Inverter Type: (32)Enphase IQ7PLUS-72-2-US
PV Panel: (32) DNA-144-MF26-440W
Racking: Iron Ridge XR-10
Total Wattage: 14,080W DC
Roof Type: Composition Shingles
Wind Load: 21 to 27 Deg
Fastener Type: Use 5/16" Dia 4" Lags

Sheet Index

General Notes:
-Enphase IQ7PLUS-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 40 feet.

AC/DC Solar LLC
605 W Lumsden Rd,
Brandon, FL 33511
855-577-7999

FRONT OF HOUSE

-COGEN Disconnect Located adjacent to Utility meter

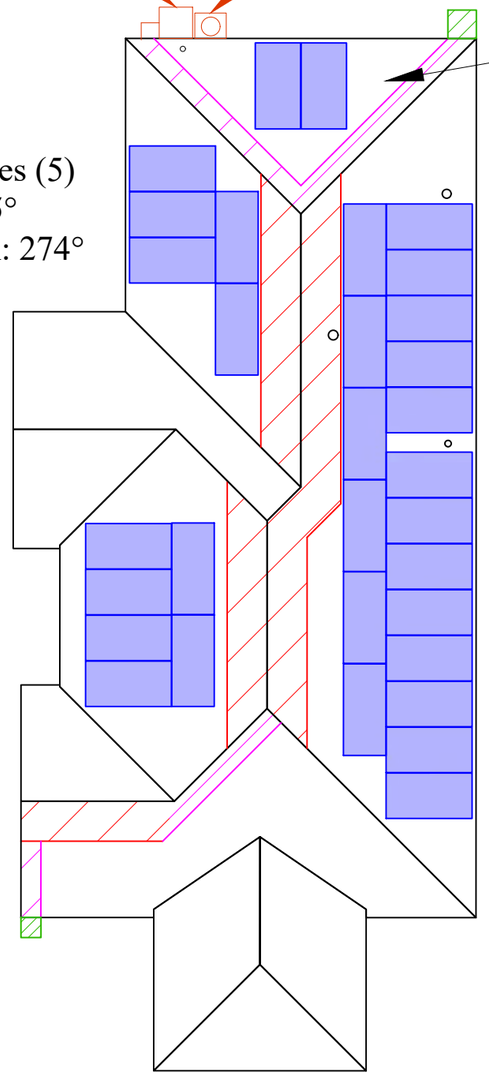
Utility Meter

R-4
Modules (2)
Pitch: 25°
Azimuth: 04°

R-3
Modules (5)
Pitch: 25°
Azimuth: 274°

R-2
Modules (6)
Pitch: 25°
Azimuth: 274°

R-1
Modules (19)
Pitch: 25°
Azimuth: 94°



3'-5"
6'-10"

Layout Subject to Change Based on Site Conditions

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

System meets the requirements of NFPA 70th Edition, Chapter 11.12

Install will be done to Manufacturer Spec

Legend

3' 1'-6" First responder access
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 NFPA-1 7th Edition 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:

Joshua & Charlene Stacy
307 SW Brandy Way
Lake City, FL
32024

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

Donnie C Godwin
2022.04.2 14:42:28 5 '00'05-

D. CHAD GODWIN LICENSE No 81360 STATE OF FLORIDA PROFESSIONAL ENGINEER
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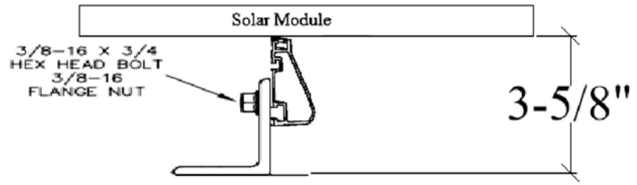
Page:	S-1

N

Compass for Aerial

Ironridge XR-10



Install will be done to Manufacturer Spec

General Notes:
- Flashlocs are secured to roof rafters.
@ 72" O.C. in Zone 1, @ 72" O.C in Zone 2e,
@ 72" O.C. in Zone 2r & @ 72" O.C in Zone 3
using 5/16" x 4" stainless steel Lag bolts.
- Subject roof has One layer.
- All penetrations are sealed and flashed.

Roof Section	Pitch	Roof Rafter and Spacing	Overhang	Notes:
R1-R4	6/12	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 - B
-Designed as per ASCE7-16

Inverter Type: (32)Enphase IQ7PLUS-72-2-US
PV Panel: (32) DNA-144-MF26-440W
Racking: Iron Ridge XR-10
Total Wattage: 14,080W DC
Roof Type: Composition Shingles
Wind Load: 21 to 27 Deg
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855-577-7999

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Rev #:	00
Rev Date:	.
Page:	S-2

12-2 Romex can be used for interior building and attic runs only. Do not use romex in conduit or outdoor environments.

#10 AWG THWN for Home runs
(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

Photovoltaics:
(32) DNA-144-MF26-440W

Inverters:
(32) Enphase IQ7PLUS-72-2-US Micro Inverters

Circuits:
(2) circuits of (11) Modules
(1) circuit of (10) Modules
Maximum Inverters Per 20A Circuit (13)

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

Roof

WARNING
ELECTRIC SHOCK HAZARD

DO NOT TOUCH TERMINALS.
TERMINALS ON BOTH THE LINE AND LOAD SIDES MAY BE ENERGIZED IN THE OPEN POSITION

PHOTOVOLTAIC SYSTEM
! AC DISCONNECT !

RATED AC OUTPUT CURRENT: 38.72A
NOMINAL OPERATING VOLTAGE: 240VAC

Enphase Combiner Box

(1) - 20A Breaker
Per Circuit
3 Circuits
240V
10/15A Breaker for Envoy
Disconnect

Solar Combiner Box
#X-IQ-AM1-240

B

Manual Lockable Disconnect

60A Service Rated
Fused Disconnect
Neutral to Ground Bond
AC Disconnect
50A Fuse

Located Adjacent to Utility Meter

C

M

Main Service Panel
150A Main

Line Side Tap

N

In Compliance with
NEC 705.12(B)

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.

Refer to NEC 312.8 for Conditions on taps in switch and over current devices Enclosures.
If the conditions are not met a tap box will need to be installed and revision completed.

Enphase Output Ckt Per String	
To Overcurrent Protection Device	
AC Max Output Current	13.31
AC Max Output Current * 1.25%	16.6
Overcurrent Protection (A)	20
No. of Current Carrying Cond	<4
Conductor Gauge (AWG)	10
Enphase Total Output Ckt	
AC Max Output Current	38.72
AC Max Output Current * 125%	48.4
Overcurrent Protection (A)	50
No. of Current Carrying Cond	<4
Conductor Gauge (AWG)	6

		Conduit (in)	L1,L2,N (Awg)	Ground (Awg)	OCPD
After Combiner	B	0.75	6	8	50
To Line Side Tap	C	0.75	6	N/A	50

Including the label below

In Case of Emergency Call
ACDC Solar LLC
at 855-577-7999

Meets 11.12.2.1.5

Note:
-All wiring to meet the 2017 NEC and Florida electric codes.
60A 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

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Chad@godwineng.com

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Brandon, FL 33511
855-577-7999

Date:	4/22/2022
Drawn by:	DC
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Rev #: 00	
Rev Date:	.
Page:	E-1

Inverter Type:
Enphase IQ7PLUS-72-2-US
PV Panel:
(32)
DNA-144-MF26-440W
Total Wattage:
14,080W 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 complaince with FFPC 1:11.12 7th Edition.

Smoke Detectors will be added as per FBC 553.883

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

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

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.

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)	75°C	
Current Carrying	<4	310.15(B)(3)(a)
AC Max Output Current	39A	690.8(A)(3)
AC Max Output Current * 1.25%	49A	690.8(B)
Overcurrent Protection(A)	50A	
Amp Temp Correction Factor	0.94	310.15(B)(2)(a)
Raceway Fill adjustment Factor	100%	310.15(B)(3)(a)
Wire Size(Awg)	6	310.15(B)(16)
Cond. Allowable Ampacity(A)	65A	
Cond Adjusted Ampacity(A)	61A	65A*1*0.94=61.1A
Ampacity Check 1 Per 690.8(B)(1)	Pass	39A*1.25=50A<65A Pass
Ampacity Check 2 Per 690.8(B)(2)	Pass	65A*0.94A*1=61.1A>39A Pass

All Exterior equipment is A minimum of Nema-R3 Rated

In compliance with 230.71

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
3* 20A < 125A
*No other loads to be added

Disconnect is in compliance 230.72

Supply side disconnect adjacent to Msp

In Case of Emergency Call
ACDC Solar LLC
at 855-577-7999

← 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

Line Side Tap will be done in Main Service Panel inside Garage

-Markings Shall Be reflective, Weather Resistant and suitable for the environment.
-Markings Shall be red with white lettering with minimum ⅜" 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)

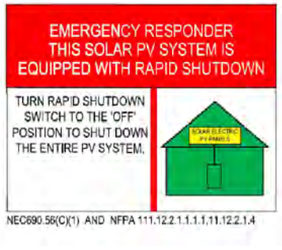
Photovoltaic AC disconnect shall be capable of being locked in the open position per NEC article 705.22(6).

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.

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



NEC 690.35

Install will be done to Manufacturer Spec

Including the label below

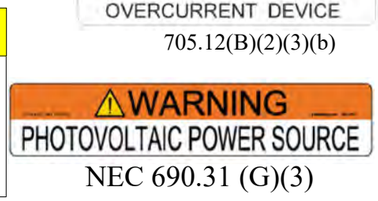
In Case of Emergency Call
ACDC Solar LLC
at 855-577-7999

Customer Info:

Joshua & Charlene Stacy
307 SW Brandy Way
Lake City, FL
32024

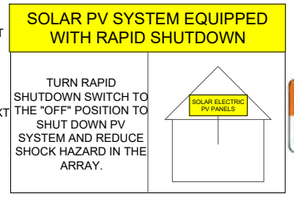
705.12(B)(3)

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



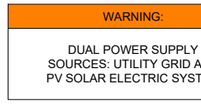
NEC 690.31 (G)(3)

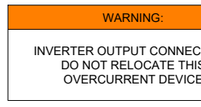
3/8 IN MIN. TEXT

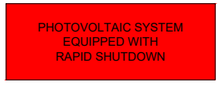


3/16 IN MIN. TEXT

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







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AC/DC Solar LLC

605 W Lumsden Rd,
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Date:	4/22/2022
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Revised by:	.
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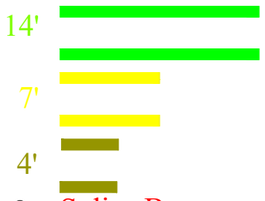
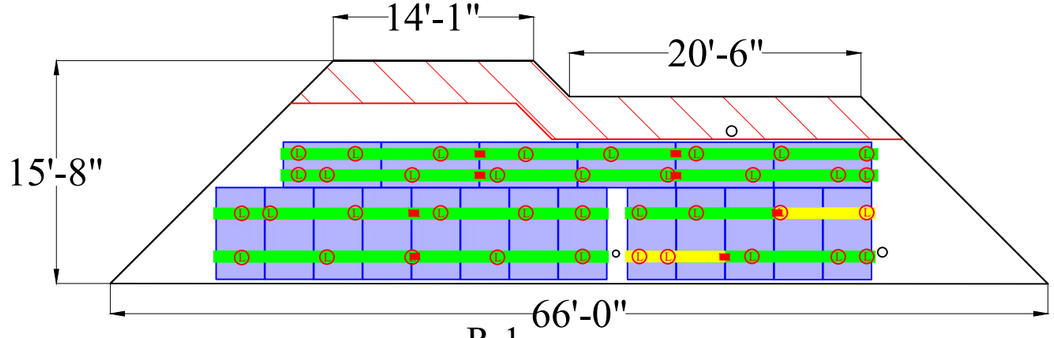
Page:	E-2

Inverter Type:
Enphase IQ7PLUS-72-2-US
PV Panel:
(32)
DNA-144-MF26-440W
Total Wattage:
14,080W DC

Iron Ridge XR-10 Rail

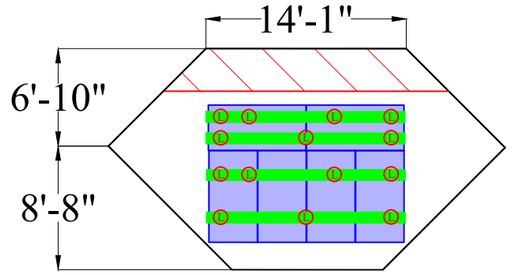


8	Splice Bar
70	Unirac Flashloc
80	Iron Ridge UFO's
32	Iron Ridge Sleeves/End Caps
4	Roof Top Combiner
8	Iron Ridge Ground Lugs
32	DNA-144-MF26-440W
32	Enphase IQ7PLUS-72-2-US
1	60A Fused Disconnect
2	50A Fuses
3	20A 2P Breaker
1	Enphase Combiner Box

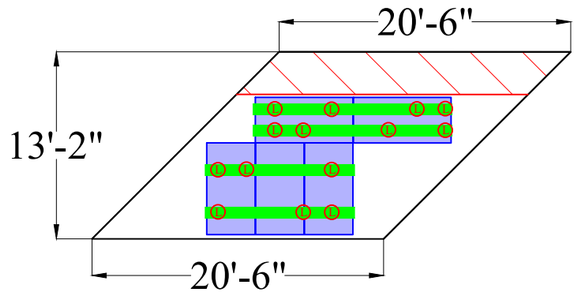


R-1
Modules (19)
Pitch: 25°
Azimuth: 94°

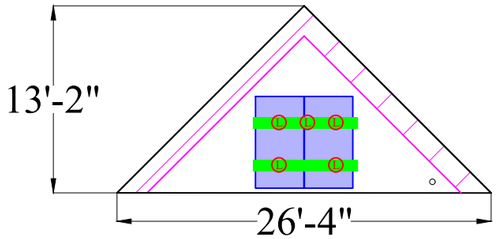
Proposed Mounting locations



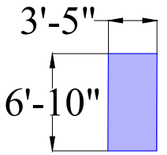
R-2
Modules (6)
Pitch: 25°
Azimuth: 274°



R-3
Modules (5)
Pitch: 25°
Azimuth: 274°



R-4
Modules (2)
Pitch: 25°
Azimuth: 04°



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

Zone 1:	Max cantilever is 24" as per manufacturer spec. Max Cantilever = Max Span * (⅓)=72"*(⅓)=24"
Zone 2e:	Max cantilever is 24" as per manufacturer spec. Max Cantilever = Max Span * (⅓)=72"*(⅓)=24"
Zone 2r:	Max cantilever is 24" as per manufacturer spec. Max Cantilever = Max Span * (⅓)=72"*(⅓)=24"
Zone 3:	Max cantilever is 24" as per manufacturer spec. Max Cantilever = Max Span * (⅓)=72"*(⅓)=24"

Inverter Type:	(32)Enphase IQ7PLUS-72-2-US
PV Panel:	(32) DNA-144-MF26-440W
Racking:	Iron Ridge XR-10
Total Wattage:	14,080W DC
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Date:	4/22/2022
Drawn by:	DC
Revised **by:**	.
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DNA™ 144

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Residential I Commercial

Designed & Engineered in Silicon Valley

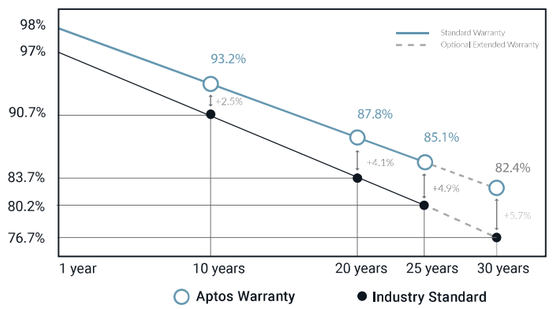
440W I 435W I 430W

Our DNA™ Split Cell Series impressively combines advanced solar technologies to maximize performance. Our patented Dual Nano Absorber (DNA™) Technology allows the panel to operate at high-efficencies in extreme temperatures. Contact our sales team today to learn more about our line of high-efficienty solar panels.

- Patented DNA™ technology boosts power performance & module efficiency
- Advanced split cell technology with 9 ultra-thin busbars allows for less resistance and more photon capture
- Ideal solution for applications affected by shading
- All-black design for pristine aesthetics
  No excessive silver bussing or ribbons
- Robust product design is reslient in extreme weather. Up to 5400 Pa snow load and 210 mph wind speeds

30 Year Warranty | 3X IEC Standards | RETC Top Performer

Linear Performance Warranty



aptos™ solar technology

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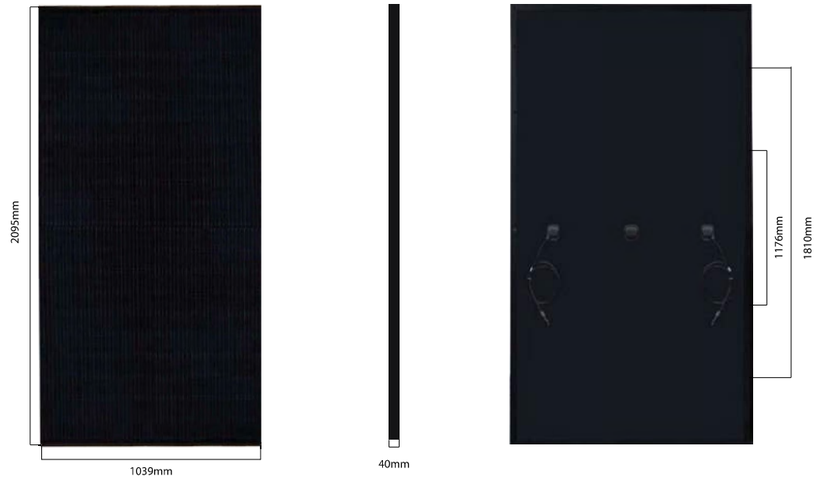
DNA™ 144

Solar for Innovators



Electrical Specifiactions

	DNA-144-MF26-440W	DNA-144-MF26-435W	DNA-144-MF26-430W
STCrated Output P_{mpp} (W)	440W	435W	430W
Module Efficiency	20.21%	19.98%	19.76%
Open Circuit Voltage V_{VOC} (V)	49.9	49.7	49.5
Short Circiut Current I_{SC} (A)	11.33	11.26	11.19
Rated Voltage V_{mmp} (V)	41.0	40.8	40.6
Rated Voltage I_{mmp} (A)	10.74	10.67	10.60

Standard Test Conditions for front-face of panel: 1000 W/m², 25°C, measurement uncertainty ≤3%

Temperature Coefficients

Temperature Coefficients P_{mmp}	-0.36%
Temperature Coefficients I_{sc}	+0.05%/°C
Temperature Coefficients V_{OC}	-0.29%/°C
Normal Operating Cell Temperature (NOCT)	44°C

Test Operating Conditions

Maximum Series Fuse	20A
Maximum System Voltage	1,000 VDC (UL&IEC)
Maximum Load Capacity (Per UL 1703)	5400 PA Snow Load / 210mph Wind Rating
Fire Performance Class	Class C/Type 1

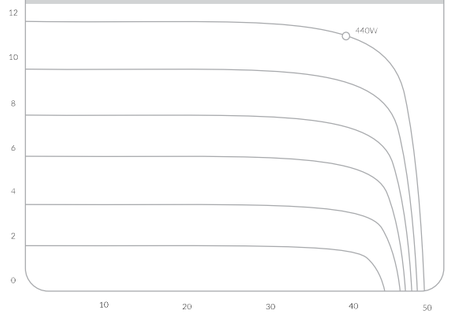
Packaging Configuration

Number of Modules per Pallet	27
Number of Pallets per 40ft. Container	22
Pallet Dimensions	2110 X 1120 X 2365
Pallet Weight (kg)	680
Container Weight (kg)	14960

Mechanical Properties

Cell Type	Monocrystalline
Glass	3.2mm, anti-reflection coating, high transmission, low iron, tempered glass
Frame	Anodized Aluminum Alloy
Junction Box	IP68
Dimensions	2095 X 1039 X 40mm
Output Cable	4mm2 (EU)12AWG,39.37in.(1200mm)
Weight	53.13lbs.(24.1kg)
Cable Length	1200mm
Encapsulant	POE

I-V Curve



Certifications

UL61730-1, UL61730-2

Aptos Solar Technology reserves the right to make specification changes without notice

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/120 half-cell and 72-cell/144 half-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/144 half-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		IQ7PLUS-72-2-US	
Commonly used module pairings[1]	235 W - 350 W +		235 W - 440 W +	
Module compatibility	60-cell/120 half-cell PV modules only		60-cell/120 half-cell and 72-cell/144 half-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	18 mA		18 mA	
Power factor setting	1.0		1.0	
Power factor (adjustable)	0.85 leading ... 0.85 lagging		0.85 leading ... 0.85 lagging	
EFFICIENCY	**@240 V**	**@208 V**	**@240 V**	**@208 V**
Peak 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	MC4 (or Amphenol H4 UTX with additional Q-DCC-5 adapter)			
Dimensions (HxWxD)	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, NEC 2017, and NEC 2020 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**

Data Sheet
Enphase Networking

Enphase IQ Combiner 3-ES/3C-ES

X-IQ-AM1-240-3-ES
X-IQ-AM1-240-3C-ES

X-IQ-AM1-240-3C-ES

X-IQ-AM1-240-3-ES

The **Enphase IQ Combiner 3-ES/3C-ES**™ with Enphase IQ Envoy™ and integrated LTE-M1 cell modem (included only with IQ Combiner 3C-ES) consolidates interconnection equipment into a single enclosure and streamlines PV 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 Envoy for communication and control
- Includes LTE-M1 cell modem (included only with IQ Combiner 3C-ES)
- Includes solar shield to match Ensemble esthetics 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

- Reduced size from IQ Combiner+ (X-IQ-AM1-240-2)
- Centered mounting brackets support single stud mounting
- Supports back and side conduit entry
- Up to four 2-pole branch circuits for 240 VAC plug-in breakers (not included)
- 80 A 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 Combiner SKU's
- UL listed

UL LISTED

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

ENPHASE

Enphase IQ Combiner 3-ES / 3C-ES

MODEL NUMBER	
IQ Combiner 3-ES (X-IQ-AM1-240-3-ES)	IQ Combiner 3-ES with Enphase IQ Envoy 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 Encharge storage system and Enpower smart switch and to deflect heat.
IQ Combiner 3C-ES (X-IQ-AM1-240-3C-ES)	IQ Combiner 3C-ES with Enphase IQ Envoy printed circuit board for integrated revenue grade PV production metering (ANSI C12.20 +/- 0.5%) and consumption monitoring (+/- 2.5%). Includes Enphase Mobile Connect LTE-M1 (CELLMODEM-M1), 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 Encharge storage system and Enpower smart switch and to deflect heat.
ACCESSORIES and **REPLACEMENT PARTS**	(not included, order separately)
Ensemble Communications Kit (COMMS-CELLMODEM-M1)	Includes COMMS-KIT-01 and CELLMODEM-M1 with 5-year data plan for Ensemble sites
Circuit Breakers BRK-10A-2-240 BRK-15A-2-240 BRK-20A-2P-240	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
EPLC-01	Power line carrier (communication bridge pair), quantity - one pair
XA-SOLARSHIELD-ES	Replacement solar shield for Combiner 3-ES / 3C-ES
XA-PLUG-120-3	Accessory receptacle for Power Line Carrier in IQ Combiner 3-ES / 3C-ES (required for EPLC-01)
XA-ENV-PCBA-3	Replacement IQ Envoy printed circuit board (PCB) for Combiner 3-ES / 3C-ES
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 Envoy breaker included
Envoy breaker	10A or 15A rating GE/Siemens/Eaton included
Production metering CT	200 A solid core pre-installed and wired to IQ Envoy
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 4G based LTE-M1 cellular modem (included only with IQ Combiner 3C-ES). 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, 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 Envoy	UL 60601-1/CANCSA 22.2 No. 61010-1

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

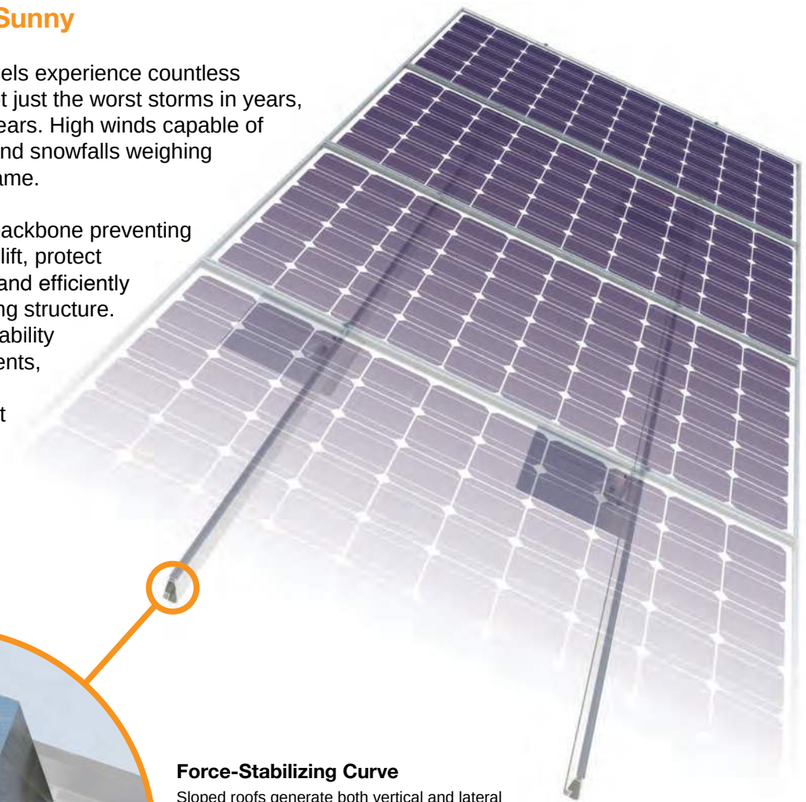
ENPHASE

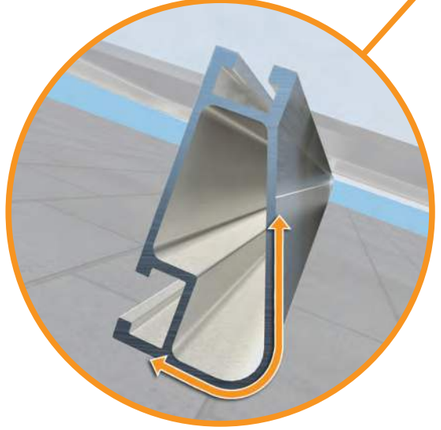
XR Rail Family

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

April 25, 2022

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

Re: Stacy – Residential PV Roof Mount Installation
307 SW Brandy Way
Lake City, FL 32024

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 – B

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 Iron ridge railing and flashings/attachments. The attachments can be attached up to 72" apart in all roof zones. 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" x 4" 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 2022.04.25 14:43:29 '00'05-

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

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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		21° to 27°		
Roof Type		Hip		
Exposure Cat.	B,C, or D	B		Section 26.7
Mean Roof Height	h	25.00	ft	
Roof attachment		5/16" x 4" Lag Screw		
Rafter/Truss Spacing		24	in O.C.	
No. of Rails		2		
No. of Modules - Portrait		22		
No. of Modules - Landscape		10		
Module Model Number		DNA-144-MF26 430-440		
bldg. least horizontal dim (typ.)		360	in	
Elevation		<1000	ft	
Est. # of attachment points		70		

Wind Load Paramaters

Wind Speed (asd)		93	mph	FRC R301.2.1.3
Effective Wind Area		23.43	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	0.70		Table 26.10-1
Array Edge Factor	γ_E	1.50		29.4.4 *Modules are considered Exposed
Solar Panel Equalization Factor	γ_a	0.65		Fig. 29.4-8
Velocity Pressure	q_h	13.16	psf	$q_h=0.00256\,K_z K_{zt} K_d K_e V^2$
Added Safety Factor		1.2		
Allowable Pullout per mount		709.6	lbs	
0.4h or 0.6h		10.00	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	12.50	ft	*modules are considered exposed that are within 1.5Lp from roof edge

PV Dead Load

# of Modules		32	
Module	W_{mod}	53	lbs
Array	W_{mods}	1700	lbs
Micro/optimizer	W_{mic}	128	lbs
PV Rail	$W_{PV\ rail}$	29	lbs
Total Weight	W_{total}	1857	lbs
Total Area	A_T	749.65	ft^2
Dead Load	D_{PV}	2.48	psf
Weight/attachment		26.5	lbs

Module and Racking Specs

Dimensions, LxWxH (in)	82.48 x 40.9 x 1.57	
Width	3.41	ft
Length	6.87	ft
Module Area	23.43	ft^2

Module load ratings

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

PV Attachment - Results

Roof Zones - Hip 21° to 27°

	1	2e	2r	3				
GC_p - Uplift	-1.3	-1.8	-1.8	-1.8				
GC_p - Down	0.7	0.7	0.7	0.7				
$p = q_h(GC_p)(\gamma_E)(\gamma_a)$	-14.3	-20.7	-20.7	-20.7			psf	29.4-7
$p = q_h(GC_p)(\gamma_E)(\gamma_a)$	9.0	9.0	9.0	9.0			psf	29.4-7
Max Allowable Span	6	6	6	6			ft	*notes
Max Cantilever (in)	24	24	24	24			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

Donnie C Godwin 2022.04.25 14:43:39 '00'05-

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