Inverter Type: (59)Enphase IQ8M-72-2-US
PV Panel: (59) Tesla T400H
Racking: Iron Ridge XR-10
Total Wattage: 23,600W DC
Roof Type: Metal
Wind Load: 7 to 20 Deg
Fastener Type: Use S-5! SolarFoot

Sheet Index

General Notes:
-Enphase IQ8M-72-2-US Micro Inverters are located on roof behind each module.
-First responder access maintained and from adjacent roof.
-Wire run from array to connection is 395 feet.

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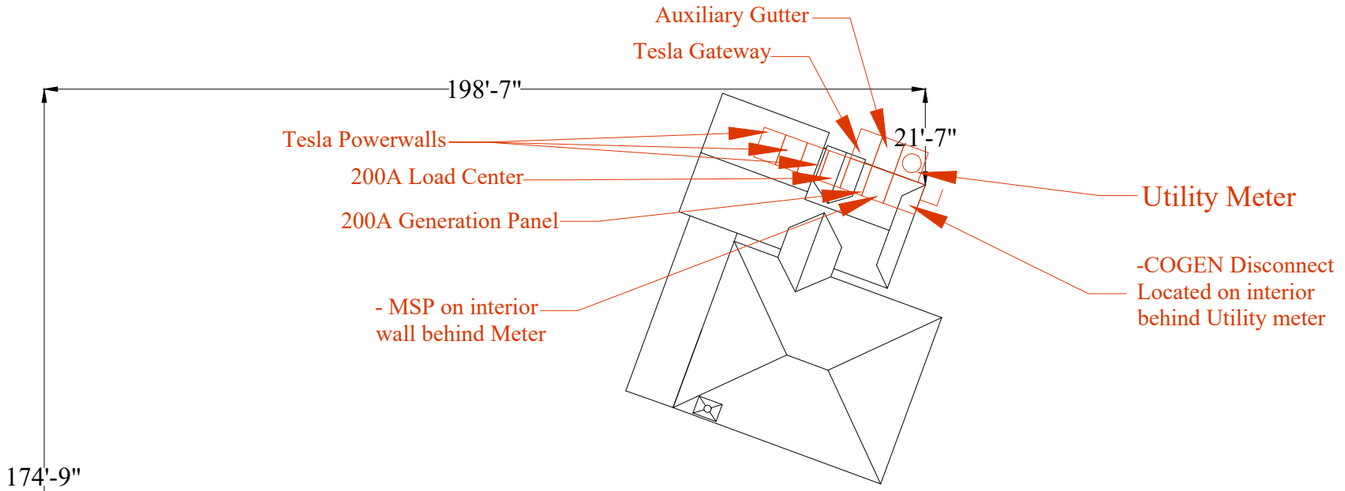
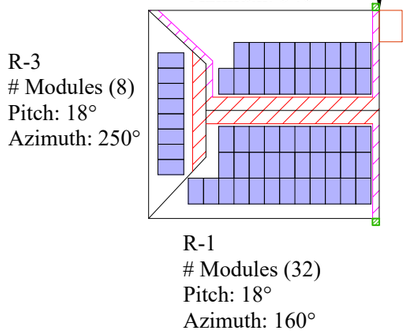
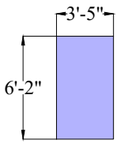
Boca Raton, FL 33487
800-530-9597



Trench approx 395' , at least 18" deep
"Dimension not to scale"



FRONT OF HOUSE



Columbia County Building Department
Plans Reviewed for Code Compliance
State of Florida

Layout Subject to Change Based on Site Conditions

System meets the requirements of NFPA 70th Edition, Chapter 1:11.12 (2018 Edition)

Install will be done to Manufacturer Spec

Legend

3' First responder access
1'-6"
Ground Access
Chimney
Satellite
Utility Meter
Vent Pipe
PV Disconnect

Meets All Editions of Florida Fire Prevention Code 2020 7th Edition
Meets all requirements of 2018 Editions of NFPA-1 and NFPA-101

3' Access Pathway

Represents all Fire Clearance including Alternative methods

1st Responder Access minimum of 36" unobstructed as per Section R324 of the 2020 IRC

Meets the requirements of the following- (2020 FL Residential Code & FBC, 7th Edition (2020 International Residential Code) - 2nd Printing modified by the FL Building Standards, 2020 Florida Building Energy Conservation Code 7th edition, County of Columbia Code, 2017 National Electric Code.)

Customer Info:

Josh Russell
452 SE Fritzi Ct
Lake City, FL
32025

Godwin Engineering and Design, LLC
8378 Foxtail Loop
Pensacola, FL 32526
D. Chad Godwin, PE
Chad@godwineng.com

D. CHAD GODWIN LICENSE No 81360 STATE OF FLORIDA PROFESSIONAL ENGINEER

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Date: 2022.08.24 12:26:18 -05'00'

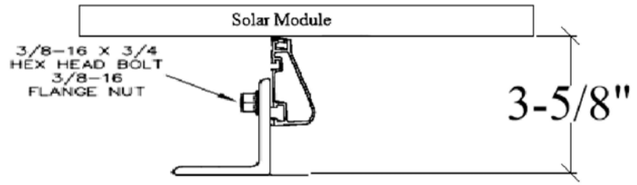
Date:	8/19/2022
Drawn by:	EF
Revised by:	.
Rev #:	00
Rev Date:	.
Page:	11"x17" S-1

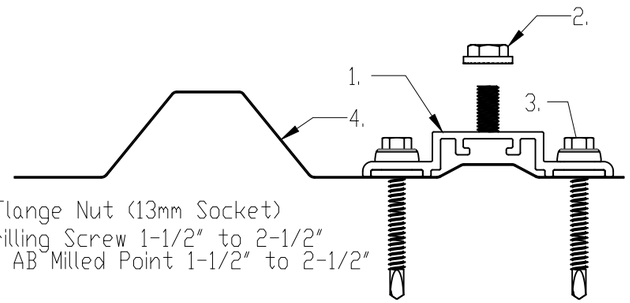
N

Compass for Aerial

Ironridge XR-10

S-5! SolarFoot





General Notes:
1. SolarFoot
2. M8-1.25 Stainless Steel Hex Flange Nut (13mm Socket)
3. Metal to Metal:1/4-14 Self Drilling Screw 1-1/2" to 2-1/2"
   Metal to Wood:1/4-14 Type 17 AB Milled Point 1-1/2" to 2-1/2"
4. Example roof

Install will be done to Manufacturer Spec

General Notes:
- S-5 Brackets are secured to Roof
@ 48" O.C. in Zone 1, @ 48" O.C in Zone 2e, @ 48" O.C. in Zone 2n,
@ 48" O.C. in Zone 2r, @ 48" O.C in Zone 3e, & @ 24" O.C. in Zone 3r
using (4) .25-14 Milled Point 2.5" Length Self-Piercing Screws
- Subject roof has One layer.
- All penetrations are sealed.

Roof Section	Pitch	Roof Rafter and Spacing	Overhang	Notes:
R1-R3	4/12	2"x4" @ 24 O.C.	12"	Truss

-Roof Height 15'
-Per 2020 FBC, the Roof Mounted PV System will be subject to the following design criteria: Design Wind Speed(Vult) - 120mph 3 sec gust, Exposure Category - C
-Designed as per ASCE7-16

Inverter Type: (59)Enphase IQ8M-72-2-US
PV Panel: (59) Tesla T400H
Racking: Iron Ridge XR-10
Total Wattage: 23,600W DC
Roof Type: Metal
Wind Load: 7 to 20 Deg
Fastener Type: Use S-5! SolarFoot

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Page:	11"X17" S-2

Voltage Drop Calculations

$$\frac{2(12.9\ \text{ohm-cm/ft})*395\text{ft}*79.65\text{A}}{211592\text{cm}} = 3.84\text{V}$$

$$\frac{3.84\text{V}}{240\text{V}} = \boxed{1.6\%} \qquad \boxed{\#4/0}$$

211592 cm / 66369 cm =3.19

3.19 *16509cm =52633 cm

#3 Ground for Trench

#10 AWG THWN for Home runs over 100'
(1) Line 1
(1) Line 2
Per Circuit
#8 AWG THWN
(1) EGC
Inside @ least 3/4" Conduit (tbd on site)

Enphase IQ Trunk Cable
Q-12-240
#12AWG THHN-THWN-2
UL 9703

Grounding Conductor
to be bare #8 Awg

NEMA 3R
Junction Box
Black - L1
Red - L2
Green - Ground

Roof

Photovoltaics:
(59) Tesla T400H

Inverters:
(59) Enphase IQ8M-72-2-US Micro Inverters

Circuits:
(5) circuits of (10) Modules
(1) circuit of (9) Modules
Maximum Inverters Per 20A Circuit (11)

Enphase Output Ckt Per String	
To Overcurrent Protection Device	
AC Max Output Current	13.5
AC Max Output Current * 1.25%	16.9
Overcurrent Protection (A)	20
No. of Current Carrying Cond	<4
Conductor Gauge (AWG)	10
Enphase Total Output Ckt	
AC Max Output Current	79.65
AC Max Output Current * 1.25%	99.6
Overcurrent Protection (A)	100
No. of Current Carrying Cond	<4
Conductor Gauge (AWG)	4/0
Each Telsa Power Wall Output Ckt	
AC Max Output Current	24
AC Max Output Current * 1.25%	30
Overcurrent Protection (A)	30
No. of Current Carrying Cond	<4
Conductor Gauge (AWG)	10
Combined Total Output Ckt	
AC Max Output Current	151.65
AC Max Output Current * 1.25%	189.6
Overcurrent Protection (A)	200
No. of Current Carrying Cond	<4
Conductor Gauge (AWG)	3/0

(1) 13.5kWh Telsa Power Wall NEMA 3R
(1) 13.5kWh Telsa Power Wall NEMA 3R
(1) 13.5kWh Telsa Power Wall NEMA 3R

#10 L1,L2,N
#10 Ground
In Min 3/4" Conduit

#10 L1,L2,N
#10 Ground
In Min 3/4" Conduit

200A Load Center

(1) - 20A Breaker
Per Circuit
6 Circuits
240V
200A Rated

Disconnect
Solar Combiner Box

Envoy

Trench approx 395' , at least 18" deep
"Dimension not to scale"

#4/0 AWG THWN
(2) Hot
(1) Neutral
#3 AWG EGC
in @ least 2" Conduit Typically

#3/0 AWG THWN
(1) Line 1
(1) Line 2
(1) Neutral
#6 (1) EGC
in @ least 2" Conduit Typically

Manual Disconnect

200A Service Rated
Fused Disconnect
AC Disconnect

200A Fuse

200A Generation Panel

30A
30A
30A
100A

#2/0 AWG THWN
(1) Line 1
(1) Line 2
(1) Neutral
#6 (1) EGC
in @ least 2" Conduit Typically

200A
Tesla Backup Gateway
Service Rated

#2/0 AWG THWN
(1) Line 1
(1) Line 2
(1) Neutral
in @ least 1.5" Conduit Typically

Auxiliary Gutter

Meter

200A

Main Service Panel

PHOTOVOLTAIC SYSTEM
! AC DISCONNECT !

RATED AC OUTPUT CURRENT: 151.65A
NOMINAL OPERATING VOLTAGE: 240VAC

Per Manufacturer specs, Tesla PowerWalls can be stacked up to 3 units
Per NFPA 855 Section 4.6.2, ESS can be grouped with a maximum stored energy of 50 kW

NEC LABEL NOTES:
1. THE WARNING SIGN(S) OR LABEL(S) SHALL COMPLY WITH NEC 110.21(B)
2. LABELS SHALL BE SUITABLE FOR THE ENVIRONMENT WHERE THEY ARE INSTALLED.
3. LABELS TO BE A MIN LETTER HEIGHT OF 3/8" AND PERMANENTLY AFFIXED.
4. LABELS SHALL ALSO COMPLY WITH THE SPECIFIC REQUIREMENTS OF THE AUTHORITY HAVING JURISDICTION.

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800-530-9597

Including the label below

In Case of Emergency Call
Go Solar Power
at 800-530-9597
EC 13007879 CVC56962

Meets 11.12.2.1.5

Note:
-All wiring to meet the 2017 NEC and Florida electric codes.
200A Disconnect
-Type of conduit to be determined on site by contractor.

Install will be done to Manufacturer Spec

GEC NOTES
- Ungrounded system per 690.41(A)(4)
- GEC must be installed per 250.64
- GEC must be continuous un-spliced or irreversibly spliced from inverter to existing service ground system or continuous from the arrays to the existing service ground system.
- GEC must be min #8 AWG and installed in conduit
- If GEC is not in conduit, it must be #6 min

Disconnects will be Visible, lockable, adjacent to and within 10' of utility meter
All Labels & Markings for photovoltaic system will be reflective and meet all requirements for NFPA 11.12

Customer Info:

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452 SE Fritzi Ct
Lake City, FL
32025

Date:	8/19/2022
Drawn by:	EF
Revised by:	.
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Page:	11"x17" E-1

Inverter Type:
Enphase IQ8M-72-2-US
PV Panel:
(59)
Tesla T400H
Total Wattage:
23,600W DC

System meets the grounding requirements of NEC 690.43

The Placard shall be permanently riveted..., and shall be made of red, weatherproof, hard plastic, with engraved white block lettering.

-A placard will be added with instructions and locations to be in compliance with 690.12, 690.56(B) and NEC 705.10

Rapid Shutdown Built in Per Code NEC 690.12

In compliance with NEC 250.58, NEC 690.8, NEC 250.24, NEC250.24(D)

PV AC disconnect is lockable in the open position per code NEC 705.22(7)

Conductors have a min ampacity of 60 amperes Per Code NEC 230.79(D)

Everything will be built to Code without all Specifics labeled on plan

System is in compliance with FFPC 1:11.12 7th Edition.

Inverter Output Ckt To Overcurrent Protection Device		
Design Temperature(F)	94°F	
Max Amb Temp Range(F)	87-95	310.15(B)(2)(a)
Temp Rating of Conductors (C)	90°C	
Current Carrying	<4	310.15(B)(3)(a)
AC Max Output Current	80A	690.8(A)(3)
AC Max Output Current * 1.25%	100A	690.8(B)
Overcurrent Protection(A)	100A	
Amp Temp Correction Factor	0.96	310.15(B)(2)(a)
Raceway Fill adjustment Factor	100%	310.15(B)(3)(a)
Wire Size(Awg)	.4/0	310.15(B)(16)
Cond. Allowable Ampacity(A)	260A	
Cond Adjusted Ampacity(A)	250A	260A*1*0.96=249.6A
Ampacity Check 1 Per 690.8(B)(1)	Pass	79.65A*1.25=100A<260A Pass
Ampacity Check 2 Per 690.8(B)(2)	Pass	260A*0.96A*1=249.6A>79.65A Pass

Smoke Detectors will be added as per FBC 553.883

All Exterior equipment is A minimum of Nema-R3 Rated

In compliance with 230.71

J-Box not penetrating roof

Markings shall be placed on all DC Conduits, DC Combiners, Raceways, Enclosures, Junction Boxes, and Cable Assemblies at every 10', turns, and above and below penetrations in compliance with NFPA

All Interactive System(S) Points of interconnection with other sources shall be marked at an accesible location at the disconnecting means as a power source and with the rated ac output current and the nominal operating AC voltage. Per NEC 690.54

Combiner box in compliance Per Code NEC 705.12
6* 20A < 200A
*No other loads to be added

Disconnect means shall be provided for all disconnecting all ungrounded conductors that supply or pass through the building or structure Per Code 2017 NEC Section 225.31 & Section 225.32

Disconnect is in compliance 230.72

Supply side disconnect adjacent to Msp

In Case of Emergency Call
Go Solar Power
at 800-530-9597
EC 13007879 CVC56962

Apply to Main Disconnect

Permanent sticker added to disconnect

Over Current Protection Device is "Next size up" Based on Inverter Maximum Continuous Output Current Rating 2017 NEC 240.4(B)

-All Electrical Service Equipment shall be located at or above BFE+1' or 8.00' NAVD

Solar to be installed into Lugs of Tesla Gateway adjacent to Utility Meter

-Markings Shall Be reflective, Weather Resistant and suitable for the environment.
-Markings Shall be red with white lettering with minimum 3/8" Capital Letters

-All new equipment located adjacent to Meter on exterior wall

Labels will be placed in the correct location Per Code NEC 690.56(B), 690.56(C), & 690.53

Smoke Alarms per F.S. 553.883

Include required label for metallic raceways and conduits to sheet E-1 per NEC article 690.31(G)(3).

Add required label to sheet E-1 per NEC article 705.10.

Include required label to sheet E-1 per NEC article 705.12(B)

Photovoltaic AC disconnect shall be capable of being locked in the open position per NEC article 705.22(6).

Photovoltaic AC Overcurrent protection shall be located within 10 feet of the point where conductors are connected to the service per NEC 705.31.

Note:
-Subject PV Systems has been designed to meet the requirments of the NEC **2017**, and those set forth by the Florida Solar Energy Center Certification, Including Maximum Number of Module Strings, Maximum number of modules per string, Maximum Output, Module Manufacturer and model number, inverter manufacturer and model number, as applicable.

NEC 705.10 A permanent plaque or directory, denoting the location of all electric power source disconnecting means on or in the premises, shall be installed at each service equipment location and at the location(s) of the system disconnect(s) for all electric power production sources capable of being interconnected. One sign required for each PV system.

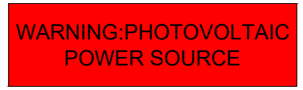
E04. Construction documents specify PV system circuits installed on or in buildings include a rapid shutdown function that controls specific conductors in accordance with NEC article 690.12.

E05. These construction documents specify that a label is provided with the method to initiate rapid shut down per 690.12(4).

E06. Construction drawings specify buildings or structures with both utility service and a PV system, complying with NEC article 690.l2 shall have a permanent plaque or directory including the following wording: “PHOTO VOLTAIC SYSTEM EQUIPPED WITH RAPID SHUTDOWN” as per NEC article 690.56 (C).

E07. Construction documents specify PV power circuit labels shall appear on every section of the wiring system that is separated by enclosures, walls, partitions, ceilings, or floors.

E08. Construction documents specify all warning sign(s) or label(s) shall comply with NEC article 110.21 (B). Label warnings shall adequately warn of the hazard. Labels shall be permanently affixed to the equipment, and Labels required shall be suitable for the environment.

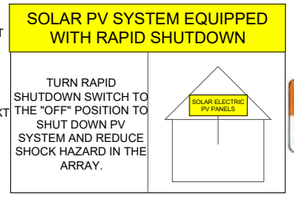


705.12(B)(3)

705.12(B)(2)(3)(b)

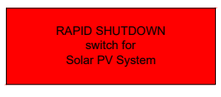
NEC 690.31 (G)(3)

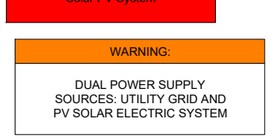
3/8 IN MIN. TEXT

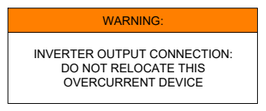


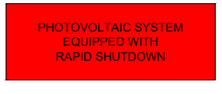
3/16 IN MIN. TEXT

Figure 690.56(C)(1)(a) Label for PV Systems that Shut down the array and the conductors leaving the array

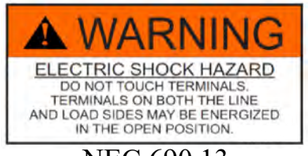








Plans Satisfy NEC 250.94 & NEC250.53(A)(2)



NEC 690.13

Install will be done to Manufacturer Spec

Including the label below

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at 800-530-9597
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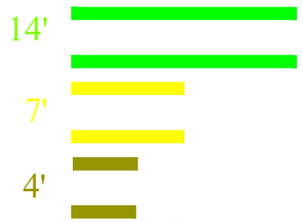
Inverter Type:
Enphase IQ8M-72-2-US
PV Panel:
(59)
Tesla T400H
Total Wattage:
23,600W DC

Iron Ridge XR-10 Rail



- Splice Bar
- S-5! SolarFoot
- Iron Ridge UFO's
- Iron Ridge Sleeves/End Caps
- 6x6 J-Box
- Iron Ridge Ground Lugs
- Tesla T400H
- Enphase IQ8M-72-2-US
- 20A 2P Breaker
- 200A Load Center
- Standalone Envoy +15A Breaker
- 200A Generation Panel
- 30A Breakers
- 100A Breaker
- Tesla Powerwalls
- 200A Fused Disconnect
- 200A Fuses
- Tesla Gateway
- 200A Main Breaker
- Auxiliary Gutter

Zone 1: Max cantilever is 16" as per manufacturer spec.
Max Cantilever = Max Span * ($\frac{1}{3}$)=48"*($\frac{1}{3}$)=16"

Zone 2e: Max cantilever is 16" as per manufacturer spec.
Max Cantilever = Max Span * ($\frac{1}{3}$)=48"*($\frac{1}{3}$)=16"

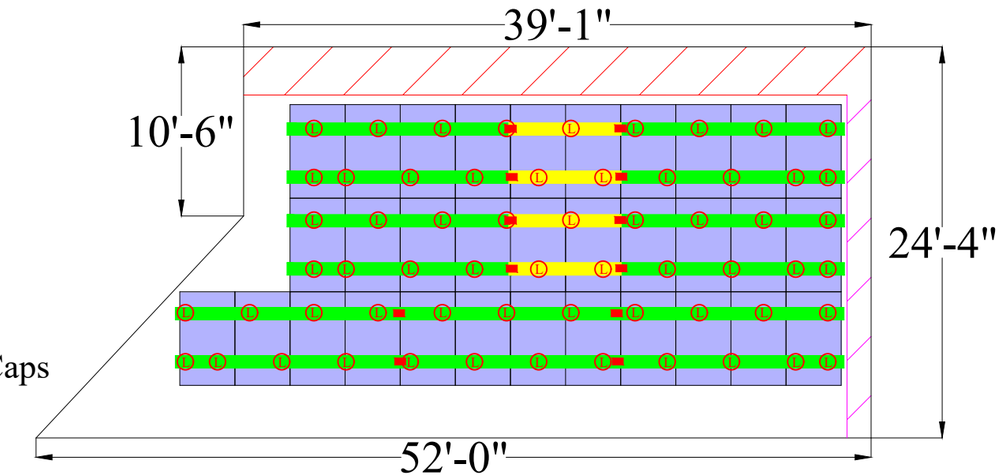
Zone 2n: Max cantilever is 16" as per manufacturer spec.
Max Cantilever = Max Span * ($\frac{1}{3}$)=48"*($\frac{1}{3}$)=16"

Zone 2r: Max cantilever is 16" as per manufacturer spec.
Max Cantilever = Max Span * ($\frac{1}{3}$)=48"*($\frac{1}{3}$)=16"

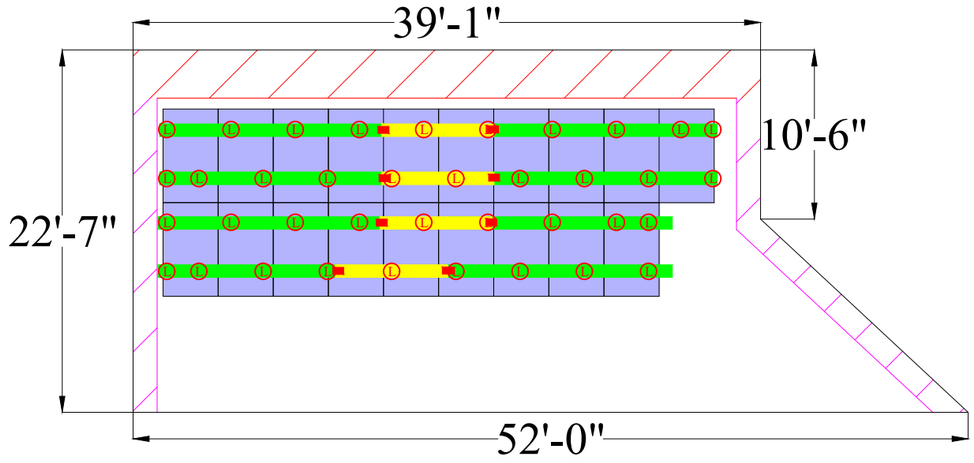
Zone 3e: Max cantilever is 16" as per manufacturer spec.
Max Cantilever = Max Span * ($\frac{1}{3}$)=48"*($\frac{1}{3}$)=16"

Zone 3r: Max cantilever is 8" as per manufacturer spec.
Max Cantilever = Max Span * ($\frac{1}{3}$)=24"*($\frac{1}{3}$)=8"

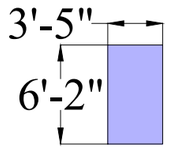
Ⓛ ← Proposed Mounting locations

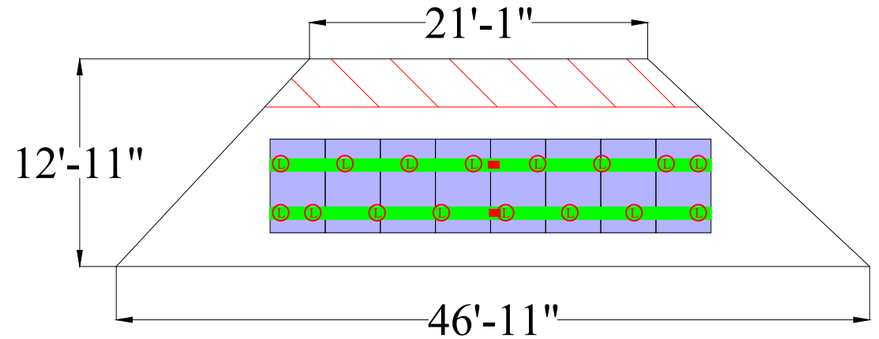


R-1
Modules (32)
Pitch: 18°
Azimuth: 160°



R-2
Modules (19)
Pitch: 18°
Azimuth: 340°





R-3
Modules (8)
Pitch: 18°
Azimuth: 250°

Plans satisfy zones FBC-1510.7.1
Install will be done to Manufacturer Spec

Inverter Type:	(59)Enphase IQ8M-72-2-US
PV Panel:	(59) Tesla T400H
Racking:	Iron Ridge XR-10
Total Wattage:	23,600W DC
Roof Type:	Metal
Wind Load:	7 to 20 Deg
Fastener Type:	Use S-5! SolarFoot

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452 SE Fritzi Ct
Lake City, FL
32025

Godwin Engineering and Design, LLC
8378 Foxtail Loop
Pensacola, FL 32526
D. Chad Godwin, PE
Chad@godwineng.com

D. CHAD GODWIN LICENSE No 81360 STATE OF FLORIDA PROFESSIONAL ENGINEER
THIS ITEM HAS BEEN ELECTRONICALLY SIGNED AND SEALED BY DONNIE CHAD GODWIN USING A DIGITAL SIGNATURE AND DATE. PRINTED COPIES OF THIS DOCUMENT ARE NOT CONSIDERED SIGNED AND SEALED AND THE SIGNATURE MUST BE VERIFIED ON ANY ELECTRONIC COPIES

Digitally signed by Donnie Godwin
Date: 2022.08.24 12:26:45 -05'00'

GO SOLAR POWER
933 Clint Moore Rd
Boca Raton, FL 33487
800-530-9597

Date:	8/19/2022
Drawn by:	EF
Revised **by:**	.
Rev #:	00
Rev Date:	.
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Tesla
Photovoltaic Module

T395H, T400H, and T405H

Maximum Power
The Tesla module is one of the most powerful residential photovoltaic modules available. Our system requires up to 20.9 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

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.

Linear Power Warranty

Module Specifications

Electrical Characteristics

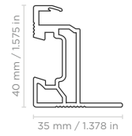
Power Class	T395H		T400H		T405H	
Test Method	STC	NMOT	STC	NMOT	STC	NMOT
Max Power, P_{MAX} (W)	395	296.3	400	300.1	405	303.8
Open Circuit Voltage, V_{OC} (V)	45.27	42.69	45.30	42.72	45.34	42.76
Short Circuit Current, I_{SC} (A)	11.10	8.95	11.14	8.97	11.17	9.00
Max Power Voltage, V_{MP} (V)	36.88	35.03	37.13	35.25	37.39	35.46
Max Power Current, I_{MP} (A)	10.71	8.46	10.77	8.51	10.83	8.57
Module Efficiency (%)	≥ 20.1		≥ 20.4		≥ 20.6	
STC	1000 W/m², 25°C, AM1.5					
NOCT	1000 W/m², 25 ± 2 °C, AM 1.5 according to IEC 60904-3 • 2800 W/m², NMOT, spectrum AM 1.5					

Temperature Rating (STC)

Temperature Coefficient of Isc	+0.04% / °C
Temperature Coefficient of V_{OC}	-0.27% / °C
Temperature Coefficient of P_{MAX} (W)	-0.34% / °C

Mechanical Loading

Front Side Design Load	3600 Pa | 75 lb/ft²
Rear Side Design Load	2660 Pa | 55 lb/ft²
Hailstone Test	25 mm Hailstone at 23 m/s

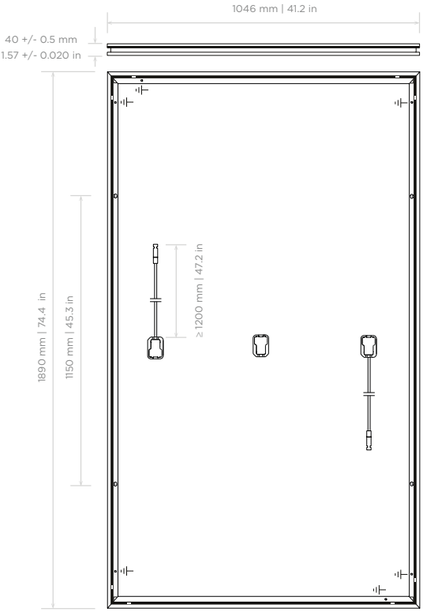


Mechanical Parameters

Cell Orientation	132 (6 x 22)
Junction Box	IP68, 3 diodes
Cable	4 mm² | 12 AWG, 1200 mm | 47.2 in. Length
Connector	Staubli MC4 or MC4 compatible
Front Cover	0.13 in (3.2 mm) thermally pre-stressed glass
Frame	Black Anodized Aluminum Alloy
Weight	23.5 kg | 51.8 lb
Dimension	1890 mm x 1046 mm x 40 mm 74.4 in x 41.2 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 61730 Type 2



ENPHASE

DATA SHEET

IQ8M and IQ8A Microinverters

Our newest IQ8 Microinverters are the industry's first microgrid-forming, software-defined microinverters with split-phase power conversion capability to convert DC power to AC power efficiently. The brain of the semiconductor-based microinverter is our proprietary application-specific integrated circuit (ASIC) which enables the microinverter to operate in grid-tied or off-grid modes. This chip is built in advanced 55nm technology with high speed digital logic and has super-fast response times to changing loads and grid events, alleviating constraints on battery sizing for home energy systems.

Part of the Enphase Energy System, IQ8 Series Microinverters integrate with the Enphase IQ Battery, Enphase IQ Gateway, and the Enphase App monitoring and analysis software.

Enphase 25 year limited warranty

IQ8 Series Microinverters redefine reliability standards with more than one million cumulative hours of power-on testing, enabling an industry-leading limited warranty of up to 25 years.

Connect PV modules quickly and easily to IQ8 Series Microinverters using the included Q-DCC-2 adapter cable with plug-n-play MC4 connectors.

UL CERTIFIED SAFETY

IQ8 Series Microinverters are UL Listed as PV Rapid Shut Down Equipment and conform with various regulations, when installed according to manufacturer's instructions.

Easy to install

- Lightweight and compact with plug-n-play connectors
- Power Line Communication (PLC) between components
- Faster installation with simple two-wire cabling

High productivity and reliability

- Produce power even when the grid is down*
- More than one million cumulative hours of testing
- Class II double-insulated enclosure
- Optimized for the latest high-powered PV modules

Microgrid-forming

- Complies with the latest advanced grid support**
- Remote automatic updates for the latest grid requirements
- Configurable to support a wide range of grid profiles
- Meets CA Rule 21 (UL 1741-SA) requirements

IQ8MA-DS-0003-01-EN-US-2022-03-17

* Only when installed with IQ System Controller 2, meets UL 1741.
** IQ8M and IQ8A supports split phase, 240V installations only.

IQ8M and IQ8A Microinverters

INPUT DATA (DC)		IQ8M-72-2-US	IQ8A-72-2-US
Commonly used module pairings[1]	W	260 – 460	295 – 500
Module compatibility		60-cell/120 half-cell, 66-cell/132 half-cell and 72-cell/144 half-cell	
MPPT voltage range	V	33 – 45	36 – 45
Operating range	V	25 – 58	
Min/max start voltage	V	30 / 58	
Max input DC voltage	V	60	
Max DC current[2] [module Isc]	A	15	
Overvoltage class DC port		II	
DC port backfeed current	mA	0	
PV array configuration		1x1 Ungrounded array; No additional DC side protection required; AC side protection requires max 20A per branch circuit	
OUTPUT DATA (AC)		**IQ8M-72-2-US**	**IQ8A-72-2-US**
Peak output power	VA	330	366
Max continuous output power	VA	325	349
Nominal (L-L) voltage/range[3]	V	240 / 211 – 264	
Max continuous output current	A	1.35	1.45
Nominal frequency	Hz	60	
Extended frequency range	Hz	50 – 68	
AC short circuit fault current over 3 cycles	Arms	2	
Max units per 20 A (L-L) branch circuit[4]		11	
Total harmonic distortion		<5%	
Overvoltage class AC port		III	
AC port backfeed current	mA	30	
Power factor setting		1.0	
Grid-tied power factor (adjustable)		0.85 leading – 0.85 lagging	
Peak efficiency	%	97.6	97.6
CEC weighted efficiency	%	97	97.5
Night-time power consumption	mW	60	
MECHANICAL DATA			
Ambient temperature range		-40°C to +60°C (-40°F to +140°F)	
Relative humidity range		4% to 100% (condensing)	
DC Connector type		MC4	
Dimensions (HxWxD)		212 mm (8.3") x 175 mm (6.9") x 30.2 mm (1.2")	
Weight		1.08 kg (2.38 lbs)	
Cooling		Natural convection – no fans	
Approved for wet locations		Yes	
Pollution degree		PD3	
Enclosure		Class II double-insulated, corrosion resistant polymeric enclosure	
Environ. category / UV exposure rating		NEMA Type 6 / outdoor	
COMPLIANCE			
Certifications		CA Rule 21 (UL 1741-SA), UL 62109-1, UL1741/IEEE1547, FCC Part 15 Class B, ICES-0003 Class B, CAN/CSA-C22.2 NO. 107.1-01 This product is UL Listed as PV Rapid Shut Down Equipment and conforms with NEC 2014, NEC 2017, and NEC 2020 section 690.12 and C22.1-2018 Rule 64-218 Rapid Shutdown of PV Systems, for AC and DC conductors, when installed according to manufacturer's instructions.	

(1) No enforced DC/AC ratio. See the compatibility calculator at https://link.enphase.com/module-compatibility
(2) Maximum continuous input DC current is 10.6A (3) Nominal voltage range can be extended beyond nominal if required by the utility. (4) Limits may vary. Refer to local requirements to define the number of microinverters per branch in your area.

IQ8MA-DS-0003-01-EN-US-2022-03-17

Data Sheet
Enphase Networking

Enphase IQ Combiner 4/4C

X-IQ-AM1-240-4
X-IQ-AM1-240-4C

X-IQ-AM1-240-4C

X-IQ-AM1-240-4

The **Enphase IQ Combiner 4/4C** with Enphase IQ Gateway and integrated LTE-M1 cell modem (included only with IQ Combiner 4C) consolidates interconnection equipment into a single enclosure and streamlines IQ microinverters and storage installations by providing a consistent, pre-wired solution for residential applications. It offers up to four 2-pole input circuits and Eaton BR series busbar assembly.

Smart

- Includes IQ Gateway for communication and control
- Includes Enphase Mobile Connect cellular modem (CELLMODEM-M1-06-SP-05), included only with IQ Combiner 4C
- Includes solar shield to match Enphase IQ Battery aesthetics and deflect heat
- Flexible networking supports Wi-Fi, Ethernet, or cellular
- Optional AC receptacle available for PLC bridge
- Provides production metering and consumption monitoring

Simple

- Centered mounting brackets support single stud mounting
- Supports bottom, back and side conduit entry
- Up to four 2-pole branch circuits for 240 VAC plug-in breakers (not included)
- 80A total PV or storage branch circuits

Reliable

- Durable NRTL-certified NEMA type 3R enclosure
- Five-year limited warranty
- Two years labor reimbursement program coverage included for both the IQ Combiner SKU's
- UL listed

UL LISTED

To learn more about Enphase offerings, visit **enphase.com**

ENPHASE

Enphase IQ Combiner 4/4C

MODEL NUMBER	
IQ Combiner 4 (X-IQ-AM1-240-4)	IQ Combiner 4 with Enphase IQ Gateway printed circuit board for integrated revenue grade PV production metering (ANSI C12.20 +/- 0.5%) and consumption monitoring (+/- 2.5%). Includes a silver solar shield to match the IQ Battery system and IQ System Controller 2 and to deflect heat.
IQ Combiner 4C (X-IQ-AM1-240-4C)	IQ Combiner 4C with Enphase IQ Gateway printed circuit board for integrated revenue grade PV production metering (ANSI C12.20 +/- 0.5%) and consumption monitoring (+/- 2.5%). Includes Enphase Mobile Connect cellular modem (CELLMODEM-M1-06-SP-05), a plug-and-play industrial-grade cell modem for systems up to 60 microinverters. (Available in the US, Canada, Mexico, Puerto Rico, and the US Virgin Islands, where there is adequate cellular service in the installation area.) Includes a silver solar shield to match the IQ Battery and IQ System Controller and to deflect heat.
ACCESSORIES AND REPLACEMENT PARTS	(not included, order separately)
Ensemble Communications Kit COMMS-CELLMODEM-M1-06 CELLMODEM-M1-06-SP-05 CELLMODEM-M1-06-AT-05	- Includes COMMS-KIT-01 and CELLMODEM-M1-06-SP-05 with 5-year Sprint data plan for Ensemble sites - 4G based LTE-M1 cellular modem with 5-year Sprint data plan - 4G based LTE-M1 cellular modem with 5-year AT&T data plan
Circuit Breakers BRK-10A-2-240V BRK-15A-2-240V BRK-20A-2P-240V BRK-15A-2P-240V-B BRK-20A-2P-240V-B	Supports Eaton BR210, BR215, BR220, BR230, BR240, BR250, and BR260 circuit breakers. Circuit breaker, 2 pole, 10A, Eaton BR210 Circuit breaker, 2 pole, 15A, Eaton BR215 Circuit breaker, 2 pole, 20A, Eaton BR220 Circuit breaker, 2 pole, 15A, Eaton BR215B with hold down kit support Circuit breaker, 2 pole, 20A, Eaton BR220B with hold down kit support
EPLC-01	Power line carrier (communication bridge pair), quantity - one pair
XA-SOLARSHIELD-ES	Replacement solar shield for IQ Combiner 4/4C
XA-PLUG-120-3	Accessory receptacle for Power Line Carrier in IQ Combiner 4/4C (required for EPLC-01)
XA-ENV-PCBA-3	Replacement IQ Gateway printed circuit board (PCB) for Combiner 4/4C
X-IQ-NA-HD-125A	Hold down kit for Eaton circuit breaker with screws.
ELECTRICAL SPECIFICATIONS	
Rating	Continuous duty
System voltage	120/240 VAC, 60 Hz
Eaton BR series busbar rating	125 A
Max. continuous current rating	65 A
Max. continuous current rating (input from PV/storage)	64 A
Max. fuse/circuit rating (output)	90 A
Branch circuits (solar and/or storage)	Up to four 2-pole Eaton BR series Distributed Generation (DG) breakers only (not included)
Max. total branch circuit breaker rating (input)	80A of distributed generation / 95A with IQ Gateway breaker included
Production metering CT	200 A solid core pre-installed and wired to IQ Gateway
Consumption monitoring CT (CT-200-SPLIT)	A pair of 200 A split core current transformers
MECHANICAL DATA	
Dimensions (WxHxD)	37.5 x 49.5 x 16.8 cm (14.75" x 19.5" x 6.63"). Height is 21.06" (53.5 cm) with mounting brackets.
Weight	7.5 kg (16.5 lbs)
Ambient temperature range	-40° C to +46° C (-40° to 115° F)
Cooling	Natural convection, plus heat shield
Enclosure environmental rating	Outdoor, NRTL-certified, NEMA type 3R, polycarbonate construction
Wire sizes	• 20 A to 50 A breaker inputs: 14 to 4 AWG copper conductors • 60 A breaker branch input: 4 to 1/0 AWG copper conductors • Main lug combined output: 10 to 2/0 AWG copper conductors • Neutral and ground: 14 to 1/0 copper conductors Always follow local code requirements for conductor sizing.
Altitude	To 2000 meters (6,560 feet)
INTERNET CONNECTION OPTIONS	
Integrated Wi-Fi	802.11b/g/n
Cellular	CELLMODEM-M1-06-SP-05, CELLMODEM-M1-06-AT-05 (4G based LTE-M1 cellular modem). Note that an Enphase Mobile Connect cellular modem is required for all Ensemble installations.
Ethernet	Optional, 802.3, Cat5E (or Cat 6) UTP Ethernet cable (not included)
COMPLIANCE	
Compliance, IQ Combiner	UL 1741, CAN/CSA C22.2 No. 107.1, 47 CFR, Part 15, Class B, ICES 003 Production metering: ANSI C12.20 accuracy class 0.5 (PV production) Consumption metering: accuracy class 2.5
Compliance, IQ Gateway	UL 60601-1/CANCSA 22.2 No. 61010-1

To learn more about Enphase offerings, visit **enphase.com**

ENPHASE

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 (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.

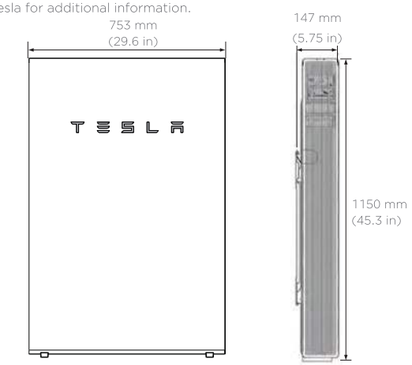
COMPLIANCE INFORMATION

Certifications	UL 1642, UL 1741, UL 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.



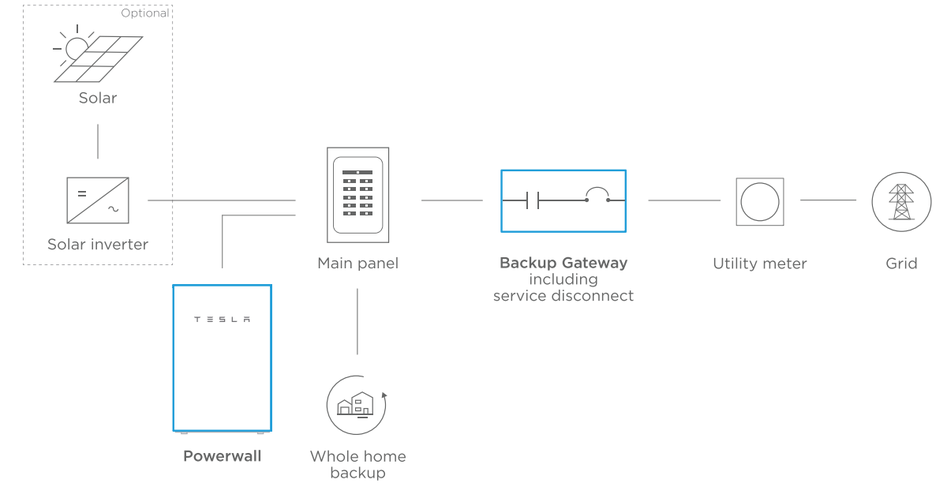
ENVIRONMENTAL SPECIFICATIONS

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)

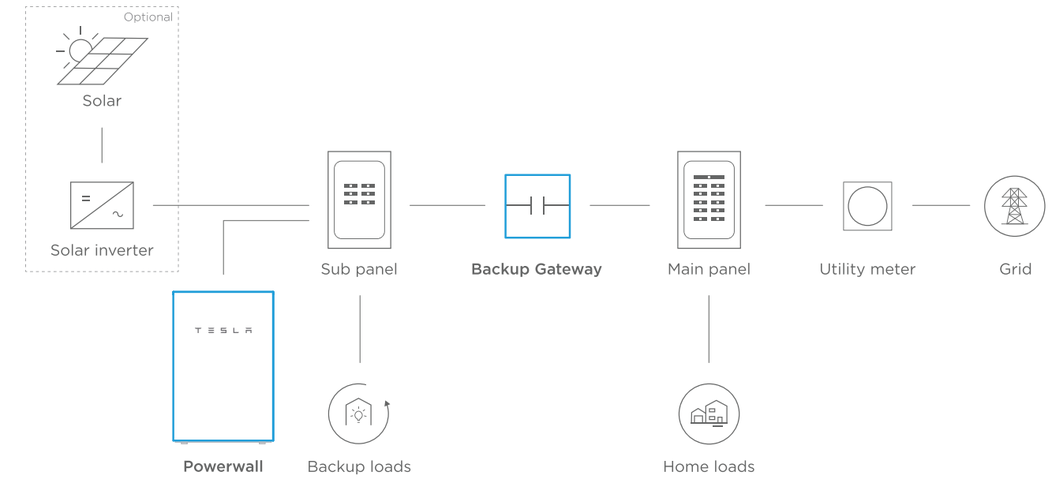
[5]Performance may be de-rated at operating temperatures below 10°C (50°F) or greater than 43°C (109°F).

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.

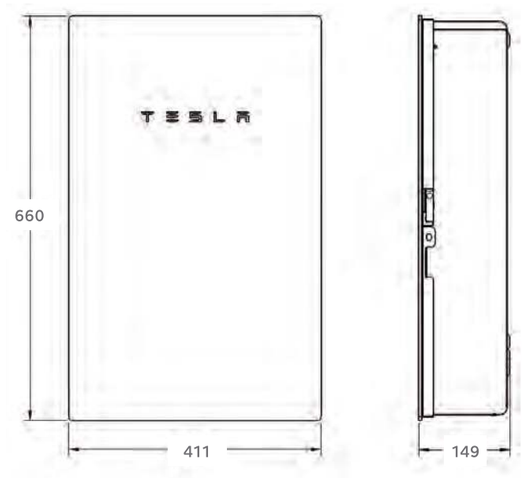
PERFORMANCE SPECIFICATIONS

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

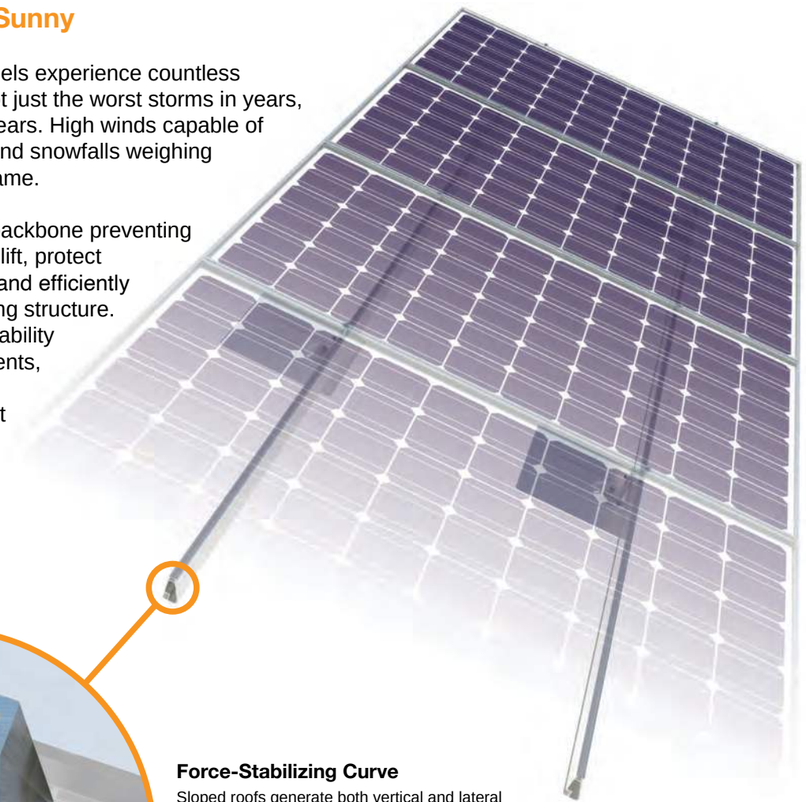
Operating Temperature	-20°C to 50°C (-4°F to 122°F)
Operating Humidity (RH)	Up to 100%, condensing
Maximum Elevation	3000 m (9843 ft)
Environment	Indoor and outdoor rated
Enclosure Type	NEMA 3R

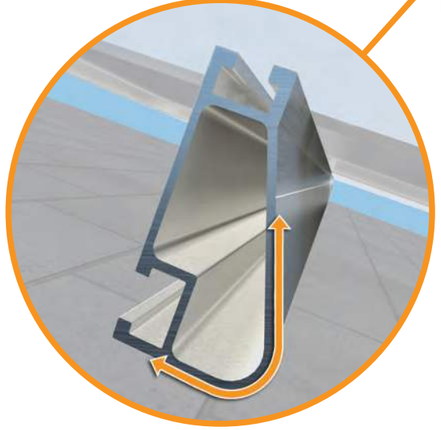
XR Rail Family

Solar Is Not Always Sunny

Over their lifetime, solar panels experience countless extreme weather events. Not just the worst storms in years, but the worst storms in 40 years. High winds capable of ripping panels from a roof, and snowfalls weighing enough to buckle a panel frame.

XR Rails are the structural backbone preventing these results. They resist uplift, protect against buckling and safely and efficiently transfer loads into the building structure. Their superior spanning capability requires fewer roof attachments, reducing the number of roof penetrations and the amount of installation time.





Force-Stabilizing Curve

Sloped roofs generate both vertical and lateral forces on mounting rails which can cause them to bend and twist. The curved shape of XR Rails is specially designed to increase strength in both directions while resisting the twisting. This unique feature ensures greater security during extreme weather and a longer system lifetime.

Compatible with Flat & Pitched Roofs

XR Rails are compatible with FlashFoot and other pitched roof attachments.

IronRidge offers a range of tilt leg options for flat roof mounting applications.

Corrosion-Resistant Materials

All XR Rails are made of 6000-series aluminum alloy, then protected with an anodized finish. Anodizing prevents surface and structural corrosion, while also providing a more attractive appearance.

Tech Brief

XR Rail Family

The XR Rail Family offers the strength of a curved rail in three targeted sizes. Each size supports specific design loads, while minimizing material costs. Depending on your location, there is an XR Rail to match.

XR10

XR10 is a sleek, low-profile mounting rail, designed for regions with light or no snow. It achieves spans up to 6 feet, while remaining light and economical.

- 6’ spanning capability
- Moderate load capability
- Clear & black anodized finish
- Internal splices available

XR100

XR100 is the ultimate residential mounting rail. It supports a range of wind and snow conditions, while also maximizing spans up to 10 feet.

- 10’ spanning capability
- Heavy load capability
- Clear & black anodized finish
- Internal splices available

XR1000

XR1000 is a heavyweight among solar mounting rails. It’s built to handle extreme climates and spans up to 12 feet for commercial applications.

- 12’ spanning capability
- Extreme load capability
- Clear anodized finish
- Internal splices available

Rail Selection

The table below was prepared in compliance with applicable engineering codes and standards.* Values are based on the following criteria: ASCE 7-16, Gable Roof Flush Mount, Roof Zones 1 & 2e, Exposure B, Roof Slope of 8 to 20 degrees and Mean Building Height of 30 ft. Visit IronRidge.com for detailed certification letters.

Load		Rail Span					
Snow (PSF)	Wind (MPH)	4’	5’ 4”	6’	8’	10’	12’
None	90	XR10		XR100		XR1000	
	120						
	140						
	160						
20	90						
	120						
	140						
	160						
30	90						
	160						
40	90						
	160						
80	160						
120	160						

*Table is meant to be a simplified span chart for conveying general rail capabilities. Use approved certification letters for actual design guidance.

GODWIN ENGINEERING AND DESIGN, LLC

8378 Foxtail Loop, Pensacola, FL 32526 | (850)712-4219 | chad@godwineng.com

August 24, 2022

To: Columbia County Building Department
135 NE Hernando Ave
Lake City, FL 32055

Re: Russell – Residential PV Roof Mount Installation
452 SE Fritzi Ct.
Lake City, FL 32025

Plan Reviewer,

This letter is regarding the installation of a new roof mounted Solar PV System on the existing residential structure at the address above. I have reviewed the attachment plan and have determined that the roof mounted PV system is in compliance with the applicable sections of the following Codes as amended and adopted by the jurisdiction:

2020 Florida Building Code 7th Edition, FBC
ASCE 7 Min. Design Loads for Buildings & Other Structures

Per 2020 FBC, the Roof Mounted PV system will be subject to the following design criteria:
Design Wind Speed (V_{ult}) - 120mph 3sec gust, Exposure Category – C

The PV System consist of the modules, railing, and connection hardware. The system will add a dead load of approximately 3 psf to the roof.

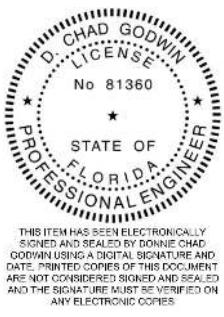
The existing roof covering is 24ga. Metal panel with min. ½" plywood decking and 2" x 4" roof trusses 24" O.C. The roofing, decking, and roof trusses are in good condition. The existing structure will be adequate for supporting the additional PV dead load and wind loads.

The securement method of the PV system is to be flush mounted to the metal panel roof with the Ironridge railing and the S-5! SolarFoot. The attachments can be attached up to 48" apart in roof zones 1, 2e, 2n, 2r, & 3e and 24" apart in roof zone 3r. The mounts should be staggered, where possible, to allow distribution of the design loads evenly to the structure. The mounts shall be installed using 4 x .25-14 Milled Point 2.5" Length Self-Piercing Screws.

Please see attached documents and contact me should you have any questions.

Sincerely,

D. Chad Godwin, PE 81360
Exp. 02/28/2023



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ASCE 7-16 CHAPTER 29 WIND LOADS - Rooftop Solar Panels Minimum Design Loads - Part 1: Enclosed(Gable,Hip,Flat h<60ft, 0°<θ<45°)

Wind Load Parameters - Inputs

Risk Category		II		Table 1.5-1
Basic Wind Speed (Ult)		120	mph	Figure 26.5-1B
Roof Angle		8° to 20°		
Roof Type		Gable		
Exposure Cat.	B,C, or D	C		Section 26.7
Mean Roof Height	h	15.00	ft	
Roof attachment		S-5! SolarFoot to Deck 1/4-14 x 4		
Rafter/Truss Spacing		24	in O.C.	
No. of Rails		2		
No. of Modules - Portrait		59		
No. of Modules - Landscape		0		
Module Model Number		T395H T400H T405H		
bldg. least horizontal dim (typ.)		360	in	
Elevation		<1000	ft	
Est. # of attachment points		115		

Wind Load Paramaters

Wind Speed (asd)		93	mph	FRC R301.2.1.3
Effective Wind Area		21.29	ft^2	26.20
Wind Directionality	K_d	0.85		Table 26.6-1
Topographic factor	K_{zt}	1.00		26.8 or 26.8.2
Ground Elevation Factor	K_e	1.00		Table 26.9-1
Velocity Exposure Coefficient	K_z	0.85		Table 26.10-1
Array Edge Factor	γ_E	1.50		29.4.4 *Modules are considered Exposed
Solar Panel Equalization Factor	γ_a	0.67		Fig. 29.4-8
Velocity Pressure	q_h	15.98	psf	$q_h=0.00256\ K_z K_{zt} K_d K_e V^2$
Added Safety Factor		1.2		
Allowable Pullout per mount		590.0	lbs	
0.4h or 0.6h		6.00	ft	Flat - 0.6h, Gable, Hip - 0.4h
10% of least horizontal dim		3.00	ft	10% of least hor. Dim. Or 0.4h, whichever is smaller, but not less than either 4% of Least hor. Or 3ft. (flat roof - 0.6h)
Roof Zone Set Back	a	3.00	ft	
	h_2	5	in	Not > 10in(panel height above roof)
	$2h_2$	10	in	*min distance array shall be from the roof edge, Gable Ridge, or hip ridge
		0.25	in	min gap between all panels but not > 6.7ft
	d1	1.00	ft	Horizontal distance orthogonal to panel edge
	d2	0.25	ft	Horizontal distance from edge of one panel to the nearest edge in the next row
	0.5h	7.50	ft	*modules are considered exposed that are within 1.5Lp from roof edge

PV Dead Load

# of Modules		59	
Module	W_{mod}	52	lbs
Array	W_{mods}	3056	lbs
Micro/optimizer	W_{mic}	236	lbs
PV Rail	$W_{PV\ rail}$	42	lbs
Total Weight	W_{total}	3335	lbs
Total Area	A_T	1255.91	ft^2
Dead Load	D_{PV}	2.66	psf
Weight/attachment		29.0	lbs

Module and Racking Specs

Dimensions, LxWxH (in)	74.4 x 41.2 x 1.57	
Width	3.43	ft
Length	6.20	ft
Module Area	21.29	ft^2

Module load ratings

	Ultimate	Allowable
Load Rating - Snow(psf)	113.4	75.6
Load Rating - Wind(psf)	-83.79	-55.9

PV Attachment - Results

Roof Zones - Gable 8° to 20°

	1	2e	2r	2n	3e	3r		
GC_p - Uplift	-2.0	-2.0	-2.6	-2.6	-2.6	-3.0		
GC_p - Down	0.5	0.5	0.5	0.5	0.5	0.5		
$p = q_h(GC_p)(\gamma_E)(\gamma_a)$	-29.4	-29.4	-39.0	-39.0	-39.0	-45.4	psf	29.4-7
$p = q_h(GC_p)(\gamma_E)(\gamma_a)$	8.0	8.0	8.0	8.0	8.0	8.0	psf	29.4-7
Max Allowable Span	4	4	4	4	4	2	ft	*notes
Max Cantilever (in)	16	16	16	16	16	8	Max span * 33% (in)	

Notes

Eq.1 Point Load = Roof Zone psf * A_{eff}

Eq.2 A_{eff} = (Module Length /2) * Max Span

Eq.3 *Max span Equation, SF = Allowable pullout / Point Load

Eq.4 Max Span = Allowable Pullout / (SF * Roof Zone psf * L/2)

a) The Max span between attachment points must not exceed the rail spans provided by racking manufacture.

b) Allowable Module load ratings are determined by SF = 1.5

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