JOHN REMINGTON
NEW GRID-INTERACTIVE PHOTOVOLTAIC SYSTEM
DC SYSTEM SIZE (3.740 KW)

SYSTEM DETAILS

DESCRIPTION	NEW GRID-INTERACTIVE PHOTOVOLTAIC SYSTEM WITH NO BATTERY STORAGE
DC RATING OF SYSTEM	SYSTEM SIZE :3.740 KW DC STC
AC RATING OF SYSTEM	2.640 KW
AC OUTPUT CURRENT	11 A
NO. OF MODULES	(11) HANWHA QPEAK DUO BLK-G6 (340W) SOLAR MODULE
NO. OF INVERTERS	(11) ENPHASE IQ7-60-2-US MICROINVERTERS
POINT OF CONNECTION	LINE SIDE TAP IN THE MSP
ARRAY STRINGING	(1) BRANCH OF 11 MODULES

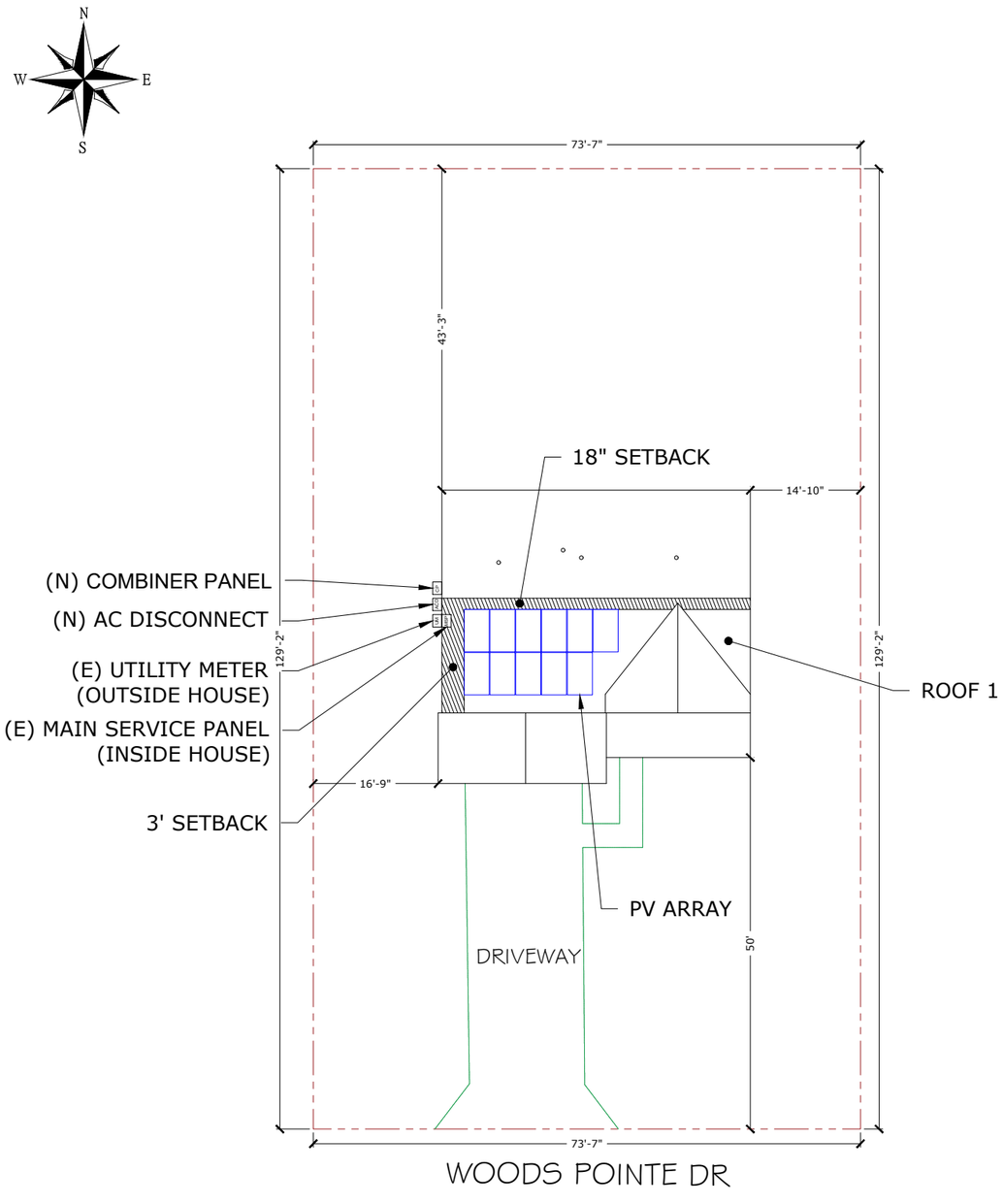
SITE DETAILS

ASHRAE EXTREME LOW	0°C
ASHRAE 2% HIGH	33°C
GROUND SNOW LOAD	20 PSF
WIND SPEED	115MPH
RISK CATEGORY	II
WIND EXPOSURE CATEGORY	B

GOVERNING CODES

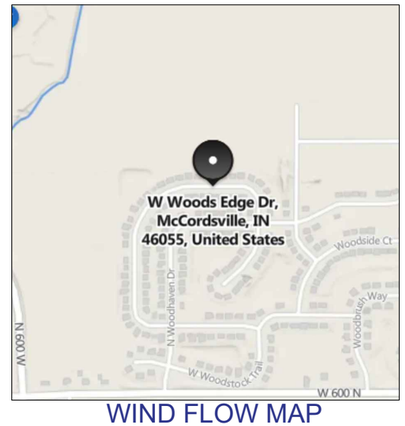
INDIANA RESIDENTIAL CODE (IRC) 2020
INDIANA BUILDING CODE (IBC) 2014
INDIANA FIRE CODE (IFC) 2014
NATIONAL ELECTRIC CODE, NEC 2008 CODE BOOK, NFPA 70

SHEET INDEX

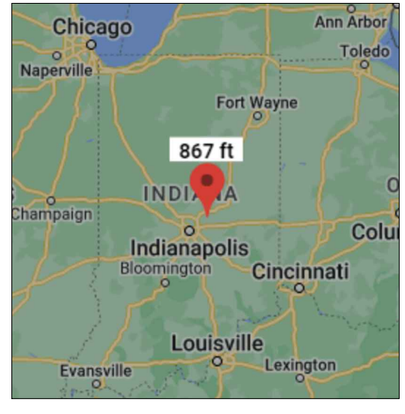


SITE MAP (N.T.S)

VICINITY MAP



WIND FLOW MAP



Rectify SOLAR
ADD : 1821 S. BASCOM AVE, UNIT 191. CAMPBELL, CA 95008, USA
LICENSE #1014694
CONTACT: 855-573-2843

Signature with Seal

JOHN REMINGTON

5448 WOODS POINTE DR, MCCORDSVILLE, IN 46055, USA

REVISIONS	DESCRIPTION	DATE
REV		
ENGG.		

PERMIT DEVELOPER	
DATE	03/03/2023
DESIGNER	OSB
REVIEWER	

SHEET NAME

SITE MAP & VICINITY MAP

SHEET NUMBER

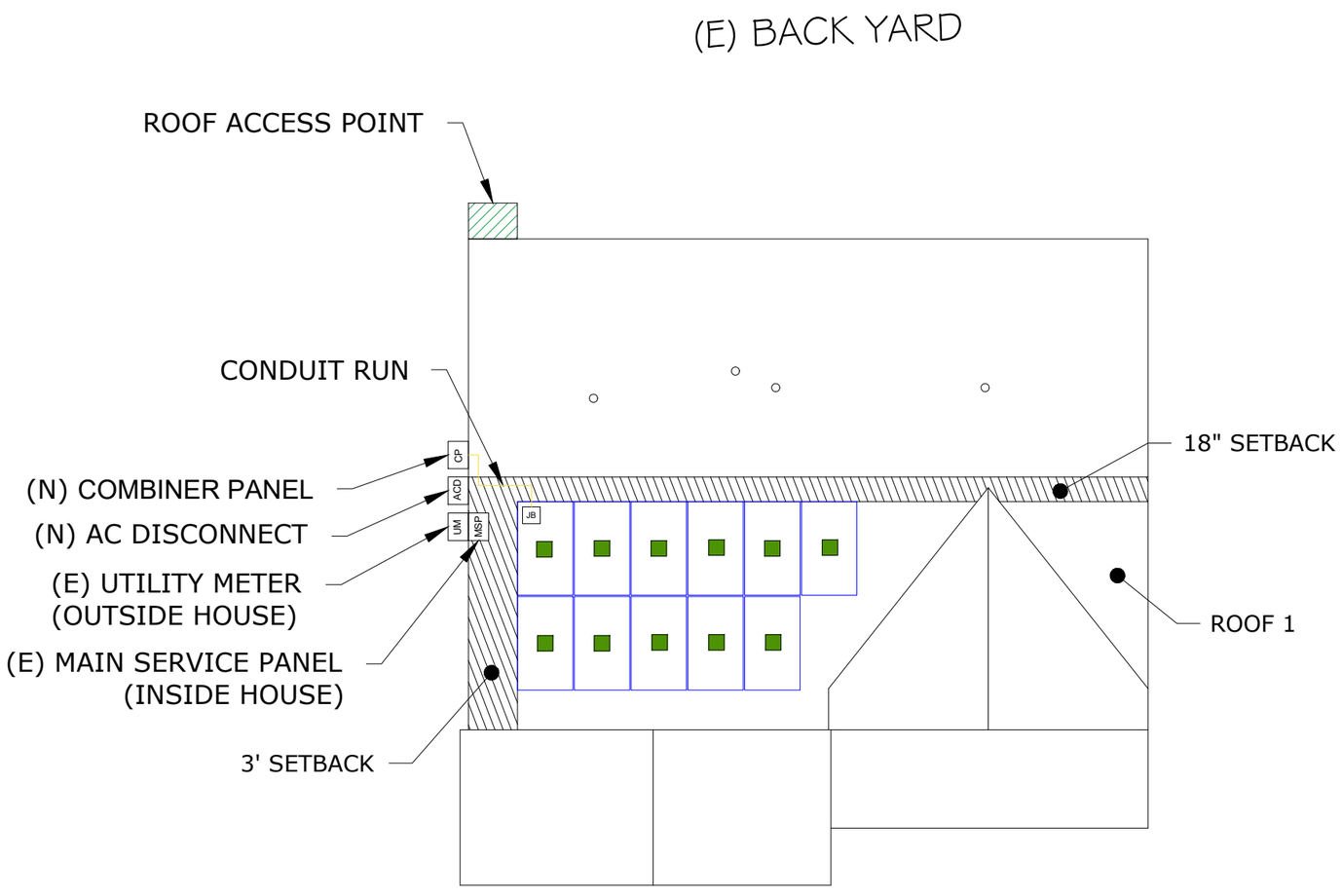
A-00

MODULE TYPE, DIMENSIONS & WEIGHT

NUMBER OF MODULES = 11 MODULES
MODULE TYPE = HANWHA QPEAK DUO BLK-G6 (340W) SOLAR MODULE
WEIGHT = 43.9 LBS / 19.9 KG.
MODULE DIMENSIONS = 68.5" X 40.5" = 19.27 SF

NUMBER OF INVERTER = 11
INVERTER TYPE = ENPHASE IQ7-60-2-US MICROINVERTERS

DC SYSTEM SIZE: 3.740 KW
AC SYSTEM SIZE: 2.640 KW



GENERAL INSTALLATION PLAN NOTES:

1) ROOF ATTACHMENTS TO TRUSSES SHALL BE INSTALLED AS SHOWN IN SHEET S-01 AND AS FOLLOWS FOR EACH WIND ZONE:.

WIND ZONE 1: MAX SPAN 4'-0" O.C.
WIND ZONE 2: MAX SPAN 4'-0" O.C.
WIND ZONE 3: MAX SPAN 2'-0" O.C.

2) EXISTING RESIDENTIAL BUILDING IS AN ASPHALT SHINGLE ROOF WITH MEAN ROOF HEIGHT 25 FT AND 2"x4" WOOD ROOF RAFTER SPACED 24" O.C.
CONTRACTOR TO FIELD VERIFY AND SHALL REPORT TO THE ENGINEER IF ANY DISCREPANCIES EXIST BETWEEN PLANS AND IN FIELD CONDITIONS.

I CERTIFY THAT THE INSTALLATION OF THE MODULES IS IN COMPLIANCE WITH IBC: RESIDENTIAL CHAPTER 3.BUILDING STRUCTURE WILL SAFELY ACCOMMODATE LATERAL AND UPLIFT WIND LOADS, AND EQUIPMENT DEAD LOADS.

LEGENDS

- UM - UTILITY METER
- MSP - MAIN SERVICE PANEL
- JB - JUNCTION BOX
- ACD - AC DISCONNECT
- CP - COMBINER PANEL
- - FIRE SETBACK
- - ROOF ACCESS POINT
- - MICROINVERTER
- - VENT, ATTIC FAN (ROOF OBSTRUCTION)
- - CONDUIT

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REVISIONS	DATE	DESCRIPTION	ENGG.	REV

PERMIT DEVELOPER	
DATE	03/03/2023
DESIGNER	OSB
REVIEWER	

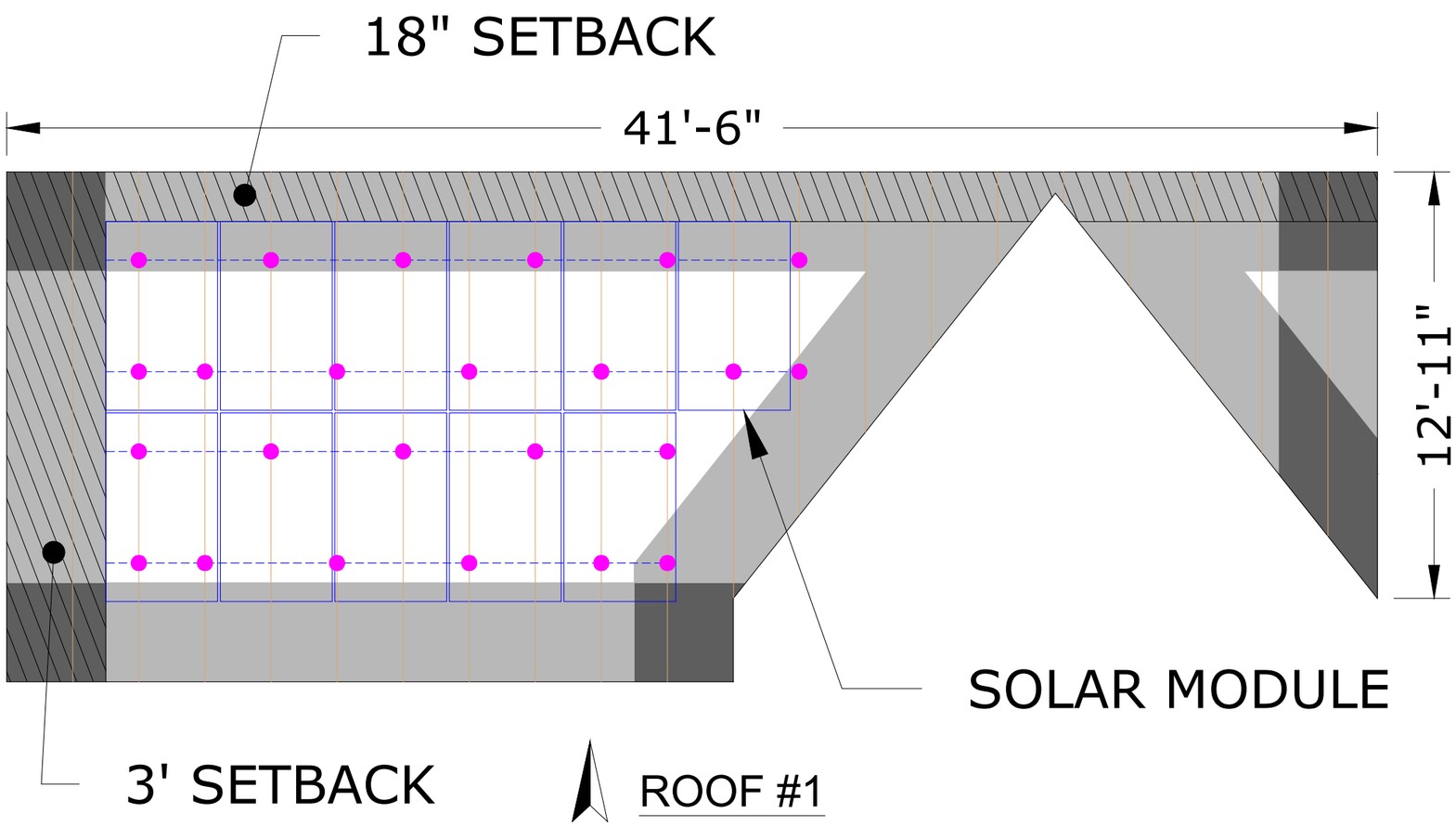
SHEET NAME
ROOF PLAN & MODULES

SHEET NUMBER
S-01

ROOF DESCRIPTION:

(ROOF #1)

MODULES - 11
ROOF TILT - 20°
ROOF AZIMUTH - 180°
TRUSSES SIZE - 2"X4" @ 24" O.C.



LEGENDS

- FIRE SETBACK
- VENT, ATTIC FAN (ROOF OBSTRUCTION)
- PV ROOF ATTACHMENT
- COUPLING
- RAFTERS / TRUSSES
- WIND ZONE I
- WIND ZONE II
- WIND ZONE III

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LICENSE #1014694
CONTACT: 855-573-2843

Signature with Seal

JOHN REMINGTON

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REVISIONS	DESCRIPTION	DATE
REV	ENGG.	

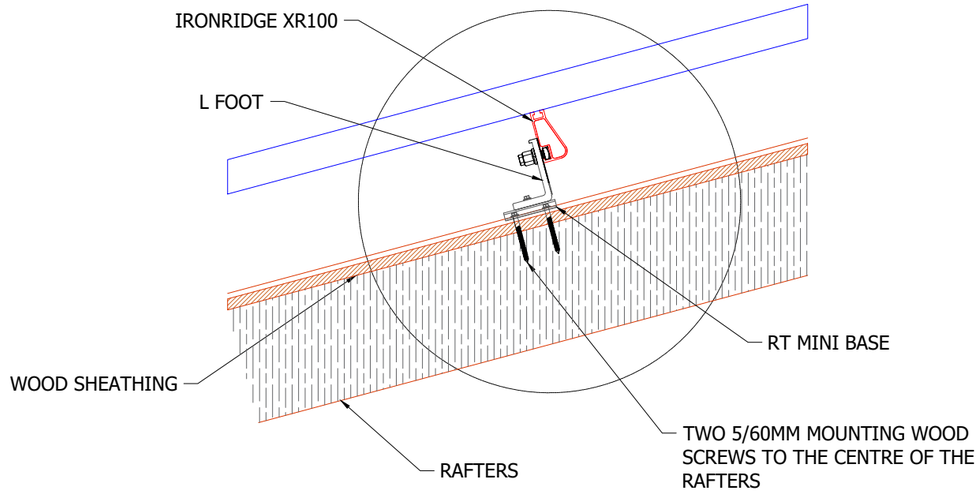
PERMIT DEVELOPER	
DATE	03/03/2023
DESIGNER	OSB
REVIEWER	

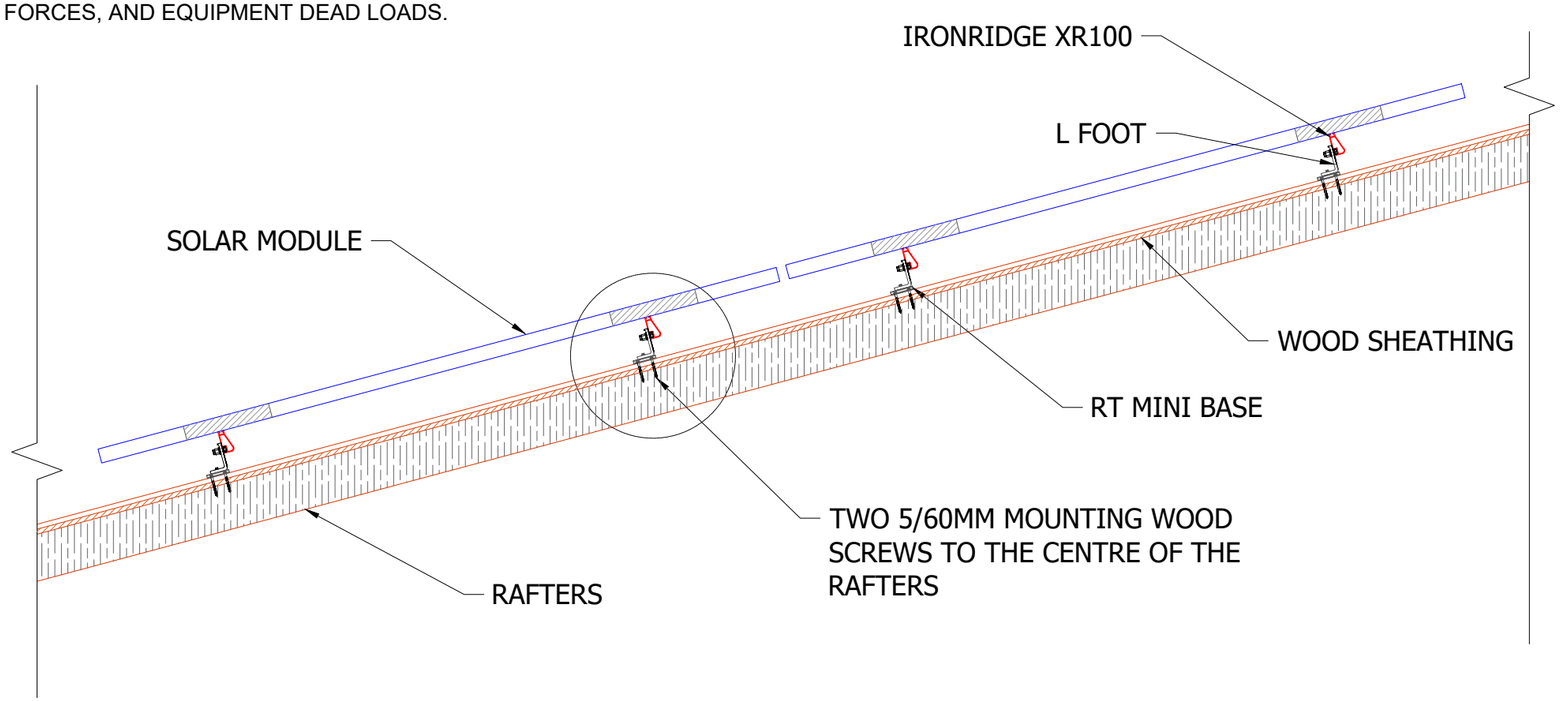
SHEET NAME: ARRAY LAYOUT

SHEET NUMBER: S-02

PHOTOVOLTAIC MODULE GENERAL NOTES:

1. APPLICABLE CODE: 2014 INDIANA BUILDING CODE 7th ED. & ASCE 7-10 MINIMUM DESIGN LOADS FOR BUILDING AND OTHER STRUCTURES
2. BOLT DIAMETER AND EMBEDMENT LENGTHS ARE DESIGNED PER NDS(2012) REQUIREMENTS. ALL BOLT CAPACITIES ARE BASED ON A WOOD ROOF TRUSS AS EMBEDMENT MATERIAL.
3. ALL WIND DESIGN CRITERIA AND PARAMETERS ARE FOR HIP AND GABLE RESIDENTIAL ROOFS, CONSIDERING FROM A 7° TO A MAXIMUM 27° (2/12 TO A MAXIMUM 6/12 PITCH) ROOF IN SCHEDULE. ALL RESIDENTIAL ROOFS SHALL NOT EXCEED 30'-0" MEAN ROOF HEIGHT.
4. ROOF SEALANTS SHALL CONFORM TO ASTM C920 AND ASTM 6511.
5. THIS SHEET REFLECTS STRUCTURAL CONNECTIONS ONLY. REFER TO MANUFACTURERS' MANUAL FOR ALL ARCHITECTURAL, MECHANICAL, ELECTRICAL, AND SOLAR SPECS.
6. ALL ALUMINUM COMPONENTS SHALL BE ANODIZED ALUMINUM 6105-T5 UNLESS OTHERWISE NOTED.
7. LAG BOLTS SHALL BE ASTM A276 STAINLESS STEEL UNLESS OTHERWISE NOTED.
8. ALL RAILING AND MODULES SHALL BE INSTALLED PER MANUFACTURERS' INSTRUCTIONS.
9. I CERTIFY THAT THE INSTALLATION OF THE MODULES IS IN COMPLIANCE WITH IBC:BUILDING CHAPTER 16 AND IRC:RESIDENTIAL CHAPTER 3. BUILDING STRUCTURE WILL SAFELY ACCOMMODATE CALCULATED WIND LATERAL AND UPLIFT FORCES, AND EQUIPMENT DEAD LOADS.





STRUCTURAL ATTACHMENT DETAILS

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REVISIONS	DATE	DESCRIPTION	ENGG.	REV

PERMIT DEVELOPER	
DATE	03/03/2023
DESIGNER	OSB
REVIEWER	

SHEET NAME: STRUCTURAL ATTACHMENT DETAILS

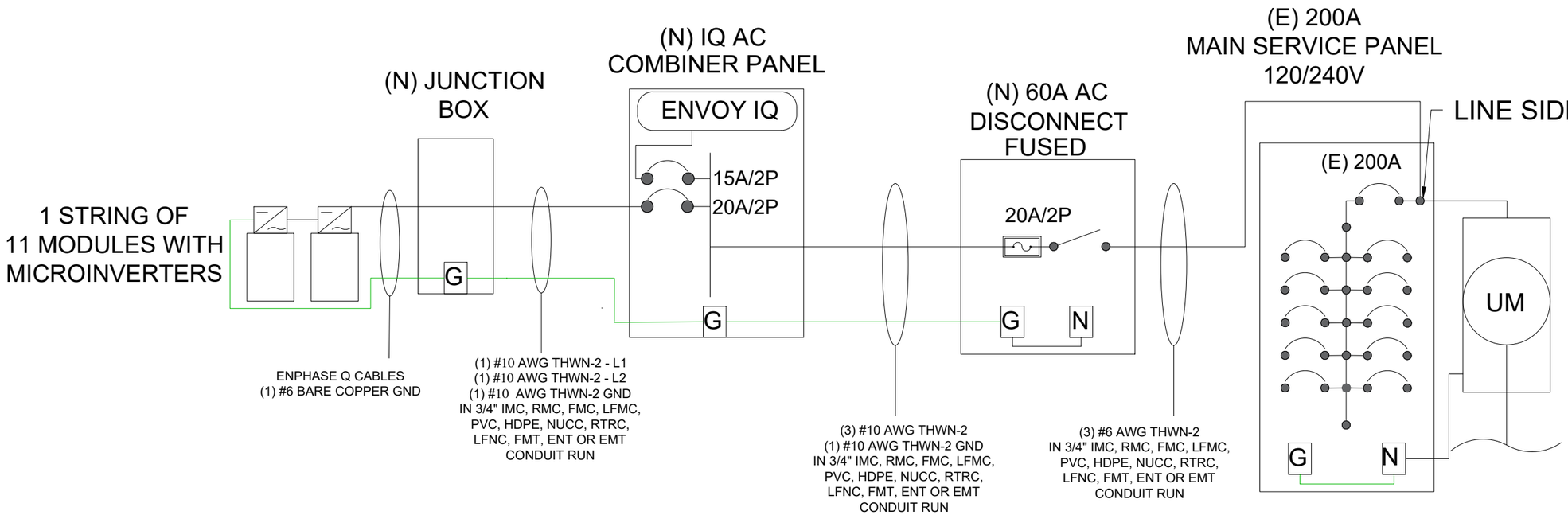
SHEET NUMBER: S-03

MODULE SPECIFICATION	
MANUFACTURER	HANWHA
MODEL NO.	Q.PEAK DUO-G6+(340W)
OPEN CIRCUIT VOLTAGE (Voc)	40.24
SHORT CIRCUIT CURRENT(Isc)	10.68
RATED VOLTAGE (Vmpp)	33.45
RATED CURRENT (Impp)	10.16

INVERTER SPECIFICATION	
MANUFACTURER	ENPHASE
MODEL NO.	IQ7-60-2-US
MAX. DC INPUT VOLTAGE	60 V
MAX. OUTPUT POWER	240 VA
NOMINAL AC OUTPUT VOLTAGE	240 V
NOMINAL AC OUTPUT CURRENT	1 A

ARRAY DETAILS	
DC SYSTEM SIZE	3.740 KW
AC SYSTEM SIZE	2.640 KW
TOTAL NO. OF MODULES	11
NO. OF MODULE PER STRING	1@11
NO. OF STRING	1

NOTE:
1. SUBJECT PV SYSTEMS HAS BEEN DESIGNED TO MEET THE REQUIREMENTS OF THE NEC 2008, NFPA 70 AND INCLUDING MAXIMUM NUMBER OF MODULE STRINGS, MAXIMUM NUMBER OF MODULES PER STRING, MAXIMUM OUTPUT, MODULE MANUFACTURER AND MODEL NUMBER, INVERTER MANUFACTURER AND MODEL NUMBER, AS APPLICABLE.
2. PROVIDE TAP BOX IN COMPLIANCE WITH 312.8 IF PANEL GUTTER SPACE IS INADEQUATE.



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REVISIONS	DESCRIPTION	DATE
REV.	ENGG.	

PERMIT DEVELOPER	
DATE	03/03/2023
DESIGNER	OSB
REVIEWER	

SHEET NAME

ELECTRICAL LINE DIAGRAM

SHEET NUMBER

E-01

ELECTRICAL CALCULATIONS:

1. CURRENT CARRYING CONDUCTOR

BEFORE IQ COMBINER PANEL
AMBIENT TEMPERATURE = 33°C+22°C = 55°C
CONDUIT INSTALLED AT MINIMUM DISTANCE OF 7/8 INCHES ABOVE ROOF .....NEC 310.15(B)(3)(c)
TEMPERATURE DERATE FACTOR - 0.76 ...NEC 310.15(B)(2)(a)
GROUPING FACTOR - 1...NEC 310.15(B)(3)(a)

CONDUCTOR AMPACITY
= (INV O/P CURRENT) x 1.25 / A.T.F / G.F ...NEC 690.8(B)
= [(11 x 1 x 1.25] / 0.76 / 1
= 18.09 A
SELECTED CONDUCTOR - #10 THWN-2 ...NEC 310.15(B)(16)

AFTER COMBINER PANEL
TEMPERATURE DERATE FACTOR - 0.96
GROUPING FACTOR - 1

CONDUCTOR AMPACITY
=(TOTAL INV O/P CURRENT) x 1.25 / 0.96 / 1 ...NEC 690.8(B)
=[(11) x 1 x1.25] /0.96 / 1
=14.32 A
SELECTED CONDUCTOR - #10 THWN-2 ...NEC 310.15(B)(16)

2. PV OVER CURRENT PROTECTION ..NEC 690.9(B)

=TOTAL INVERTER O/P CURRENT x 1.25
=(11) x 1 x1.25 = 13.75 A
SELECTED OCPD = 20A

SELECTED EQUIPMENT GROUND CONDUCTOR (EGC) = #10 THWN-2 ... NEC 250.122(A)

ELECTRICAL NOTES

1. ALL EQUIPMENT TO BE LISTED BY UL OR OTHER NRTL ANDLABELED FOR ITS APPLICATION.
2. COPPER CONDUCTORS SHALL BE RATED FOR 600 V AND 90 DEGREE C WET ENVIRONMENT.THE TERMINALS ARE RATED FOR 75 DEGREE C ROMEX/NM-B (NONMETALLIC-SHEATHED) CABLE MAY BE USED FOR BOTH EXPOSED AND CONCEALED WORK IN NORMALLY DRY LOCATIONS AT TEMPERATURES NOT TO EXCEED 90°C (WITH AMPACITY LIMITED TO THAT FOR 60°C CONDUCTORS) AS SPECIFIED IN THE NATIONAL ELECTRICAL CODE. VOLTAGE RATING FOR NM-B CABLE IS 600 VOLTS.
3. CONDUCTOR TERMINATION AND SPLICING AS PER NEC 110.14 WIRING, CONDUIT AND RACEWAYS MOUNTED ON ROOFTOPS SHALL BE ROUTED DIRECTLY TO AND LOCATED AS CLOSE AS POSSIBLE TO THE NEAREST RIDGE, HIP, OR VALLEY.SHALL BE ROUTED DIRECTLY TO, AND LOCATED AS CLOSE AS
4. WORKING CLEARANCES AROUND ALL NEW AND EXISTING ELECTRICAL EQUIPMENT SHALL COMPLY WITH NEC 110.265. WORKING CLEARANCES AROUND ALL NEW AND EXISTING
5. DRAWINGS INDICATE THE GENERAL ARRANGEMENT OF SYSTEMS CONTRACTOR SHALL FURNISH ALL NECESSARY OUTLETS, SUPPORTS, FITTINGS AND ACCESSORIES TO FULFILL APPLICABLE CODES AND STANDARDS.
6. WHERE SIZES OF JUNCTION BOXES, RACEWAYS, AND CONDUITS ARE NOT SPECIFIED, THE CONTRACTOR SHALL SIZE THEM ACCORDINGLY.
7. ALL WIRE TERMINATIONS SHALL BE APPROPRIATELY LABELED AND READILY VISIBLE.
8. MODULE GROUNDING CLIPS TO BE INSTALLED BETWEEN MODULE FRAME AND MODULE SUPPORT RAIL, PER THE GROUNDING CLIP MANUFACTURER'S INSTRUCTION.
9. MODULE SUPPORT RAIL TO BE BONDED TO CONTINUOUS COPPER G.E.C. VIA WEEB LUG OR ILSCO GBL-4DBT LAY-IN LUG.
10. THE POLARITY OF THE GROUNDED CONDUCTORS IS NEGATIVE.
11. UTILITY HAS 24-HR UNRESTRICTED ACCESS TO ALL PHOTOVOLTAIC SYSTEM COMPONENTS LOCATED AT THE SERVICE ENTRANCE.
12. MODULES CONFORM TO AND ARE LISTED UNDER UL 1703.
13. RACKING CONFORMS TO AND IS LISTED UNDER UL 2703.
14. CONDUCTORS EXPOSED TO SUNLIGHT SHALL BE LISTED AS SUNLIGHT RESISTANT PER NEC ARTICLE 300.6 (C) (1) AND ARTICLE 310.10 (D).
15. CONDUCTORS EXPOSED TO WET LOCATIONS SHALL BE SUITABLE FOR USE IN WET LOCATIONS PER NEC ARTICLE 310.10 (C)

MAX VOLTAGE DROP CALCULATION

CABLE SIZE	CABLE DESCRIPTION	ONE WAY DISTANCE IN FEET (D)	BRANCH CURRENT (I)	RESISTANCE OF CONDUCTOR(R)	VOLTAGE (V)	% VOLTAGE DROP= (0.2*D*I*R) /V*100
#10 THWN-2	JUNCTION BOX TO COMBINER PANEL	20	11	1.24	240	0.227

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JOHN REMINGTON

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REVISIONS

REV	ENGG	DESCRIPTION	DATE

PERMIT DEVELOPER	
DATE	03/03/2023
DESIGNER	OSB
REVIEWER	

SHEET NAME: WIRING CALCULATIONS

SHEET NUMBER: E-02

⚠ WARNING

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

LABEL LOCATION:
AC DISCONNECT, POINT OF INTERCONNECTION
PER CODE: NEC 690.17(E), CB

WARNING PHOTOVOLTAIC POWER SOURCE

LABEL LOCATION:
CONDUIT, COMBINER BOX
(PER CODE: NEC690.31(G)(3)(4) & NEC 690.13(G)(4)

⚠ WARNING DUAL POWER SOURCE
SECOND SOURCE IS PHOTOVOLTAIC SYSTEM

LABEL LOCATION:
POINT OF INTERCONNECTION
(PER CODE: NEC 705.12(D)(3) & NEC 690.64)

ADHESIVE FASTENED SIGNS:

· THE LABEL SHALL BE SUITABLE FOR THE ENVIRONMENT WHERE IT IS INSTALLED. NEC110.21(B)(3)
· WHERE REQUIRED ELSEWHERE IN THIS CODE AND FIELD APPLIED LABELS, WARNING(S) AND MARKING SHALL COMPLY WITH ANSI Z535.4. NEC 110.21(B) FIELD MARKING
· ADHESIVE FASTENED SIGNS MAY BE ACCEPTABLE IF PROPERLY ADHERED. VINYL SIGNS SHALL BE WEATHER RESISTANT. IFC 605.11.1.3

PHOTOVOLTAIC SYSTEM AC DISCONNECT
RATED OPERATING AC CURRENT 11 AMPS
NOMINAL AC OPERATING VOLTAGE 240 VOLTS

LABEL LOCATION:
AC DISCONNECT, POINT OF INTERCONNECTION
(PER CODE: NEC690.54)

WARNING
INVERTER OUTPUT CONNECTION DO NOT RELOCATE THIS OVERCURRENT DEVICE

LABEL LOCATION:
POINT OF INTERCONNECTION
(PER CODE: NEC 705.12(D)(7))
[Not required if panelboard is rated not less than sum of ampere ratings of all overcurrent devices supplying it]

DATA PER PANEL

NOMINAL OPERATING AC VOLTAGE -	240	V
NOMINAL OPERATING AC FREQUENCY-	60	Hz
MAXIMUM AC POWER-	240	VA
MAXIMUM AC CURRENT-	1	A
MAXIMUM OVERCURRENT DEVICE RATING FOR AC MODULE PROTECTION PER CIRCUIT-	20	A

LABEL LOCATION:
COMBINER PANEL, AC DISCONNECT
(PER CODE: NEC 690.52)

PHOTOVOLTAIC SYSTEM EQUIPPED WITH RAPID SHUTDOWN

LABEL LOCATION:
AC DISCONNECT, DC DISCONNECT, POINT OF INTERCONNECTION
(PER CODE: NEC690.56(C))

⚠ WARNING
INVERTER OUTPUT CONNECTION
DO NOT RELOCATE THIS
OVERCURRENT DEVICE

EMERGENCY CONTACT
855-573-2843

⚠ WARNING
DEDICATED SOLAR PANELS DO NOT CONNECT ANY OTHER LOADS

SOLAR PV SYSTEM EQUIPPED WITH RAPID SHUTDOWN

TURN RAPID SHUTDOWN SWITCH TO THE "OFF" POSITION TO SHUTDOWN PV SYSTEM AND REDUCE SHOCK HAZARD IN ARRAY

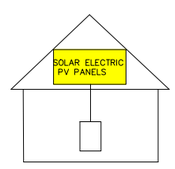

Figure 690.56(C)(1)(a) Label for PV Systems that Shut down the array and the conductors leaving the array

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REVISIONS	DATE	DESCRIPTION	ENGG	REV

PERMIT DEVELOPER	
DATE	03/03/2023
DESIGNER	OSB
REVIEWER	

SHEET NAME
SYSTEM LABELING

SHEET NUMBER
E-03

powered by Q.ANTUM DUO

Q.PEAK DUO-G6+
340-355

ENDURING HIGH PERFORMANCE

PV magazine award 2017 Top Innovation

VDE Quality Tested
- high reliability
- low degradation
- optimized durability
- continuous line monitoring

www.VDEInfo.com
ID. 40032587

EUPD RESEARCH TOP BRAND PV MODULES EUROPE 2019

Q CELLS YIELD SECURITY
- ANTI PID TECHNOLOGY (APT)
- HOT-SPOT PROTECT (HSP)
- TRACEABLE QUALITY (TRA.Q™)
- ANTI LID TECHNOLOGY (ALT)

Q.ANTUM TECHNOLOGY: LOW LEVELIZED COST OF ELECTRICITY
Higher yield per surface area, lower BOS costs, higher power classes, and an efficiency rate of up to 20.1%.

INNOVATIVE ALL-WEATHER TECHNOLOGY
Optimal yields, whatever the weather with excellent low-light and temperature behavior.

ENDURING HIGH PERFORMANCE
Long-term yield security with Anti LID and Anti PID Technology[1], Hot-Spot Protect and Traceable Quality Tra.Q™.

EXTREME WEATHER RATING
High-tech aluminum alloy frame, certified for high snow (5400 Pa) and wind loads (4000 Pa).

A RELIABLE INVESTMENT
Inclusive 25-year product warranty and 25-year linear performance warranty[2].

STATE OF THE ART MODULE TECHNOLOGY
Q.ANTUM DUO combines cutting edge cell separation and innovative wiring with Q.ANTUM Technology.

[1] APT test conditions according to IEC/TS 62804-1:2015, method B (–1500 V, 168 h)
[2] See data sheet on rear for further information

THE IDEAL SOLUTION FOR:

Rooftop arrays on residential buildings

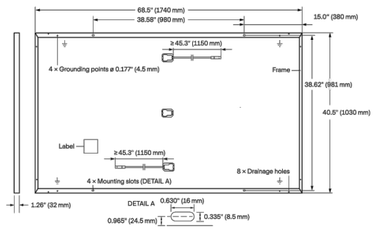
Rooftop arrays on commercial / industrial buildings

Engineered in Germany

Q CELLS

MECHANICAL SPECIFICATION

Format	68.5 × 40.6 × 1.26 in (including frame) (1740 × 1030 × 32 mm)
Weight	43.9 lbs (19.9 kg)
Front Cover	0.13 in (3.2 mm) thermally pre-stressed glass with anti-reflection technology
Back Cover	Composite film
Frame	Black anodized aluminum
Cell	6 × 20 monocrystalline Q.ANTUM solar half cells
Junction Box	2.09-3.98 × 1.26-2.36 × 0.59-0.71 in (53-101 × 32-60 × 15-18 mm), Protection class IP67, with bypass diodes
Cable	4 mm² Solar cable; (+) ≥ 45.3 in (1150 mm), (–) ≥ 45.3 in (1150 mm)
Connector	Stäubli MC4, Hanwha Q CELLS HQC4, Amphenol UTX, Renhe 05-6, Tongling TL-Cable01S, JMTHY JM601; IP68 or Friends PV2e; IP67

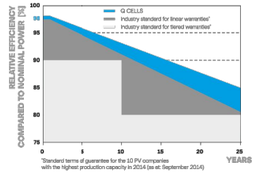


ELECTRICAL CHARACTERISTICS

POWER CLASS			340	345	350	355
MINIMUM PERFORMANCE AT STANDARD TEST CONDITIONS, STC[1] (POWER TOLERANCE +5 W / –0 W)						
Minimum	Power at MPP[1]	P_{MPP} [W]	340	345	350	355
	Short Circuit Current[1]	I_{SC} [A]	10.68	10.73	10.79	10.84
	Open Circuit Voltage[1]	V_{OC} [V]	40.24	40.49	40.73	40.98
	Current at MPP	I_{MPP} [A]	10.16	10.22	10.27	10.33
	Voltage at MPP	V_{MPP} [V]	33.45	33.76	34.07	34.38
	Efficiency[1]	η [%]	≥ 19.0	≥ 19.3	≥ 19.5	≥ 19.8
MINIMUM PERFORMANCE AT NORMAL OPERATING CONDITIONS, NMOT[2]						
Minimum	Power at MPP	P_{MPP} [W]	254.5	258.2	261.9	265.7
	Short Circuit Current	I_{SC} [A]	8.60	8.65	8.69	8.74
	Open Circuit Voltage	V_{OC} [V]	37.94	38.17	38.41	38.65
	Current at MPP	I_{MPP} [A]	8.00	8.04	8.09	8.13
	Voltage at MPP	V_{MPP} [V]	31.81	32.10	32.40	32.69

[1] Measurement tolerances P_{MPP} ±3%; I_{SC}; V_{OC} ±5% at STC: 1000 W/m², 25 ± 2 °C, AM 1.5 according to IEC 60904-3 • [2] 800 W/m², NMOT, spectrum AM 1.5

Q CELLS PERFORMANCE WARRANTY

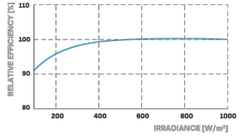


*Standard terms of guarantee for the 10 PV companies with the highest production capacity in 2014 (as at: September 2014)

At least 98% of nominal power during first year. Thereafter max. 0.54% degradation per year. At least 93.1% of nominal power up to 10 years. At least 85% of nominal power up to 25 years.

All data within measurement tolerances. Full warranties in accordance with the warranty terms of the Q CELLS sales organization of your respective country.

PERFORMANCE AT LOW IRRADIANCE



Typical module performance under low irradiance conditions in comparison to STC conditions (25 °C, 1000 W/m²)

TEMPERATURE COEFFICIENTS						
Temperature Coefficient of I_{SC}	α	[%/K]	+0.04	Temperature Coefficient of V_{OC}	β	[%/K]	–0.27
Temperature Coefficient of P_{MPP}	γ	[%/K]	–0.36	Normal Module Operating Temperature	NMOT	[°F]	109 ± 5.4 (43 ± 3 °C)

PROPERTIES FOR SYSTEM DESIGN

Maximum System Voltage V_{SYS}	[V]	1000 (IEC) / 1000 (UL)	Safety Class	II
Maximum Series Fuse Rating	[A DC]	20	Fire Rating based on ANSI / UL 1703	C (IEC) / TYPE 2 (UL)
Max. Design Load, Push / Pull[3]	[lbs / ft²]	75 (3600 Pa) / 55 (2667 Pa)	Permitted Module Temperature on Continuous Duty	–40 °F up to +185 °F (–40 °C up to +85 °C)
Max. Test Load, Push / Pull[3]	[lbs / ft²]	113 (5400 Pa) / 84 (4000 Pa)		

[3] See Installation Manual

QUALIFICATIONS AND CERTIFICATES

UL 1703, VDE Quality Tested, CE-compliant, IEC 61215:2016, IEC 61730:2016, Application Class II, U.S. Patent No. 9,893,215 (solar cells)

PACKAGING INFORMATION

Number of Modules per Pallet	32
Number of Pallets per 53' Trailer	28
Number of Pallets per 40' HC-Container	24
Pallet Dimensions (L × W × H)	71.5 × 45.3 × 48.0 in (1815 × 1150 × 1220 mm)
Pallet Weight	1505 lbs (683 kg)

Note: Installation instructions must be followed. See the installation and operating manual or contact our technical service department for further information on approved installation and use of this product.

Hanwha Q CELLS America Inc.
400 Spectrum Center Drive, Suite 1400, Irvine, CA 92618, USA | **TEL** +1 949 748 59 96 | **EMAIL** inquiry@us.q-cells.com | **WEB** www.q-cells.us

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REVISIONS	DATE	DESCRIPTION	ENGG.	REV

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DATE	03/03/2023
DESIGNER	OSB
REVIEWER	

SHEET NAME
MODULE DATASHEET

SHEET NUMBER
DS-01

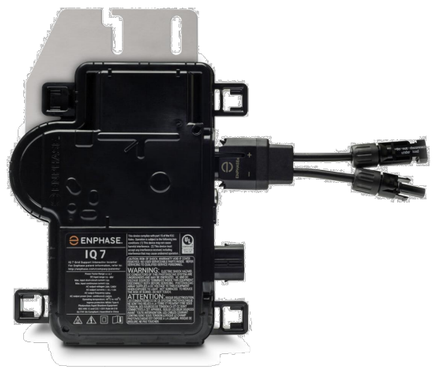
Data Sheet
Enphase Microinverters
Region: AMERICAS

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.

CERTIFIED

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

ENPHASE

Enphase IQ 7 and IQ 7+ Microinverters

INPUT DATA (DC)	IQ7-60-2-US		IQ7PLUS-72-2-US	
Commonly used module pairings[1]	235 W - 350 W +		235 W - 440 W +	
Module compatibility	60-cell 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	18 mA		18 mA	
Power factor setting	1.0		1.0	
Power factor (adjustable)	0.85 leading ... 0.85 lagging		0.85 leading ... 0.85 lagging	
EFFICIENCY	**@240 V**	**@208 V**	**@240 V**	**@208 V**
Peak efficiency	97.6 %	97.6 %	97.5 %	97.3 %
CEC weighted efficiency	97.0 %	97.0 %	97.0 %	97.0 %
MECHANICAL DATA				
Ambient temperature range	-40°C to +65°C			
Relative humidity range	4% to 100% (condensing)			
Connector type	MC4 (or Amphenol H4 UTX with additional Q-DCC-5 adapter)			
Dimensions (HxWxD)	212 mm x 175 mm x 30.2 mm (without bracket)			
Weight	1.08 kg (2.38 lbs)			
Cooling	Natural convection - No fans			
Approved for wet locations	Yes			
Pollution degree	PD3			
Enclosure	Class II double-insulated, corrosion resistant polymeric enclosure			
Environmental category / UV exposure rating	NEMA Type 6 / outdoor			
FEATURES				
Communication	Power Line Communication (PLC)			
Monitoring	Enlighten Manager and MyEnlighten monitoring options. Both options require installation of an Enphase IQ Envoy.			
Disconnecting means	The AC and DC connectors have been evaluated and approved by UL for use as the load-break disconnect required by NEC 690.			
Compliance	CA Rule 21 (UL 1741-SA) UL 62109-1, UL1741/IEEE1547, FCC Part 15 Class B, ICES-0003 Class B, CAN/CSA-C22.2 NO. 107.1-01 This product is UL Listed as PV Rapid Shut Down Equipment and conforms with NEC-2014 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**

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REVIEWER	

SHEET NAME
INVERTER DATASHEET

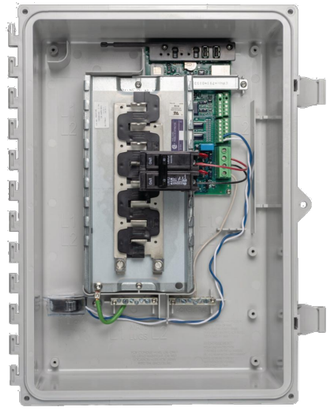
SHEET NUMBER
DS-02

Data Sheet
Enphase Networking

Enphase IQ Combiner 3

(X-IQ-AM1-240-3)

The **Enphase IQ Combiner 3™** with Enphase IQ Envoy™ consolidates interconnection equipment into a single enclosure and streamlines PV and storage installations by providing a consistent, pre-wired solution for residential applications. It offers up to four 2-pole input circuits and Eaton BR series busbar assembly.



Smart

- Includes IQ Envoy for communication and control
- Flexible networking supports Wi-Fi, Ethernet, or cellular
- Optional AC receptacle available for PLC bridge
- Provides production metering and optional consumption monitoring

Simple

- Reduced size from previous combiner
- Centered mounting brackets support single stud mounting
- Supports back and side conduit entry
- Up to four 2-pole branch circuits for 240 VAC plug-in breakers (not included)
- 80 A total PV or storage branch circuits

Reliable

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

UL LISTED

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

ENPHASE.

Enphase IQ Combiner 3

MODEL NUMBER	
IQ Combiner 3 X-IQ-AM1-240-3	IQ Combiner 3 with Enphase IQ Envoy™ printed circuit board for integrated revenue grade PV **production** metering (ANSI C12.20 +/- 0.5%) and optional* **consumption** monitoring (+/- 2.5%).
ACCESSORIES and **REPLACEMENT PARTS** (not included, order separately)	
Enphase Mobile Connect™ CELLMODEM-03 (4G/12-year data plan) CELLMODEM-01 (3G/5-year data plan) CELLMODEM-M1 (4G based LTE-M/5-year data plan)	Plug and play industrial grade cellular modem with 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 * Consumption monitoring is required for Enphase Storage Systems	Split core current transformers enable whole home **consumption** metering (+/- 2.5%).
Wireless USB adapter COMMS-KIT-01	Installed at the IQ Envoy. For communications with Enphase Encharge™ storage and Enphase Enpower™ smart switch. Includes USB cable for connection to IQ Envoy or Enphase IQ Combiner™ and allows redundant wireless communication with Encharge and Enpower.
Circuit Breakers BRK-10A-2-240 BRK-15A-2-240 BRK-20A-2P-240	Supports Eaton BR210, BR215, BR220, BR230, BR240, BR250, and BR260 circuit breakers. Circuit breaker, 2 pole, 10A, Eaton BR210 Circuit breaker, 2 pole, 15A, Eaton BR215 Circuit breaker, 2 pole, 20A, Eaton BR220
EPLC-01	Power line carrier (communication bridge pair), quantity - one pair
XA-PLUG-120-3	Accessory receptacle for Power Line Carrier in IQ Combiner 3 (required for EPLC-01)
XA-ENV-PCBA-3	Replacement IQ Envoy printed circuit board (PCB) for Combiner 3
ELECTRICAL SPECIFICATIONS	
Rating	Continuous duty
System voltage	120/240 VAC, 60 Hz
Eaton BR series busbar rating	125 A
Max. continuous current rating (output to grid)	65 A
Max. fuse/circuit rating (output)	90 A
Branch circuits (solar and/or storage)	Up to four 2-pole Eaton BR series Distributed Generation (DG) breakers only (not included)
Max. continuous current rating (input from PV)	64 A
Max. total branch circuit breaker rating (input)	80A of distributed generation / 90A with IQ Envoy breaker included
Production Metering CT	200 A solid core pre-installed and wired to IQ Envoy
MECHANICAL DATA	
Dimensions (WxHxD)	49.5 x 37.5 x 16.8 cm (19.5” x 14.75” x 6.63”). Height is 21.06” (53.5 cm with mounting brackets).
Weight	7.5 kg (16.5 lbs)
Ambient temperature range	-40° C to +46° C (-40° to 115° F)
Cooling	Natural convection, plus heat shield
Enclosure environmental rating	Outdoor, NRTL-certified, NEMA type 3R, polycarbonate construction
Wire sizes	• 20 A to 50 A breaker inputs: 14 to 4 AWG copper conductors • 60 A breaker branch input: 4 to 1/0 AWG copper conductors • Main lug combined output: 10 to 2/0 AWG copper conductors • Neutral and ground: 14 to 1/0 copper conductors Always follow local code requirements for conductor sizing.
Altitude	To 2000 meters (6,560 feet)
INTERNET CONNECTION OPTIONS	
Integrated Wi-Fi	802.11b/g/n
Ethernet	Optional, 802.3, Cat5E (or Cat 6) UTP Ethernet cable (not included)
Cellular	Optional, CELLMODEM-01 (3G) or CELLMODEM-03 (4G) or CELLMODEM-M1 (4G based LTE-M) (not included)
COMPLIANCE	
Compliance, Combiner	UL 1741, CAN/CSA C22.2 No. 107.1, 47 CFR, Part 15, Class B, ICES 003 Production metering: ANSI C12.20 accuracy class 0.5 (PV production)
Compliance, IQ Envoy	UL 60601-1/CANCSA 22.2 No. 61010-1

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

2019-11-04

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REVIEWER	

SHEET NAME
COMBINER DATASHEET

SHEET NUMBER
DS-03

RT-MINI

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

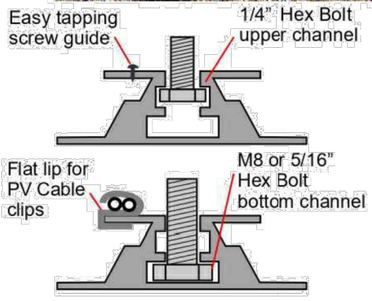
RT-MINI is suitable for mounting any rail system with a conventional L-Foot.

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

ICC ES ICC ESR 3575

Call Now for more details

858-935-6064



RT-MINI

Flexible Flashing certified by the International Code Council (ICC)

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

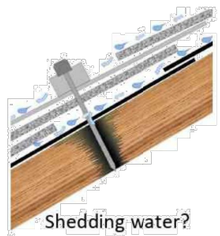
Components

RT2-00-MINIBK
PAT : PENDING

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

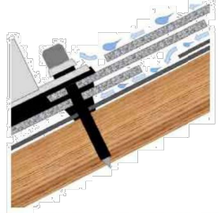
RT-Butyl is Roof Tech’s flexible flashing used in 550,000 residential PV systems for the last 20 years. It is the first PV mounting system with Flexible Flashing certified by the ICC.

Metal Flashing Retrofit



Shedding water?

Flexible Flashing



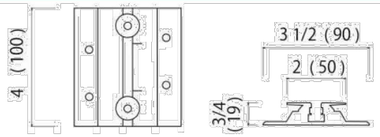
100% Waterproof

ICC ESR-3575

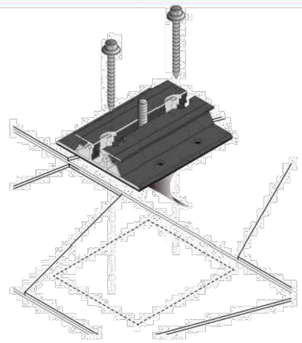
ASTM2140 testing

UV testing (7500 hrs.)

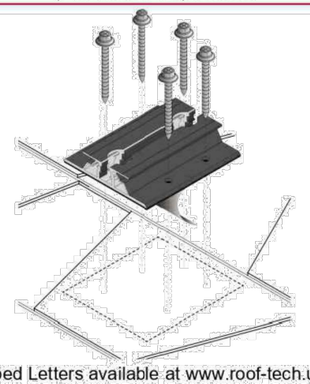
Dimensions in (mm)



Rafter installation



Deck installation



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

Roof Tech
Smarter PV mounting solutions from top of roof to bottom line®
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DATE	03/03/2023
DESIGNER	OSB
REVIEWER	

SHEET NAME

ATTACHMENT DATASHEET

SHEET NUMBER

DS-04

Tech Brief

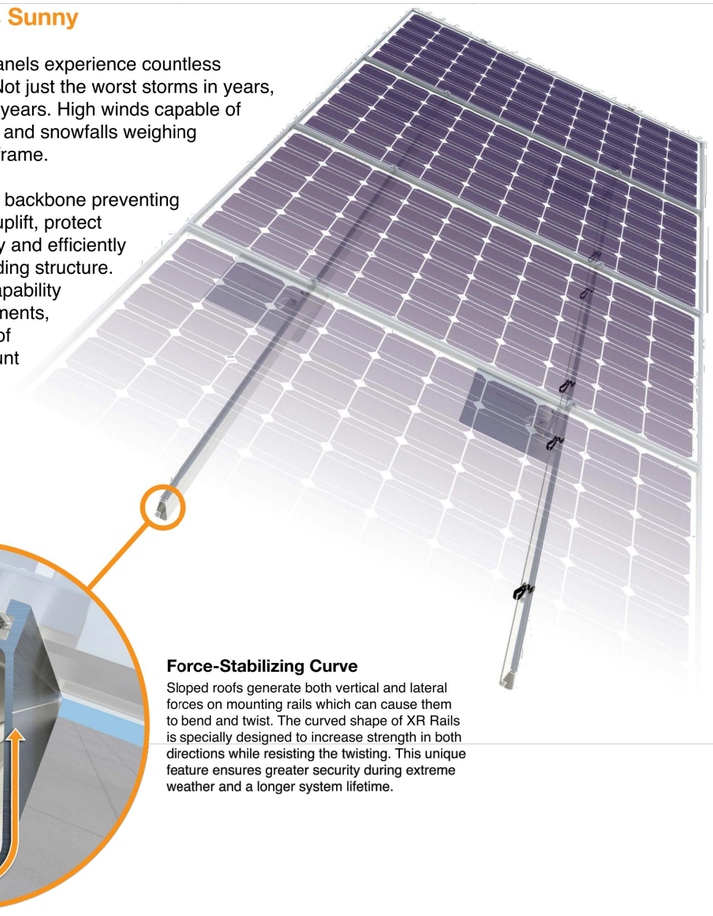
IRONRIDGE

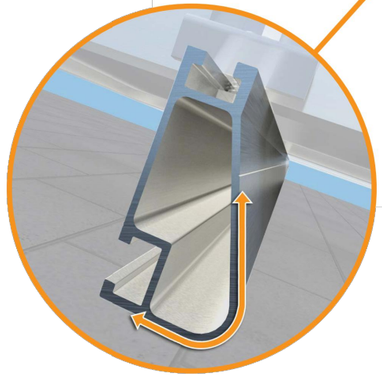
XR Rail Family

Solar Is Not Always Sunny

Over their lifetime, solar panels experience countless extreme weather events. Not just the worst storms in years, but the worst storms in 40 years. High winds capable of ripping panels from a roof, and snowfalls weighing enough to buckle a panel frame.

XR Rails are the structural backbone preventing these results. They resist uplift, protect against buckling and safely and efficiently transfer loads into the building structure. Their superior spanning capability requires fewer roof attachments, reducing the number of roof penetrations and the amount of installation time.





Force-Stabilizing Curve

Sloped roofs generate both vertical and lateral forces on mounting rails which can cause them to bend and twist. The curved shape of XR Rails is specially designed to increase strength in both directions while resisting the twisting. This unique feature ensures greater security during extreme weather and a longer system lifetime.

Compatible with Flat & Pitched Roofs

XR Rails are compatible with FlashFoot and other pitched roof attachments.

IronRidge offers a range of tilt leg options for flat roof mounting applications.

Corrosion-Resistant Materials

All XR Rails are made of marine-grade aluminum alloy, then protected with an anodized finish. Anodizing prevents surface and structural corrosion, while also providing a more attractive appearance.

Tech Brief

XR Rail Family

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

XR10

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

- 6' spanning capability
- Moderate load capability
- Clear 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 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						
	120						
	140						
	160						
30	100						
	160						
40	100						
	160						
50-70	160						
80-90	160						

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