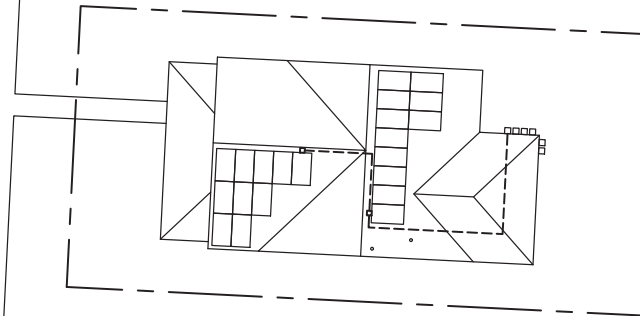


MAP OF LOCATION

NORTH TEJON STREET



# ION

4801 N UNIVERSITY AVE, SUITE 900  
 PROVO, UT 84604  
 (888) 781-7074

KRISTEN L FLORES

2007 NORTH TEJON STREET  
 COLORADO SPRINGS, CO 80907



LICENSED ELECTRICAL CONTRACTOR COMPANY:  
 ION DEVELOPER LLC,  
 DAVID STANLEY CONRAD (ME.3000364)  
 CLASSIFICATION:  
 ELECTRICAL CONTRACTOR  
 LICENSE NUMBER:  
 EC.0100960  
 EXPIRATION:  
 9/30/2020  
 AUTHORIZED CONTRACTOR:  
*David S. Conrad*

SYSTEM SIZE: 6.93 kW DC  
 5.04 kW AC  
 21 MODULES

DATE: 11/5/2020

DRAWN BY: JB

ADDITIONAL NOTES:

SCOPE OF WORK:  
 THE SYSTEM CONSISTS OF A 6.93 KW DC (5.04 KW AC) ROOF-MOUNTED PHOTOVOLTAIC POWER SYSTEM OPERATING IN PARALLEL WITH THE UTILITY GRID. THERE ARE (21) SILFAB SOLAR SIL-330BL MODULES AND (21) ENPHASE IQ7-60-E-US MICRO-INVERTERS, MOUNTED ON THE BACK OF EACH PV MODULE, CONNECTING TO THE UTILITY GRID THROUGH THE EXISTING MAIN LOAD CENTER. ELECTRICAL MODIFICATIONS WILL BE MADE TO THE MAIN LOAD CENTER.

INTERCONNECTION METHOD: LINE-SIDE TAP

ROOF MATERIAL: Composite Shingle

PROJECT WILL COMPLY WITH THE 2015 IBC, 2015 IFC, 2015 IRC AND 2017 NEC.

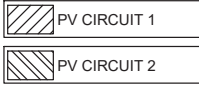
ALL CONDUIT WILL BE PAINTED TO MATCH THE EXISTING STRUCTURE.

AC DISCONNECT LOCATED NEXT TO OR WITHIN 10 FEET OF MAIN SERVICE PANEL (LINE OF SIGHT MAINTAINED).

SCALE: 1" = 22'

SHEET:

COVER  
 PV 0.0



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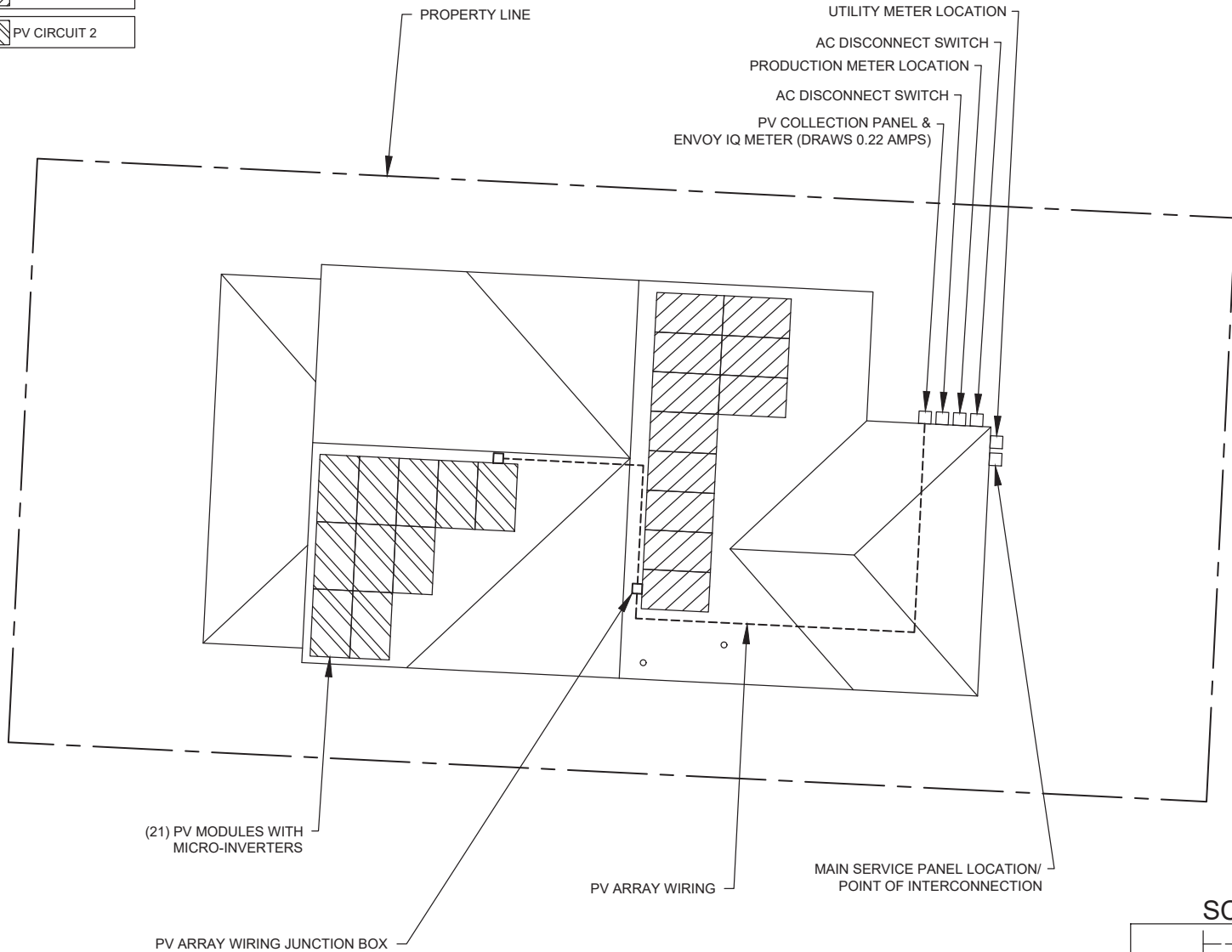
SYSTEM SIZE: 6.93 kW DC  
 5.04 kW AC  
 21 MODULES

DATE: 11/5/2020

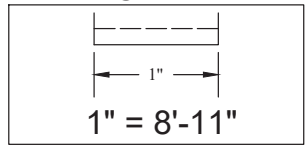
DRAWN BY: JB

ADDITIONAL NOTES:

SHEET:  
**SITE PLAN**  
**PV 1.0**

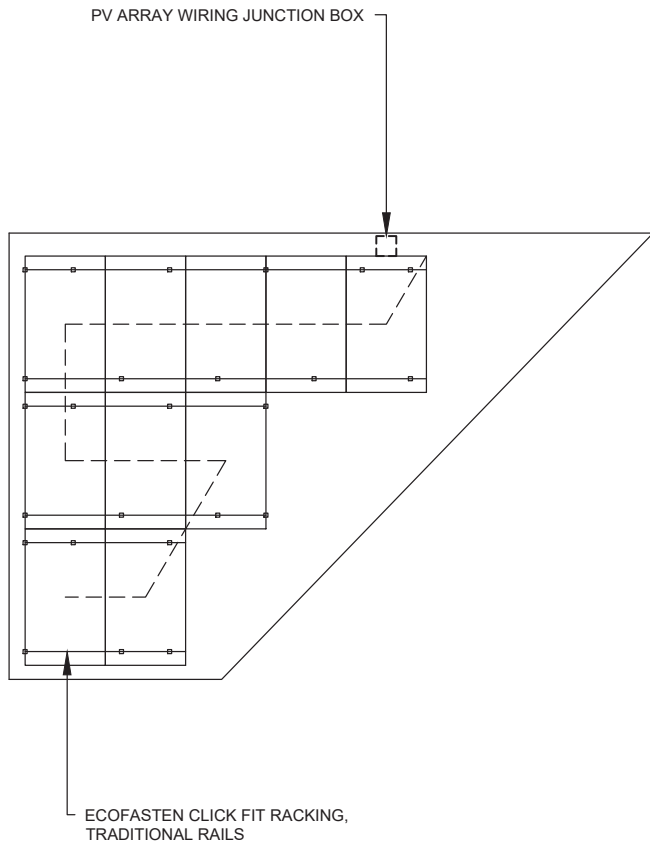


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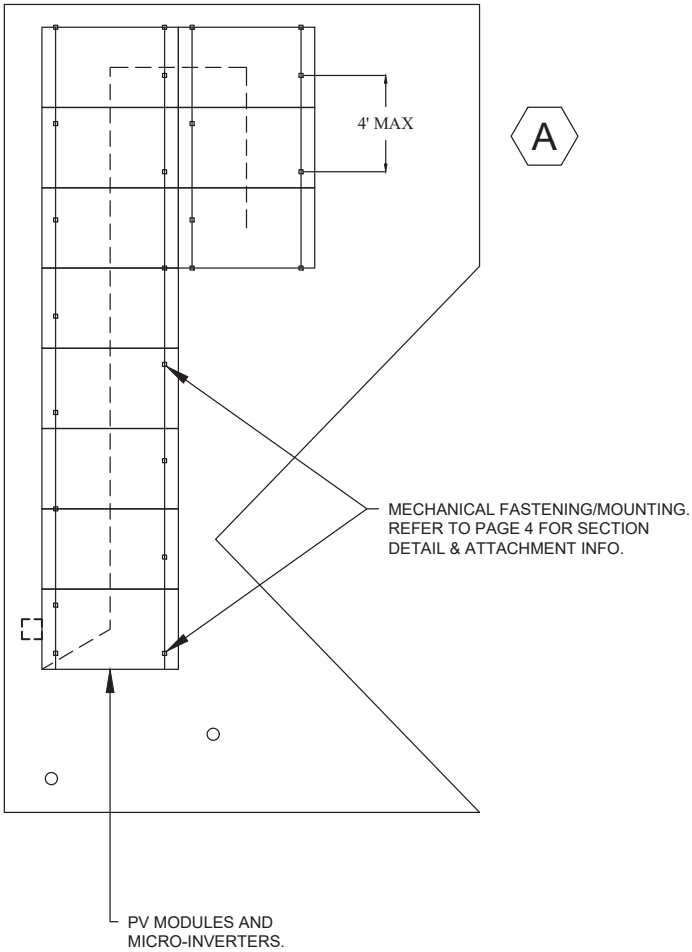


1" = 8'-11"

B



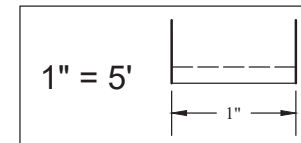
A



**ROOF SECTION DATA**

ROOF SECTION	A	B	C	D	E	F	G	H
MODULES	11	10						
TILT	37	37						
AZIMUTH	91	181						
SOLAR ACCESS AVG.	88.00%	90.00%						

SCALE:



**ION**

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SYSTEM SIZE: 6.93 kW DC  
5.04 kW AC  
21 MODULES

DATE: 11/5/2020

DRAWN BY: JB

ADDITIONAL NOTES:

2" x 4" RAFTER SYSTEM 24"  
ON CENTER

CANTILEVERS WILL BE NO  
MORE THAN 24"

ATTACHMENT POINTS WILL  
BE NO MORE THAN 4'  
APART, STAGGERED

SHEET:  
**ROOF PLAN  
PV 2.0**

**WEATHER DATA**

HIGH TEMP, 2% AVG.	32 °C
MIN DESIGN TEMP	-23 °C
GROUND SNOW LOAD	30 psf
WIND SPEED	100 mph

FROM 2009 ASHRAE HANDBOOK - FUNDAMENTALS

1. HIGH TEMPERATURE 2% AVERAGE BASED ON ASHRAE HIGHEST MONTH 2% DRY BULB TEMPERATURE FOR ASHRAE LOCATION MOST SIMILAR TO INSTALLATION LOCATION
2. MINIMUM DESIGN TEMPERATURE BASED ON ASHRAE MINIMUM MEAN EXTREME DRY BULB TEMPERATURE FOR ASHRAE LOCATION MOST SIMILAR TO INSTALLATION LOCATION
3. ALTERNATE POWER SOURCE PLACARD SHALL BE PERMANENTLY ATTACHED TO A/C DISCONNECT
4. ELECTRICAL INSTALL SHALL COMPLY WITH 2017 NATIONAL ELECTRICAL CODE
5. ALL SOLAR MODULES, EQUIPMENT, AND METALLIC COMPONENTS SHALL BE BONDED
6. IF THE EXISTING MAIN SERVICE DOES NOT HAVE VERIFIABLE GROUNDING ELECTRODE, IT IS THE PV CONTRACTOR'S RESPONSIBILITY TO INSTALL A SUPPLEMENTAL GROUNDING ELECTRODE
7. EACH MODULE SHALL BE GROUNDED PER MANUFACTURER INSTRUCTIONS AND APPROVED METHODS
8. PV INSTALLATION SHALL NOT OBSTRUCT ANY PLUMBING, MECHANICAL OR BUILDING ROOF VENTS
9. CONNECTORS THAT ARE NOT READILY ACCESSIBLE AND THAT ARE USED IN THE CIRCUITS OPERATING AT OR OVER 30V AC OR DC SHALL REQUIRE A TOOL FOR OPERATING AND ARE REQUIRED TO BE MARKED "DO NOT DISCONNECT UNDER LOAD" OR "NOT FOR CURRENT INTERRUPTING"
10. THIS SYSTEM IS IN FULL COMPLIANCE WITH THE COLORADO FIRE CODE FOR PHOTOVOLTAIC INSTALLATION AND ARTICLE 690 OF THE NATIONAL ELECTRIC CODE (NEC NFPA 70)
11. BUILDING CONSTRUCTION TYPE: TYPE V
12. BUILDING OCCUPANCY TYPE: R3

**ION**

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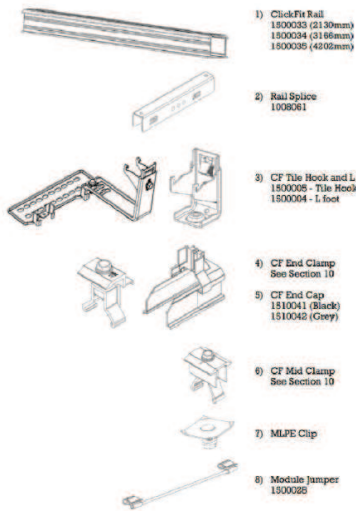
DATE: 11/5/2020

DRAWN BY: JB

ADDITIONAL NOTES:

SHEET:  
 LOCATION NOTES  
**PV 3.0**

#### 4.0 System Components



- 1) ClickFit Rail  
1500033 (2130mm)  
1500034 (2186mm)  
1500035 (4206mm)
- 2) Rail Splice  
1008061
- 3) CF Tile Hook and L Foot  
1500005 - Tile Hook  
1500004 - L foot
- 4) CF End Clamp  
See Section 10
- 5) CF End Cap  
1510041 (Black)  
1510042 (Grey)
- 6) CF Mid Clamp  
See Section 10
- 7) MLPE Clip
- 8) Module Jumper  
1500028

#### 6.2 Installing flashing and L-foot

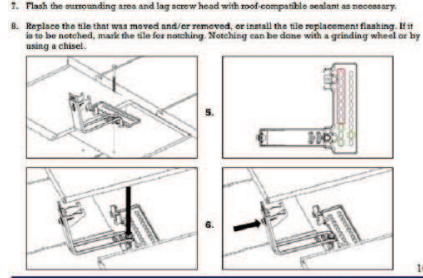
- ClickFit for comp shingle roofs uses EcoFasten Solar's CF1 watertight flashing system
  - Other roof types may use different EcoFasten Solar attachments, see www.EcoFastenSolar.com for more information.
- Installation Steps:**
1. Locate rafters from section 5.2.
  2. Drill 1/4" pilot holes at all attachment points and back fill using roof-compatible sealant.
  3. Separate shingles where flashing is to be installed. Insert the flashing so the top portion is under the next row of shingles North. Ensure the flashing is pushed far enough up-slope to prevent water infiltration through the vertical joints between shingles.
  4. Align CF1 flashing hole with pilot hole. Insert the lag bolt with pre-installed bonded washer through the L-foot and EPDM grommet. Tighten the lag bolt until a ring of EPDM is visible around the circumference of the bonded washer.

\*Torque range is usually between 100-140 in-ft depending upon a number of factors. The EPDM ring visual indicator is the most effective way to ensure a watertight seal without damaging the system.



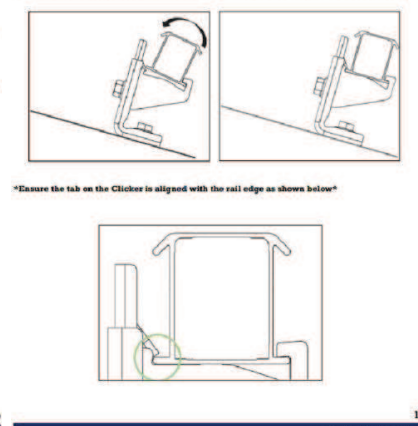
#### 6.3 Installing Tile Hooks

1. Locate rafters on the roof, mark the sites to be removed. Hint: In some cases rafters are visible at the eaves of the roof, making it easy to find the rough location of the rafters. In other cases, the fascia board may have nail heads visible where it was attached to the rafters. In the worst-case a row of tiles may need to be moved to determine the rafter locations.
2. Slide the tile at the desired location upward to expose the roof sub surface. If the tile is to be notched, or if using a replacement flashing, remove it entirely. Clean the sub surface with a brush to remove any debris that could affect the sealing.
3. Locate the rafter center and mark it.
4. Place the tile hook with the hook itself in the valley of the next tile below. Drill one 1/4" pilot hole in the rafter center, taking care to keep the hook in the valley of the tile below. Backfill this hole with a roof-compatible sealant. For flat tiles, try to avoid having the hook land directly under a joint between tiles, this will create a larger gap on more notching than necessary.
5. Install one 5/16" x 4" lag screw on the row of holes closest to the tile hook arm. If possible, install the screw in one of the three holes directly next to the arm. If the lag screw must be installed in one of the seven holes furthest from the arm (denoted by the red rectangle below), install three deck screws in the pattern shown by the green circles below.
6. Adjust the height of the tile hook as necessary using the bolt shown in the fourth image.
7. Flash the surrounding area and lag screw head with roof-compatible sealant as necessary.
8. Replace the tile that was moved and/or removed, or install the tile replacement flashing. If it is to be notched, mark the tile for notching. Notching can be done with a grinding wheel or by using a chisel.



#### 6.4 Installing the Rail

1. Place the rail in the Clickers.
2. Ensure the rails extend a maximum of 2" past the last attachments in each row and that each rail is aligned with the next row North and/or South.
3. Roll the rail into each Clicker, an audible "click" should be heard. If attachments are extremely misaligned it may be necessary to loosen the leveling bolt, snap the Clicker onto the rail, then re-tighten the leveling bolt.
4. Level the rail if necessary by loosening the bolt attaching the Clicker to the L foot or tile hook.



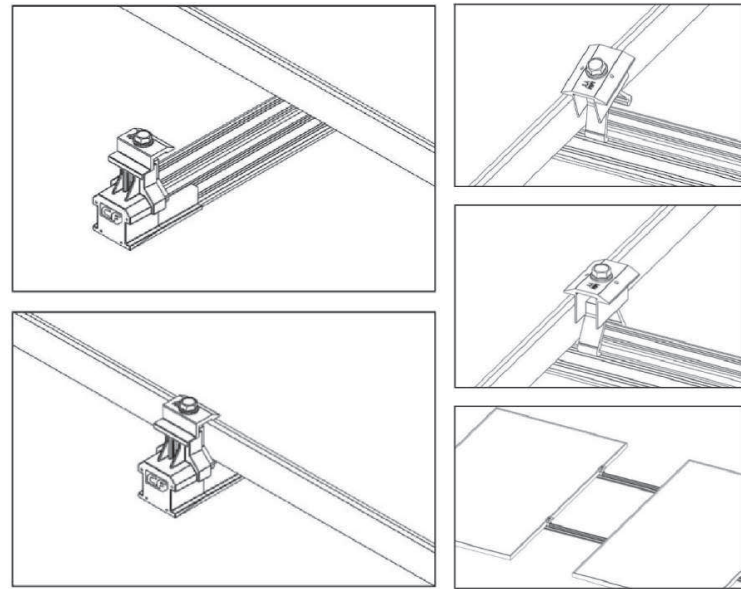
#### 8.0 System Specifications

Max Modules Per Ground Leg	200
Max Controller	1/3 of allowable bracket spacing
Fire Rating - Tile	Type 1 on Non-Combustible Roof Surfaces
Fire Rating	Type 2
Max System Voltage	1500VDC
Ground Wire Specs	TBD by Engineer of Record
Max Downstroke/Upst	TBD by Engineer of Record
Warranty	60 Year Material and Workmanship
UL Marketing	System Marketers Per Detail on all End Caps
Roof Pitch	10-40 Degrees



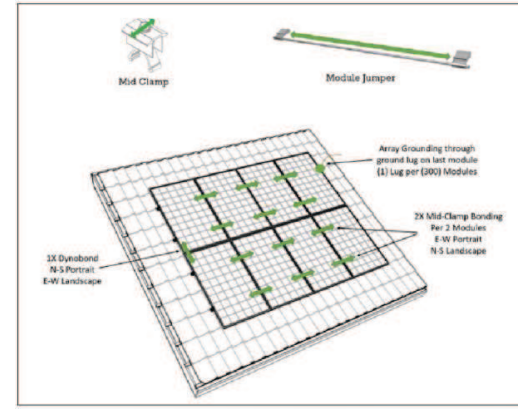
Component	Torque (in-lb)	Notes
Lag Screw	120-140	Changes depending on roof/masturb/etc. the visual indicator of the black EPDM ring around the bonded washer for torquing.
Mid-Clamp	144	
End-Clamp	144	
Rail Clicker Leveling Bolt	80	Pre-torque upon delivery. Applies to Tile Hook and L-Foot Clicker
Roof Jumper Bolt	N/A	Lightly clamp bolts to flush with top of steel tile row
Grounded Lag	N/A	Refer to specific ground lag manufacturer's installation manual

#### END CLAMPS/CAPS & MID CLAMPS



#### 7.0 Bonding and Grounding

**7.1 Bonding Paths**  
All bond paths are carried either module-to-module through the mid clamp, or module-to-module through the module jumper shown below (bond paths shown in green):



\*Mid clamps are multi-use, however, if a mid-clamp is removed after tightening, ensure that the grounding pins bite into "new metal" to ensure proper bonding\*



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ION DEVELOPER LLC  
DAVID STANLEY CONRAD (ME.3000364)  
CLASSIFICATION:  
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LICENSE NUMBER:  
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EXPIRATION:  
9/30/2020  
AUTHORIZED CONTRACTOR:  
*David S. Conrad*

SYSTEM SIZE: 6.93 kW DC  
5.04 kW AC  
21 MODULES

DATE: 11/5/2020

DRAWN BY: JB

ADDITIONAL NOTES:

SHEET:  
**MOUNTING  
PV 4.0**



## THIS PV SYSTEM WILL HAVE THE FOLLOWING MARKINGS:

1 -- MATERIALS USED FOR MARKINGS WILL BE WEATHER RESISTANT. THE UNDERWRITERS LABORATORIES MARKING AND LABELING SYSTEM 969 (UL969) WILL BE USED AS STANDARD TO DETERMINE WEATHER RATING.

2 -- MARKING STATING "CAUTION: SOLAR ELECTRIC SYSTEM CONNECTED" WILL BE PLACED AT THE MAIN SERVICE DISCONNECT.

3 -- MARKING STATING "WARNING: PHOTOVOLTAIC POWER SOURCE" WILL BE PLACED ALONG DIRECT CURRENT CONDUIT, RACEWAYS, ENCLOSURES, CABLE ASSEMBLIES, AND JUNCTION BOXES.

4 -- THE MARKING WILL BE MADE TO THE FOLLOWING SPECIFICATIONS:

- RED BACKGROUND
- WHITE LETTERING
- MINIMUM 3/8" LETTER HEIGHT
- ALL CAPITAL LETTERS
- ARIAL OR SIMILAR FONT, NON-BOLD
- REFLECTIVE, WEATHER RESISTANT MATERIAL SUITABLE FOR THE ENVIRONMENT (DURABLE ADHESIVE MATERIALS MAY MEET THIS REQUIREMENT)

5 -- MARKING WILL BE PLACED ON ALL INTERIOR AND EXTERIOR CONDUIT, RACEWAYS, ENCLOSURES, CABLE ASSEMBLIES, AND JUNCTION BOXES TO ALERT THE FIRE SERVICE TO AVOID CUTTING THEM. MARKINGS WILL BE PLACED ON ALL EXTERIOR DC CONDUIT, RACEWAYS, ENCLOSURES, AND CABLE ASSEMBLIES EVERY 10 FEET, AT TURNS AND ABOVE AND/OR BELOW PENETRATIONS AND ALL DC COMBINER AND JUNCTION BOXES.

# ION

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21 MODULES

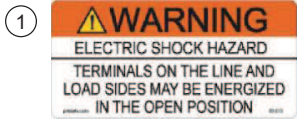
DATE: 11/5/2020

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ADDITIONAL NOTES:

SHEET:  
SYSTEM MARKINGS  
**PV 5.0**





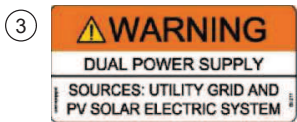
NEC 690.13(B) & NEC 705.22

LOCATED AT ALL PV DISCONNECTING MEANS WHERE ALL TERMINALS OF THE DISCONNECTING MEANS MAY BE ENERGIZED IN THE OPEN POSITION



NEC 690.13(B) & NEC 690.54

LOCATED AT THE POINT OF INTERCONNECTION AND MARKED AT ALL AC DISCONNECTING MEANS



NEC 705.12(B)(3)

LOCATED AT THE POINT OF INTERCONNECTION FOR EQUIPMENT CONTAINING OVERCURRENT DEVICES IN CIRCUITS SUPPLYING POWER TO A BUSBAR OR CONDUCTOR SUPPLIED FROM MULTIPLE SOURCES

LOCATED AT EACH SERVICE EQUIPMENT AND ALL ELECTRIC POWER PRODUCTION SOURCE LOCATIONS



NEC 705.12(B)(2)(3)(B)

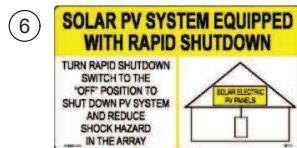
LOCATED AT THE POINT OF INTERCONNECTION AND MARKED AT ALL AC DISCONNECTING MEANS



NEC 690.31(G)(3 & 4)

LOCATED ON EXPOSED RACEWAYS, CABLE TRAYS, COVERS AND ENCLOSURES OF JUNCTION BOXES, AND OTHER WIRING METHODS

LABEL SHALL BE SPACED AT MAXIMUM 10 FT. SECTIONS OR WHERE SEPARATED BY ENCLOSURES, WALLS, PARTITIONS, CEILINGS, OR FLOORS



NEC 690.56(C)(1)(A)

LABEL PLACED FOR PV SYSTEMS THAT SHUT DOWN THE ARRAY AND CONDUCTORS LEAVING THE ARRAY LEVEL (AFTER THE MICRO-INVERTER OUTPUT TERMINALS)

LOCATED NO MORE THAN 3 FT. AWAY FROM THE SERVICE DISCONNECTING MEANS TO WHICH THE PV SYSTEMS ARE CONNECTED AND AT ALL IDENTIFIED RAPID SHUTDOWN SWITCHES IF NOT IN THE SAME LOCATION



NEC 690.56(B) & NEC 705.10

LOCATED AT MAIN SERVICE DISCONNECTING MEANS IF ALL ELECTRICAL POWER SOURCE DISCONNECTING MEANS ARE GROUPED WITHIN 10 FT. AND WITHIN LINE OF SITE OF THE MAIN SERVICE DISCONNECT



NEC 690.56(C)(3)

LOCATED AT THE PRIMARY RAPID SHUT DOWN DISCONNECT SWITCH



NEC 705.12(B)(2)(3)(C)

LABEL USED ONLY IF THERE ARE 3 OR MORE SUPPLY/POWER SOURCES ON A BUSBAR

LOCATED AT LOAD CENTERS CONTAINING 3 OR MORE SUPPLY/POWER SOURCES



NEC 705.12(B)(2)(3)(B)

LOCATED ON THE PV CIRCUIT(S) COMBINER PANEL

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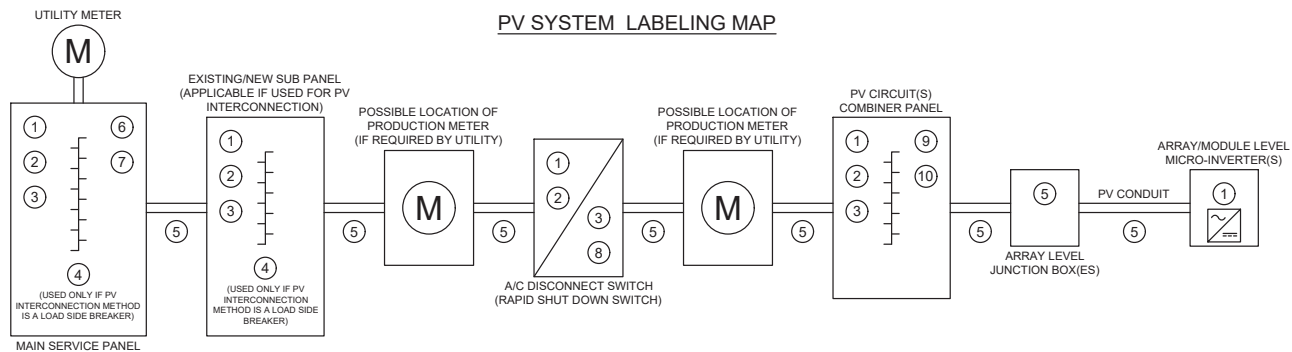
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ADDITIONAL NOTES:

SHEET:  
SYSTEM MARKINGS  
PV 6.0



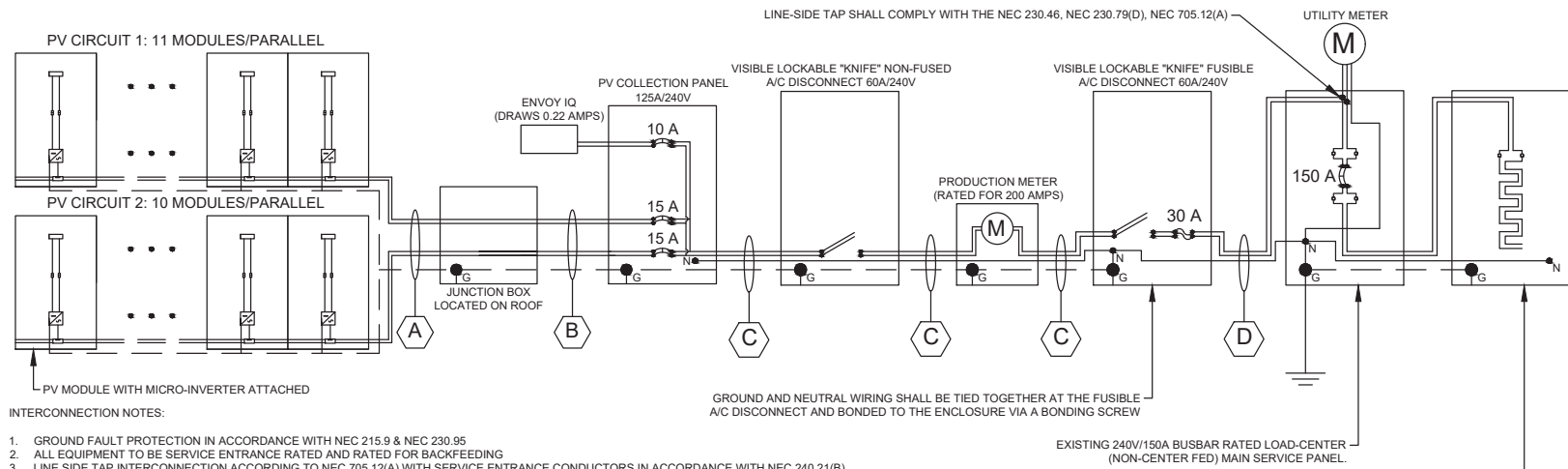
PV MODULE SPECIFICATIONS		
MODULE MAKE AND MODEL	SILFAB SIL 330BL	
MAXIMUM POWER (DC)	330	WATTS
MAX POWER-POINT VOLTAGE (VMPP)	33.3	VOLTS
MAX POWER-POINT CURRENT (IMPP)	9.92	AMPS
OPEN CIRCUIT VOLTAGE (VOC)	40.5	VOLTS
SHORT CIRCUIT CURRENT (ISC)	10.42	AMPS
TEMPERATURE COEFFICIENT VOC	-0.28	%/°C
MAXIMUM SYSTEM VOLTAGE	1000V DC (UL)	

MICRO-INVERTER SPECIFICATIONS		
INVERTER MAKE AND MODEL	ENPHASE IQ7-60-E-US	
RATED OUTPUT POWER (AC)	240	WATTS
NOMINAL OUTPUT VOLTAGE (AC)	240	VOLTS
MAX OUTPUT CURRENT (AC)	1	AMPS
MAX INPUT VOLTAGE (DC)	48	VOLTS
MAX INPUT CURRENT (DC)	15	AMPS
MAX OCPD RATING (AC)	20	AMPS
MAX NUMBER OF PANELS PER CIRCUIT	16	



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**INTERCONNECTION NOTES:**

- GROUND FAULT PROTECTION IN ACCORDANCE WITH NEC 215.9 & NEC 230.95
- ALL EQUIPMENT TO BE SERVICE ENTRANCE RATED AND RATED FOR BACKFEEDING
- LINE SIDE TAP INTERCONNECTION ACCORDING TO NEC 705.12(A) WITH SERVICE ENTRANCE CONDUCTORS IN ACCORDANCE WITH NEC 240.21(B)

**DISCONNECT NOTES**

- DISCONNECTING SWITCHES SHALL BE WIRED SUCH THAT WHEN THE SWITCH IS OPENED THE CONDUCTORS REMAINING LIVE ARE CONNECTED TO THE TERMINALS MARKED "LINE SIDE" (UPPER TERMINALS)
- AC DISCONNECT MUST BE ACCESSIBLE TO QUALIFIED UTILITY PERSONNEL, BE LOCKABLE, AND BE A VISIBLE-BREAK SWITCH
- DC CURRENT CONDUCTORS ARE TO REMAIN OUTSIDE OF THE BUILDING PRIOR TO EITHER FUSIBLE SOURCE CIRCUIT

AC PHOTOVOLTAIC SYSTEM RATINGS		
MAX AC OPERATING CURRENT	21	AMPS
MAX AC OPERATING VOLTAGE	240	VOLTS

\*TYPE NM-B CABLE WILL BE RAN THROUGH THE ATTIC SPACE/INTERIOR WHERE POSSIBLE 0

RACEWAY AND CONDUCTOR SCHEDULE						
TAG	CONDUCTOR TYPE	MINIMUM WIRE SIZE	# OF CONDUCTORS	RACEWAY / CABLE TYPE	MINIMUM CONDUIT SIZE	
A	ENPHASE Q-CABLE (USE-2)	12	2	USE-2 / FREE AIR	FREE AIR	
	BARE COPPER (EGC)	6	1	BARE / FREE AIR		
B	CU THHN OR NM-B CABLE *	10	4	EMT OR NM-B CABLE	3/4" / INTERIOR USE	
	CU THHN OR NM-B CABLE (EGC) *	10	1			
C	CU THHN/THWN-2	6	3	EMT	3/4"	
	CU THHN/THWN-2 (EGC)	8	1			
D	CU THHN/THWN-2	6	3	EMT	3/4"	



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*David S. Conrad*

SYSTEM SIZE:  
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5.04 kW AC  
21 MODULES

DATE: 11/5/2020

DRAWN BY: JB

ADDITIONAL NOTES:

SHEET:  
**1-LINE  
EL 1.0**



NEC ARTICLE 690.43 EQUIPMENT  
 GROUNDING SPECIFIES THAT ALL EXPOSED  
 NON-CURRENT-CARRYING METAL PARTS OF  
 PV MODULE FRAMES, ELECTRICAL  
 EQUIPMENT, AND CONDUCTOR  
 ENCLOSURES SHALL BE PROVIDED WITH  
 EQUIPMENT GROUNDING. 690.43(B)  
 STRUCTURE AS EQUIPMENT GROUNDING  
 CONDUCTOR ALLOWS FOR EQUIPMENT TO  
 BE USED AS THE EQUIPMENT GROUNDING  
 CONDUCTOR IN A PHOTOVOLTAIC SYSTEM.  
 SPECIFICALLY, "DEVICES LISTED, LABELED,  
 AND IDENTIFIED FOR BONDING AND  
 GROUNDING THE METAL PARTS OF PV  
 SYSTEMS SHALL BE PERMITTED TO BOND  
 THE EQUIPMENT TO GROUNDED METAL  
 SUPPORTS." THE DEVICES LISTED AND  
 IDENTIFIED FOR GROUNDING THE

EQUIPMENT MAY BE STAND-ALONE  
 GROUNDING COMPONENTS OR UL-2703  
 LISTED MOUNTING HARDWARE. IN AN  
 ENPHASE MICROINVERTER SYSTEM, IF THE  
 MICROINVERTERS AND MODULES ARE  
 BONDED TO THE RACKING ASSEMBLIES  
 WITH THE USE OF LISTED AND APPROVED  
 GROUNDING CLIPS OR GROUNDING  
 COMPONENTS, THE EQUIPMENT  
 GROUNDING CONDUCTOR PROVIDED TO  
 THE MICROINVERTERS THROUGH THE  
 ENPHASE ENGAGE CABLE MAY ALSO BE  
 USED TO GROUND THE OTHER  
 PHOTOVOLTAIC SYSTEM COMPONENTS.

# ION

4801 N UNIVERSITY AVE, SUITE 900  
 PROVO, UT 84604  
 (888) 781-7074

KRISTEN L FLORES  
 2007 NORTH TEJON STREET  
 COLORADO SPRINGS, CO 80907



LICENSED ELECTRICAL CONTRACTOR COMPANY:  
 ION DEVELOPER LLC  
 DAVID STANLEY CONRAD (ME.3000364)  
 CLASSIFICATION:  
 ELECTRICAL CONTRACTOR  
 LICENSE NUMBER:  
 EC-0100960  
 EXPIRATION:  
 9/30/2020  
 AUTHORIZED CONTRACTOR:  
*David S. Conrad*

SYSTEM SIZE: 6.93 kW DC  
 5.04 kW AC  
 21 MODULES

DATE: 11/5/2020

DRAWN BY: JB

ADDITIONAL NOTES:

SHEET:  
 ELECTRICAL NOTES  
 EL 2.0



# SIL-330 BL



Proud Partner of

ION

## 60 Cell Monocrystalline PV Module



CHUBB®

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

### INDUSTRY LEADING WARRANTY

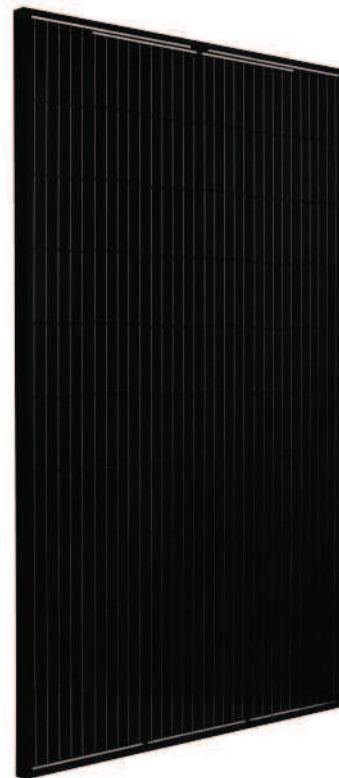
All our products include an industry leading 25-year product workmanship and 30-year performance warranty.

### 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 100% made in North America.



#### ■ 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 low load bearing structures up to 5400Pa. The light-weight frame is exclusively designed for wide-ranging racking compatibility and durability.

#### ■ LOWEST DEFECT RATE

Total automation ensures strict quality controls during the entire manufacturing process at our ISO certified facilities. 48.18 ppm as per December 2018.

#### ■ DOMESTIC PRODUCTION

Silfab Solar manufactures our PV modules in two automated locations within North America. Our 300+ 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 BL mono PERC	
Test Conditions		STC	NOCT
Module Power (Pmax)	Wp	330	250
Maximum power voltage (Vpmax)	V	33.3	30.0
Maximum power current (Ipmax)	A	9.92	8.3
Open circuit voltage (Voc)	V	40.5	37.46
Short circuit current (Isc)	A	10.42	8.54
Module efficiency	%	19.4	18.4
Maximum system voltage (VDC)	V		1000
Series fuse rating	A		20
Power Tolerance	Wp		+/- 3%

Measurement conditions: STC 1000 W/m<sup>2</sup> • AM 1.5 • Temperature 25 °C • NOCT 800 W/m<sup>2</sup> • AM 1.5 • Measurement uncertainty ≤ 3%  
 • Sun simulator calibration reference modules from Fraunhofer Institute. Electrical characteristics may vary by ±5%.

Temperature Ratings		SIL-330 BL mono PERC	
Temperature Coefficient Isc		0.064 %/°C	
Temperature Coefficient Voc		-0.28 %/°C	
Temperature Coefficient Pmax		-0.36 %/°C	
NOCT (± 2°C)		45 °C	
Operating temperature		-40/+85 °C	

Mechanical Properties and Components		SIL-330 BL 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 <sup>2</sup>	83.5/112.8 lb/ft <sup>2</sup>	
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 compatible	47.2 in, Ø 0.22 in, MC4 compatible	
Backsheet	High durability, superior hydrolysis resistance, multi-layer dielectric film		
Frame	Anodized Aluminum (Black)		
Bypass diodes	3 diodes-30SQ045T (45V max DC blocking voltage, 30A max forward rectified current)		
Junction Box	UL 3730 Certified, IP67 rated		

Warranties		SIL-330 BL mono PERC			
Module product workmanship warranty		25 years**			
Linear power performance guarantee		30 years			
		≥ 97% end 1 <sup>st</sup> year	≥ 90% end 12 <sup>th</sup> year	≥ 82% end 25 <sup>th</sup> year	≥ 80% end 30 <sup>th</sup> year

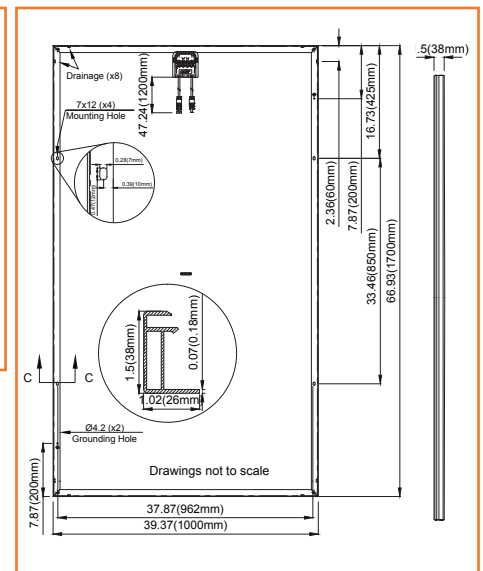
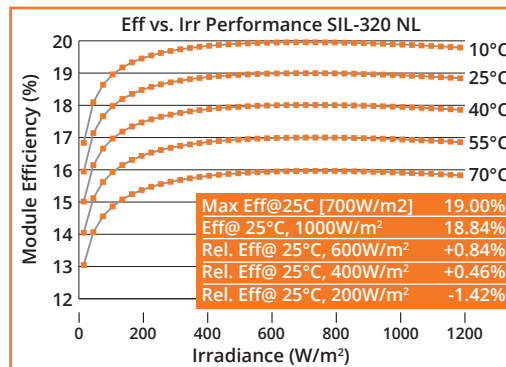
Certifications		SIL-330 BL mono PERC			
Product		ULC ORD C1703, UL 1703, CEC listed, IEC 62716 Ammonia Corrosion; IEC61701:2011 Salt Mist Corrosion Certified, UL Fire Rating: Type 2			
Factory		ISO9001:2015			

- 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](http://www.silfabsolar.com).

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



Tel 888-781-7074



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 Tel +1 360-569-4733







# PREMIUM QUALITY SOLAR MODULES FOR YOUR HOME



## YOUR NORTH AMERICAN PV MODULE MANUFACTURER

Operating in Toronto, Canada and Bellingham, Washington, the combined 158,000 sq. ft. facilities feature multiple automated ISO 9001-2015 quality certified production lines utilizing just-in-time manufacturing to deliver Buy American approved PV modules specifically designed for, and dedicated to, the North American market.

Silfab utilizes precision engineering and automation to produce superior reliability and performance with the lowest defect rate in the US.



Proud  
Partner of

ION



# AESTHETICALLY PLEASING + MAXIMUM POWER

Add the beauty of all black solar to your home. Seamless in appearance, Silfab's sleek all black modules – cells, frame, backsheet – provide a solar array as good looking as the house under it.



## HIGH POWER DENSITY = MORE POWER + SMALLER FOOTPRINT

Silfab produces some of the highest efficiency modules in the market without the new technology price premium attached. With a smaller footprint, you can harvest more energy from the sun and yield a better ROI through clean renewable energy.



## LOCAL SERVICE AND SUPPORT

North American management results in better service and support. When you have questions about your Silfab solar modules, help is right around the corner from our 100% North American team.



## HIGH-PERFORMANCE WARRANTY COVERAGE

Solar is a big investment and you want to have peace of mind that it will perform as expected for the lifetime of the system. Silfab offers a comprehensive production and component warranty that will ensure your investment is covered.\*



## AUTOMATION FOR HIGHER QUALITY

Ensuring that solar modules perform for 25 years requires high-quality components and manufacturing. Silfab modules, manufactured in our fully-automated facility, deliver you the highest quality modules made in North America.

### ENHANCED DURABILITY

- 2400Pa wind and 5400Pa snow load ratings for enhanced durability in extreme conditions



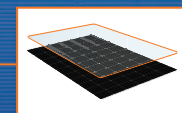
### GLASS STRUCTURE

- Glass with internal pyramid structure for higher production at low radiation intensities (sunset, sunrise, winter)



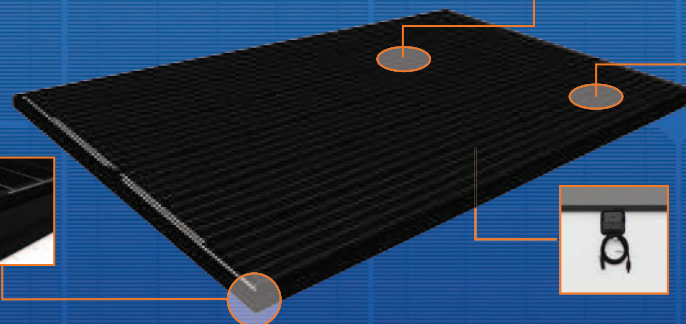
### ANTI-REFLECTIVE GLASS COATING

- Reduces glare to increase the amount of sunlight converted to electricity



### FRAME FEATURES

- Low profile frame for seamless roof integration
- All aluminum, compressed frame for enhanced strength and rigidity
- Sleek frame design for faster snow shedding and clearing of dirt build-up



### BACK SURFACE

- White back surface reduces cell temperatures to improve production
- High-quality backsides for long-lasting protection against nature's elements



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

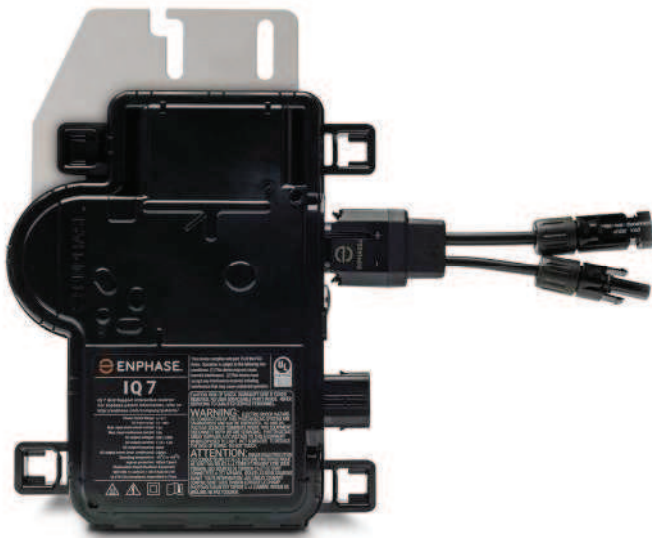
Silfab Solar Inc.  
800 Cornwall Ave | Bellingham WA 98225 USA  
Tel +1 360-569-4733

# 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.





## 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 I <sub>sc</sub> )	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 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](https://enphase.com)



## 2007 N Tejon St - Solar installation

### Proposed Design vs Rear Roof Only- Comparison

Proposal	Production	
Original (21 panels)	8,882 kWh	
Rear Roof (19 panels)	6,878 kWh	
	<b>Production Decrease</b>	<b>-2,004 kWh</b>

We are proposing a 21 panel design with panels on the front of the home. The section in the front has the best sun exposure and can fit many panels. When we tried to fit the panels on the back of the home, to limit visibility, we were only able to fit 19 panels and the production dropped by 23%.

Proposed Design



### YOUR SOLAR SYSTEM DETAILS

SYSTEM SIZE (STC-DC)

**6.93 kW**

ESTIMATED YEAR 1 PRODUCTION

**8,882 kWh**

Rear Roof Design



### YOUR SOLAR SYSTEM DETAILS

SYSTEM SIZE (STC-DC)

**6.27 kW**

ESTIMATED YEAR 1 PRODUCTION

**6,878 kWh**

# Aurora Shade Report

## Customer

Kristen Flores

## Designer

Rebeka Craig

## Organization

Ion Solar

## Address

2007 N Tejon St  
Colorado Springs, CO  
80907, USA

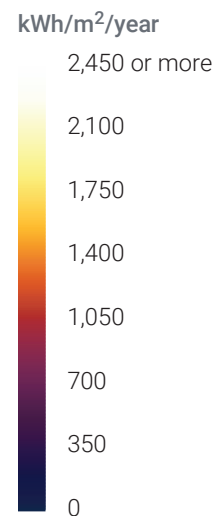
## Coordinates

(38.862148, -104.821773)

## Date

2 November 2020

## Annual irradiance



## Summary

Array	Panel Count	Azimuth (deg.)	Pitch (deg.)	Annual TOF (%)	Annual Solar Access (%)	Annual TSRF (%)
1	10	181	34	100	90	90
2	11	91	35	81	88	71
Weighted average by panel count	-	-	-	-	89.2	80.4

## Monthly solar access (%) across arrays

Array	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	75	85	94	96	96	96	96	96	95	90	79	73
2	81	90	91	90	89	88	89	89	90	90	85	77





Front of home from the south



Closer view of front of home from the south



Front of home



Front of home from the north





Back of home from the South



Back of home from the north



## Panels Installed on Similar Roofs

