT IS BACKFED

Label Location:
(D) (POI)
Per Code:
NEC 690.64.B.4

WARNING
INVERTER OUTPUT
CONNECTION
DO NOT RELOCATE
THIS OVERCURRENT
DEVICE

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

WARNING
ELECTRIC SHOCK HAZARD
THE DC CONDUCTORS OF THIS
PHOTOVOLTAIC SYSTEM ARE
UNGROUNDED AND
MAY BE ENERGIZED

Label Location:
(DC) (INV)

STATE OF NEW YORK
WILLIAM KEGANG LOU
EXP 1/31/24
095002-1
LICENSED PROFESSIONAL ENGINEER

(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		

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.

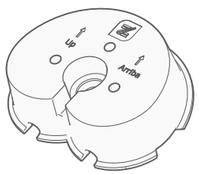
Zep wire management products listed to UL 1565 for wire positioning devices.

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

ZS Comp bonding products are listed to UL 2703.

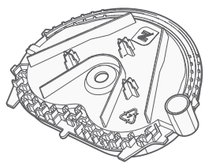
MOUNTING BLOCK

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

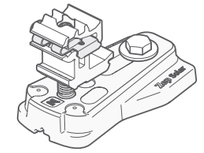
Part #850-1631-002 and #850-1631-004

GROUND ZEP

Listed to UL 2703
Part #850-1511

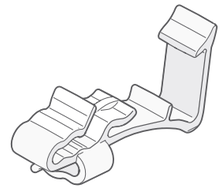
LEVELING FOOT

Listed to UL 2703
Part #850-1397



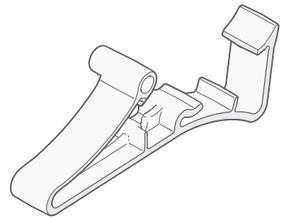
DC WIRE CLIP

Listed to UL 1565
Part #850-1509



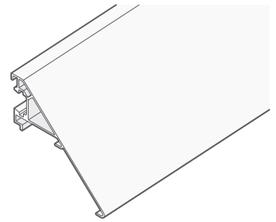
HOME RUN CLIP

Listed to UL 1565
Part #850-1510



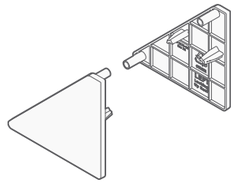
ARRAY SKIRT

Listed to UL 2703
Part #850-1608



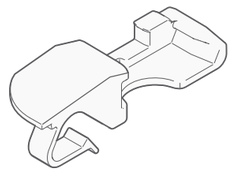
END CAP

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



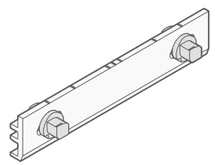
SKIRT GRIP

Listed to UL 2703
Part #850-1606



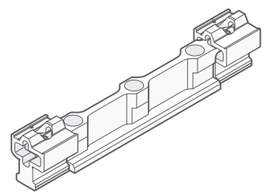
INTERLOCK

Listed to UL 2703
Part #850-1613



HYBRID INTERLOCK

Listed to UL 2703
Part #850-1281



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	14 kWh[1]
Usable Energy	13.5 kWh[1]
Real Power, max continuous	5 kW (charge and discharge)
Real Power, peak (10 s, off-grid/backup)	7 kW (charge and discharge)
Apparent Power, max continuous	5.8 kVA (charge and discharge)
Apparent Power, peak (10 s, off-grid/backup)	7.2 kVA (charge and discharge)
Load Start Capability	88 - 106 A LRA[2]
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	90%[1,3]
Warranty	10 years

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

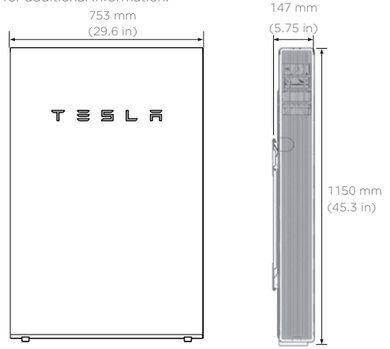
COMPLIANCE INFORMATION

Certifications	UL 1642, UL 1741, UL 1741 SA, UL 1741 SB, 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)
Fire Testing	Meets the unit level performance criteria of UL 9540A

MECHANICAL SPECIFICATIONS

Dimensions	1150 mm x 753 mm x 147 mm (45.3 in x 29.6 in x 5.75 in)[4]
Weight	114 kg (251.3 lbs)[4]
Mounting options	Floor or wall mount

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



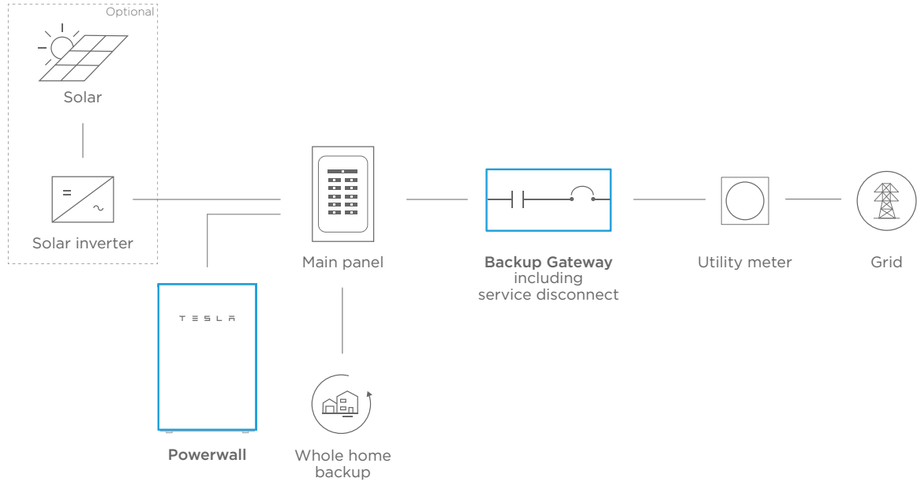
ENVIRONMENTAL SPECIFICATIONS

Operating Temperature	–20°C to 50°C (–4°F to 122°F)[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	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)

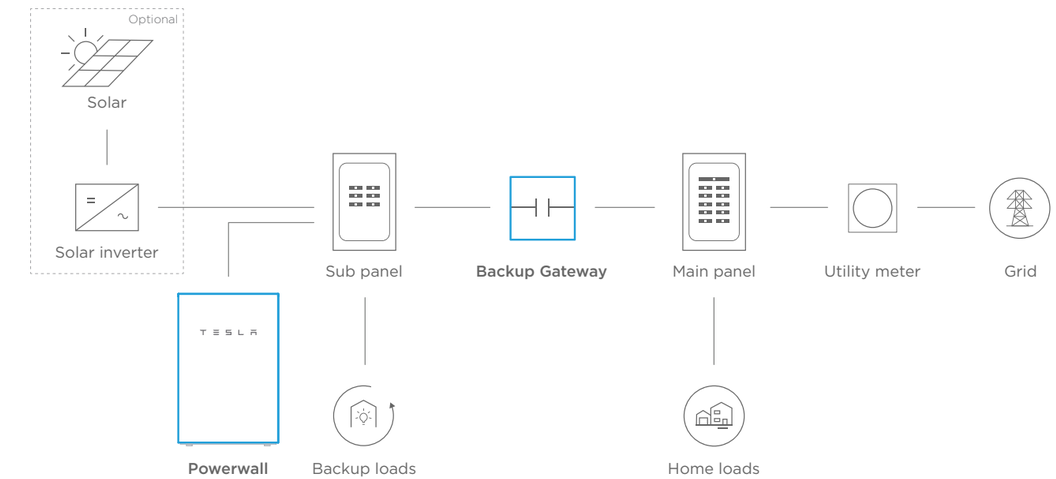
[5]Performance may be de-rated at operating temperatures below 10°C (50°F) or greater than 43°C (109°F).

TYPICAL SYSTEM LAYOUTS

WHOLE HOME BACKUP



PARTIAL HOME BACKUP



POWERWALL

Backup Gateway 2

The Backup Gateway 2 for Tesla Powerwall provides energy management and monitoring for solar self-consumption, time-based control, and backup.

The Backup Gateway 2 controls connection to the grid, automatically detecting outages and providing a seamless transition to backup power. When equipped with a main circuit breaker, the Backup Gateway 2 can be installed at the service entrance. When the optional internal panelboard is installed, the Backup Gateway 2 can also function as a load center.

The Backup Gateway 2 communicates directly with Powerwall, allowing you to monitor energy use and manage backup energy reserves from any mobile device with the Tesla app.

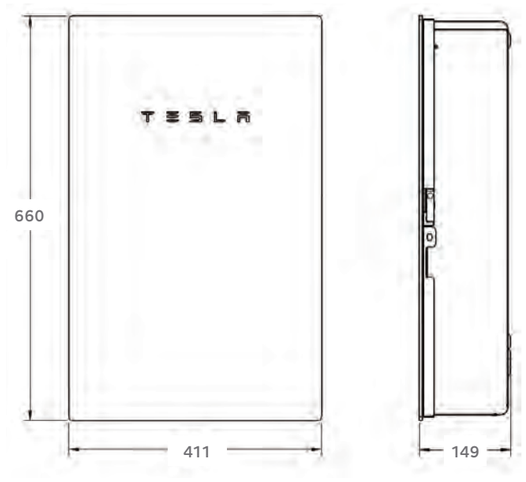
PERFORMANCE SPECIFICATIONS

Model Number	1232100-xx-y
AC Voltage (Nominal)	120/240V
Feed-In Type	Split Phase
Grid Frequency	60 Hz
Current Rating	200 A
Maximum Input Short Circuit Current	10 kA[1]
Overcurrent Protection Device	100-200A; Service Entrance Rated[1]
Overvoltage Category	Category IV
AC Meter	Revenue accurate (+/– 0.2 %)
Primary Connectivity	Ethernet, Wi-Fi
Secondary Connectivity	Cellular (3G, LTE/4G)[2]
User Interface	Tesla App
Operating Modes	Support for solar self-consumption, time-based control, and backup
Backup Transition	Automatic disconnect for seamless backup
Modularity	Supports up to 10 AC-coupled Powerwalls
Optional Internal Panelboard	200A 6-space / 12 circuit Eaton BR Circuit Breakers
Warranty	10 years

[1] When protected by Class J fuses, Backup Gateway 2 is suitable for use in circuits capable of delivering not more than 22kA symmetrical amperes.
[2] The customer is expected to provide internet connectivity for Backup Gateway 2; cellular should not be used as the primary mode of connectivity. Cellular connectivity subject to network operator service coverage and signal strength.

MECHANICAL SPECIFICATIONS

Dimensions	660 mm x 411 mm x 149 mm (26 in x 16 in x 6 in)
Weight	20.4 kg (45 lb)
Mounting options	Wall mount, Semi-flush mount



COMPLIANCE INFORMATION

Certifications	UL 67, UL 869A, UL 916, UL 1741 PCS CSA 22.2 0.19, CSA 22.2 205
Emissions	FCC Part 15, ICES 003

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

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)

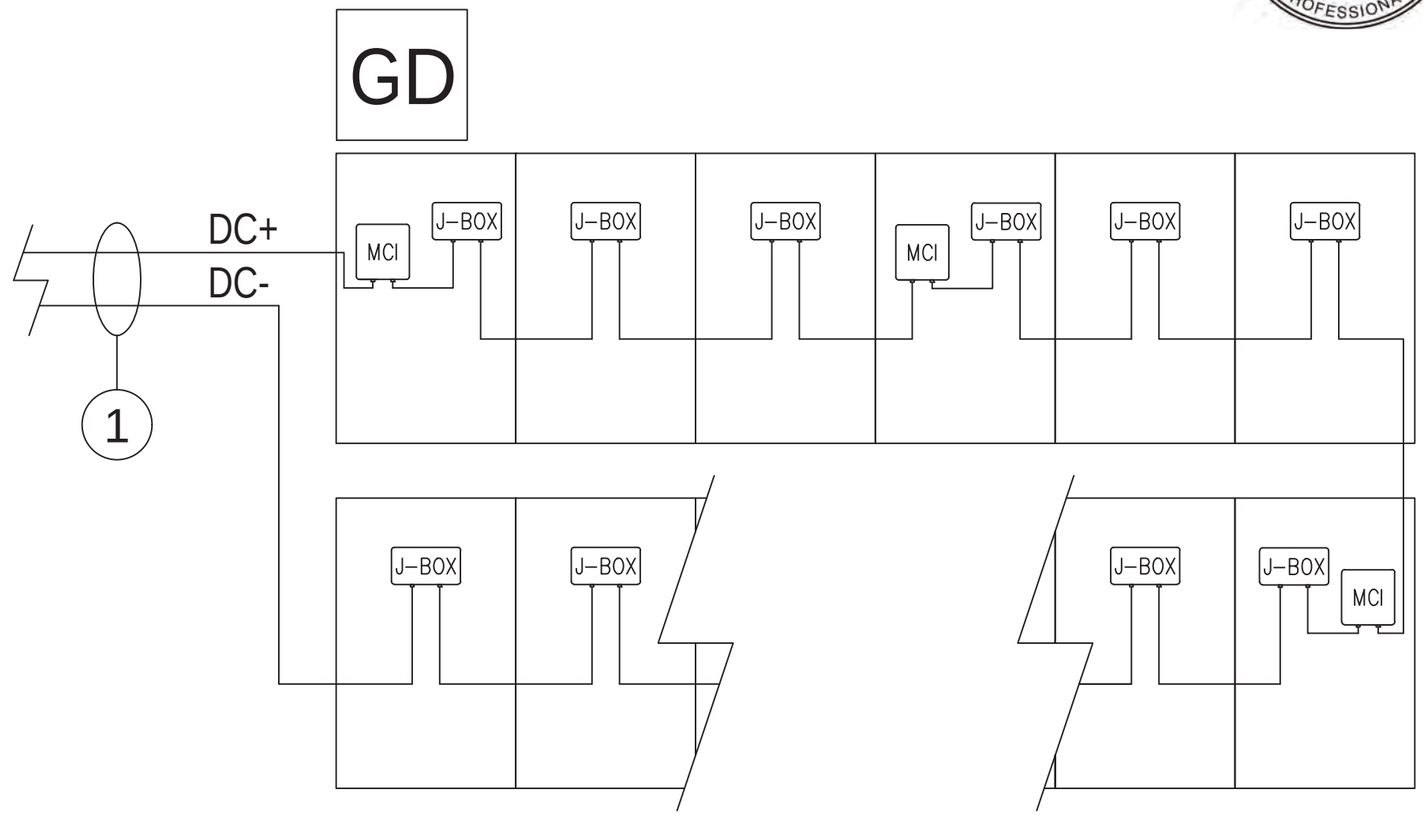
RETROFIT PV MODULES

- 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

TESLA



1 — (2) AWG, PV Wire, 600V, Black

DC

MCI WIRING DETAIL

GENERAL NOTES

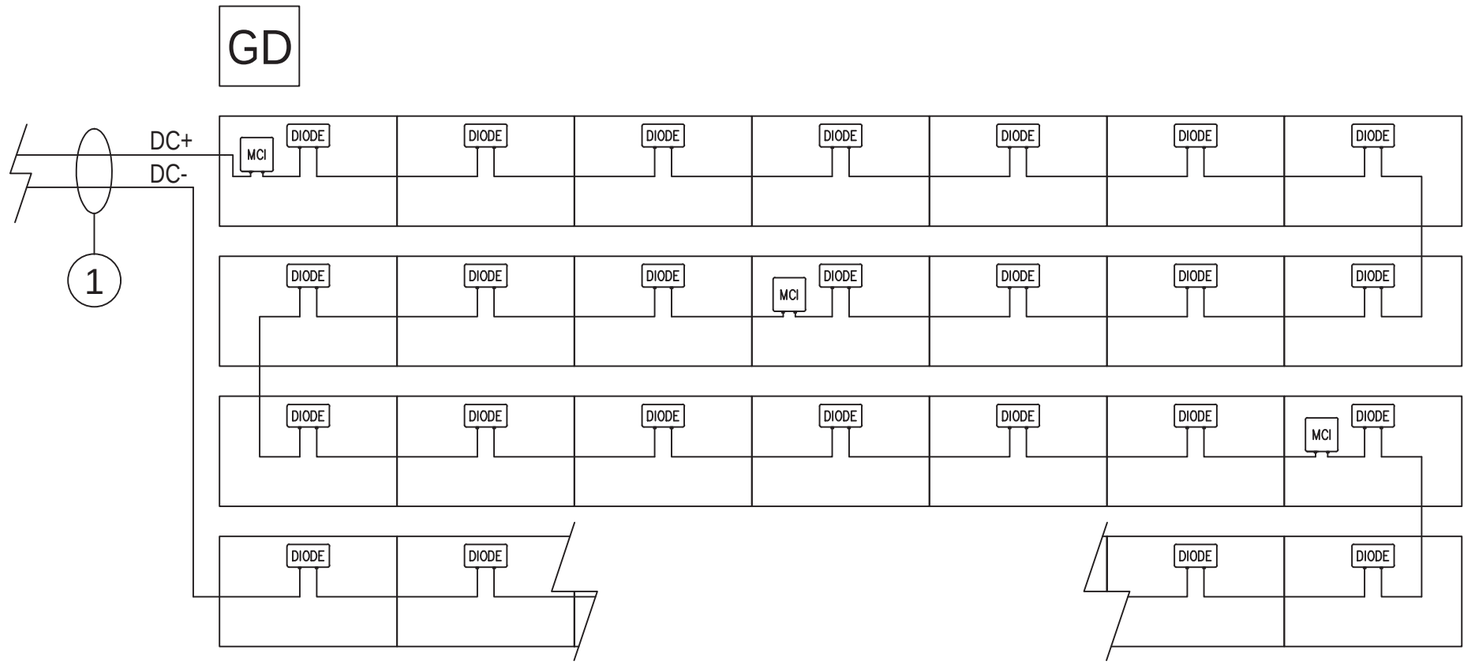
- DRAWING OF STANDARD MCI WIRING DETAIL FOR ANY GIVEN STRING LENGTH
- IF INITIATED, RAPID SHUTDOWN OCCURS WITHIN 30 SECONDS OF ACTIVATION AND LIMITS VOLTAGE ON THE ROOF TO NO GREATER THAN 165V (690.12.B.2.1)
- MID CIRCUIT INTERRUPTER (MCI) IS A UL 1741 PVRSE CERTIFIED RAPID SHUTDOWN DEVICE (RSD)

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

TESLA



1 — (2) AWG, PV Wire, 600V, Black

DC

powered by Q.ANTUM DUO Z

Q.PEAK DUO BLK ML-G10.a+/TS 385-405

ENDURING HIGH PERFORMANCE

Quality Controlled PV
TÜVRheinland CERTIFIED
www.tuv.com ID 1111232615

ZEP COMPATIBLE

EUPD RESEARCH TOP BRAND PV MODULES EUROPE 2021

25 YR Warranty Product & Performance

Q CELLS Yield Security

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 Technology[1]. 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 warranty[2].

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

THE IDEAL SOLUTION FOR:

Rooftop arrays on residential buildings

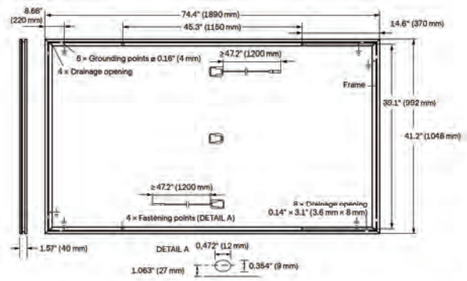
Rooftop arrays on commercial / industrial buildings

Engineered in Germany

Q CELLS

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 mm² Solar cable; (+) ≥47.2 in (1200 mm), (−) ≥47.2 in (1200 mm)
Connector	Stäubli MC4; IP68

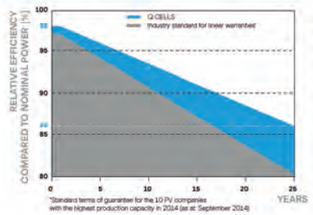


ELECTRICAL CHARACTERISTICS

POWER CLASS				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[1]	I_{SC}	[A]	11.04	11.07	11.10	11.14	11.17
	Open Circuit Voltage[1]	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[1]	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 • [2] 800 W/m², NMOT, spectrum AM 1.5

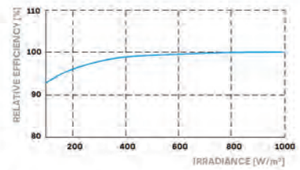
Q CELLS PERFORMANCE WARRANTY



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.

All data within measurement tolerances. Full warranties in accordance with the warranty terms of the Q CELLS sales organisation of your respective country.

PERFORMANCE AT LOW IRRADIANCE



Typical module performance under low irradiance conditions in comparison to STC conditions (25 °C, 1000 W/m²)

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)	FV 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/ft²]	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/ft²]	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.

Hanwha Q CELLS America Inc.
400 Spectrum Center Drive, Suite 1400, Irvine, CA 92618, USA | TEL +1 949 748 59 96 | EMAIL inquiry@us.q-cells.com | WEB www.q-cells.us

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

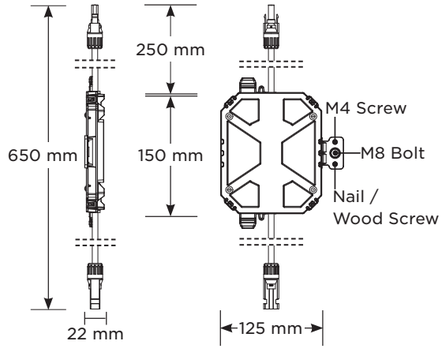
Ambient Temperature	-40°C to 50°C (-40°F to 122°F)
Storage Temperature	–30°C to 70°C (–22°F to 158°F)
Enclosure Rating	NEMA 4X / IP65

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.

Tesla Solar Inverter
with Site Controller

—

Tesla Solar Inverter completes the Tesla home solar system, converting DC power from solar to AC power for home consumption. Tesla's renowned expertise in power electronics has been combined with robust safety features and a simple installation process to produce an outstanding solar inverter that is compatible with both Solar Roof and traditional solar panels. Once installed, homeowners use the Tesla mobile app to manage their solar system and monitor energy consumption, resulting in a truly unique ecosystem experience.

KEY FEATURES

- Built on Powerwall technology for exceptional efficiency and reliability
- Wi-Fi, Ethernet, and cellular connectivity with easy over-the-air updates
- Designed to integrate with Tesla Powerwall and Tesla App
- 0.5% revenue-grade metering for Solar Renewable Energy Credit (SREC) programs included

Tesla Solar Inverter Technical Specifications

Electrical Specifications: Output (AC)

Model Number	1538000-xx-y			
Output (AC) [1]	3.8 kW	5 kW	5.7 kW	7.6 kW
Nominal Power	3,800 W	5,000 W	5,700 W	7,600 W
Maximum Apparent Power	3,840 VA	5,040 VA	5,760 VA	7,680 VA
Maximum Continuous Current	16 A	21 A	24 A	32 A
Breaker (Overcurrent Protection)	20 A	30 A	30 A	40 A
Nominal Power Factor	1 - 0.9 (leading / lagging			
THD (at Nominal Power)	<5%			

[1] A label will be applied to the Solar Inverter indicating the configured amperage.

Electrical Specifications: Input (DC)

MPPT	4
Input Connectors per MPPT	1-2-1-2
Maximum Input Voltage	600 VDC
DC Input Voltage Range	60 - 550 VDC
DC MPPT Voltage Range	60 - 480 VDC [2]
Maximum Current per MPPT (I_{MP})	13 A [3]
Maximum Short Circuit Current per MPPT (I_{SC})	17 A [3]

[2] Maximum current.

[3] Where 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}.

Performance Specifications

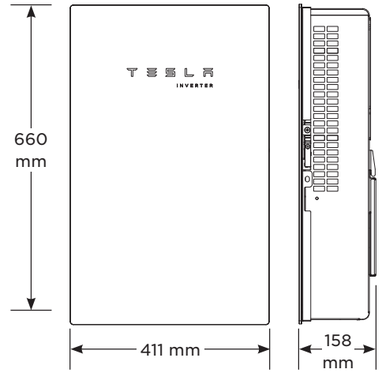
Peak Efficiency	98.6% at 240 V
CEC Efficiency	98.0% at 240 V
Allowable DC/AC Ratio	1.7
Customer Interface	Tesla Mobile App
Internet Connectivity	Wi-Fi (2.4 GHz, 802.11 b/g/n), Ethernet, Cellular (LTE/4G) [4]
Revenue Grade Meter	Revenue Accurate (+/- 0.5%)
AC Remote Metering Support	Wi-Fi (2.4 GHz, 802.11 b/g/n), RS-485
Protections	Integrated arc fault circuit interrupter (AFCI), Rapid Shutdown
Supported Grid Types	60 Hz, 240 V Split Phase

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

Tesla Solar Inverter Technical Specifications

Mechanical Specifications

Dimensions	660 mm x 411 mm x 158 mm (26 in x 16 in x 6 in)



Weight	52 lb [5]
Mounting Options	Wall mount (bracket)

[5] Door and bracket can be removed for a mounting weight of 37 lb.

Environmental Specifications

Operating Temperature	–30°C to 45°C (–22°F to 113°F) [6]
Operating Humidity (RH)	Up to 100%, condensing
Storage Temperature	–30°C to 70°C (–22°F to 158°F)
Maximum Elevation	3000 m (9843 ft)
Environment	Indoor and outdoor rated
Enclosure Type	NEMA 3R
Ingress Rating	IP55 (Wiring compartment)
Pollution Rating	PD2 for power electronics and terminal wiring compartment, PD3 for all other components
Operating Noise @ 1 m	< 40 db(A) nominal, < 50 db(A) maximum

[6] Performance may be de-rated to 6.2 kW at 240 V when operating at temperatures greater than 45°C.

Compliance Information

Grid Certifications	UL 1741, UL 1741 SA, UL 1741 SB, UL 1741 PCS, IEEE 1547-2018, IEEE 1547.1
Safety Certifications	UL 1741 PVRSS, UL 1699B, UL 1998 (US), UL 3741
Emissions	EN 61000-6-3 (Residential), FCC 47CFR15.109 (a)