GENERAL NOTES

1. ALL ELECTRICAL MATERIALS SHALL BE NEW AND LISTED BY RECOGNIZED ELECTRICAL TESTING LABORATORY

CUSTOM MADE EQUIPMENT SHALL HAVE COMPLETE TEST DATA SUBMITTED BY THE MANUFACTURER ATTESTING TO ITS SAFETY

2. OUTDOOR EQUIPMENT SHALL BE NEMA 3R RATED OR BETTER

3. ALL METALLIC EQUIPMENT SHALL BE GROUNDED

4. CONTRACTOR SHALL OBTAIN ELECTRICAL PERMITS PRIOR TO INSTALLATION AND SHALL COORDINATE ALL INSPECTIONS, TESTING COMMISSIONING AND ACCEPTANCE WITH THE CLIENT, UTILITY CO. AND CITY INSPECTORS AS NEEDED.

5. THE ELECTRICAL CONTRACTOR SHALL VERIFY THE EXACT LOCATIONS OF SERVICE POINTS AND SERVICE SIZES WITH THE SERVING UTILITY COMPANY AND COMPLY WITH ALL UTILITY COMPANIES REQUIREMENTS.

6. DRAWINGS ARE DIAGRAMMATIC ONLY, ROUTING OF RACEWAYS SHALL BE OPTION OF THE CONTRACTOR UNLESS OTHERWISE NOTED AND SHALL BE COORDINATED WITH OTHER TRADES.

7. IF THE ROOF MATERIAL OR ROOF STRUCTURE NOT ADEQUATE FOR PV INSTALLATION, CALL ENGINEER PRIOR TO INSTALL. THE CONTRACTOR IS RESPONSIBLE TO VERIFY THAT THE ROOF IS CAPABLE OF WITHSTANDING THE EXTRA WEIGHT.

8. IF THE DISTANCES FOR CABLE RUNS ARE DIFFERENT THAN SHOWN, THE CONTRACTOR SHALL NOTIFY THE ELECTRICAL ENGINEER TO VALIDATE THE WIRE SIZE. FINAL DRAWINGS WILL BE RED-LINED AND UPDATED AS APPROPRIATE.

9. WHENEVER A DISCREPANCY IN QUALITY OF EQUIPMENT ARISES ON THE DRAWING OR SPECIFICATIONS, THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING AND INSTALLING ALL MATERIAL AND SERVICES REQUIRED BY THE STRICTEST CONDITIONS NOTED ON THE DRAWINGS OR IN THE SPECIFICATIONS TO ENSURE COMPLETE COMPLIANCE AND LONGEVITY OF THE OPERABLE SYSTEM REQUIRED BY THE ARCHITECT/ENGINEERS.

10. ALL BROCHURES, OPERATION MANUALS, CATALOGS, SHOP DRAWINGS, ETC. SHALL BE HANDED OVER TO OWNER'S REPRESENTATIVE AT THE COMPLETION OF WORK

PHOTOVOLTAIC NOTES:

1. ROOFTOP MOUNTED PHOTOVOLTAIC PANELS AND MODULES SHALL BE TESTED, LISTED AND IDENTIFIED BY RECOGNIZED ELECTRICAL TESTING LABORATORY

2. SOLAR SYSTEM SHALL NOT COVER ANY PLUMBING OR MECHANICAL VENTS

3. MODULES AND SUPPORT STRUCTURES SHALL BE GROUNDED.

4. SOLAR INVERTER SHALL BE LISTED TO UL1741.

5. REMOVAL OF AN INTERACTIVE INVERTER OR OTHER EQUIPMENT SHALL NOT DISCONNECT THE BONDING CONNECTION BETWEEN THE GROUNDING ELECTRODE CONDUCTOR AND THE PHOTOVOLTAIC SOURCE AND/OR OUTPUT CIRCUIT GROUNDED CONDUCTORS.

6. ALL PV MODULES AND ASSOCIATED EQUIPMENT AND WIRING SHALL BE PROTECTED FROM PHYSICAL DAMAGE.

7. LIVE PARTS OF PV SOURCE CIRCUITS AND PV OUTPUT CIRCUITS OVER 150V TO GROUND SHALL NOT BE ACCESSIBLE TO OTHER THAN QUALIFIED PERSONS WHILE ENERGIZED.

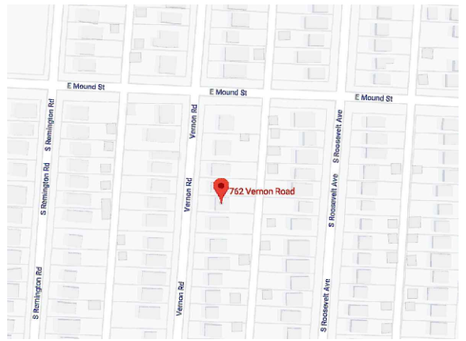
8. INVERTER IS EQUIPED WITH INTEGRATED GFDI, THUS PROVIDING GROUND FAULT PROTECTION

9. ALL CONDUCTORS SHALL BE COPPER AND 90 DEG RATED

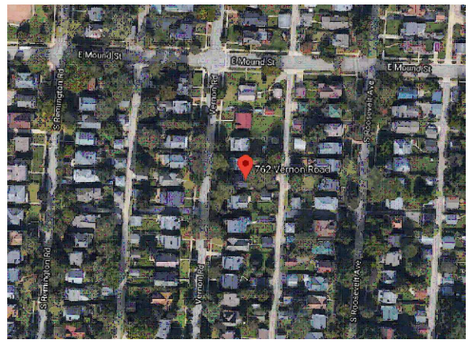
10. ALL ELECTRICAL EQUIPMENT SHALL BE LISTED BY A RECOGNIZED ELECTRICAL TESTING LABORATORY.

11. A SINGLE CONDUCTOR SHALL BE PERMITTED TO BE USED TO PERFORM THE MULTIPLE FUNCTIONS OF DC GROUNDING, AC GROUNDING AND BONDING BETWEEN AC AND DC SYSTEMS.

12. NON-CURRENT CARRYING METAL PARTS OF EQUIPMENT SHALL BE EFFECTIVELY BONDED TOGETHER. BOND BOTH ENDS OF RACEWAYS.



VICINITY MAP
SCALE: NTS



SATELLITE VIEW
SCALE: NTS

INDEX

MAIN

THE INSTALLATION OF SOLAR ARRAYS AND PHOTOVOLTAIC POWER SYSTEMS SHALL COMPLY WITH THE FOLLOWING CODES:

NATIONAL ELECTRICAL CODE 2017
OHIO BUILDING CODE 2017
INTERNATIONAL FIRE CODE 2017
INTERNATIONAL ENERGY CONSERVATION CODE 2018

AS ADOPED BY THE STATE OF OHIO

ALL OTHER ORDINANCE ADOPTED BY THE LOCAL GOVERNING AGENCIES

PV SOLAR SYSTEM DETAILS

SYSTEM SIZE: DC STC: 6.93 KW
SYSTEM SIZE: AC CEC: 6.34 KW
SOLAR MODULES: (19) LG 365 watt
INVERTERS: (19) Enphase IQ7 Plus Microinverters

ELECTRICAL INFORMATION:
EXISTING
MAIN SERVICE PANEL BUS SIZE: 200A
MAIN SERVICE BREAKER SIZE: 200A
MOUNTING SYSTEM: IRONRIDGE

BUILDING INFORMATION:
ONE STORY HOUSE
CONSTRUCTION TYPE: V-B
OCCUPANCY: R
ROOF: COMP. SHINGLE
RAFTER: 2 X 6 @ 24" O.C.

Project Name:
Stacey Philliber and Eric Sauerhoff
Property address:
762 Vernon Rd, Bexley OH 43209

CONTRACTOR

Ecohouse Solar

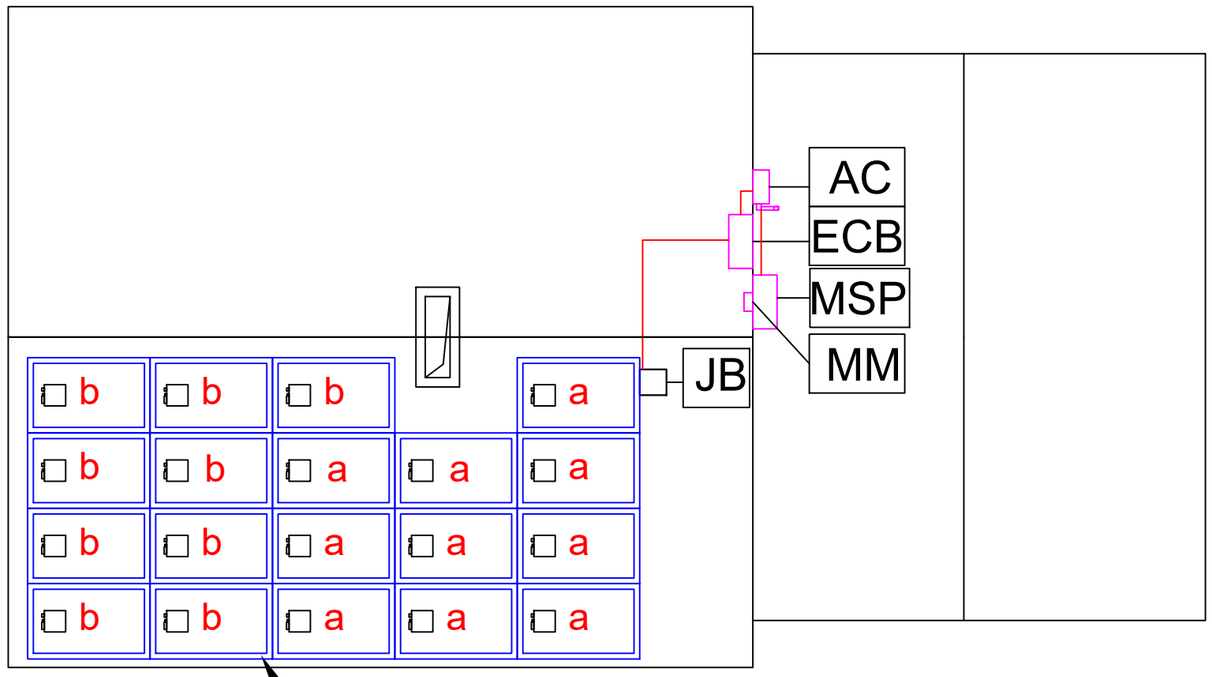
1857 Northwest Boulevard
Columbus, OH 43212

DESIGNER: www.solarpaperwork.com
DATE: 09/20/2019

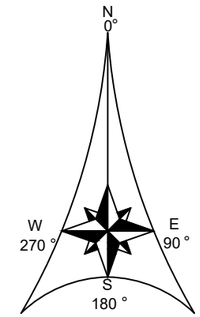
INDEX	
MSP	(E) Main Service Panel
MM	(E) Main Meter
ECB	(N) Enphase Combiner Box
AC	(N) AC Disconnect
JB	(N) Junction Box
	Microinverter/Optimizer
	Solar Module
	Conduit
	Setback

Total Roof Area: 963.3
Total Module Area: 342
35.5 % of Coverage

Vernon Rd



Solar PV Array
19 - LG 365W Modules
19 - IQ7 Plus Microinverters
Pitch: 32 Deg
Orientation: 90 Deg



SCALE: 3/32" = 1'-0"

1 **ROOF PLAN**

Project Name:
Stacey Philliber and Eric Sauerhoff
Property address:
762 Vernon Rd, Bexley OH 43209

CONTRACTOR

Ecohouse Solar

1857 Northwest Boulevard
Columbus, OH 43212

DESIGNER: www.solarpaperwork.com
DATE: 09/20/2019

#	ITEM	DESCRIPTION	QTY
1	PV MODULE	LG LG365Q1C-V5 Voc = 42.8V, Vmp = 36.7V Isc = 10.8A, Imp = 9.95A	19
2	SOLARDECK JB	4"x4"x2" UL LISTED WATER TIGHT NEMA TYPE 3	1
3	MAIN SERVICE PANEL	(E) MAIN SERVICE PANEL & METER 200A BUSBAR & 200A MAIN BREAKER	1
4	MICROINVERTERS	ENPHASE IQ7 PLUS MICROINVERTERS IQ7PLUS-72-X-US (240V) PEAK PWR TRACKING VOLTAGE: = 27-45 V CEC EFFICIENCY : = 97.0 % ENCLOSURE : NEMA 6 MAXIMUM INPUT CURRENT: = 15 A MAXIMUM OUTPUT CURRENT: = 1.21A MAXIMUM INPUT POWER: = 235 - 440W+ MAXIMUM OUTPUT POWER: = 240 W	19
5	ECB	Enphase Combiner Box	1
6	AC DISCONNECT	60A 2P BLADE TYPE 240V NON-FUSABLE	1
7	MM	UTILITY METER	1

WIRE CHART

#	MODULE QTY x NEC MULT x MICROINV. OUTPUT AMPS = DESIGN AMPS	BREAKER SIZE (A)	WIRE TYPE	EGC	WIRE RATING X TEMP DERATE X CONDUCTOR DERATE = DERATED WIRE	CONDUIT SIZE
1a	10 X 1.25 X 1.21 = 15.1 A	20	(2) #12 AWG, ENPHASE Q CABLE	(1) #6 BARE SOLID COPPER GEC	30 X .71 X 1 = 21.3 >= 15.1	IN FREE AIR
1b	9 X 1.25 X 1.21 = 13.6 A	15	(2) #12 AWG, ENPHASE Q CABLE	(1) #6 BARE SOLID COPPER GEC	30 X .71 X 1 = 21.3 >= 13.6	IN FREE AIR
2	10 X 1.25 X 1.21 = 15.1 A	20	(4) #10 AWG, CU-THWN-2	(1) #10 AWG, CU-THWN-2 EGC	40 X .71 X .8 = 22.7 >= 15.1	3/4" EMT
3	19 X 1.25 X 1.21 = 28.7 A	30	(3) #8 AWG, CU-THWN-2	(1) #10 AWG, CU-THWN-2 EGC	55 X .91 X 1 = 50.05 >= 28.7	3/4" EMT
4	19 X 1.25 X 1.21 = 28.7 A	30	(3) #8 AWG, CU-THWN-2	(1) #10 AWG, CU-THWN-2 EGC	55 X .91 X 1 = 50.05 >= 28.7	3/4" EMT

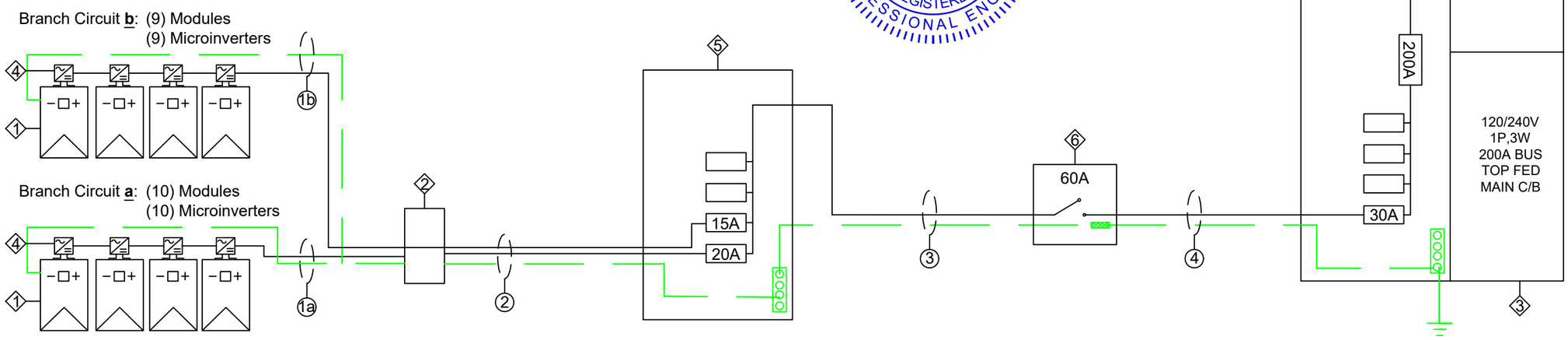
KEY NOTES:

- **SOLID BARE G.E.C (FREE-AIR) MOUNTED UNDER ARRAY**
- **PER NEC ARTICLE 690.35 INVERTER GROUND FAULT PROTECTION PROVIDED**
- **ALL GROUNDS AND NEUTRALS BONDED TO EXISTING GROUNDING CONDUCTOR W/IRREVERSIBLE CRIP CONNECTOR,**
- **BACKFED BREAKERS MUST BE LOCATED @ OPPOSITE END OF BUS BAR FROM MAIN BREAKER OR MAIN LUG ON GRID SIDE. WHEN A BACKFED BREAKER IS THE METHOD OF UTILITY INTERCONNECTION, BREAKER SHALL NOT READ ' LINE OR LOAD'.**
- **PER CEC 250.65(C): CONDUCTOR SPLICES ONLY ALLOWED WITH COMPRESSION CONNECTORS OR EXOTHERMIC WELDING**
- **ALL GROUNDS AND NEUTRALS BONDED TO EXISTING GROUNDING CONDUCTOR W/IRREVERSIBLE CRIP CONNECTOR,**
- **VERIFY (E) UFER GROUND NEAR MSP. IF (E) UFER IS NOT ACCESSIBLE OR VERIFIABLE, INSTALL A NEW 5/8" Ø X 8' LONG GROUNDING ROD AND BOND SOLAR SYSTEM EQUIPMENT GROUNDING ACCORDINGLY.**
- **LOAD/LINE SIDE INTERCONNECTION AT MAIN PANEL PER ART. 705.12**

AC SYSTEM SIZE CALCULATION						
Module PTC Rating (W)	x	NO. of Modules	x	Average Inverter CEC Efficiency	=	AC System Size
344.1	x	19	x	97%	=	6.34 kW AC

PERCENT OF VALUES	NUMBER OF CURRENT CARRYING CONDUCTORS IN EMT
.80	4-6
.70	7-9
.50	10-20

120% RULE CALCULATION PER NEC 705.12(D)(2)(3)		
MAIN BUSBAR RATING:	200	AMPS
MAIN SERVICE BREAKER RATING:	200	AMPS
PV BACKFEDING CURRENT:	30	AMPS
BUSBAR X 120%	- MAIN BREAKER	= MAX PV BREAKER
240	200	= 40



STATE OF OHIO
METHODE MANIRAGUHA
PE-83807
Exp. 12/31/2019
REGISTERED PROFESSIONAL ENGINEER

2 SINGLE LINE DIAGRAM

Project Name:
Stacey Phillber and Eric Sauerhoff
Property address:
762 Vernon Rd, Bexley OH 43209

CONTRACTOR

Ecohouse Solar

1857 Northwest Boulevard
Columbus, OH 43212

DESIGNER: www.solarpaperwork.com
DATE: 09/20/2019

1. **CAUTION**
AUTHORIZED SOLAR PERSONNAL ONLY!

2. **CAUTION**
SOLAR DC CURRENT PRESENT DURING DAYLIGHT HOURS

(STICKER TO BE LOCATED ON CONDUIT WITH DC CURRENT EVERY 4' HORIZONTALLY OR 10' VERTICALLY AND 1' FROM EACH SIDE OF A BEND)

3. **WARNING!**
ELECTRIC SHOCK HAZARD. IF GROUND FAULT IS INDICATED, NORMALLY GROUNDED CONDUCTORS MAY BE UNGROUNDED AND ENERGIZED.

4. **DC DISCONNECT**
DC PHOTOVOLTAIC POWER SOURCE
RATED MAX POWER POINT CURRENT- ____ AMPS
RATED MAX POWER POINT VOLTAGE- ____ VOLTS
MAXIMUM SYSTEM VOLTAGE- ____ VOLTS
SHORT CIRCUIT CURRENT- ____ AMPS

5. **WARNING!**
ELECTRIC SHOCK HAZARD. DO NOT TOUCH THE TERMINALS. TERMINALS ON BOTH THE LINE AND LOAD SIDES MAY BE ENERGIZED IN THE OPEN POSITION.

6. **PV SUB-PANEL ONLY**

(TO BE LOCATED ON SUB-PANEL ONLY WHEN SUB-PANEL IS DEDICATED FOR PV ONLY)

7. **AC DISCONNECT**
AC PHOTOVOLTAIC POWER SOURCE
RATED AC OUTPUT CURRENT: 28.7 A MAX
NOMINAL AC OPERATING VOLTAGE: 240 Vac

8. **THIS PANEL FED BY MULTIPLE SOURCES (UTILITY & SOLAR)**

9. **SOLAR**

(STICKER LOCATED INSIDE PANEL NEXT TO SOLAR BREAKER)

10. **WARNING!**
INVERTER OUTPUT CONNECTION. DO NOT RELOCATE THIS OVERCURRENT DEVICE

(STICKER LOCATED INSIDE PANEL BELOW PV BREAKER)

11. **PV LOAD CENTER SIZED FOR PV BREAKERS ONLY OR RENDERED UNABLE TO ACCEPT ANY ADDITIONAL LOADS.**

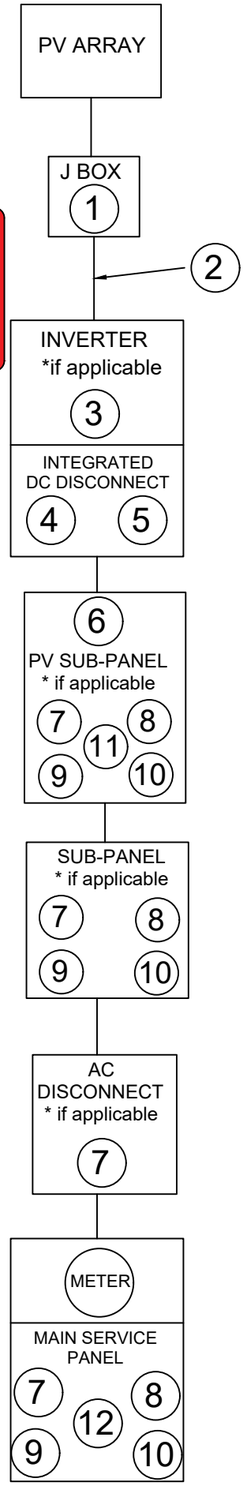
(STICKER LOCATED ON THE PV SUB PANEL)

12. **PHOTOVOLTAIC SYSTEM EQUIPPED WITH RAPID SHUT DOWN**

(STICKER LOCATED ON THE MAIN SERVICE PANEL)

Permanent directory or plaque providing location of service disconnecting means and photovoltaic system disconnecting means, if not located at the same location. (Plaques shall be metal or plastic, with engraved or machine printed letters, or electro-photo plating, in a contrasting color to the plaque. Plaques shall be permanently attached to the equipmenq or in the required location using an approved method that is suitable to withstand the environment to which it is exposed. Plaques and signage shall meet legibility, defacemet, exposure and adhesion requirements of Underwriters Laboratories marking and labeling system 969(UL969).

Plaques will have red background & white lettering.



MARKINGS, LABELS AND WIRING SIGNS

A. Purpose: Provide emergency responders with appropriate warning and guidance with respect to isolating solar electric system.
This can facilitate identifying energized electrical lines that connect solar panels to the inverter, as these should not be cut when venting for smoke removal
B. Main Service Disconnect.
1. Residential buildings - The marking main be placed within the main service disconnect. The marking shall be placed
outside cover if the main service disconnect is operable with the service panel closed.
2. Commercial buildings - Tha marking shall be placed adjacent to the main service disconnect clearly visible from the location where the level is operated
3. Markings: Verbiage, Format and Type of Material.
a. Verbiage: CAUTION: SOLAR ELECTRIC SYSTEM CONNECTED
b. Format: White lettering on a red background. Minimum 3/8 inches letter height. All letters shall be capitalized. Arial or similar font, non bold.
c. Material: Reflective, weather resistant material suitable for the environment (use UL - 969 as standard for weather rating). Durable adhesive materials meet this requirement.
C.Marking Requirements on DC conduit, raceways, enclosures, cable assemblies, DC combiners and junction boxes:
1. Markings: Verbiage, Format and Type of Material.
a. Placement : Markings shall be placed every 10 feet on all interior and exterior DC conduits, raceways, enclosures, and cable assemblies,
at turns, above and for below penetrations, all DC combiners and junction boxes
b. Verbiage: CAUTION: SOLAR CIRCUIT Note: The format and type of material shall adhere to "V. V-3b, c" of this requirement.
c. Inverters are not required to have caution markings
1.Marking is required on all interior and exterior DC conduit raceways,enclosures,cable assemblies,and junction boxes,combiner boxes and disconnects.
2.The materials used for marking shall be reflective,weather resistant material suitable for the environment.
Minimum 3/8 "letter height; all upper case letters Arial or similar font; Red background with white lettering.
3.Marcking shall contain the words: **WARNING : PHOTOVOLTAIC POWER SOURCE**.
4.Marking shall be placed adjacent to the main service disconnect in a location clearly visible from the location where the disconnect is operated

STATE OF OHIO
METHODE MANIRAGUHA
PE-83807
Exp. 12/31/2019
REGISTERED PROFESSIONAL ENGINEER

3 **SIGNAGE**

Project Name:
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1857 Northwest Boulevard
Columbus, OH 43212

DESIGNER: ***www.solarpaperwork.com***
DATE: ***09/20/2019***

INDEX	
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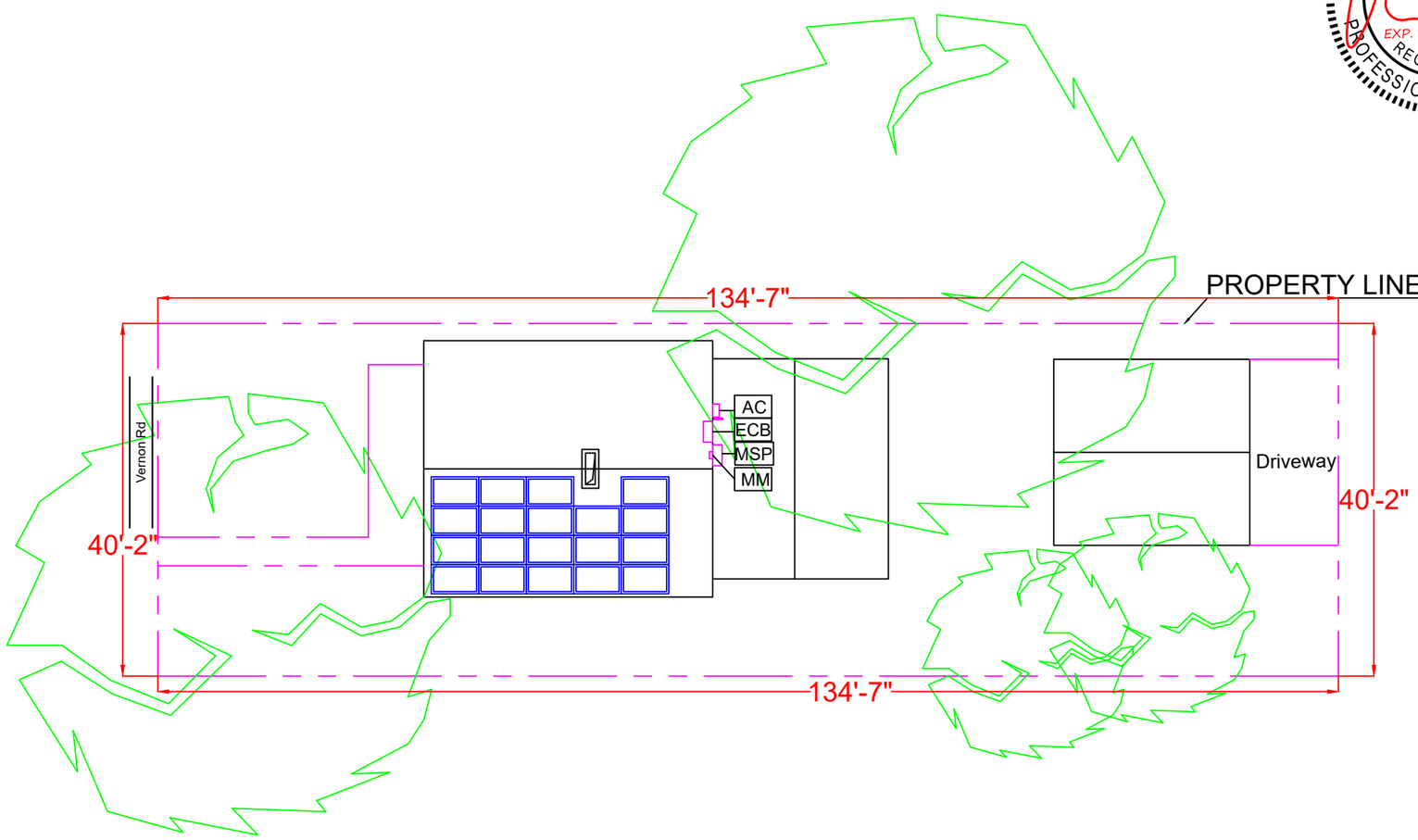
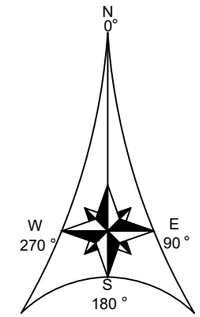
	Solar Module



STATE OF OHIO
PAUL K. ZACHER
79735
EXP. 12/31/2019
REGISTERED PROFESSIONAL ENGINEER



SCALE: 1/16" = 1'-0"

4 SITE PLAN

Project Name:
Stacey Philliber and Eric Sauerhoff
Property address:
762 Vernon Rd, Bexley OH 43209

CONTRACTOR

Ecohouse Solar

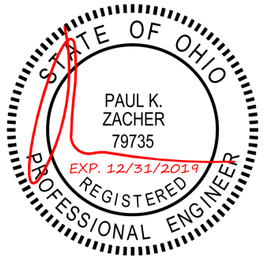
1857 Northwest Boulevard
Columbus, OH 43212

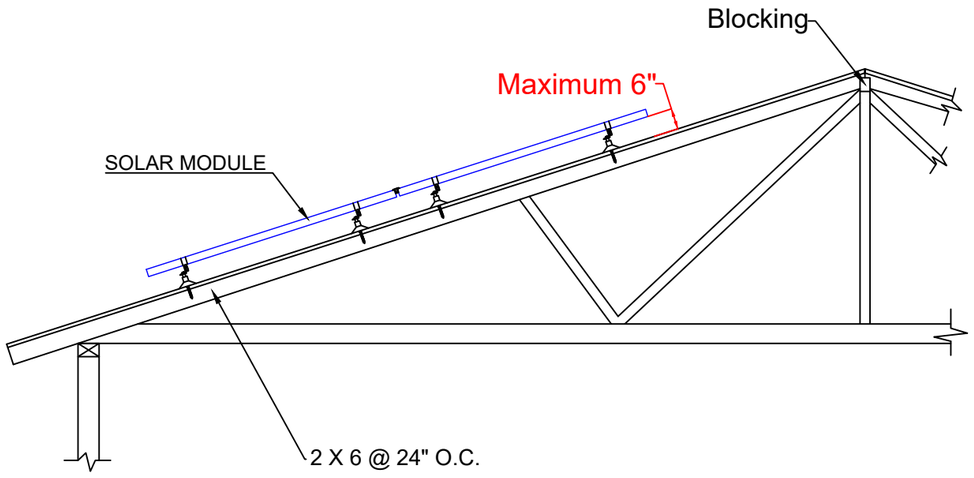
ecoHOUSE SOLAR

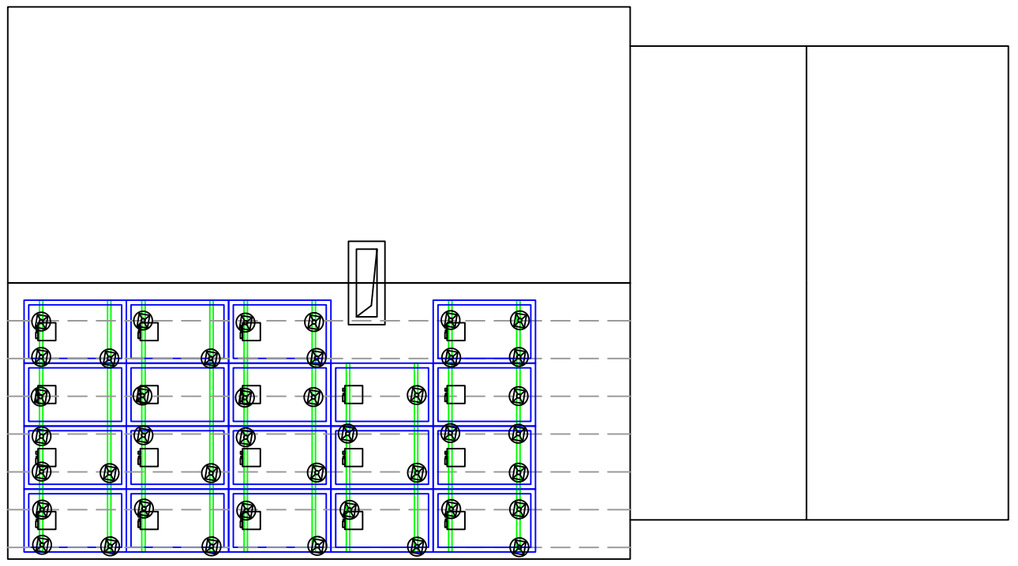
DESIGNER: www.solarpaperwork.com
DATE: 09/20/2019

MODULE WEIGHT (lbs)	38.6
# OF MODULES	19
TOTAL MODULE WEIGHT (lbs)	733.4
RACK WEIGHT (lbs)	146.6
MICROINVERTER WEIGHT (lbs)	45.2
TOTAL SYSTEM WEIGHT (lbs)	925.2
# OF STANDOFFS	42
MAX SPAN BETWEEN STANDOFFS (in)	48
LOADING PER STANDOFF (lbs)	22.02
TOTAL AREA (sq.ft.)	342
LOADING (PSF)	2.70

1. IronRidge Racking System
2. Roof Tech Minis Attachment
3. Roof attachment hardware to be mounted to existing structure
   (2 X 6 @ 24" O.C. RAFTER) with 48" O.C. rail spans or less.
4. Lag bolts are 5/16" X 3.5" stainless steel with 2.5" minimum embedment into the center of the roof
5. Roof sheathed with 1/2" plywood and upper surface is faced with felt paper.
   Finished roof surface is **One layer of** COMP. SHINGLE.







ATTACHMENT
RAIL
RAFTER

5 ATTACHMENT LAYOUT

Project Name:
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1857 Northwest Boulevard
Columbus, OH 43212

DESIGNER: www.solarpaperwork.com
DATE: 09/20/2019

Data Sheet
Enphase Microinverters
Region: AMERICAS

Enphase IQ 7 and IQ 7+ Microinverters

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

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

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

Easy to Install

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

Productive and Reliable

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

Smart Grid Ready

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

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

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

ENPHASE.

Enphase IQ 7 and IQ 7+ Microinverters

INPUT DATA (DC)	IQ7-60-2-US / IQ7-60-B-US		IQ7PLUS-72-2-US / IQ7PLUS-72-B-US	
Commonly used module pairings[1]	235 W - 350 W +		235 W - 440 W +	
Module compatibility	60-cell PV modules only		60-cell and 72-cell PV modules	
Maximum input DC voltage	48 V		60 V	
Peak power tracking voltage	27 V - 37 V		27 V - 45 V	
Operating range	16 V - 48 V		16 V - 60 V	
Min/Max start voltage	22 V / 48 V		22 V / 60 V	
Max DC short circuit current (module Isc)	15 A		15 A	
Overvoltage class DC port	II		II	
DC port backfeed current	0 A		0 A	
PV array configuration	1 x 1 ungrounded array; No additional DC side protection required; AC side protection requires max 20A per branch circuit			
OUTPUT DATA (AC)	**IQ 7 Microinverter**		**IQ 7+ Microinverter**	
Peak output power	250 VA		295 VA	
Maximum continuous output power	240 VA		290 VA	
Nominal (L-L) voltage/range[2]	240 V / 211-264 V	208 V / 183-229 V	240 V / 211-264 V	208 V / 183-229 V
Maximum continuous output current	1.0 A (240 V)	1.15 A (208 V)	1.21 A (240 V)	1.39 A (208 V)
Nominal frequency	60 Hz		60 Hz	
Extended frequency range	47 - 68 Hz		47 - 68 Hz	
AC short circuit fault current over 3 cycles	5.8 Arms		5.8 Arms	
Maximum units per 20 A (L-L) branch circuit[3]	16 (240 VAC)	13 (208 VAC)	13 (240 VAC)	11 (208 VAC)
Overvoltage class AC port	III		III	
AC port backfeed current	0 A		0 A	
Power factor setting	1.0		1.0	
Power factor (adjustable)	0.7 leading ... 0.7 lagging		0.7 leading ... 0.7 lagging	
EFFICIENCY	**@240 V**	**@208 V**	**@240 V**	**@208 V**
Peak CEC efficiency	97.6 %	97.6 %	97.5 %	97.3 %
CEC weighted efficiency	97.0 %	97.0 %	97.0 %	97.0 %
MECHANICAL DATA				
Ambient temperature range	-40°C to +65°C			
Relative humidity range	4% to 100% (condensing)			
Connector type (IQ7-60-2-US & IQ7PLUS-72-2-US)	MC4 (or Amphenol H4 UTX with additional Q-DCC-5 adapter)			
Connector type (IQ7-60-B-US & IQ7PLUS-72-B-US)	Friends PV2 (MC4 intermateable). Adaptors for modules with MC4 or UTX connectors: - PV2 to MC4: order ECA-S20-S22 - PV2 to UTX: order ECA-S20-S25			
Dimensions (WxHxD)	212 mm x 175 mm x 30.2 mm (without bracket)			
Weight	1.08 kg (2.38 lbs)			
Cooling	Natural convection - No fans			
Approved for wet locations	Yes			
Pollution degree	PD3			
Enclosure	Class II double-insulated, corrosion resistant polymeric enclosure			
Environmental category / UV exposure rating	NEMA Type 6 / outdoor			
FEATURES				
Communication	Power Line Communication (PLC)			
Monitoring	Enlighten Manager and MyEnlighten monitoring options. Both options require installation of an Enphase IQ Envoy.			
Disconnecting means	The AC and DC connectors have been evaluated and approved by UL for use as the load-break disconnect required by NEC 690.			
Compliance	CA Rule 21 (UL 1741-SA) UL 62109-1, UL1741/IEEE1547, FCC Part 15 Class B, ICES-0003 Class B, CAN/CSA-C22.2 NO. 107.1-01 This product is UL Listed as PV Rapid Shut Down Equipment and conforms with NEC-2014 and NEC-2017 section 690.12 and C22.1-2015 Rule 64-218 Rapid Shutdown of PV Systems, for AC and DC conductors, when installed according manufacturer's instructions.			

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

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

ENPHASE.

2018-05-24

6 **INVERTER DATA SHEET**

Project Name:
Stacey Phillber and Eric Sauerhoff
Property address:
762 Vernon Rd, Bexley OH 43209

CONTRACTOR

Ecohouse Solar

1857 Northwest Boulevard
Columbus, OH 43212

ecoHOUSE SOLAR

DESIGNER: www.solarpaperwork.com
DATE: 09/20/2019

LG NeON®R

LG370Q1C-V5 | LG365Q1C-V5

60

370W | 365W

LG NeON® R is powerful solar module that provides world-class performance. A new cell structure that eliminates electrodes on the front maximizes the utilization of light and enhances reliability.
LG NeON® R is a result of LG's efforts to increase customer's values beyond efficiency. LG NeON® R features enhanced durability, performance under real -world conditions, an enhanced warranty and aesthetic design suitable for roofs.

Feature

Aesthetic Roof
LG NeON® R has been designed with aesthetics in mind: the lack of any electrodes on the front creates an improved, modern aesthetic.

Extended Product Warranty
LG has extended the product warranty of the LG NeON® R to 25 years which is top level of the industry.

Enhanced Performance Warranty
LG NeON® R has an enhanced performance warranty. After 25 years, LG NeON® R is guaranteed to perform at minimum 90.8% of initial performance.

More generation per square meter
The LG NeON® R has been designed to significantly enhance its output, making it efficient even in limited space.

About LG Electronics

LG Electronics is a global big player, committed to expanding its operations with the solar market. The company first embarked on a solar energy source research program in 1985, supported by LG Group's vast experience in the semi-conductor, LCD, chemistry and materials industries. In 2010, LG Solar successfully released its first Monok® series to the market, which is now available in 32 countries. The NeON® (previous Monok® NeON), NeON® 2, NeON® 2 BiFacial won the "Intersolar AWARD" in 2013, 2015 and 2018, which demonstrates LG Solar's lead, innovation and commitment to the industry.

LG Life's Good

LG NeON®R

LG370Q1C-V5 | LG365Q1C-V5

General Data

Cell Properties(Material / Type)	Monocrystalline / N-type
Cell Maker	LG
Cell Configuration	60 Cells (6 x 10)
Module Dimensions(L x W x H)	1,700mm x 1,016mm x 40mm
Weight	17.5 kg
Glass(Thickness / Material)	2.8mm / Tempered Glass with AR Coating
Backsheet(Color)	White
Frame(Material)	Anodized Aluminium
Junction Box(Protection Degree)	IP68 with 3 Bypass Diodes
Cables(Length)	1,000mm x 2EA
Connector(Type / Maker)	MC4 / MC

Certifications and Warranty

Certifications	IEC 61215-1/-1-1/2:2016, IEC 61730-1/2:2016
	UL 1703
	ISO 9001, ISO 14001, ISO 50001
	OHSAS 18001
Salt Mist Corrosion Test	IEC 61701:2012 Severity 6
Ammonia Corrosion Test	IEC 62716:2013
Module Fire Performance	Type 1
Fire Rating	Class C (UL 790)
Product Warranty	25 Years
Output Warranty of Pmax	Linear Warranty*

*1) First year : 98%, 2)After 1st year : 0.5% annual degradation 3) 90.8% for 25years

Temperature Characteristics

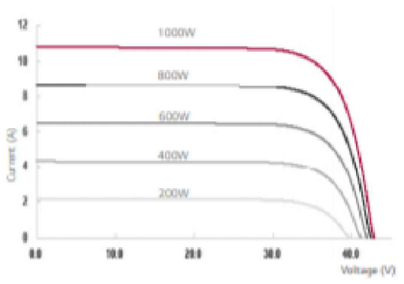
NMOT*	[°C]	44 ± 3
Pmax	[%/°C]	-0.30
Voc	[%/°C]	-0.24
Isc	[%/°C]	0.037

*NMOT(Nominal Module Operating Temperature) : Irradiance 800 W/m², Ambient temperature 20 °C, Wind speed 1 m/s, Spectrum AM 1.5

Electrical Properties (NMOT)

Model		LG370Q1C-V5	LG365Q1C-V5
Maximum Power (Pmax)	[W]	279	275
MPP Voltage (Vmpp)	[V]	36.9	36.6
MPP Current (Impp)	[A]	7.55	7.51
Open Circuit Voltage (Voc)	[V]	40.3	40.2
Short Circuit Current (Isc)	[A]	8.71	8.70

I-V Curves



Electrical Properties (STC*)

Model		LG370Q1C-V5	LG365Q1C-V5
Maximum Power (Pmax)	[W]	370	365
MPP Voltage (Vmpp)	[V]	37.0	36.7
MPP Current (Impp)	[A]	10.01	9.95
Open Circuit Voltage (Voc, ±5%)	[V]	42.8	42.8
Short Circuit Current (Isc, ±5%)	[A]	10.82	10.80
Module Efficiency	[%]	21.4	21.1
Power Tolerance	[%]	0 ~ +3	

* STC (Standard Test Condition): Irradiance 1000 W/m², Cell Temperature 25 °C, AM 1.5, Measure Tolerance ± 3%

Operating Conditions

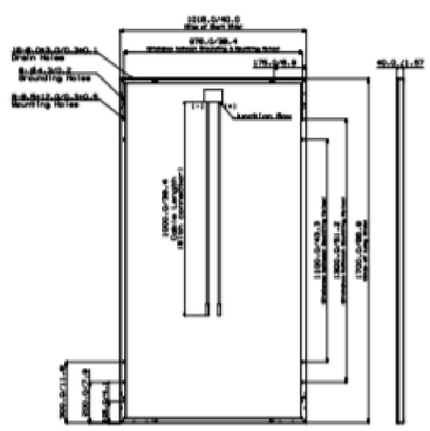
Operating Temperature	[°C]	-40 ~ +90
Maximum System Voltage	[V]	1,000
Maximum Series Fuse Rating	[A]	20
Mechanical Test Load(Front)	[Pa / psf]	5,400 / 113
Mechanical Test Load(Rear)	[Pa / psf]	4,000 / 83.5

* Test Load ÷ Design x Safety Factor(1.5)

Packaging Configuration

Number of Modules Per Pallet	[EA]	25
Number of Modules Per 40ft HQ Container	[EA]	650
Packaging Box Dimensions (L x W x H)	[mm]	1,750 x 1,120 x 1,221
Packaging Box Gross Weight	[kg]	473

Dimensions (mm / inch)



LG Electronics Inc.
Solar Business Division
LG Twin Towers, 128 Yeoui-daero, Yeongdeungpo-gu, Seoul 07336, Korea
www.lg-solar.com

7 **MODULE DATA SHEET**

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Data Sheet
Enphase Networking

Enphase AC Combiner Box

The **Enphase AC Combiner Box**™ with Enphase Envoy-S™ consolidates interconnection equipment into a single enclosure and streamlines PV installations by providing a consistent, pre-wired solution for residential applications.

Smart

- Includes Envoy-S for communication and control
- Flexible networking supports Wi-Fi, Ethernet, or cellular

Simple

- Three pre-installed 20 A / 240 VAC circuit breakers
- Pre-configured revenue-grade metering available

Reliable

- Durable NRTL-certified NEMA type 3R enclosure
- Five-year warranty

LISTED

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

ENPHASE.

Enphase AC Combiner Box

MODEL NUMBERS	
XAM1-120-B (880-00834) or XAM1-120 (880-00211)	AC Combiner with Enphase Envoy-S Metered™ for integrated revenue grade PV production metering (ANSI C12.20 +/- 0.5%) and optional consumption monitoring (+/- 2.5%).
ACCESSORIES (order separately)	
Enphase Mobile Connect™ CELLMODEM-01 (3G) or CELLMODEM-03 (4G)	Plug and play industrial grade cellular modem with five-year data plan 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.)
Consumption Monitoring CT CT-200-SPLIT	Split core current transformers enable whole home consumption metering (+/- 2.5%).
ELECTRICAL SPECIFICATIONS	
Rating	Continuous duty
Solar branch circuit breakers	Three 2-pole 20 A / 240 VAC DIN rail-mounted breakers
Maximum system voltage	240 VAC
Rated output current	48 A
Rated input current, each input	16 A
Maximum fuse/circuit breaker rating (output)	60 A
Production Metering CT	200 A solid core pre-installed on solar busbar and wired to Envoy-S
MECHANICAL DATA	
Dimensions (WxHxD)	38.0 x 38.7 x 20.3 cm (15.0" x 15.3" x 8.0")
Weight	5.1 kg (11.2 lbs)
Ambient temperature range	-40° C to +46° C (-40° to 115° F)
Cooling	Vented, natural convection, plus heat shield
Enclosure environmental rating	Outdoor, NRTL-certified, NEMA type 3R, polycarbonate construction
Altitude	To 2000 meters (6,560 feet)
Wire size:	Follow local code requirements for conductor sizing.
Model XAM1-120-B	• 14 to 6 AWG copper conductors for branch inputs. • 14 to 4 AWG copper conductors for combined output.
Model XAM1-120	• 12 to 6 AWG copper conductors for branch inputs. • 12 to 4 AWG copper conductors for combined output.
INTERNET CONNECTION OPTIONS	
Integrated Wi-Fi	802.11b/g/n
Ethernet	802.3, Cat5E (or Cat 6) UTP Ethernet cable - (not included)
Cellular	Optional, CELLMODEM-01 (3G) or CELLMODEM-03 (4G) - (not included)
COMPLIANCE	
Compliance, Combiner Box	UL 1741
Compliance, Envoy-S	UL 916 CAN/CSA C22.2 No. 61010-1 47 CFR, Part 15, Class B, ICES 003 IEC/EN 61010-1:2010, EN50065-1, EN61000-4-5, EN61000-6-1, EN61000-6-2 Metering: ANSI C12.20 accuracy class 0.5

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

2017-04-14

ENPHASE.

8 **ENPHASE AC COMBINER BOX DATA SHEET**

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DATE: 09/20/2019

Datasheet

IRONRIDGE

Flush Mount System

Built for solar's toughest roofs.

IronRidge builds the strongest mounting system for pitched roofs in solar. Every component has been tested to the limit and proven in extreme environments.

Our rigorous approach has led to unique structural features, such as curved rails and reinforced flashings, and is also why our products are fully certified, code compliant and backed by a 25-year warranty.

Strength Tested
All components evaluated for superior structural performance.

PE Certified
Pre-stamped engineering letters available in most states.

Class A Fire Rating
Certified to maintain the fire resistance rating of the existing roof.

Design Assistant
Online software makes it simple to create, share, and price projects.

UL 2703 Listed System
Entire system and components meet newest effective UL 2703 standard.

25-Year Warranty
Products guaranteed to be free of impairing defects.

Datasheet

XR Rails

XR10 Rail

A low-profile mounting rail for regions with light snow.

- 6' spanning capability
- Moderate load capability
- Clear and black finish

XR100 Rail

The ultimate residential solar mounting rail.

- 8' spanning capability
- Heavy load capability
- Clear and black finish

XR1000 Rail

A heavyweight mounting rail for commercial projects.

- 12' spanning capability
- Extreme load capability
- Clear anodized finish

Bonded Splices

All rails use internal splices for seamless connections.

- Self-drilling screws
- Varying versions for rails
- Forms secure bonding

Clamps & Grounding

UFOs

Universal Fastening Objects bond modules to rails.

- Fully assembled & lubed
- Single, universal size
- Clear and black finish

Stopper Sleeves

Snap onto the UFO to turn into a bonded end clamp.

- Bonds modules to rails
- Sized to match modules
- Clear and black finish

CAMO

Bond modules to rails while staying completely hidden.

- Universal end-cam clamp
- Tool-less installation
- Fully assembled

Grounding Lugs

Connect arrays to equipment ground.

- Low profile
- Single tool installation
- Mounts in any direction

Attachments

FlashFoot2

Flash and mount XR Rails with superior waterproofing.

- Twist-on Cap eases install
- Wind-driven rain tested
- Mill and black finish

Conduit Mount

Flash and mount conduit, strut, or junction boxes.

- Twist-on Cap eases install
- Wind-driven rain tested
- Secures ¾" or 1" conduit

Slotted L-Feet

Drop-in design for rapid rail attachment.

- Secure rail connections
- Slot for vertical adjusting
- Clear and black finish

Bonding Hardware

Bond and attach XR Rails to roof attachments.

- T & Square Bolt options
- Nut uses 7/16" socket
- Assembled and lubricated

Resources

Design Assistant
Go from rough layout to fully engineered system. For free.
Go to IronRidge.com/design

NABCEP Certified Training
Earn free continuing education credits, while learning more about our systems.
Go to IronRidge.com/training

9 **RACKING DATA SHEET**

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DESIGNER: www.solarpaperwork.com
DATE: 09/20/2019

RT-MINI

Flexible Flashing certified by the International Code Council (ICC)

Engineered to ASTM D 1761 (Standard Test Methods for Mechanical Fasteners in Wood)

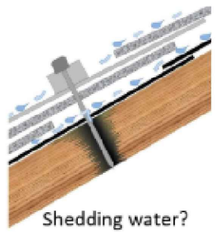
Components

RT2-00-MINIBK
PAT : PENDING

MINI base : 20 ea.
Screw : 40 ea.
Extra RT-Butyl : 10 ea.

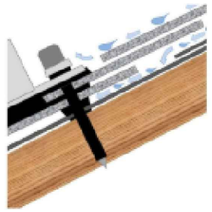
RT-Butyl is Roof Tech's flexible flashing used in 550,000 residential PV systems for the last 20 years. It is the first PV mounting system with Flexible Flashing certified by the ICC.

Metal Flashing Retrofit



Shedding water?

Flexible Flashing



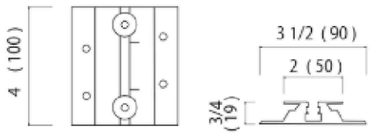
100% Waterproof

ICC ESR-3575

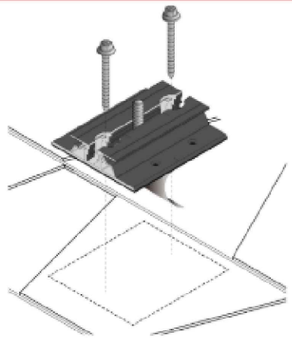
ASTM2140 testing

UV testing (7500 hrs.)

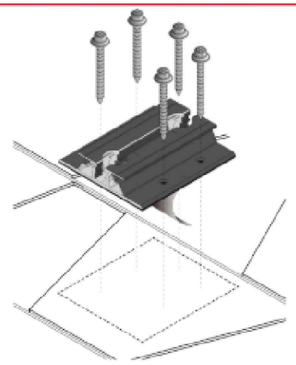
Dimensions in (mm)



Rafter installation



Deck installation



P.E. Stamped Letters available at www.roof-tech.us/support

Roof Tech Inc.
www.roof-tech.us info@roof-tech.us
10620 Treena Street, Suite 230, San Diego, CA 92131
858.935.6064

RT-MINI

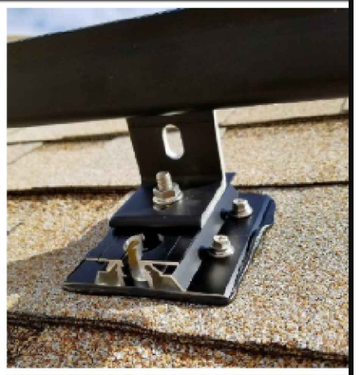
Self-flashing base for asphalt & metal roof-top PV mounting systems

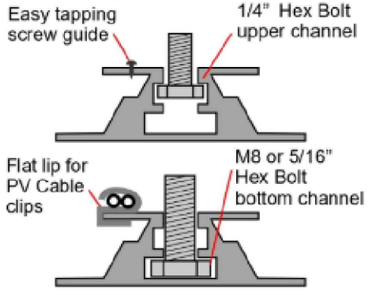
RT-MINI is suitable for mounting any rail system with a conventional L-Foot.

Dual bolt design: M8 or 5/16" for L-Foot & 1/4" for EMC

ICC ESR 3575

Call Now for more details
858-935-6064





Roof Tech
Smarter PV mounting solutions from top of roof to bottom line®
www.roof-tech.us info@roof-tech.us

10 ATTACHMENT DATA SHEET

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Rapid shutdown is built-in

The 2014 edition of the National Electrical Code (NEC 2014) added new rapid shutdown requirements for PV systems installed on buildings. Enphase Microinverters fully meet rapid shutdown requirements in the new code without the need to install any additional electrical equipment.

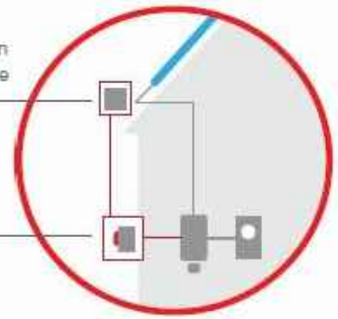
What's new in NEC 2014?
NEC 2014, Section 690.12 applies to PV conductors over 10 feet from the PV array and requires that the conductors power down to 30 volts and 240 volt-amperes within 10 seconds of rapid shutdown initiation.

String inverters require work arounds for rapid shutdown

Work around.
Specialized Rapid Shutdown electrical box installed on the roof within 10 feet of array.

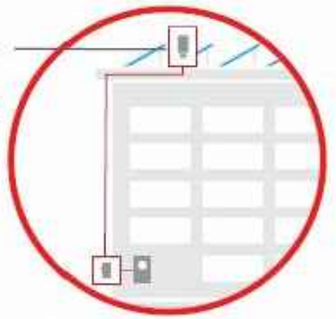
Work around.
Shutoff switch that is easily accessible to first responders on the ground.

Work around.
Extra conduit in installation.



Residential String Inverter

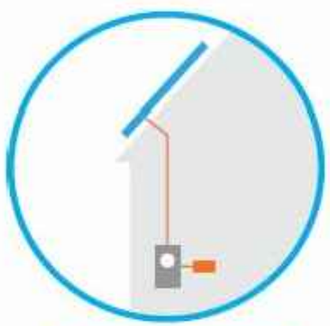
Work around.
String inverter installed on roof, a hostile environment that string inverters are not built to live in.



Commercial String Inverter

Enphase comes standard with rapid shutdown capability

All Enphase microinverters, even those that were previously installed, inherently meet rapid shutdown requirements, no additional equipment or workarounds needed



Residential Microinverter

Enphase microinverters can safely shut down automatically, leaving only low-voltage DC electricity isolated to the PV module

Commercial Microinverter

To learn more, visit enphase.com

[e] enphase® ENERGY

11 **RSD DATA SHEET**

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