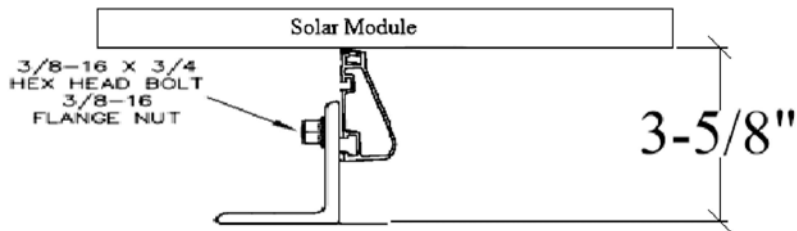




Ironridge XR-100



General Notes:

- L Feet are secured to roof rafters.
@ 96" O.C. in Zone 1, @ 72" O.C in Zone 2e,
@ 48" O.C. in Zone 2r, & @ 48" O.C in Zone 3.
using 5/16" x 4.75" stainless steel Lag bolts.
- Subject roof has One layer.
- All penetrations are sealed and flashed.

Install will be done to Manufacturer Spec

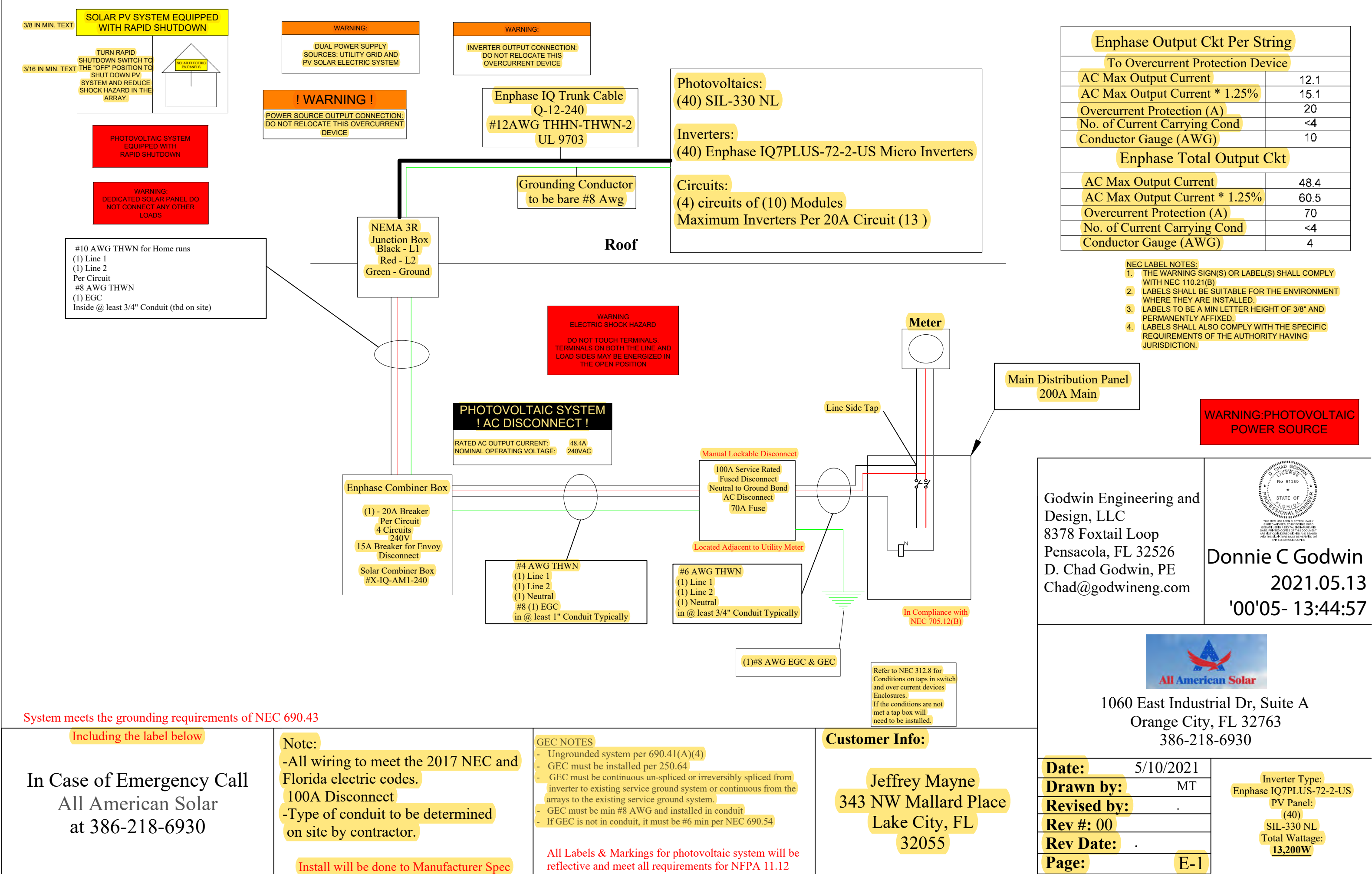
Godwin Engineering and Design, LLC
8378 Foxtail Loop
Pensacola, FL 32526
D. Chad Godwin, PE
Chad@godwineng.com

Donnie C Godwin
2021.05.13
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Roof Section	Pitch	Roof Rafter and Spacing	Overhang	Notes:
R1-R2	7/12	2"x4" @ 24 O.C.	12"	Truss
-Designed as per ASCE7-16 -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		Inverter Type: Enphase IQ7PLUS-72-2-US PV Panel: (40) SIL-330 NL Racking: Iron Ridge Total Wattage: 13,200W Roof Type: Composition Shingles Wind Load: Deg 27 to 45 Fastener Type: Use 5/16" Dia 4.75"Lags		Customer Info: Jeffrey Mayne 343 NW Mallard Place Lake City, FL 32055

1060 East Industrial Dr, Suite A
Orange City, FL 32763
386-218-6930

Date:	5/10/2021
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Rev #: 00	
Rev Date:	.
Page:	S-2



L

Proposed Mounting locations

- Iron Ridge Rail

XR-100 17'

XR-100 14'

XR-100 7'

4'

Splice Bar

Iron Ridge FF2

Iron Ridge UFO's

Iron Ridge Sleeves/End Caps

Combiner

Iron Ridge Ground Lugs

SIL-330 NL

Enphase IQ7PLUS-72-2-US

100A Fused Disconnect

70A Fuse

20A Breakers

Enphase Combiner Box
- 4

15

8

56

94

28

2

7

40

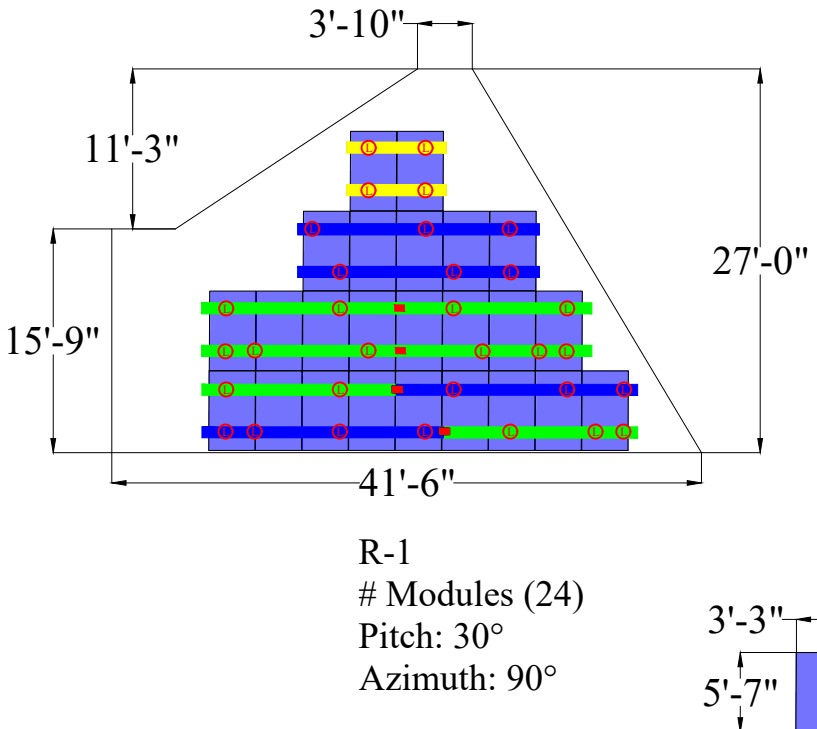
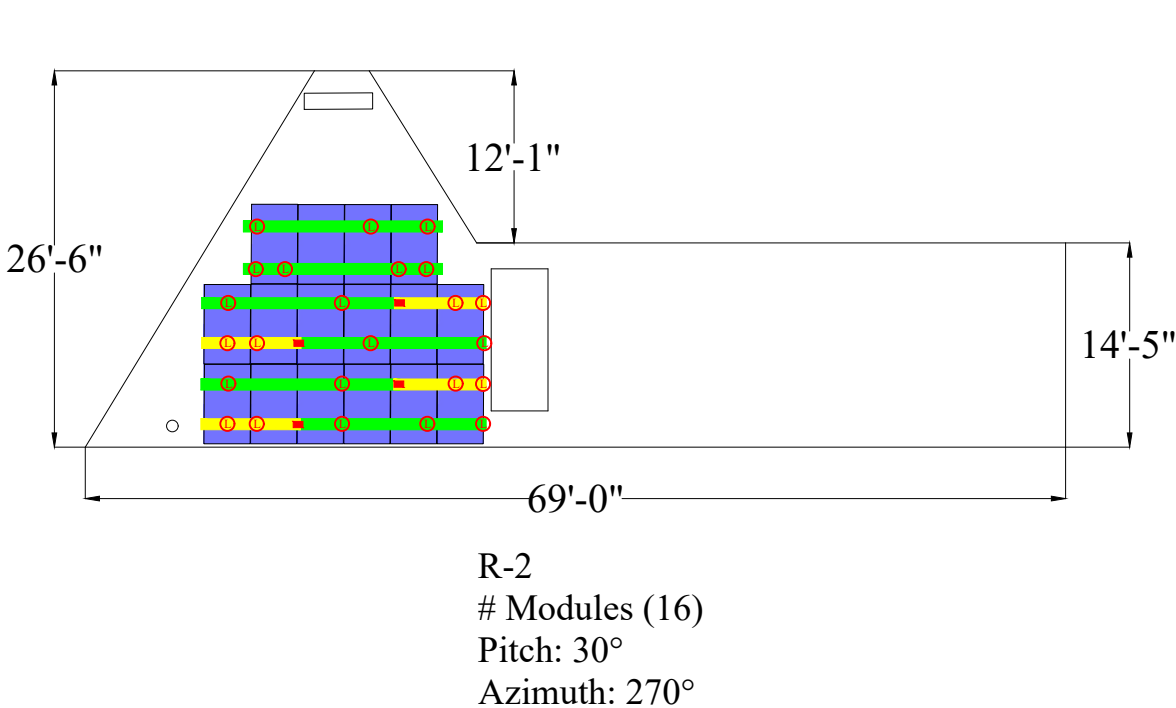
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1

1

4

1



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

- Zone 1:

Max cantilever is 32" as per manufacturer spec.

Max Cantilever = Max Span * (1/3)=96"*(1/3)=32"

Zone 2e:

Max cantilever is 24" as per manufacturer spec.

Max Cantilever = Max Span * (1/3)=72"*(1/3)=24"

Zone 2r:

Max cantilever is 16" as per manufacturer spec.

Max Cantilever = Max Span * (1/3)=48"*(1/3)=16"

Zone 3:

Max cantilever is 16" as per manufacturer spec.

Max Cantilever = Max Span * (1/3)=48"*(1/3)=16"

Inverter Type:	Enphase IQ7PLUS-72-2-US	Customer Info: Jeffrey Mayne 343 NW Mallard Place Lake City, FL 32055
PV Panel:	(40) SIL-330 NL	
Racking:	Iron Ridge	
Total Wattage:	13,200W	
Roof Type:	Composition Shingles	
Wind Load:	Deg 27 to 45	
Fastener Type:	Use 5/16" Dia 4.75"Lags	

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

Donnie C Godwin
2021.05.13
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1060 East Industrial Dr, Suite A
Orange City, FL 32763
386-218-6930

Date: 5/10/2021

Drawn by: MT

Revised by: .

Rev #: 00

Rev Date: .

Page: S-1A



SIL-330 NL



HIGH EFFICIENCY PREMIUM MONO-PERC PV MODULE



CHUBB
* Chubb provides error and omission insurance to Silfab Solar Inc.

INDUSTRY LEADING WARRANTY

All our products include an industry leading 25-year product workmanship and 30-year performance warranty.

35+ YEARS OF SOLAR INNOVATION

Leveraging over 35+ years of worldwide experience in the solar industry, Silfab is dedicated to superior manufacturing processes and innovations such as Bifacial and Back Contact technologies, to ensure our partners have the latest in solar innovation.

NORTH AMERICAN QUALITY

Silfab is the leading automated solar module manufacturer in North America. Utilizing premium quality materials and strict quality control management to deliver the highest efficiency, premium quality PV modules.



BAA / ARRA COMPLIANT

Silfab panels are designed and manufactured to meet Buy American Act Compliance. The US State Department, US Military and FAA have all utilized Silfab panels in their solar installations.

LIGHT AND DURABLE

Engineered to accommodate high wind load conditions for test loads validated up to 4000Pa uplift. The light-weight frame is exclusively designed for wide-ranging racking compatibility and durability.

QUALITY MATTERS

Total automation ensures strict quality controls during the entire manufacturing process at our ISO certified facilities.

DOMESTIC PRODUCTION

Silfab Solar manufactures PV modules in two automated locations within North America. Our 500+ North American team is ready to help our partners win the hearts and minds of customers, providing customer service and product delivery that is direct, efficient and local.

AESTHETICALLY PLEASING

All black sleek design, ideal for high-profile residential or commercial applications.

PID RESISTANT

PID Resistant due to advanced cell technology and material selection. In accordance to IEC 62804-1.

Electrical Specifications		SIL-330 NL mono PERC	
Test Conditions		STC	NOCT
Module Power (Pmax)	Wp	330	235
Maximum power voltage (Vpmax)	V	33.3	30.2
Maximum power current (Ipmax)	A	9.92	7.8
Open circuit voltage (Voc)	V	40.5	36.7
Short circuit current (Isc)	A	10.42	8.2
Module efficiency	%	19.4	17.3
Maximum system voltage (VDC)	V	1000	
Max series fuse rating	A	20	
Power Tolerance	Wp	0 to +10	

Measurement conditions: STC 1000 W/m² • AM 1.5 • Temperature 25 °C • NOCT 800 W/m² • AM 1.5 • Measurement uncertainty ≤ 3%
• Sun simulator calibration reference modules from Fraunhofer Institute. Electrical characteristics may vary by ±5% and power by 0 to +10W.

Temperature Ratings		SIL-330 NL mono PERC	
Temperature Coefficient Isc		0.064 %/°C	
Temperature Coefficient Voc		-0.28 %/°C	
Temperature Coefficient Pmax		-0.36 %/°C	
NOCT (± 2°C)		46 °C	
Operating temperature		-40/+85 °C	

Mechanical Properties and Components		SIL-330 NL mono PERC	
	Metric	Imperial	
Module weight	18.6 kg ±0.2 kg	41 ±0.4 lbs	
Dimensions (H x L x D)	1700 mm x 1000 mm x 38 mm	66.9 in x 39.4 in x 1.5 in	
Maximum surface load (wind/snow)*	4000 Pa rear load / 5400 Pa front load N/m ²	83.5/112.8 lb/ft ²	
Hail impact resistance	Ø 25 mm at 83 km/h	Ø 1 in at 51.6 mph	
Cells	60 - Si mono PERC - 5 busbar 158.75 x 158.75 mm	60 - Si mono PERC - 5 busbar 6.25 x 6.25 Inch	
Glass	3.2 mm high transmittance, tempered, DSM anti-reflective coating	0.126 in high transmittance, tempered, DSM anti-reflective coating	
Cables and connectors (refer to installation manual)	1200 mm, Ø 5.7 mm, MC4 from Staubli	47.2 in, Ø 0.22 in (12AWG), MC4 from Staubli	

Backsheet	High durability, superior hydrolysis and UV resistance, multi-layer dielectric film, fluorine-free PV backsheet		
Frame	Anodized Aluminum (Black)		
Bypass diodes	3 diodes-30SQ045T (45V max DC blocking voltage, 30A max forward rectified current)		
Junction Box	UL 3730 Certified, IEC 62790 Certified, IP67 rated		
Warranties	SIL-330 NL mono PERC		
Module product workmanship warranty	25 years**		
Linear power performance guarantee	30 years		

Certifications		SIL-330 NL mono PERC	
Product		ULC ORD C1703, UL1703, CEC listed***, UL 61215-1/-1-1/-2, UL 61730-1/-2, IEC 61215-1/-1-1/-2***, IEC 61730-1/-2***, CSA C22.2#61730-1/-2***, IEC 62716 Ammonia Corrosion; IEC61701:2011 Salt Mist Corrosion Certified, UL Fire Rating: Type 2	
Factory		ISO9001:2015	

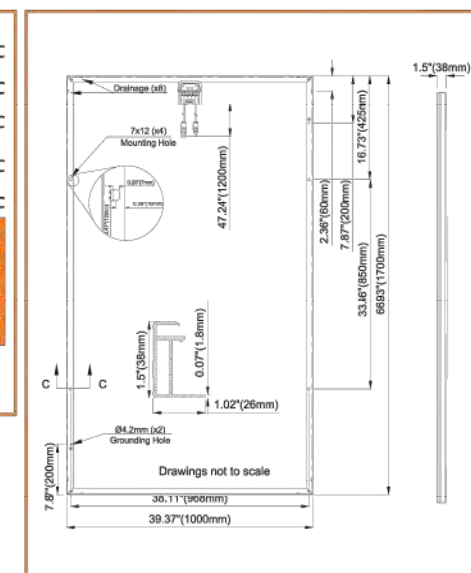
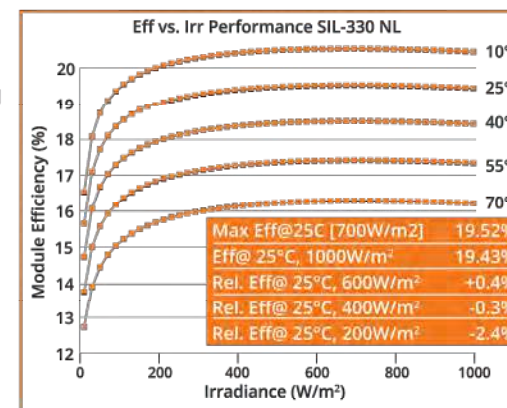
- Modules Per Pallet: 26
- Pallets Per Truck: 36
- Modules Per Truck: 936

*▲ Warning. Read the Safety and Installation Manual for mounting specifications and before handling, installing and operating modules.

**12 year extendable to 25 years subject to registration and conditions outlined under "Warranty" at www.silfabsolar.com.

***Certification and CEC listing in progress. August 2020 expected completion date for CEC listing, IEC 61730/61215 and CSA C22.2#61730-1/-2

Third-party generated pan files from Fraunhofer-Institute for Solar Energy Systems ISE are available for download at: www.silfabsolar.com/downloads



Silfab Solar Inc.
240 Courtneypark Drive East
Mississauga ON L5T 2Y3 Canada
Tel +1 905-255-2501 | Fax +1 905-696-0267
info@silfabsolar.com | www.silfabsolar.com

Silfab Solar Inc.
800 Cornwall Ave
Bellingham WA 98225 USA
Tel +1 360-569-4733



Enphase IQ 7 and IQ 7+ Microinverters

The high-powered smart grid-ready **Enphase IQ 7 Micro™** and **Enphase IQ 7+ Micro™** dramatically simplify the installation process while achieving the highest system efficiency.

Part of the Enphase IQ System, the IQ 7 and IQ 7+ Microinverters integrate with the Enphase IQ Envoy™, Enphase IQ Battery™, and the Enphase Enlighten™ monitoring and analysis software.

IQ Series Microinverters extend the reliability standards set forth by previous generations and undergo over a million hours of power-on testing, enabling Enphase to provide an industry-leading warranty of up to 25 years.



Easy to Install

- Lightweight and simple
- Faster installation with improved, lighter two-wire cabling
- Built-in rapid shutdown compliant (NEC 2014 & 2017)

Productive and Reliable

- Optimized for high powered 60-cell and 72-cell* modules
- More than a million hours of testing
- Class II double-insulated enclosure
- UL listed

Smart Grid Ready

- Complies with advanced grid support, voltage and frequency ride-through requirements
- Remotely updates to respond to changing grid requirements
- Configurable for varying grid profiles
- Meets CA Rule 21 (UL 1741-SA)

* The IQ 7+ Micro is required to support 72-cell modules.



To learn more about Enphase offerings, visit enphase.com



Enphase IQ 7 and IQ 7+ Microinverters

INPUT DATA (DC)		IQ7-60-2-US / IQ7-60-B-US		IQ7PLUS-72-2-US / IQ7PLUS-72-B-US	
Commonly used module pairings ¹	235 W - 350 W +		235 W - 440 W +		
Module compatibility	60-cell PV modules only		60-cell and 72-cell PV modules		
Maximum input DC voltage	48 V		60 V		
Peak power tracking voltage	27 V - 37 V		27 V - 45 V		
Operating range	16 V - 48 V		16 V - 60 V		
Min/Max start voltage	22 V / 48 V		22 V / 60 V		
Max DC short circuit current (module Isc)	15 A		15 A		
Overvoltage class DC port	II		II		
DC port backfeed current	0 A		0 A		
PV array configuration	1 x 1 ungrounded array; No additional DC side protection required; AC side protection requires max 20A per branch circuit				
OUTPUT DATA (AC)		IQ 7 Microinverter		IQ 7+ Microinverter	
Peak output power	250 VA		295 VA		
Maximum continuous output power	240 VA		290 VA		
Nominal (L-L) voltage/range ²	240 V / 211-264 V	208 V / 183-229 V	240 V / 211-264 V	208 V / 183-229 V	
Maximum continuous output current	1.0 A (240 V)	1.15 A (208 V)	1.21 A (240 V)	1.39 A (208 V)	
Nominal frequency	60 Hz		60 Hz		
Extended frequency range	47 - 68 Hz		47 - 68 Hz		
AC short circuit fault current over 3 cycles	5.8 Arms		5.8 Arms		
Maximum units per 20 A (L-L) branch circuit ³	16 (240 VAC)	13 (208 VAC)	13 (240 VAC)	11 (208 VAC)	
Overvoltage class AC port	III		III		
AC port backfeed current	0 A		0 A		
Power factor setting	1.0		1.0		
Power factor (adjustable)	0.7 leading ... 0.7 lagging		0.7 leading ... 0.7 lagging		
EFFICIENCY		@240 V	@208 V	@240 V	@208 V
Peak CEC efficiency		97.6 %	97.6 %	97.5 %	97.3 %
CEC weighted efficiency		97.0 %	97.0 %	97.0 %	97.0 %
MECHANICAL DATA					
Ambient temperature range	-40°C to +65°C				
Relative humidity range	4% to 100% (condensing)				
Connector type (IQ7-60-2-US & IQ7PLUS-72-2-US)	MC4 (or Amphenol H4 UTX with additional Q-DCC-5 adapter)				
Connector type (IQ7-60-B-US & IQ7PLUS-72-B-US)	Friends PV2 (MC4 intermateable). Adaptors for modules with MC4 or UTX connectors: - PV2 to MC4: order ECA-S20-S22 - PV2 to UTX: order ECA-S20-S25				
Dimensions (WxHxD)	212 mm x 175 mm x 30.2 mm (without bracket)				
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				
EnVironmental category / UV exposure rating	NEMA Type 6 / outdoor				
FEATURES					
Communication	Power Line Communication (PLC)				
Monitoring	Enlighten Manager and MyEnlighten monitoring options. Both options require installation of an Enphase IQ Envoy.				
Disconnecting means	The AC and DC connectors have been evaluated and approved by UL for use as the load-break disconnect required by NEC 690.				
Compliance	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 and NEC-2017 section 690.12 and C22.1-2015 Rule 64-218 Rapid Shutdown of PV Systems, for AC and DC conductors, when installed according manufacturer's instructions.				

1. No enforced DC/AC ratio. See the compatibility calculator at <https://enphase.com/en-us/support/module-compatibility>.
2. Nominal voltage range can be extended beyond nominal if required by the utility.
3. Limits may vary. Refer to local requirements to define the number of microinverters per branch in your area.

To learn more about Enphase offerings, visit enphase.com



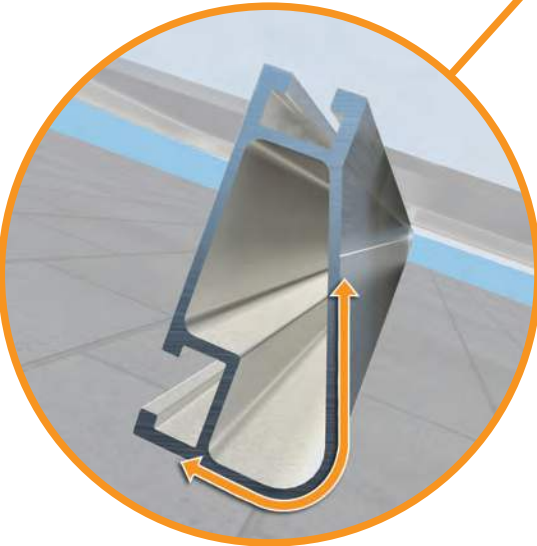
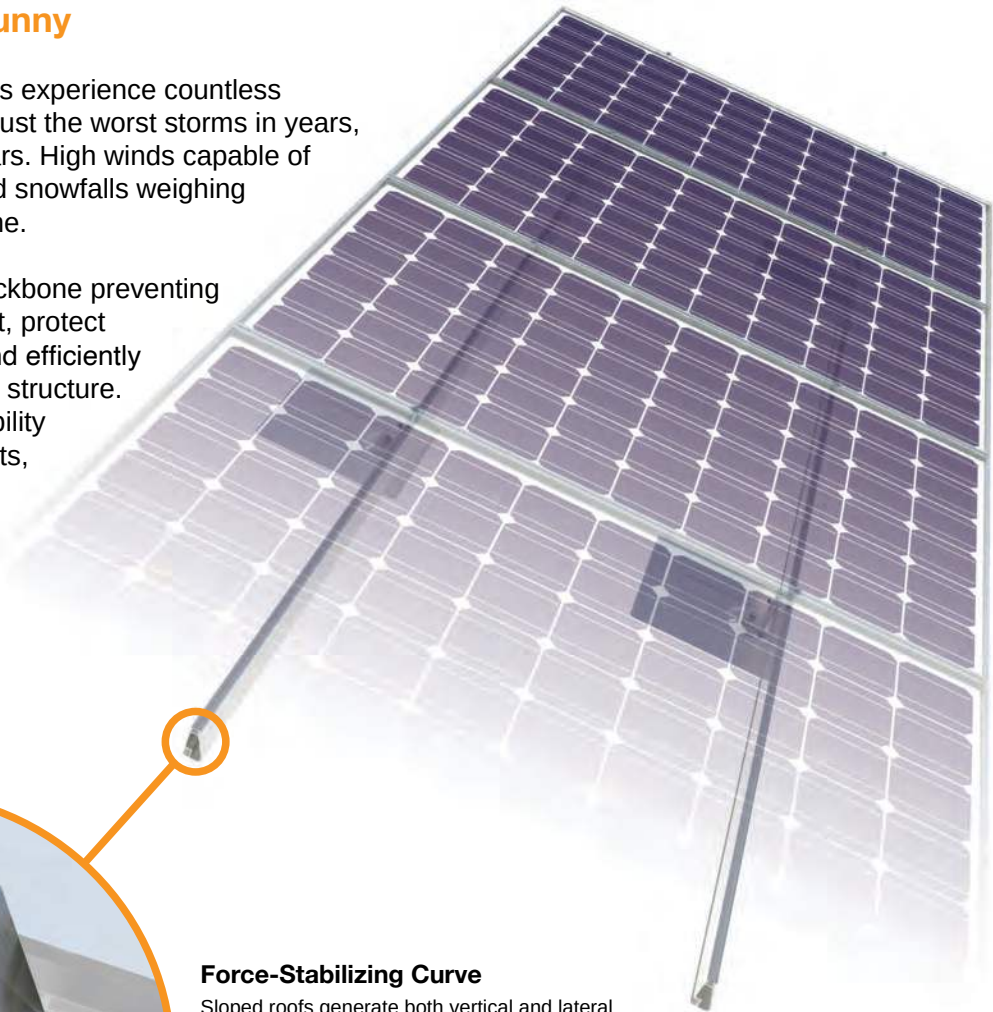


XR Rail Family

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.



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

May 12, 2021

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

Re: Mayne – Residential PV Roof Mount Installation
343 NW Mallard Pl.
Lake City, FL 32055

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 Asphalt Shingle 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.

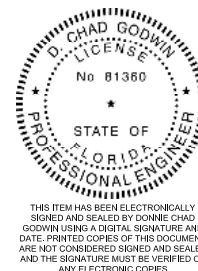
The securement method of the PV system is to be flush mounted to the asphalt shingle roof with the Ironridge railing and flashings/attachments. The attachments can be attached up to 96" apart in roof zone 1, 72" apart in roof zone 2e, and 48" apart in roof zones 2r, & 3. The mounts should be staggered, where possible, to allow distribution of the design loads evenly to the structure. The mounts shall be installed with a min. 5/16" lag screw with minimum 2-5/16" thread length.

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

Sincerely,

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

Donnie C
Godwin
2021.05.13
13:45:29
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ASCE 7-16 CHAPTER 29 WIND LOADS - Rooftop Solar Panels Minimum Design Loads - Part 1: Enclosed(Hip, $h < 60\text{ft}$, $28^\circ < \theta < 45^\circ$)

Risk Category	II	Table 1.5-1	Load Types	Load, PSF
Basic Wind Speed (Ult)	120	Figure 26.5-1B	Dead Load, D	3
Wind Speed (asd)	93	IBC 1609.3.1	Weight of Ice, D _i	0
Roof Angle	28 to 45	*	Earthquake, E	0
Effective Wind Area	21.00	ft ² 26.20	Fluid, F	n/a
Wind Load Parameters				
Wind Directionality	K _d 0.85	Table 26.6-1	Flood Load, F _s	n/a
Exposure Cat. B, C, or D	C	Section 26.7	Lateral Earth psi, H	n/a
Topographic factor	K _{zt} 1.00	26.8 or 26.8.2	Live Load, L	n/a
Ground Elevation Factor	K _e 1.00	Table 26.9-1	Roof Live, L _r	n/a
Velocity Exposure Coefficient	K _z 0.85	Table 30.3-1	Rain, R	n/a
Array Edge Factor	γ_E 1.50	29.4.4 *Modules are considered Exposed	Snow, S	0
Solar Panel Equalization Factor	γ_a 0.67	Fig. 29.4-8	Self-Straining, T	n/a
Velocity Pressure	q _p 15.98 psf	$q_h = 0.00256 K_z K_{zt} K_d K_e V^2$	Wind, W	see calc
Mean Roof Height	h 15.00 ft	h ₂ 5 in	Wind-on-Ice, W _i	n/a
0.4h	6.00 ft	2h ₂ 10 in		
least horizontal dim	360 in	0.25 in		
10% of least horizontal dim	3.00 ft	d1 1.00 ft		
Roof Zone Set Back	a 3.00 ft	d2 0.25 ft		
h/B	0.50	0.5h 7.50 ft		
		1.5Lp 8.45 ft		

Figure 30.3-2G(Hip roof, $h < 60\text{ft}$, $28^\circ < \theta < 45^\circ$)

Zone				
	1	2e	2r	3
GC _p	-1.40	-1.50	-2.10	-2.20
GC _p	0.70	0.70	0.70	0.70
p = q _h (GC _p)(γ_E)(γ_a)	-22.52	-24.13	-33.78	-35.39
p = q _h (GC _p)(γ_E)(γ_a)	11.26	11.26	11.26	11.26

Design Calculations for the Use of Attachment to Roof Truss/Rafter

Module Length	C(L _p)	5.63	ft
Module Width	B	3.73	ft
Module Area	A	21	ft ²
Total Design Load (Uplift)	P _{design}	-22.52 -24.13 -33.78 -35.39	psf
Total Design Load (Downforce)	P _{design}	11.26 11.26 11.26 11.26	psf
Design Load per Module	T _{up}	-472.96 -506.74 -709.44 -743.22	lbs
Design Load per Module	T _{down}	236.48 236.48 236.48 236.48	lbs
Distributed Load (Uplift)	P _{dist. Up}	-63.40 -67.93 -95.10 -99.63	plf
Distributed Load (Down)	P _{dist. Down}	31.70 31.70 31.70 31.70	plf
Railspace Between Anchor Points	L	8 6 4 4	ft
Point Load per Mount (Uplift)	R	-507.19 -407.57 -380.40 -398.51	lbs
Point Load per Mount (Down)	R	126.80 95.10 63.40 63.40	lbs

$$T_{up} = A * P_{design}$$

$$T_{dn} = A * P_{design}$$

$$T_{up} / B * 2$$

$$T_{dn} / B * 2$$

Table 1.1 - Pullout Value for Single Lag Screw

Specific Gravity	G	0.55	0.55	0.55	0.55
Diameter of Lag Screw	D	5/16	5/16	5/16	5/16
Pullout Value of	W	306.8697	306.8697	306.8697	306.8697
# of Lag screws		1	1	1	1
Thread Length	T _d	2.3125	2.3125	2.3125	2.3125
Design Pullout Value per Mount	W _t	709.6363	709.6363	709.6363	709.6363
SAFETY FACTOR	SF	1.40	1.74	1.87	1.78
		1	2r	2e	3
Maximum Cantilever from Last attachment					
Max Cantilever	M	32	24	16	16

Table 11.2A, NDS 2005, page 68 (SYP)

$$W = 1800 G^{3/2} D^{3/4}$$

Table L2, NDS 2005

$$W_t = W * \# \text{ of Lags } * T_d$$

Calculation: SF=W_t/R (Uplift)

Max rail span * 33%

Donnie C
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