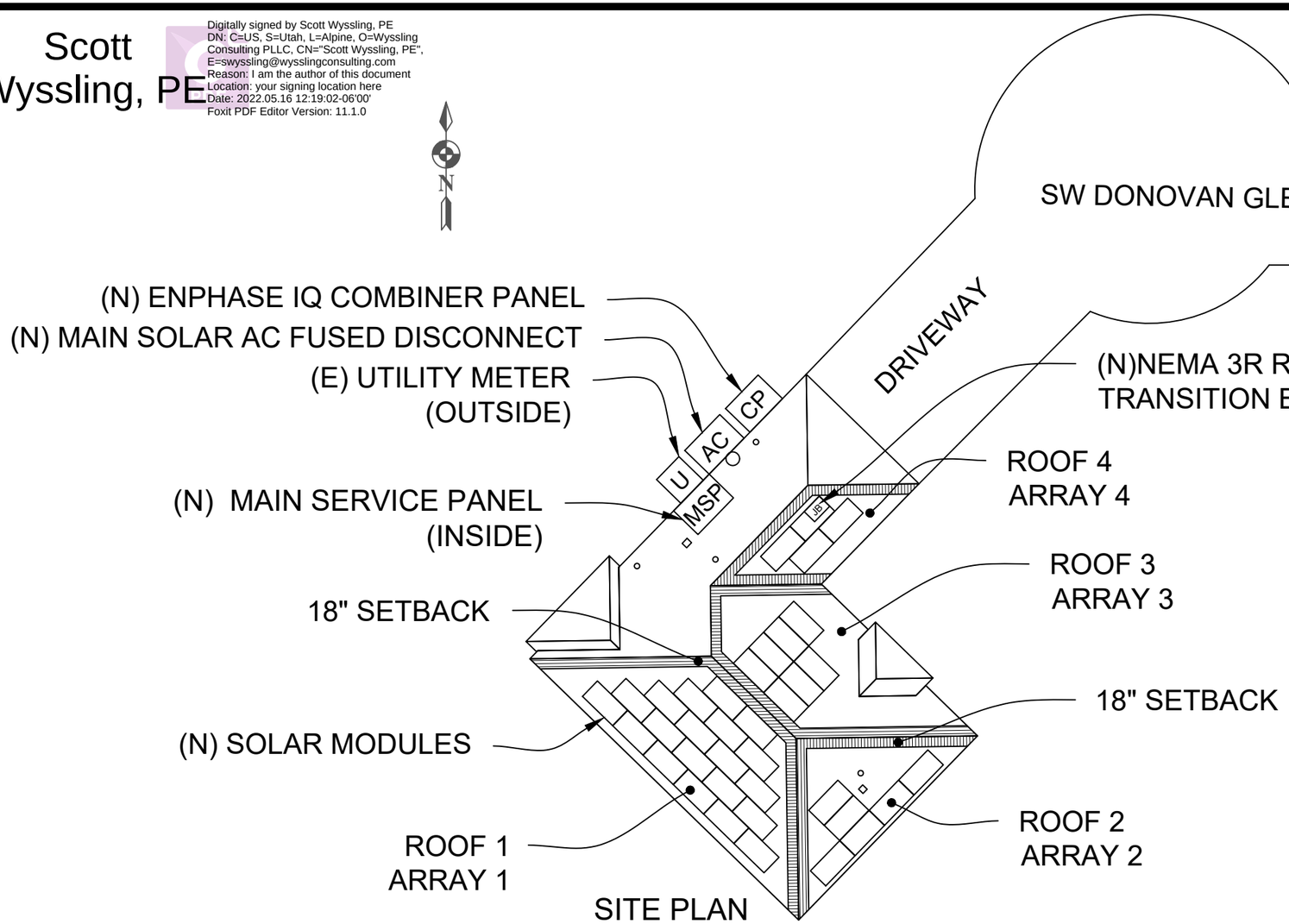
Scott Wyssling, PE

Digitally signed by Scott Wyssling, PE
DN: C=US, S=Utah, L=Alpine, O=Wyssling Consulting PLLC, CN="Scott Wyssling, PE", E=swyssling@wysslingconsulting.com
Reason: I am the author of this document
Location: your signing location here
Date: 2022.05.16 12:19:02-06'00'
Foxit PDF Editor Version: 11.1.0



SITE PLAN

SCALE: NTS

SITE MAP

SCALE: NTS

VICINITY MAP

SCALE: NTS

SCOTT E WYSSLING LICENSED No. 81551 STATE OF FLORIDA PROFESSIONAL ENGINEER

Wyssling Consulting, PLLC
76 N Meadowbrook Drive Alpine UT 84004
Florida License # RY34912

Date Signed 05-16-22

PROPOSED SYSTEM SPECIFICATION	
SYSTEM SIZE DC	14.8 KWP
SYSTEM SIZE AC	@295 VA PEAK POWER = 10.915 KWP
SYSTEM SIZE AC	@290 VA MAX. CONT. POWER = 10.73 KWP
MODULES USED	(37)Hanwha Q.PEAK DUO BLK ML-G10+ 400
INVERTER USED	(37)ENPHASE IQ7PLUS-72-2-US
BRANCH CIRCUIT	1 CIRCUIT OF 13 MODULES
	2 CIRCUITS OF 12 MODULES
RACKING	ECOFASTEN ROCKIT
FLASHING	COMPOSITE SHINGLE FLASHING

ELECTRICAL SPECIFICATION	
SERVICE PANEL	200A MCB WITH 200A BUSBAR
INTERCONNECTION	LINE SIDE TAP
PV OCPD	60A AC DISCONNECT WITH 60 A FUSES

ROOF SPECIFICATION	
ROOF TYPE	COMPOSITE SHINGLE
ROOF CONDITION	BAD
RE-ROOFING	REQUIRED
RAFTERS	2"x 4" @ 24" O.C.
SHEATHING	1/2" OSB

ARRAY SPECIFICATION			
ROOF NO.	TILT	AZIMUTH	QTY
1	23°	224°	20
2	23°	134°	6
3	23°	44°	7
4	23°	134°	4
TOTAL			37

ROOF COVERAGE AREA CALCULATION	
TOTAL AREA OF ROOF	2834.11 SQ. FT
TOTAL AREA OF ARRAY	782.01 SQ. FT
PERCENTAGE OF TOTAL ARRAY AREA OCCUPIED ON ROOF	27.59%

NOTE : PROVIDING ARRAYS TAKE LESS THAN 33% OF TOTAL ROOF AREA, WHEN THE ARRAYS TAKE LESS THAN 33% WE CAN JUSTIFY 18" SETBACKS FROM RIDGE

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REFERENCE CODES	FBC 2020
ELECTRICAL CODE	NEC-2017
BUILDING USAGE	R - RESIDENTIAL
CONSTRUCTION	5-B UNPROTECTED

WIND EXPOSURE CATEGORY	B
WIND SPEED	145 MPH
SNOW LOAD	0 LB/SQ.FT.

TABLE OF CONTENT	
NO.	TITLE
PV-1.0	SITE PLAN
PV-2.0	ARRAY LAYOUT
PV-3.0	STRUCTURAL
PV-4.0	ELECTRICAL LINE DIAGRAM
PV-5.0	ELECTRICAL CALCULATIONS
PV-6.0	LABELS
ATTACHMENT	DATASHEETS

Suntuity
2137 Route 35
Holmdel, NJ 07733
Tel:(732) 979-2400
Fax: (732) 979 -2401

PROJECT NAME & ADDRESS

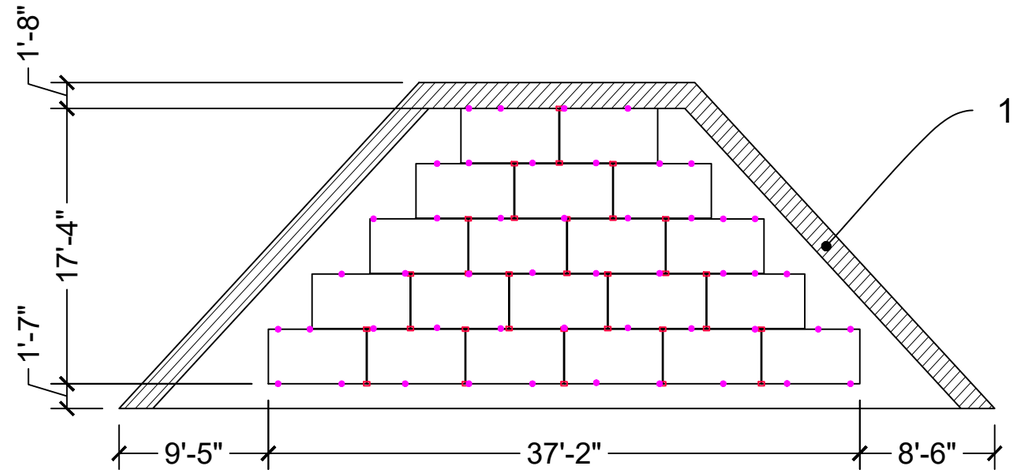
PRISCILLA DIXON
524 SW DONOVAN GLN
LAKE CITY,
FLORIDA, 32024-6600
(Lat, Long: 30.090796, -82.718001)

Signature with Seal

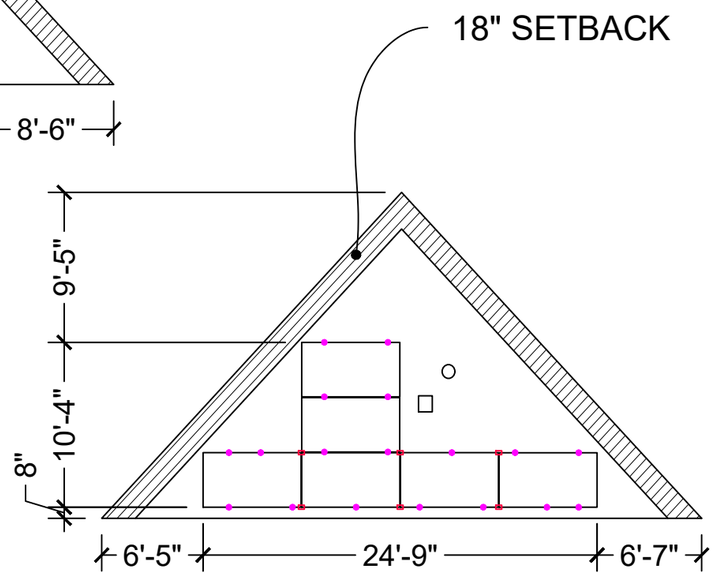
REVISIONS

REV	DESCRIPTION	DATE	DRW BY	REV BY

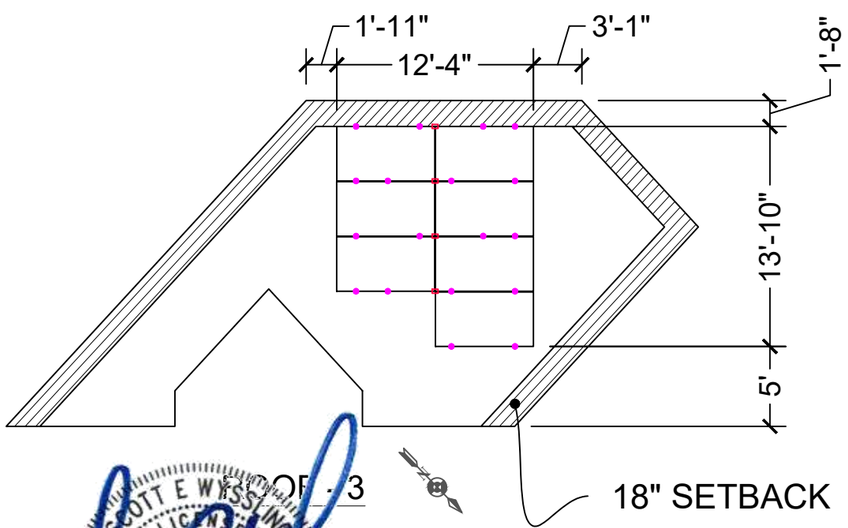
DATE DRAWN	05-09-2022
DRAWN BY	SUSMITA
REVIEWED BY	PARIKSHIT
SHEET NAME	SITE PLAN
SHEET NO.	PV-1.0



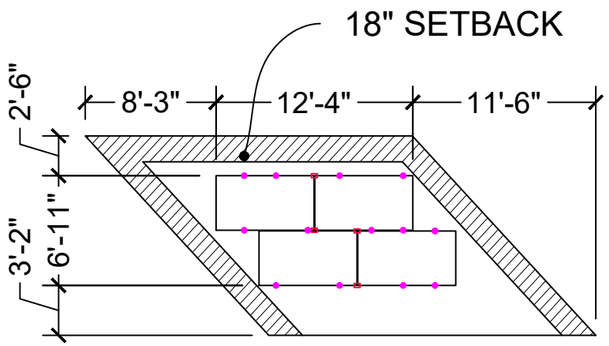
ROOF - 1



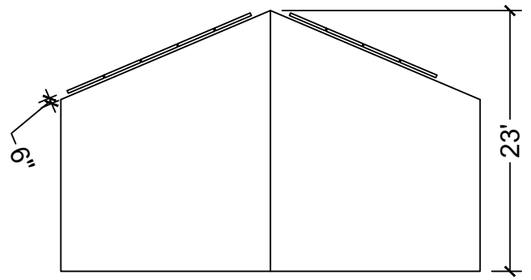
ROOF - 2



ROOF - 3



ROOF - 4



SIDE ELEVATION

SCALE: NTS

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ARRAY LAYOUT

SCALE: NTS

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ROOF TYPE	COMPOSITE SHINGLE
ROOF CONDITION	BAD
RE-ROOFING	REQUIRED
RAFTERS	2"x 4" @ 24" O.C.
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ROOF NO.	TILT	AZIMUTH	QTY
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TOTAL			37

LEGEND

- VENT, ATTIC FAN (ROOF OBSTRUCTION)
- MOUNTS
- COUPLING
- ROOF SETBACK

Suntuity
2137 Route 35
Holmdel, NJ 07733
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PROJECT NAME & ADDRESS

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LAKE CITY,
FLORIDA, 32024-6600
(Lat, Long: 30.090796, -82.718001)

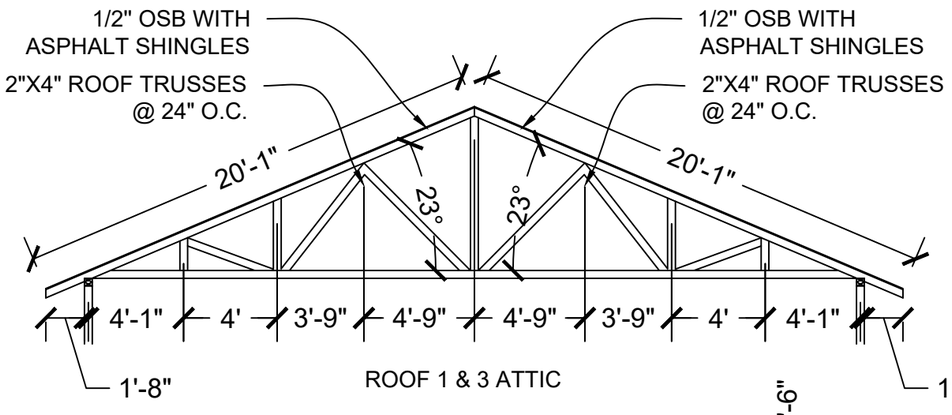
Signature with Seal

REVISIONS

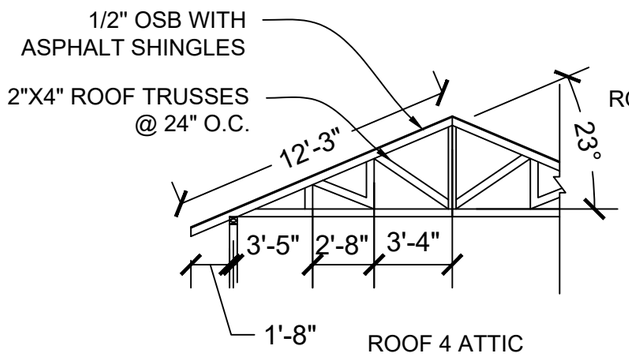
REV	DESCRIPTION	DATE	DRW BY	REV BY

DATE DRAWN	05-09-2022
DRAWN BY	SUSMITA
REVIEWED BY	PARIKSHIT

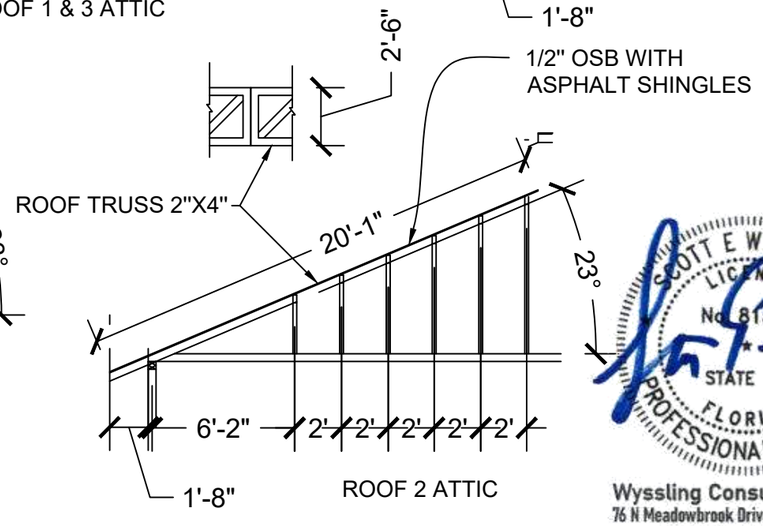
SHEET NAME	ARRAY LAYOUT
SHEET NO.	PV-2.0



ROOF 1 & 3 ATTIC



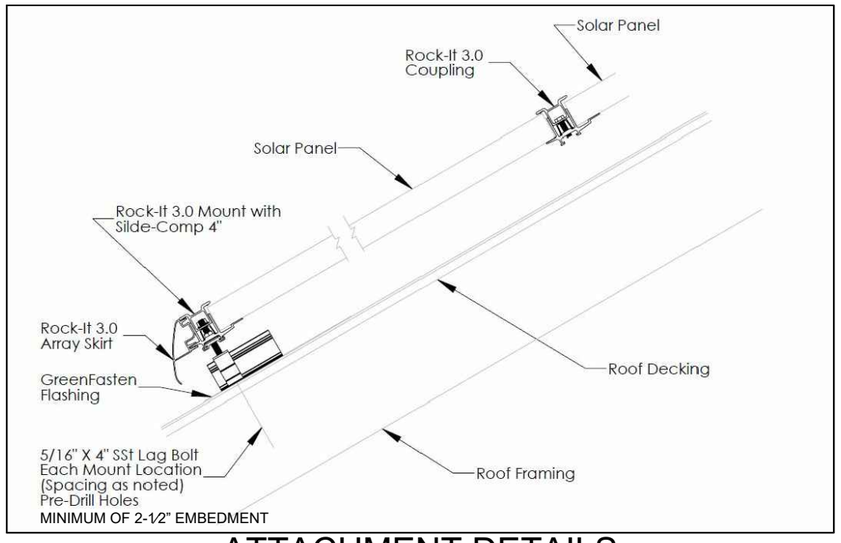
ROOF 4 ATTIC



ROOF 2 ATTIC

ATTIC DETAILS

SCALE: NTS



ATTACHMENT DETAILS

SCALE: NTS

KEY PLAN

SCALE: NTS

PROPOSED SYSTEM SPECIFICATION	
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ROOF SPECIFICATION	
ROOF TYPE	COMPOSITE SHINGLE
ROOF CONDITION	BAD
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ROOF NO.	TILT	AZIMUTH	QTY
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3	23°	44°	7
4	23°	134°	4
TOTAL			37

RACKING SPECIFICATION	
MIN/MAX ROOF SLOPE	1/2:12 / 12:12
MAX ANCHOR SPACING (35MM/40MM) MAX ANCHOR SPACING (32MM)	48"
MAX MODULE SIZE	74" X 41.1" X 1.26"
MODULE CANTILEVER	MAXIMUM CANTILEVER IS 1/3 BRACKET SPACING

MODULE SPECIFICATION	
MODEL	HANWHA Q.PEAK DUO BLK ML-G10+ 400
FORMAT	74" ~ 41.1" ~ 1.26" (INCLUDING FRAME)
WEIGHT	48.5 LBS

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Date Signed 05-16-22

GENERAL NOTES

1. SOLAR PANELS SHALL NOT EXCEED ANY PART OF ROOF EDGE OR PEAK.

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PV MODULE
WEIGHT = 48.5 LBS.
AREA = 74" x 41.1" NOMINAL (21.121 SQ.FT.)

MODULE = 48.5 LBS. OVER 21.121 SQ.FT. = 2.296 LBS/SQ.FT.
FOOT SPACING IS 48" O.C. ACROSS PANEL WIDTH WITH 2 ROWS PER MODULE

TYPICAL LAYOUT PROVIDES AN AVERAGE OF 1.6 FEET PER MODULE.

MODULE WEIGHT DISTRIBUTED PER MOUNTING FOOT =
48.5 LBS./1.6 FEET = 30.3 LBS./MTG. FOOT.

MOUNTING LOAD CALCULATION

Suntuity
2137 Route 35
Holmdel, NJ 07733
Tel:(732) 979-2400
Fax: (732) 979 -2401

PROJECT NAME & ADDRESS

PRISCILLA DIXON
524 SW DONOVAN GLN
LAKE CITY,
FLORIDA, 32024-6600
(Lat, Long: 30.090796, -82.718001)

Signature with Seal

REVISIONS				
REV	DESCRIPTION	DATE	DRW BY	REV BY

DATE DRAWN	05-09-2022
DRAWN BY	SUSMITA
REVIEWED BY	PARIKSHIT
SHEET NAME	STRUCTURAL
SHEET NO.	PV-3.0

PROPOSED SYSTEM SPECIFICATION	
SYSTEM SIZE DC	14.8 KWP
SYSTEM SIZE AC	@295 VA PEAK POWER = 10.915 KWP
SYSTEM SIZE AC	@290 VA MAX. CONT. POWER = 10.73 KWP
MODULES USED	(37)Hanwha Q.PEAK DUO BLK ML-G10+ 400
INVERTER USED	(37)ENPHASE IQ7PLUS-72-2-US
BRANCH CIRCUIT	1 CIRCUIT OF 13 MODULES
	2 CIRCUITS OF 12 MODULES
RACKING	ECOFASTEN ROCKIT
FLASHING	COMPOSITE SHINGLE FLASHING

ELECTRICAL SPECIFICATION	
SERVICE PANEL	200A MCB WITH 200A BUSBAR
INTERCONNECTION	LINE SIDE TAP
PV OCPD	60A AC DISCONNECT WITH 60 A FUSES

CONDUIT TAG	QTY	CONDUCTOR INFORMATION		CONDUIT TYPE	CONDUIT SIZE
A	(3)	-	ENPHASE IQ CABLE	NA	NA
B	(6)	#10AWG	THWN-2	PVC, EMT OR FLEX IN ATTIC	1"
	(1)	#6AWG	THWN-2 GND		
C	(3)	#6AWG	THWN-2	PVC, EMT OR FLEX IN ATTIC	1"
	(1)	#6AWG	THWN-2 GND		
C1	(3)	#6AWG	THWN-2	PVC, EMT OR FLEX IN ATTIC	1"
D	(1)	#6AWG	BARE GROUND	NA	NA

THE ENPHASE MICRO-INVERTERS HAVE INTEGRATED GROUND AND DOUBLE INSULATION, SO NO GEC OR EGC IS REQUIRED. THE DC CIRCUIT IS ISOLATED AND INSULATED FROM GROUND AND MEETS THE REQUIREMENTS OF NEC 690.35

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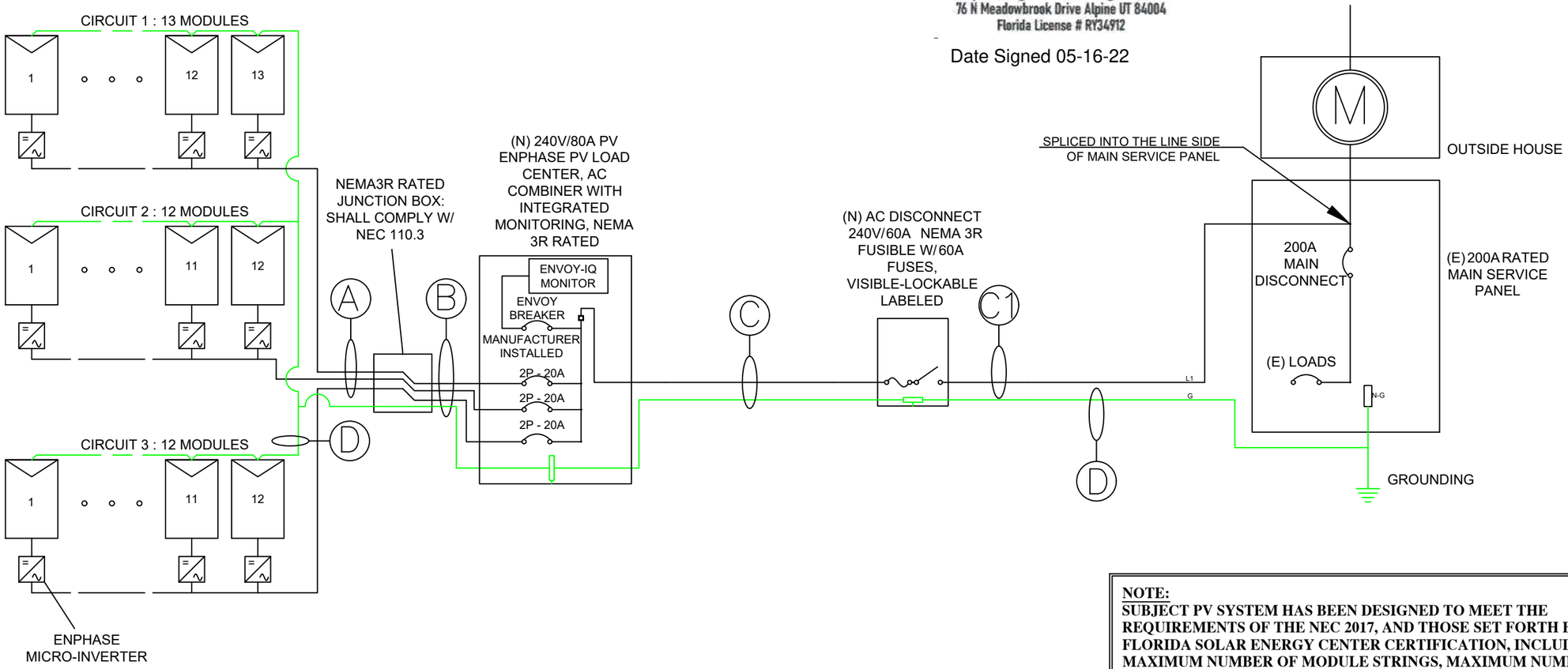
Date Signed 05-16-22



NOTE:
SUBJECT PV SYSTEM HAS BEEN DESIGNED TO MEET THE REQUIREMENTS OF THE NEC 2017, AND THOSE SET FORTH BY THE FLORIDA SOLAR ENERGY CENTER CERTIFICATION, INCLUDING MAXIMUM NUMBER OF MODULE STRINGS, MAXIMUM NUMBER OF MODULES PER STRING, MAXIMUM OUTPUT, MODULE MANUFACTURER AND MODEL NUMBER, INVERTER MANUFACTURER AND MODEL NUMBER, AS APPLICABLE.

ELECTRICAL LINE DIAGRAM

SCALE: NTS

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2137 Route 35
Holmdel, NJ 07733
Tel:(732) 979-2400
Fax: (732) 979 -2401

PROJECT NAME & ADDRESS

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LAKE CITY,
FLORIDA, 32024-6600
(Lat, Long: 30.090796, -82.718001)

Signature with Seal

REVISIONS

REV	DESCRIPTION	DATE	DRW BY	REV BY

DATE DRAWN	05-09-2022
DRAWN BY	SUSMITA
REVIEWED BY	PARIKSHIT
SHEET NAME	ELECTRICAL LINE DIAGRAM
SHEET NO.	PV-4.0

SOLAR MODULE SPECIFICATIONS	
MANUFACTURER / MODEL #	Hanwha Q.PEAK DUO BLK ML-G10+ 400
VMP	37 V
IMP	10.77 A
VOC	45.3 V
ISC	11.14 A

INVERTER SPECIFICATIONS	
MANUFACTURER	ENPHASE
MODEL NO.	IQ7PLUS-72-2-US
MAX DC INPUT VOLTAGE	60 V
MAX OUTPUT POWER	290 VA
PEAK OUTPUT POWER	295 VA
NOMINAL AC OUTPUT VOLTAGE	240 V
NOMINAL AC OUTPUT CURRENT	1.21 A

TEMPERATURE DETAILS	
RECORD LOW TEMP	-5°
AMBIENT TEMP (HIGH TEMP 2%)	34°

CONDUCTOR AMPACITY BEFORE COMBINER PANEL:

EXPECTED WIRE TEMP (In Celsius)	NEC CODES	34°
TEMP. CORRECTION PER TABLE	310.15(B)(2)(a)	0.96
NO. OF CURRENT CARRYING CONDUCTORS	-	6
CONDUIT FILL CORRECTION PER NEC	310.15(B)(3)(a)	0.8
CIRCUIT CONDUCTOR SIZE	-	10 AWG
CIRCUIT CONDUCTOR AMPACITY	310.15(B)(16)	35A

REQUIRED CIRCUIT CONDUCTOR AMPACITY 1.25 X MAX OUTPUT CURRENT	NEC 690.8(A&B)	19.66A
DERATED AMPACITY OF CIRCUIT CONDUCTOR TEMP. CORRECTION X CONDUIT FILL CORRECTION X CIRCUIT CONDUCTOR AMPACITY	NEC TABLE 310.15(B)(2)(a) 310.15(B)(16) 310.15(B)(3)(a)	26.88A

CONDUCTOR AMPACITY AFTER COMBINER PANEL:

EXPECTED WIRE TEMP (In Celsius)	NEC CODES	34°
TEMP. CORRECTION PER TABLE	310.15(B)(2)(a)	0.96
NO. OF CURRENT CARRYING CONDUCTORS	-	3
CONDUIT FILL CORRECTION	310.15(B)(3)(a)	1
CIRCUIT CONDUCTOR SIZE	-	6 AWG
CIRCUIT CONDUCTOR AMPACITY	310.15(B)(16)	65A

REQUIRED CIRCUIT CONDUCTOR AMPACITY 1.25 X MAX OUTPUT CURRENT	NEC 690.8(A&B)	55.96A
DERATED AMPACITY OF CIRCUIT CONDUCTOR TEMP. CORRECTION X CONDUIT FILL CORRECTION X CIRCUIT CONDUCTOR AMPACITY	NEC TABLE 310.15(B)(2)(a) 310.15(B)(16) 310.15(B)(3)(a)	62.4A
SELECTED OCPD	NEC 240.6(A)	60A

ELECTRICAL NOTES

1.) ALL EQUIPMENT TO BE LISTED BY UL OR OTHER NRTL, AND LABELED FOR ITS APPLICATION.
2.) ALL CONDUCTORS SHALL BE COPPER, RATED FOR 600 V AND 90 DEGREE C WET ENVIRONMENT.
3.) 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.
4.) WORKING CLEARANCES AROUND ALL NEW AND EXISTING ELECTRICAL EQUIPMENT SHALL COMPLY WITH NEC 110.26.
5.) DRAWINGS INDICATE THE GENERAL ARRANGEMENT OF SYSTEMS. CONTRACTOR SHALL FURNISH ALL NECESSARY OUTLETS, SUPPORTS, FITTINGS AND ACESSORIES 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

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Date Signed 05-16-22

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(Lat, Long: 30.090796, -82.718001)

Signature with Seal

REVISIONS	REV	DESCRIPTION	DATE	DRW BY	REV BY

DATE DRAWN	05-09-2022
DRAWN BY	SUSMITA
REVIEWED BY	PARIKSHIT
SHEET NAME	ELECTRICAL CALCULATION
SHEET NO.	PV-5.0

SOLAR AC DISCONNECT LABELS

NOTICE
AC VOLTAGE = 240V
MAX FUSE: 60A
MAX CURRENT: 55.96A

NOTICE
RAPID SHUTDOWN
DISCONNECT SWITCH

WARNING
THIS IS MAIN 2 OF 2 WITH
MAIN 1 OF 2 LOCATED INSIDE

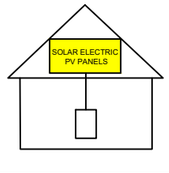
AC COMBINER LABELS

Suntuity
2137 ROUTE 35
HOLMDEL, NJ 07733
TEL: (732) 979-2400
www.suntuity.com

NOTICE
THIS SYSTEM IS EQUIPPED WITH RAPID SHUTDOWN ROOFTOP INVERTERS WILL DE-ENERGISE AT SERVICE PANEL OUTAGE

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



NOTICE
AC COMBINER AND DATA AQUISITION.
DO NOT ADD LOADS.
DO NOT TOUCH TERMINALS.
LINE AND LOAD SIDE MAY BE ENERGIZED IN OPEN POSITION.

CONDUIT LABELS

CAUTION
PHOTOVOLTAIC AC SOURCE

UTILITY METER

WARNING
DUAL POWER SOURCE

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SERVICE PANEL LABEL

WARNING
THIS IS MAIN 1 OF 2 WITH
MAIN 2 OF 2 LOCATED OUTSIDE
THIS SERVICE IS ALSO SERVED BY A PV SYSTEM WITH RAPID SHUTDOWN. INVERTERS LOCATED ON ROOF AUTO DE-ENERGISE WHEN SOLAR SERVICE MAIN IS IN OPEN POSITION.
THE DC CONDUCTORS OF THE PV SYSTEM ARE UNGROUNDED AND MAY BE ENEGIZED.
IF BACKFEED BREAKER PRESENT DO NOT RELOCATE THIS OVERCURRENT DEVICE.

CAUTION
DO NOT DISCONNECT
UNDER LOAD

Suntuity
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REVISIONS	REV	DESCRIPTION	DATE	DRW BY	REV BY

DATE DRAWN	05-09-2022
DRAWN BY	SUSMITA
REVIEWED BY	PARIKSHIT

SHEET NAME	LABELS
SHEET NO.	PV-6.0

powered by Q.ANTUM DUO Z

Q.PEAK DUO BLK ML-G10+

385-405

ENDURING HIGH PERFORMANCE

25 YR Warranty
Product & Performance

EUPD RESEARCH TOP BRAND PV MODULES EUROPE 2021

Q CELLS Yield Security

BREAKING THE 20% EFFICIENCY BARRIER

Q.ANTUM DUO Z Technology with zero gap cell layout boosts module efficiency up to 20.9%.

THE MOST THOROUGH TESTING PROGRAMME IN THE INDUSTRY

Q CELLS is the first solar module manufacturer to pass the most comprehensive quality programme in the industry: The new "Quality Controlled PV" of the independent certification institute TÜV Rheinland.

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 Technology, 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].

[1] APT test conditions according to IEC / TS 62804-1:2015, method A (–1500 V, 96 h)
[2] See data sheet on rear for further information.

THE IDEAL SOLUTION FOR:

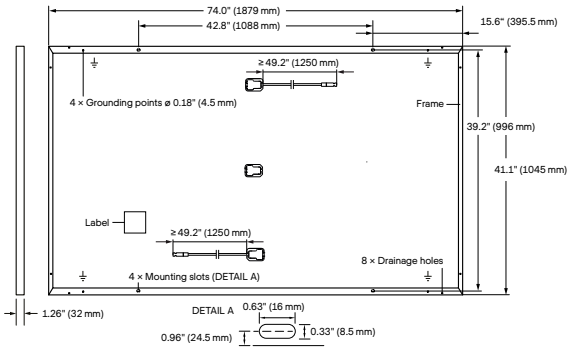
Rooftop arrays on residential buildings

Engineered in Germany

Q CELLS

MECHANICAL SPECIFICATION

Format	74.0 in × 41.1 in × 1.26 in (including frame) (1879 mm × 1045 mm × 32 mm)
Weight	48.5 lbs (22.0 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 × 22 monocrystalline Q.ANTUM solar half cells
Junction Box	2.09-3.98 in × 1.26-2.36 in × 0.59-0.71 in (53-101 mm × 32-60 mm × 15-18 mm), IP67, with bypass diodes
Cable	4 mm² Solar cable; (+) ≥49.2 in (1250 mm), (–) ≥49.2 in (1250 mm)
Connector	Stäubli MC4; IP68

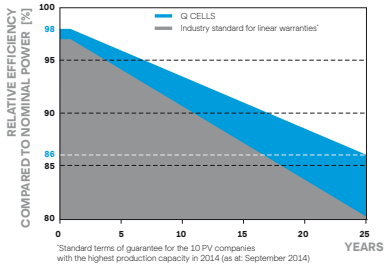


ELECTRICAL CHARACTERISTICS

POWER CLASS				385	390	395	400	405
MINIMUM PERFORMANCE AT STANDARD TEST CONDITIONS, STC[1] (POWER TOLERANCE +5 W / –0 W)								
Minimum	Power at MPP[1]	P_{MPP}	[W]	385	390	395	400	405
Minimum	Short Circuit Current[1]	I_{SC}	[A]	11.04	11.07	11.10	11.14	11.17
Minimum	Open Circuit Voltage[1]	V_{OC}	[V]	45.19	45.23	45.27	45.30	45.34
Minimum	Current at MPP	I_{MPP}	[A]	10.59	10.65	10.71	10.77	10.83
Minimum	Voltage at MPP	V_{MPP}	[V]	36.36	36.62	36.88	37.13	37.39
Minimum	Efficiency[1]	η	[%]	≥19.6	≥19.9	≥20.1	≥20.4	≥20.6
MINIMUM PERFORMANCE AT NORMAL OPERATING CONDITIONS, NMOT[2]								
Minimum	Power at MPP	P_{MPP}	[W]	288.8	292.6	296.3	300.1	303.8
Minimum	Short Circuit Current	I_{SC}	[A]	8.90	8.92	8.95	8.97	9.00
Minimum	Open Circuit Voltage	V_{OC}	[V]	42.62	42.65	42.69	42.72	42.76
Minimum	Current at MPP	I_{MPP}	[A]	8.35	8.41	8.46	8.51	8.57
Minimum	Voltage at MPP	V_{MPP}	[V]	34.59	34.81	35.03	35.25	35.46

[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

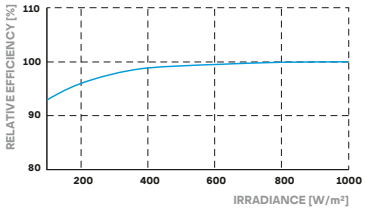
Q CELLS PERFORMANCE WARRANTY



At least 98% of nominal power during first year. Thereafter max. 0.5% degradation per year. At least 93.5% of nominal power up to 10 years. At least 86% 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 organisation 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]	–0.34	Nominal 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)	PV module classification	Class II
Maximum Series Fuse Rating	[A DC]	20	Fire Rating based on ANSI / UL 61730	TYPE 2
Max. Design Load, Push / Pull[3]	[lbs/ft²]	75 (3600 Pa) / 55 (2660 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 61730, CE-compliant,
Quality Controlled PV - TÜV Rheinland,
IEC 61215:2016, IEC 61730:2016,
U.S. Patent No. 9,893,215 (solar cells),
QCPV Certification ongoing.

C Certified US
UL 61730

TÜVRheinland CERTIFIED
www.tuv.com
ID 1111220277

PACKAGING INFORMATION

Horizontal packaging	76.4 in 1940 mm	43.3 in 1100 mm	48.0 in 1220 mm	1656 lbs 751 kg	24 pallets	24 pallets	32 modules

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

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.

UL CERTIFIED
SAFETY US-CA E341165

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.

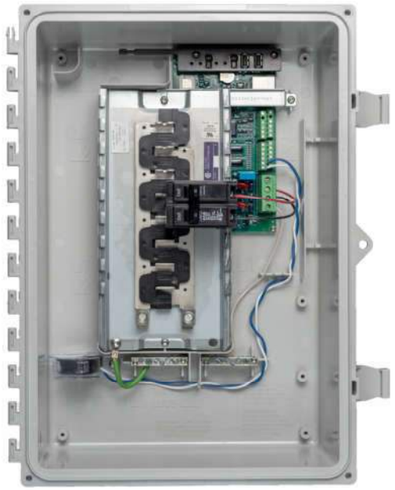
2018-05-24

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 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	Split core current transformers enable whole home consumption metering (+/- 2.5%).
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 2
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

* Consumption monitoring is required for Enphase Storage Systems.

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

2018-09-13

ENPHASE.

ROCK-IT SYSTEM 3.0

Designed with the installer in mind.

EcoFasten Solar specializes in solar roof attachments that are fast and easy to install, straightforward, secure and cost-effective. EcoFasten offers a wide variety of standard products as well as custom solutions, for a one-stop source for all of your rooftop anchoring needs. Products are rigorously tested and approved above and beyond industry standards in-house and by third party agencies. EcoFasten's patented conical sealing system has been in service in the snow guard and solar industries for over two decades.

Features

- New and improved design
- Fastest, easiest to level system on the market
- Integrated electrical bonding
- SIMPLE- only 4 components
- North-South adjustability
- Only one tool required (1/2" deep wellsocket)
- Vertical adjustment of 3"-4"

System Components* - Required

ROCK-IT SLIDE
4" or 8"

ROCK-IT 3.0
MOUNT

ROCK-IT 3.0
COUPLING AND
LOAD BEARING FOOT

ROCK-IT 3.0
ARRAY SKIRT

System Components* - Optional

ROCK-IT 3.0
HYBRID MOUNT
(Refer to pg. 5)

ROCK-IT CLIP SS
(Refer to pg. 7)

ROCK-IT CLIP 2.0
(Refer to pg. 7)

ROCK-IT 3.0
ARRAY SKIRT
END CAPS
(END CAPS COME
PRE-INSTALLED ON EAST
END OF SKIRT SECTIONS)

EcoFasten Solar

EcoFasten Solar products are protected by the following U.S. Patents:
8,151,522 8,153,700 8,181,398 8,166,713 8,146,299 8,209,914 8,245,454 8,272,174 8,225,557 9,010,038 9,134,040 9,175,478 9,212,833

SolaDeck

FLASHED PV ROOF-MOUNT COMBINER/ENCLOSURE

Basic Features

- Stamped Seamless Construction
- 18 Gauge Galvanized Steel
- Powder Coated Surfaces
- Flashes into the roof deck
- 3 Roof deck knockouts .5", .75", 1"
- 5 Centering dimples for entry/exit fittings or conduit
- 2 Position Ground lug installed
- Mounting Hardware Included

SolaDeck Model SD 0783

SolaDeck UL50 Type 3R Enclosures

Available Models:
Model SD 0783 - (3" fixed Din Rail)
Model SD 0786 - (6" slotted Din Rail)

SolaDeck UL 1741 Combiner/Enclosures

Models SD 0783-41 and SD 0786-41 are labeled and ETL listed UL STD 1741 according to the UL STD 1741 for photovoltaic combiner enclosures.

Max Rated - 600VDC, 120AMPS

Model SD 0783-41 3" Fixed Din Rail fastened using Norlock System

****Typical System Configuration**

4- Din Rail Mounted Fuse Holders 600VDC 30 AMP
1- Power Distribution Block 600VDC 175AMP
1- Bus Bar with UL lug

Model SD 0786-41 6" Slotted Din Rail fastened using steel studs

****Typical System Configuration**

4- Din Rail Mounted Fuse Holders 600VDC 30 AMP
4- Din Rail Mounted Terminal Blocks
Bus Bars with UL lug

**Fuse holders and terminal blocks added in the field must be UL listed or recognized and meet 600 VDC 30 AMP 110C for fuse holders, 600V 50 AMP 90C for rail mounted terminal blocks and 600 V 175 AMP 90C for Power Distribution Blocks. Use Copper Wire Conductors.

Cover is trimmed to allow conduit or fittings, base is center dimpled for fitting locations.

Model SD 0783-41, wired with Din Rail mounted fuse holders, bus bar and power distribution block.

Model SD 0786-41, wired with Din Rail mounted fuse holders, terminal blocks and bus bars.

RSTC Enterprises, Inc • 2219 Heimstead Road • Eau Cliare, WI 54703
For product information call 1(866) 367-7782

L221N

Light Duty—Visible Blades 10 kA Short Circuit Current Rating

The Square D light duty enclosed switch is ideal for home applications in disconnecting power to workshops, hobby rooms, furnaces, and garages. The light duty safety switch has visible blades and a ground lug as standard features.

Table 3.1: Fusible

System	Amperes	Fuse	NEMA Type 1 Indoor Cat. No.	Horsepower Ratings			
				120 Vac		240 Vac	
				Std.	Max.	Std.	Max.
				1Ø	1Ø	1Ø	1Ø
2 Wire (1 Blades and Fuseholders, 1 Neutral)—120 Vac							
	30	Plug	L111N	—	—	—	—
3 Wire (2 Blades and Fuseholders, 1 Neutral)—120/240 Vac							
	30	Plug Cart	L211N L221N	1/2 1/2	2 2	1-1/2 1-1/2	3 3

D223N

General Duty—Up To 100 kA Short Circuit Current Rating

General duty safety switches are designed for residential and commercial applications where durability and economy are prime considerations. Typical loads are lighting, air conditioning, and appliances. They are suitable for use as service equipment when equipped with a factory or field-installed neutral assembly or a field-installed service grounding kit, (see page 3-5) as applicable.

General duty safety switches are UL Listed, File E2875, and meet or exceed the NEMA Standard KS1.

240 Volt—Single Throw Fusible Switches

Table 3.2: Fusible

System	Amperes	Fuse	NEMA Type 1 Indoor	NEMA Type 3R *[1]* Rainproof	Class R Fuse Kits *[2]*	Horsepower Ratings			
						Std. (Fast Acting One-Time Fuses)		Max. (Dual Element Time-Delay Fuses)	
			Cat. No.	Cat. No.	Cat. No.	1Ø	3Ø	1Ø	3Ø
2 Wire (1 Blade and Fuseholder, 1 Neutral)—120 Vac									
	30	Plug	Use Light Duty Device for this Application (see above)			—	—	—	—
	30	Cart.	Use three-wire devices for this application.			—	—	—	—
3 Wire (2 Blades and Fuseholders, 1 Neutral)—120/240 Vac (Plug), 240 Vac (Cart.) Maximum									
	30	Plug	D211N	D211NRB	—	1-1/2	—	3	—
	30	Cart.	D221N	D221NRB	DRK30	1-1/2	3*[3]*	3	7-1/2 *[3]*
	60	Cart.	D222N	D222NRB	RFK03H	3	7-1/2*[3]*	10	15*[3]*
	100	Cart.	D223N	D223NRB	RFK10	7-1/2	15*[3]*	15	30*[3]*
	200	Cart.	D224N *[4]*	D224NRB *[4]*	HRK1020	15	25*[3]*	—	60*[3]*
	400	Cart.	D225N	D225NR	DRK40	—	—	—	—
	600 *[5]*	Cart.	D226N	D226NR	DRK600	—	—	—	—
4 Wire (3 Blades and Fuseholders, 1 Neutral)—240 Vac Maximum									
	30	Cart.	D321N	D321NRB	DRK30	1-1/2	3	3	7-1/2
	60	Cart.	D322N	D322NRB	RFK03H	3	7-1/2*[6]*	10	15*[6]*
	100	Cart.	D323N	D323NRB	RFK10	7-1/2	15*[6]*	15	30*[6]*
	200	Cart.	D324N *[4]*	D324NRB *[4]*	HRK1020	15	25*[6]*	—	60*[6]*
	400	Cart.	D325N	D325NR	DRK40	—	50	—	125
	400 *[7]*	Class T	D325NT	D325NTR	—	—	50	—	—
	600 *[5]*	Cart.	D326N	D326NR	DRK600	—	75	—	150
	600 *[7]*	Class T	D326NT	D326NTR	—	—	75	—	—
	800 *[7]*	Class T	T327N	T327NR	—	—	100	—	—

[1] Bolt-on hubs —Refer to Rainproof Bolt-On Hubs, Table 1.27, page 3-14.
[2] When properly installed, the Class R Fuse Kit rejects all but Class R fuses.
[3] For corner grounded delta systems only. Use switching poles for ungrounded conductors. See data bulletin 2700DB0202 for additional information.
[4] For 200% neutral, order (1) additional neutral kit SN20A and (1) neutral jumper kit SN20NI.
[5] Order Class J Fuse Kit GDJK600 if using Class J fuses.
[6] If corner grounded delta, use outer switching poles for ungrounded conductors.
[7] D325NT, D325NTR, D326NT, D326NTR, T327N and T327NR accept only 300Vac Class T fuses.

240 Volt—Single Throw Non-Fusible Switches

Table 3.3: Non-Fusible

System	Amperes	NEMA Type 1 Indoor	NEMA Type 3R Rainproof *[8]*	Horsepower Ratings (Max.)	
		Cat. No.	Cat. No.	1Ø	3Ø
2 Wire (2 Blades)—240 Vac Maximum					
	30	—	DU221RB	3	—
	60	—	DU222RB	10	—
	60	QO260NATS *[9] [10]*	QO200TR *[9] [10] [11]*	10	—
	100	QO2000NS *[9] [10]*	QO2000NRB *[9] [11]*	20	—
	200	Use 3P Switch	Use 3P Switch	—	—
	400	Use 3P Switch	Use 3P Switch	—	—
	600	Use 3P Switch	Use 3P Switch	—	—
3 Wire (3 Blades)—240 Vac Maximum					
	30	DU321	DU321RB	3	7-1/2
	60	DU322	DU322RB	10	15
	100	DU323 *[12]*	DU323RB *[12]*	15	40
	200	DU324 *[13]*	DU324RB *[13]*	15	60
	400	DU325	—	—	125
	600	DU326 *[14]*	—	—	150

UL Listed Maximum Short Circuit Current Ratings — AC Only

Table 3.4: Fusible Safety Switch Short Circuit Current Rating

Fuse Class	UL Listed Short Circuit Rating
Plug	10 kA
H, K	10 kA
J *[15]*, R	100 kA
T *[16]*	100 kA

Non-Fusible Safety Switches

Systems equal or less than 10 kAIR SCCR —Any brand of circuit breaker or fuse not exceeding the ampere rating of the switch may be used in conjunction with a non-fusible safety switch.

Systems above 10 kAIR SCCR—The UL Listed short circuit current rating for Square D non-fusible switches is based upon the switch being used in conjunction with fuses or Square D circuit breakers or Mag-Gard motor circuit protectors.

Table 3.5: Non-Fusible Safety Switch Short Circuit Current Rating

Fuse Class or Circuit Breaker Type *[17]*	UL Listed Short Circuit Rating
Any Brand Circuit Breaker	10 kA
H or J PowerPact Circuit Breaker	Up to 65 kA *[18]*
H, K	10 kA
J, R	100 kA *[19]*
T	100 kA *[20]*

[8] Bolt-on hubs—Refer to Hubs, page 3-14.
[9] Enclosed molded case switch—Refer to Section 1.
[10] Includes factory-installed grounding kit.
[11] Not service entrance rated—Refer to Table 3.34 for more information.
[12] If a neutral assembly is required, order and field install SN0610.
[13] If a neutral assembly is required, order and field install a SN20A Neutral Assembly Kit. For a 200% neutral application, order and field install (2) SN20A Neutral Assembly Kits and (1) SN20NI Neutral Jumper Kit.
[14] If a neutral assembly is required, order and field install D600SN.
[15] Only applicable to 200 A - 600 A except D325NT, D325NTR, D326NT and D326NTR.
[16] Only applicable to D325NT, D325NTR, D326NT, D326NTR, T327N and T327NR.
[17] Ampere rating of fuse or circuit breaker not to exceed switch ampere rating.
[18] Only applicable to DU324 and DU324RB. HD, JD = 25 kA maximum.
[19] SCCR = 50 kA, applicable to DU222RB, DU322 and DU322RB.
[20] Only applicable to DU323, DU323RB, DU325 and DU326.