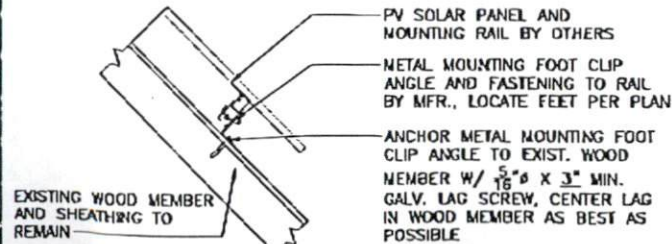




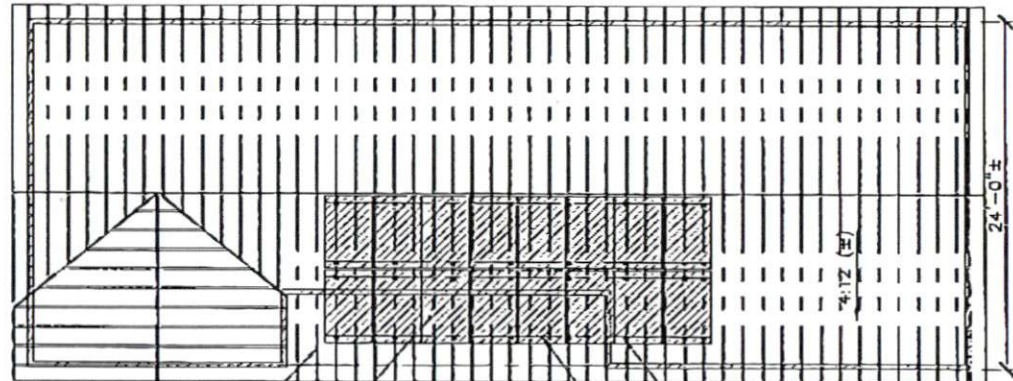
DAK Engineering, PC  
 License # CA-037  
 15214 City View Drive  
 Suite 300  
 Asheville, NC 27115  
 828-794-0571  
 FAX 828-794-7023

**GENERAL NOTES**

- Existing rafters have been analyzed based upon indicated sizes, spacings, and spans. Rafters have been confirmed by the installer to be 2x6 Southern Yellow Pine No. 2 Grade (SYP #2).
- Analysis performed using the design procedures included in the 2018 IBC and based upon a nominal design wind speed of 120 mph and ground snow load of 15 psf. Exposure B.
- Installer has verified the member sizes, grade stamps, truss spans, and spacing in field. Anomalies such as wider spacings, additional loads (such as HVAC equipment), and/or deflected, bowed, or damaged framing members shall be brought to the engineer's attention immediately.
- Metal rails, clips, and other support hardware shall be provided by others. See provider's cut sheets for material information and fastening details.
- Photovoltaic (PV) solar panels as analyzed based upon the criteria: approximate size of 3'-3" x 5'-6" and weigh approximately 47 pounds each. Exact manufacturer and model chosen and installed by installer.
- Work not indicated on a part of the drawings, but reasonably implied to be similar to that shown at corresponding pieces, shall be repeated.
- These structural drawings are intended solely to address the adequacy of the existing roof framing components to support the additional loads imposed by the installation of the indicated PV solar panels in accordance with the load requirements of the 2018 North Carolina Residential Code. All other components of the existing house, both structural and otherwise, are outside the scope of these drawings.
- Install water-tight flashing and/or caulking around all roof penetrations as required by IRC.
- Fasteners for preservative treated and fire retardant-treated wood shall be hot-dipped zinc coated galvanized steel, stainless steel, silicon bronze, or copper per IBC 2304.9.5.



**2** TYP. ATTACHMENT TO ROOF  
 S1 SCALE: 1" = 1'-0"



EXISTING RAFTERS @ 16" ± O.C. TO REMAIN

(2) ROWS OF (8) PV SOLAR PANELS IN PORTRAIT LAYOUT (16 TOTAL), SEE PLAN BY INSTALLER

FRONT OF BUILDING

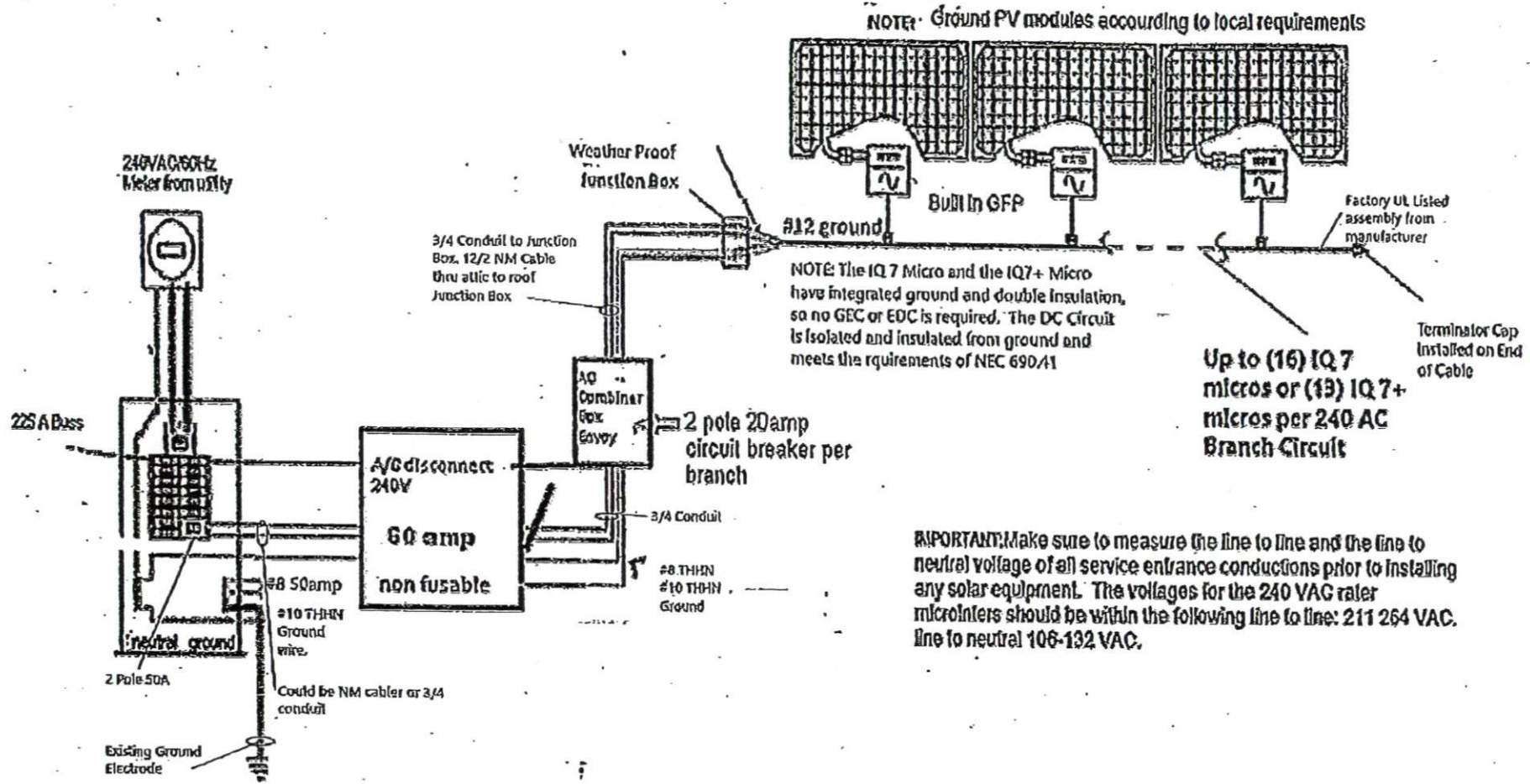
"L" MOUNTING FOOT BY MFR., SPACE MFG. FEET @ 4'-0" O.C. MAX. (32 TOTAL), AND FASTEN TO RAFTERS PER DETAIL

(2) METAL RAILS PER ROW OF PANELS, DESIGN AND FASTENING BY MFR.

**1** PANEL INSTALLATION PLAN  
 S1 SCALE: 1/8" = 1'-0"

AAPCO / SOLAR TIME  
 JOB #621162 CASTENEDA RESIDENCE  
 SOLAR PANEL INSTALLATION PLAN

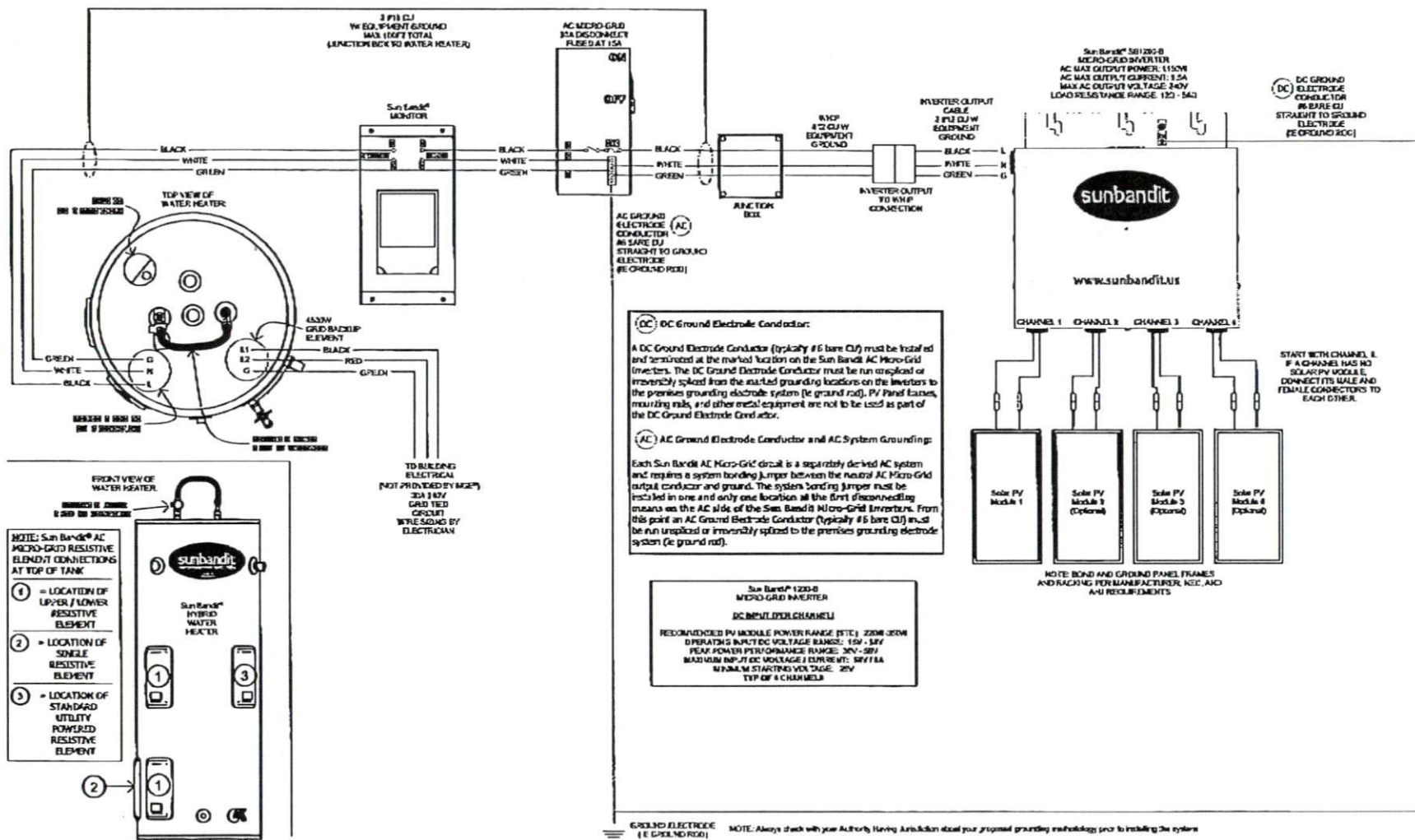
DESIGN BY: EDB  
 CHECKED BY: ADB  
 CREATED BY: EDB  
 DATE: 2018-05-03  
 SCALE: AS SHOWN  
 REVISIONS:



FIELD WIRING DIAGRAM  
240VAC SINGLE PHASE

NAME: Barbara Castaneda  
 ADDRESS: 284 Perry Rd. Sanford, NC 27332  
 SYSTEM SIZE: \_\_\_\_\_  
 MODEL: (10) enphase energy IQ7 plus  
 PANEL: (10) Solara 360w

# Series 1200-B Three-Line



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NOTE: ALL WORK TO BE PERFORMED BY QUALIFIED ELECTRICIANS. ALL WORK TO BE DONE PER AHJ AND UTILITY REQUIREMENTS. ALL INSTALLATION CONDITIONS TO BE FIELD VERIFIED FOR APPROPRIATENESS.

Series 1200-B THREE-LINE

**sunbandit**  
 Solar-Hybrid Energy Systems - Patent(s) Pending

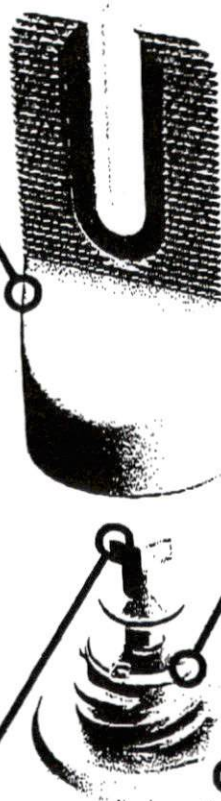
01 of 01

## The Strongest Attachment in Solar

IronRidge FlashFoot2 raises the bar in solar roof protection. The unique water seal design is both elevated and encapsulated, delivering redundant layers of protection against water intrusion. In addition, the twist-on Cap perfectly aligns the rail attachment with the lag bolt to maximize mechanical strength.

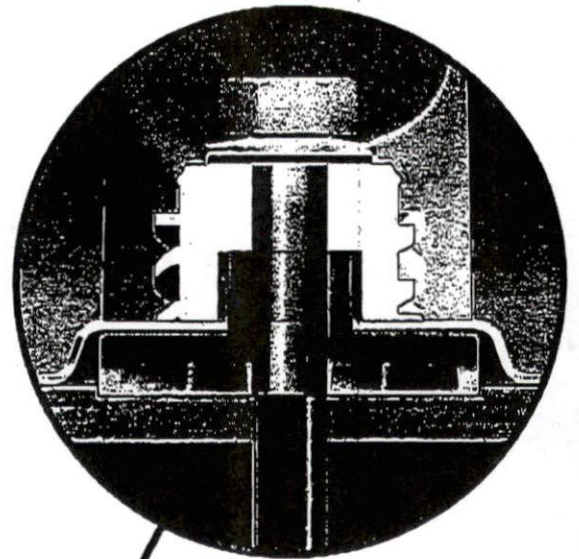
### Twist-On Cap

FlashFoot2's unique Cap design encapsulates the lag bolt and locks into place with a simple twist. The Cap helps FlashFoot2 deliver superior structural strength, by aligning the rail and lag bolt in a concentric load path.



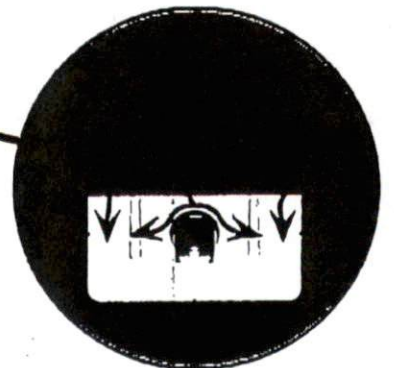
### Single Socket Size

A custom-design lag bolt allows you to install FlashFoot2 with the same 7/16" socket size used on other Flush Mount System components.



### Three-Tier Water Seal

FlashFoot2's seal architecture utilizes three layers of protection. An elevated platform diverts water away, while a stack of rugged components raises the seal an entire inch. The seal is then fully-encapsulated by the Cap. FlashFoot2 is the first solar attachment to pass the TAS-100 Wind-Driven Rain Test.



### Water-Shedding Design

An elevated platform diverts water away from the water seal.

## Installation Features

(B)

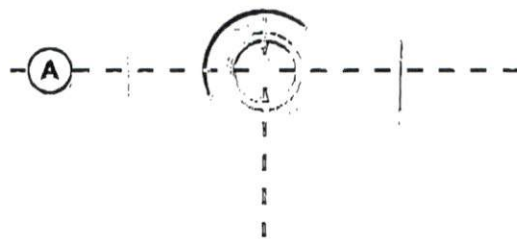
### (A) Alignment Markers

Quickly align the flashing with chalk lines to find pilot holes.

(C)

### (B) Rounded Corners

Makes it easier to handle and insert under the roof shingles.



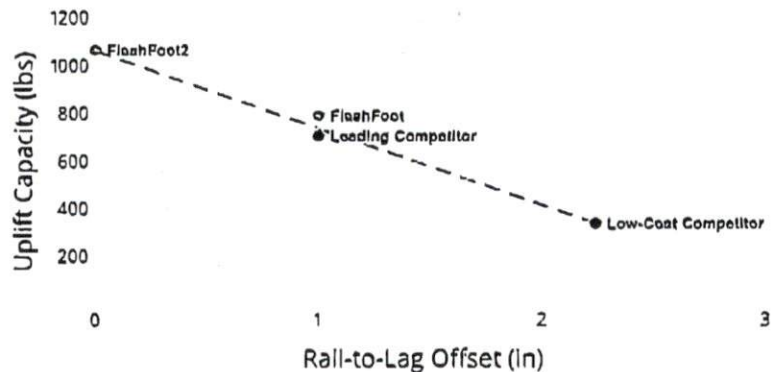
### (C) Reinforcement Ribs

Help to stiffen the flashing and prevent any bending or crinkling during installation.

## Benefits of Concentric Loading

Traditional solar attachments have a horizontal offset between the rail and lag bolt, which introduces leverage on the lag bolt and decreases uplift capacity.

FlashFoot2 is the only product to align the rail and lag bolt. This concentric loading design results in a stronger attachment for the system.



## Testing & Certification

### Structural Certification

Designed and Certified for Compliance with the International Building Code & ASCE/SEI-7.

### Water Seal Ratings

Water Sealing Tested to UL 441 Section 27 "Rain Test" and TAS 100-95 "Wind Driven Rain Test" by Intertek. Ratings applicable for composition shingle roofs having slopes between 2:12 and 12:12.

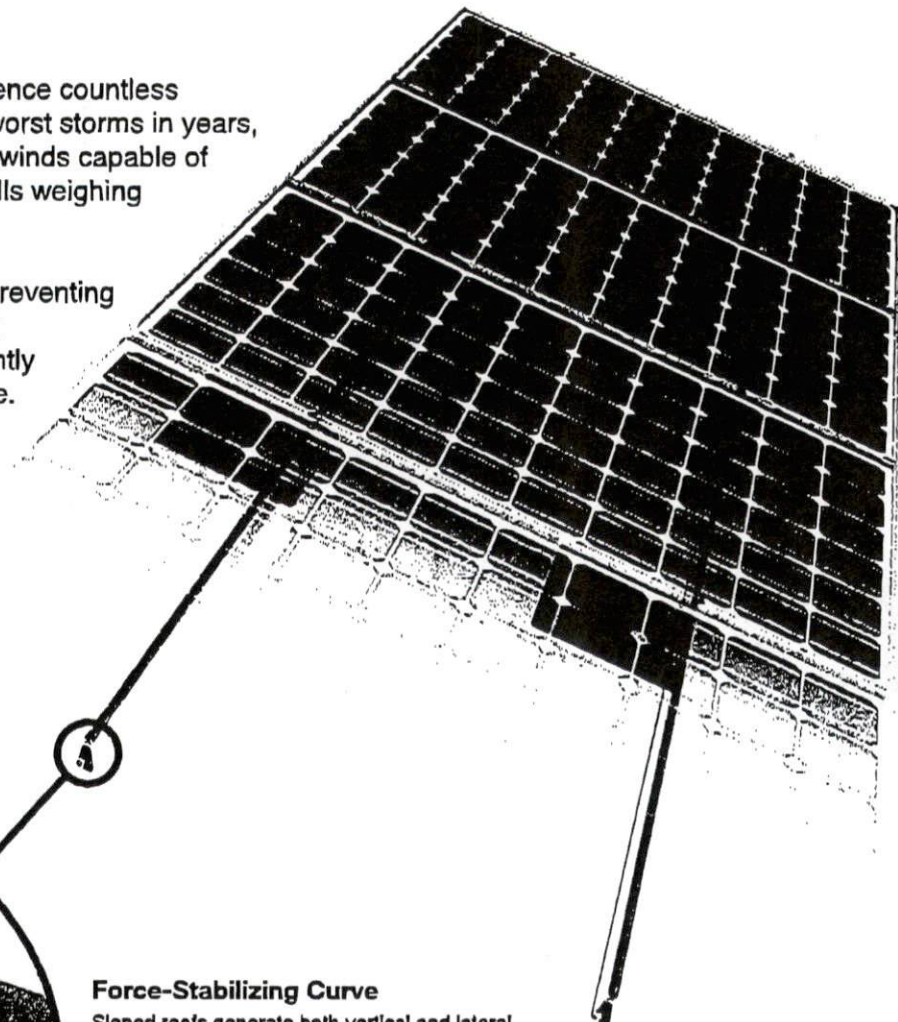
### UL 2703

Conforms to UL 2703 Mechanical and Bonding Requirements. See Flush Mount Install Manual for full ratings.

## 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.

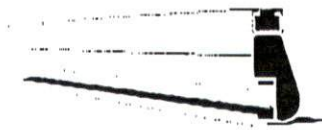
### Corrosion-Resistant Materials

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

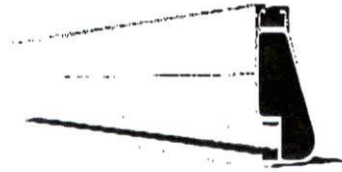
The XR Rail Family offers the strength of a curved rail in three targeted sizes. Each size supports specific design loads, while minimizing material costs. Depending on your location, there is an XR Rail to match.



### XR10

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

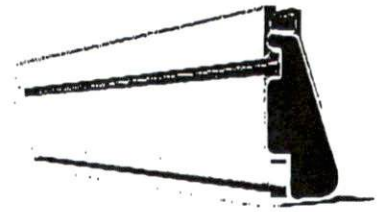
- 6' spanning capability
- Moderate load capability
- Clear & black anodized finish
- Internal splices available



### XR100

XR100 is the ultimate residential mounting rail. It supports a range of wind and snow conditions, while also maximizing spans up to 8 feet.

- 8' 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 12 feet or more for commercial applications.

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

## Rail Selection

The following table was prepared in compliance with applicable engineering codes and standards. Values are based on the following criteria: ASCE 7-10, Roof Zone 1, Exposure B, Roof Slope of 7 to 27 degrees and Mean Building Height of 30 ft. Visit [IronRidge.com](http://IronRidge.com) for detailed span tables and certifications.

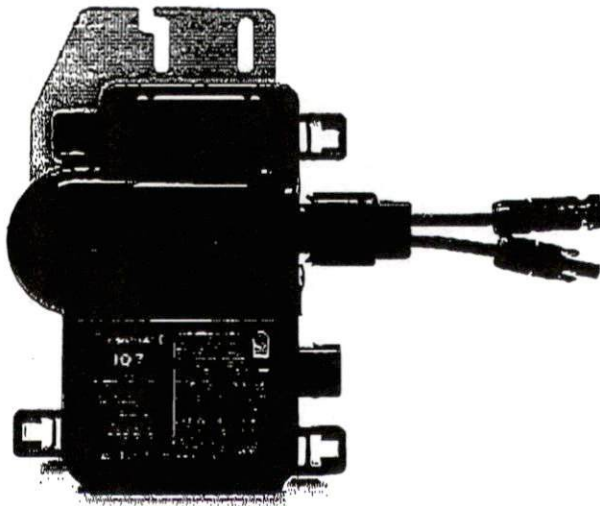
Load		Rail Span					
Snow (PSF)	Wind (MPH)	4'	5' 4"	6'	8'	10'	12'
None	100	XR10			XR100		XR1000
	120						
	140						
	160						
10-20	100					XR1000	
	120						
	140						
	160						
30	100						
	160						
40	100						
	160						
50-70	160						
80-90	160						

## 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](http://enphase.com)

 ENPHASE.



## Enphase IQ 7 and IQ 7+ Microinverters

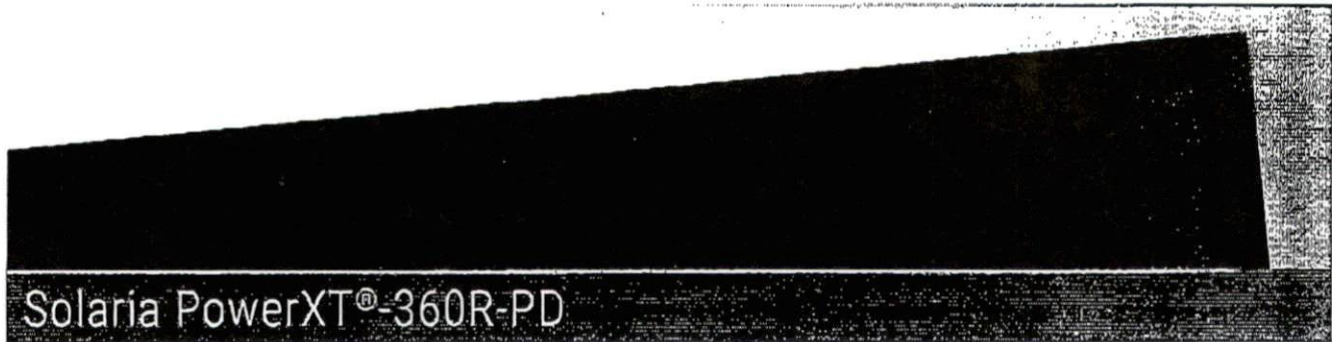
INPUT DATA (DC)	IQ7-60-2-US / IQ7-60-B-US		IQ7PLUS-72-2-US / IQ7PLUS-72-B-US	
Commonly used module pairings <sup>1</sup>	235 W - 350 W +		235 W - 440 W +	
Module compatibility	60-cell PV modules only		60-cell and 72-cell PV modules	
Maximum input DC voltage	48 V		60 V	
Peak power tracking voltage	27 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 <sup>2</sup>	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 <sup>3</sup>	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)	0.85 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 (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 Interchangeable). 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 (2.39 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/IEEET1547, 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](https://enphase.com)



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2018-11-19



Achieving up to 20% efficiency, Solaria PowerXT solar modules are one of the highest power modules in the residential solar market. Compared to conventional modules, Solaria PowerXT modules have fewer gaps between the solar cells; this leads to higher power and superior aesthetics. Solaria PowerXT residential modules are manufactured with black backsheet and frames, giving them a striking appearance.

Developed in California, Solaria's patented cell cutting and module assembly takes processed solar wafers and turns them into PowerXT solar modules. The process starts by creating a highly reliable PowerXT cell where busbars and ribbon interconnections are eliminated. Solaria then packages the cells into the PowerXT solar module, reducing inactive space between the cells. All of the above leads to an exceptionally efficient solar module produced in a cost effective manner.

### Higher Efficiency, Higher Power

Solaria PowerXT modules achieve up to 20% efficiency; conventional modules achieve 15% – 17% efficiency. Solaria PowerXT modules are one of the highest power modules available.

### Lower System Costs

Solaria PowerXT modules produce more power per square meter area. This reduces installation costs due to fewer balance of system components.

### Improved Shading Tolerance

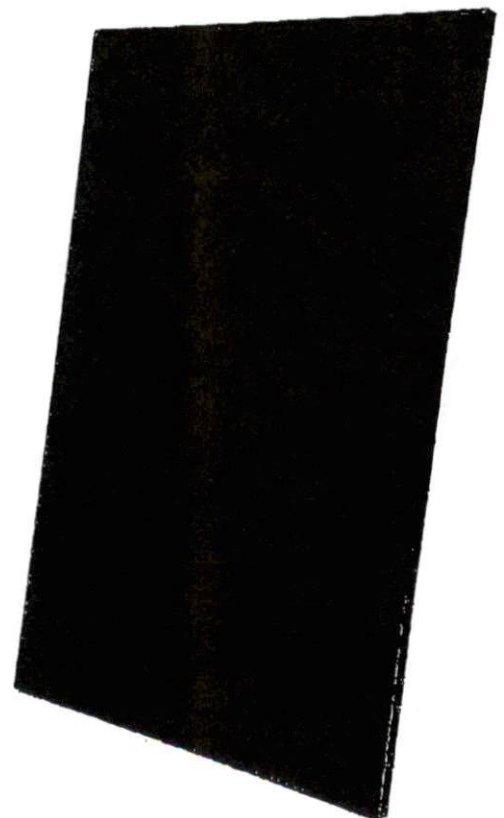
Sub-strings are interconnected in parallel, within each of the four module quadrants, which dramatically lowers the shading losses and boosts energy yield.

### Improved Aesthetics

Compared to conventional modules, Solaria PowerXT modules have a more uniform appearance and superior aesthetics.

### Durability and Reliability

Solder-less cell interconnections are highly reliable and designed to far exceed the industry leading 25 year warranty.



### About Solaria

Established in 2000, The Solaria Corporation has created one of the industry's most respected IP portfolios, with over 100 patents encompassing materials, processes, applications, products, manufacturing automation and equipment. Headquartered in Fremont, California, Solaria has developed a technology platform that unlocks the potential of solar energy allowing it to be ubiquitous and universally accessed.



### Performance at STC (1000W/m<sup>2</sup>, 25° C, AM 1.5)

Solaria PowerXT-		345R-PD	350R-PD	355R-PD	360R-PD
Max Power (P <sub>max</sub> )	[W]	345	350	355	360
Efficiency	[%]	19.1	19.4	19.6	19.9
Open Circuit Voltage (V <sub>oc</sub> )	[V]	46.9	47.1	47.4	47.7
Short Circuit Current (I <sub>sc</sub> )	[A]	9.46	9.49	9.53	9.56
Max Power Voltage (V <sub>mp</sub> )	[V]	38.5	38.8	39.1	39.5
Max Power Current (I <sub>mp</sub> )	[A]	8.93	9.02	9.09	9.13
Power Tolerance	[%]	-0/+3	-0/+3	-0/+3	-0/+3

### Performance at NOCT (800W/m<sup>2</sup>, 20° C Amb, Wind 1 m/s, AM 1.5)

Max Power (P <sub>max</sub> )	[W]	255	259	261	265
Open Circuit Voltage (V <sub>oc</sub> )	[V]	44.1	44.3	44.6	44.8
Short Circuit Current (I <sub>sc</sub> )	[A]	7.66	7.69	7.68	7.71
Max Power Voltage (V <sub>mp</sub> )	[V]	35.4	35.7	36.0	36.3
Max Power Current (I <sub>mp</sub> )	[A]	7.15	7.22	7.27	7.30

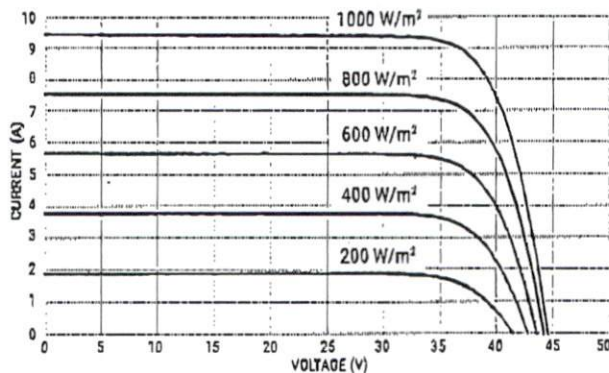
### Temperature Characteristics

NOCT	[°C]	45 +/-2
Temp. Coeff. of P <sub>max</sub>	[% / °C]	-0.39
Temp. Coeff. of V <sub>oc</sub>	[% / °C]	-0.29
Temp. Coeff. of I <sub>sc</sub>	[% / °C]	0.04

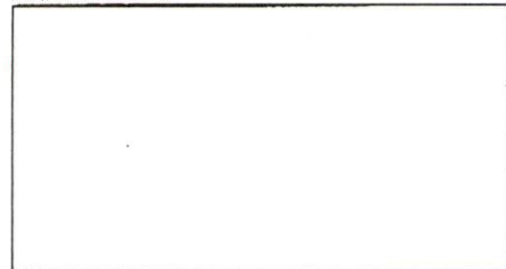
### Design Parameters

Operating temperature	[°C]	-40 to +85
Max System Voltage	[V]	1000
Max Fuse Rating	[A]	15
Bypass Diodes	[#]	4

### IV Curves vs. Irradiance (350W Module)



Authorized Dealer



### Mechanical Characteristics

Cell Type	Monocrystalline Silicon
Dimensions (L x W x H)	1621mm x 1116mm x 40mm
Weight	21 kg / 46 lbs
Glass Type / Thickness	AR Coated, Tempered / 3.2mm
Frame Type	Anodized Aluminum
Cable Type / Length	12 AWG PV Wire (UL) / 1000mm
Connector Type	Amphenol H4 (MC4 compatible)
Junction Box	IP67 / 4 diodes
Front Load (UL 1703)	5400 Pa / 113 psf*
Rear Load (UL 1703)	2400 Pa / 50 psf*

\* Refer to Solaria Installation Manual for details

### Certifications / Warranty

Certifications	UL 1703/IEC 61215/IEC 61730/CEC CAN/CSA-C22.2
Fire Type (UL 1703)	1
Power & Product Warranty	25 years*

\* Warranty details at [www.solaria.com](http://www.solaria.com)

### Packaging

Stacking Method	Horizontal / Palletized
Pcs / Pallet	25
Pallet Dims	1668 x 1150 x 1230 mm
Pallet Weight	590 kg / 1300 lbs
Pallets / 40-ft Container	28
Pcs / 40-ft Container	700

