PHOTOVOLTAIC ROOF MOUNT SYSTEM

28 MODULES-ROOF MOUNTED - 8.96 kWDC, 7.60 kWAC

93 BENNETT RD,COATS, NC 27521 USA

SYSTEM SUMMARY:

(N) 28 - JINKO SOLAR JKM320M-60HBL (320W) MODULES
(N) 01 - SOLAREDGE SE7600H-US INVERTER
(N) 28 - SOLAREDGE P320 POWER OPTIMIZERS
(N) JUNCTION BOX
(E) 125A MAIN SERVICE PANEL WITH RULE OF SIX
(N) 60A NON FUSED AC DISCONNECT

DESIGN CRITERIA:

ROOF TYPE: - ASPHALT SHINGLE
NUMBER OF LAYERS: - 01
ROOF FRAME: - 2" X 6" RAFTERS @24" O.C.
STORY: - ONE STORY
SNOW LOAD : - 15 PSF
WIND SPEED :- 118 MPH
WIND EXPOSURE:- B

GENERAL NOTES

- THE CONTRACTOR/INSTALLER OF THE SOLAR PV SYSTEM OVER EXISTING ROOF SHALL CONFORM TO OSHA REQUIREMENTS DURING THE CONSTRUCTION PHASE. JOB SAFETY AND CONSTRUCTION PROCEDURES ARE THE SOLE RESPONSIBILITY OF THE CONTRACTOR/INSTALLER.
- REFER TO ELECTRICAL DRAWING PV-5 FOR PANEL DETAILED INFORMATION.
- IN CASE OF CONFLICT BETWEEN STRUCTURAL DRAWINGS AND ELECTRICAL DRAWINGS, THE MOST RIGID REQUIREMENTS SHALL GOVERN.
- THE CONTRACTOR/INSTALLER SHALL VERIFY ALL EXISTING BUILDING INFORMATION SHOWN (DIMENSIONS, ROOF TOP PROJECTIONS, ETC.) AND NOTIFY THE ENGINEER OF ANY DISCREPANCIES PRIOR TO INSTALLATIONS OF PV SYSTEM.
- THE CONTRACTOR/INSTALLER SHALL VERIFY AND COORDINATE EXISTING OPENINGS, ROOF TOP UNITS, VENT PIPES, ETC. SHOWN ON DRAWINGS. IF THERE IS A DISCREPANCY BETWEEN DRAWINGS, IT IS THE CONTRACTORS/INSTALLER'S RESPONSIBILITY TO NOTIFY ENGINEER PRIOR TO PERFORMING THE WORK.
- ALL CONSTRUCTION IS TO BE PERFORMED IN STRICT CONFORMANCE WITH ALL APPLICABLE TOWN, COUNTY & STATE REGULATIONS AND/OR ANY OTHER GOVERNING BODIES.
- DO NOT SCALE THESE DRAWINGS, USE DIMENSIONS. CONTRACTOR MUST CONDUCT ROOF SURVEY TO VERIFY DIMENSIONS SHOWN ON PLAN PRIOR TO INSTALLATION. IF THERE IS A DISCREPANCY IT IS CONTRACTOR/INSTALLER'S RESPONSIBILITY TO NOTIFY THE ENGINEER IMMEDIATELY.

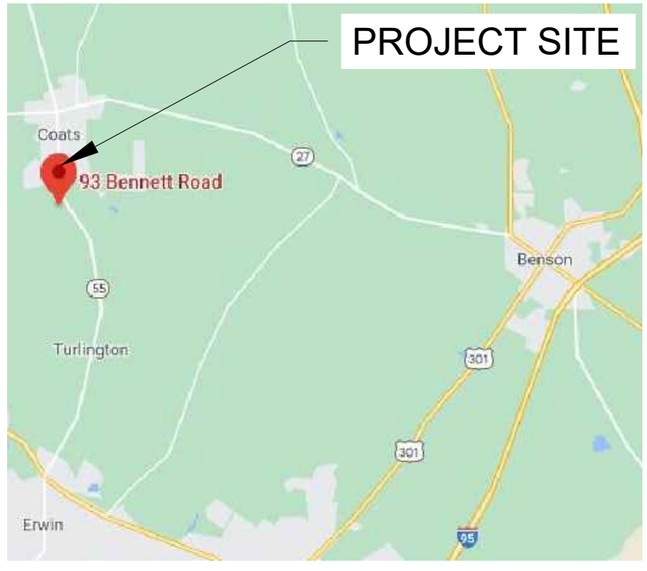
NOTICE TO CONTRACTOR
All construction must comply with current NC Building Codes and is subject to field inspection and verification.
APPROVED
Limited building only review
Permit holder responsible for full compliance with the code
09/10/2020
Harnett COUNTY NORTH CAROLINA

GOVERNING CODES:

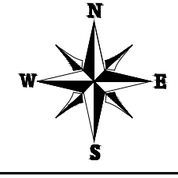
THIS PROJECT SHALL COMPLY WITH THE FOLLOWING CODE
2018 NORTH CAROLINA BUILDING CODE (NCBC)
2018 NORTH CAROLINA RESIDENTIAL CODE (NCRC)
2018 NORTH CAROLINA FIRE CODE (NCFC)
2018 NORTH CAROLINA PLUMBING CODE (NCPC)
2018 NORTH CAROLINA MECHANICAL CODE (NCMC)
2018 NORTH CAROLINA FUEL GAS CODE (NCFGC)
2018 NORTH CAROLINA ENERGY CONSERVATION CODE (NCECC)
2017 NORTH CAROLINA ELECTRICAL CODE (NCEC)
2015 INTERNATIONAL BUILDING CODE (IBC)
2015 INTERNATIONAL RESIDENTIAL CODE (IRC)
2015 INTERNATIONAL EXISTING BUILDING CODE (IEBC)
2015 INTERNATIONAL FUEL GAS CODE (IFGC)
2015 INTERNATIONAL FIRE CODE (IFC)
2015 INTERNATIONAL MECHANICAL CODE (IMC)
2015 INTERNATIONAL ENERGY CONSERVATION CODE (IECC).

SHEET INDEX

1 AERIAL PHOTO
PV-0 SCALE: NTS



2 VICINITY MAP
PV-0 SCALE: NTS



TOTAL SOLAR SOLUTIONS.
3463 MAGIC DR SUITE 2003,SAN ANTONIO, TX, 78229
TEL: (801) 989-3585
Email: tbright@totalsolarsolutions.co

VERSION

DESCRIPTION	DATE	REV
INITIAL RELEASE	8/28/2020	UR

ENGINEER'S STAMP

PROJECT NAME

CHRISTOPHER PETOLETTI
93 BENNETT RD,
COATS, NC 27521 USA
APN# 0705990180
UTILITY: DUKE PROGRESS
AHJ: COATS

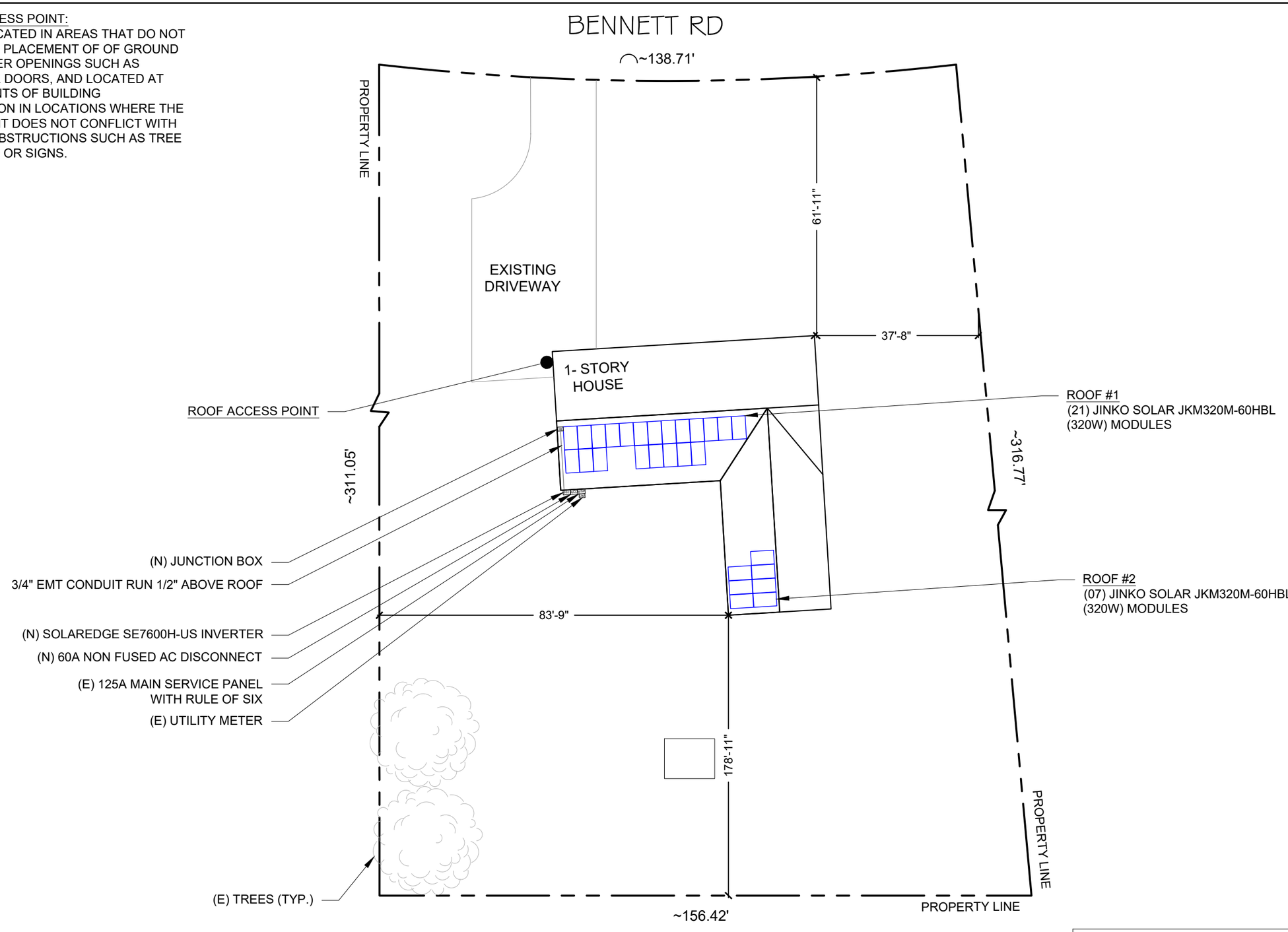
SHEET NAME

COVER SHEET

SHEET NUMBER

PV-0

● ROOF ACCESS POINT:
SHALL BE LOCATED IN AREAS THAT DO NOT REQUIRE THE PLACEMENT OF OF GROUND LADDERS OVER OPENINGS SUCH AS WINDOWS OR DOORS, AND LOCATED AT STRONG POINTS OF BUILDING CONSTRUCTION IN LOCATIONS WHERE THE ACCESS POINT DOES NOT CONFLICT WITH OVERHEAD OBSTRUCTIONS SUCH AS TREE LIMBS, WIRES OR SIGNS.



NOTE:
- ALL ELECTRICAL EQUIPMENT, INVERTERS, DISCONNECTS, MAIN SERVICE PANELS, ETC. SHALL NOT BE INSTALLED WITHIN 3' OF THE GAS METERS' SUPPLY OR DEMAND PIPING.
- PLUMBING VENTS, SKYLIGHTS AND MECHANICAL VENTS SHALL NOT BE COVERED, MOVED, RE-ROUTED OR RE-LOCATED.

1 SITE PLAN WITH ROOF PLAN

SCALE: 1/24"=1'-0"

N

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AHJ: COATS

SHEET NAME

SITE PLAN WITH ROOF PLAN

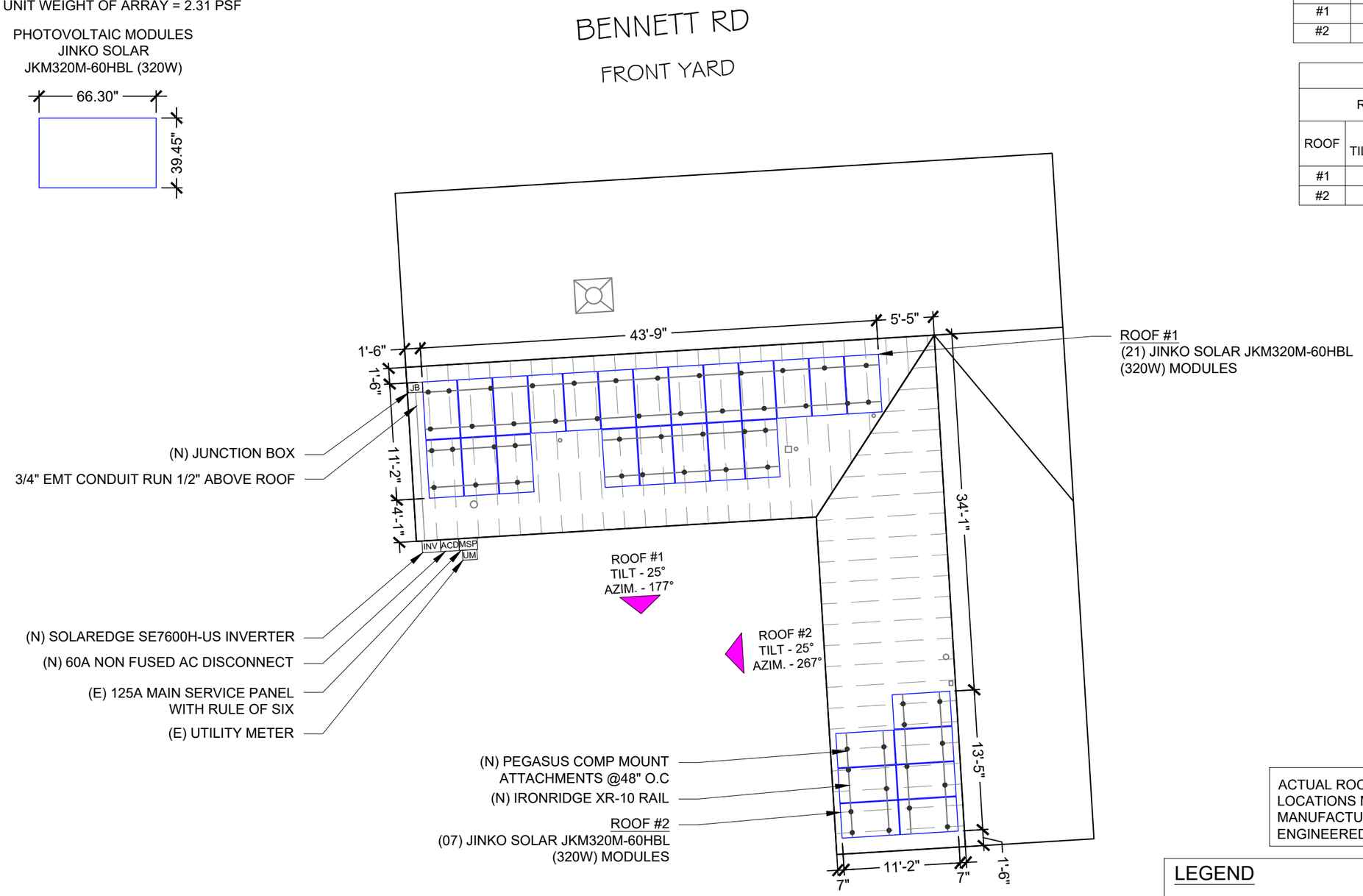
SHEET NUMBER

PV-1

MODULE TYPE, DIMENSIONS & WEIGHT

NUMBER OF MODULES = 28 MODULES
MODULE TYPE = JINKO SOLAR JKM320M-60HBL (320W) MODULES
MODULE WEIGHT = 41.9 LBS / 19.0 KG.
MODULE DIMENSIONS = 66.30"X 39.45" = 18.16 SF
UNIT WEIGHT OF ARRAY = 2.31 PSF

PHOTOVOLTAIC MODULES
JINKO SOLAR
JKM320M-60HBL (320W)



1 ROOF PLAN WITH MODULES

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

N

ARRAY AREA & ROOF AREA CALC'S				
ROOF	# OF MODULES	ARRAY AREA (Sq. Ft.)	ROOF AREA (Sq. Ft.)	ROOF AREA COVERED BY ARRAY (%)
#1	21	381.43	742.31	51.38
#2	7	127.14	501.79	25.34

ROOF DESCRIPTION				
ROOF TYPE			ASPHALT SHINGLE (1 LAYER)	
ROOF	ROOF TILT/SLOPE	AZIMUTH	RAFTERS SIZE	RAFTERS SPACING
#1	25°	177°	2" x 6"	24" O.C.
#2	25°	267°	2" x 6"	24" O.C.

ACTUAL ROOF CONDITIONS AND RAFTER (OR SEAM) LOCATIONS MAY VARY. INSTALL AS PER MANUFACTURER(S) INSTALLATION GUIDELINES AND ENGINEERED SPANS FOR ATTACHMENTS.

LEGEND

- UM - UTILITY METER
- MSP - MAIN SERVICE PANEL
- INV - INVERTER
- JB - JUNCTION BOX
- VENT, ATTIC FAN (ROOF OBSTRUCTION)
- ROOF ATTACHMENT
- RAFTERS
- CONDUIT
- CHIMNEY
- ACD - AC DISCONNECT

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AHJ: COATS

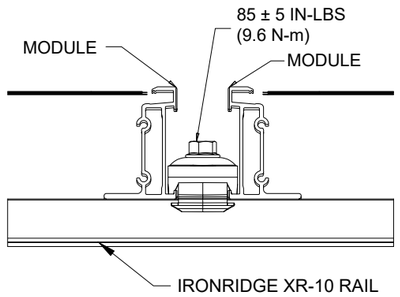
SHEET NAME

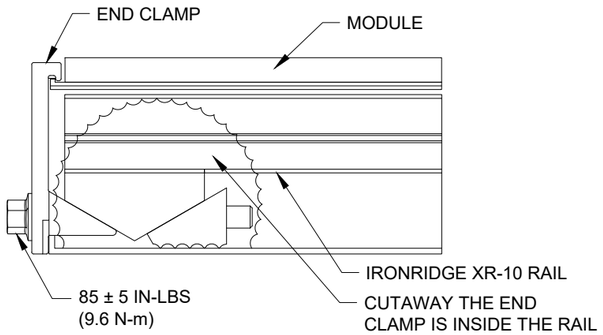
ROOF PLAN WITH MODULES

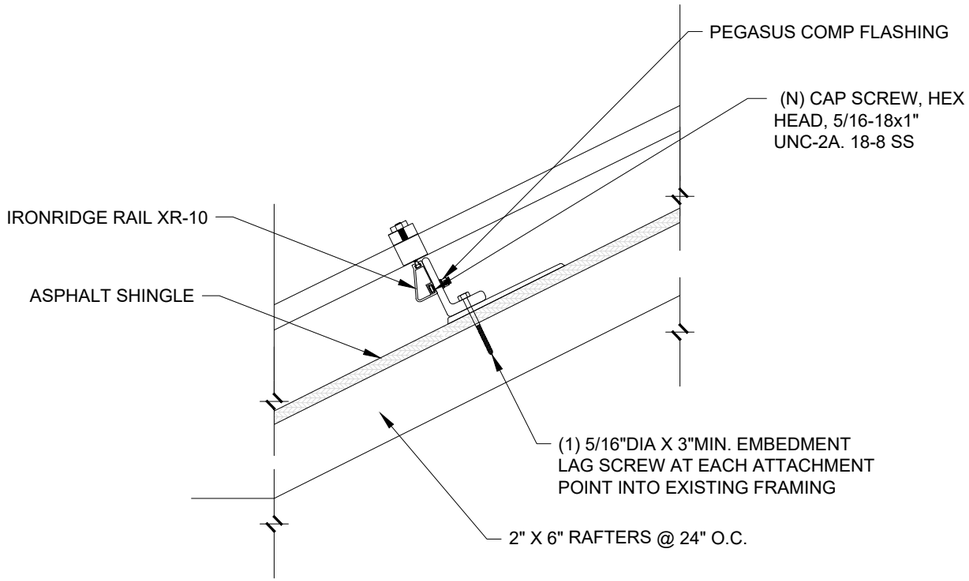
SHEET NUMBER

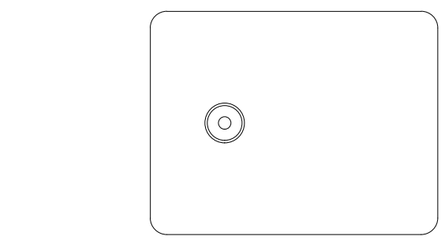
PV-2

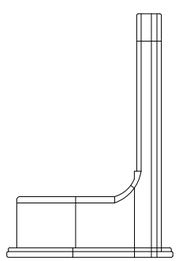
NOTES:
- 5/16" LAG BOLTS MUST EMBED 2.5" INTO ROOF STRUCTURAL MEMBERS/RAFTERS
- TORQUE ALL 5/16" HARDWARE TO THE FOLLOWING:
  - SILVER S.S. 10-16 FT-LBS
  - BLACK S.S. 7-9 FT-BLS
- RAILS MOUNT TO DOWN SLOPE SIDE OF L FOOT

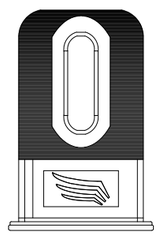






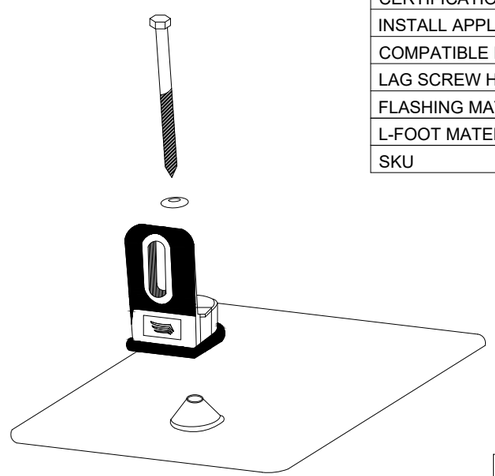






PEGASUS COMP FLASHING DETAIL

SPECIFICATIONS	COMP. L-FOOT INSTALL KIT
CONTENTS	FLASHING, L-FOOT, LAG
ROOF TYPE	ASPHALT SHINGLE
CERTIFICATIONS	IBC, ASCE/SEI 7-10
INSTALL APPLICATION	RAILED SYSTEMS
COMPATIBLE RAIL	ALL
LAG SCREW HARDWARE	5/16" SS W/ WASHER
FLASHING MATERIAL	PAINTED GALVALUME PLUS
L-FOOT MATERIAL	CAST ALUMINUM
SKU	RRCLFOOMIBDK-24



ACTUAL ROOF CONDITIONS AND RAFTER (OR SEAM) LOCATIONS MAY VARY. INSTALL AS PER MANUFACTURER(S) INSTALLATION GUIDELINES AND ENGINEERED SPANS FOR ATTACHMENTS.

1 ATTACHMENT DETAIL
PV-3

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93 BENNETT RD,
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APN# 0705990180
UTILITY: DUKE PROGRESS
AHJ: COATS

SHEET NAME

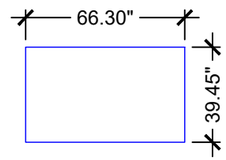
ATTACHMENT DETAIL

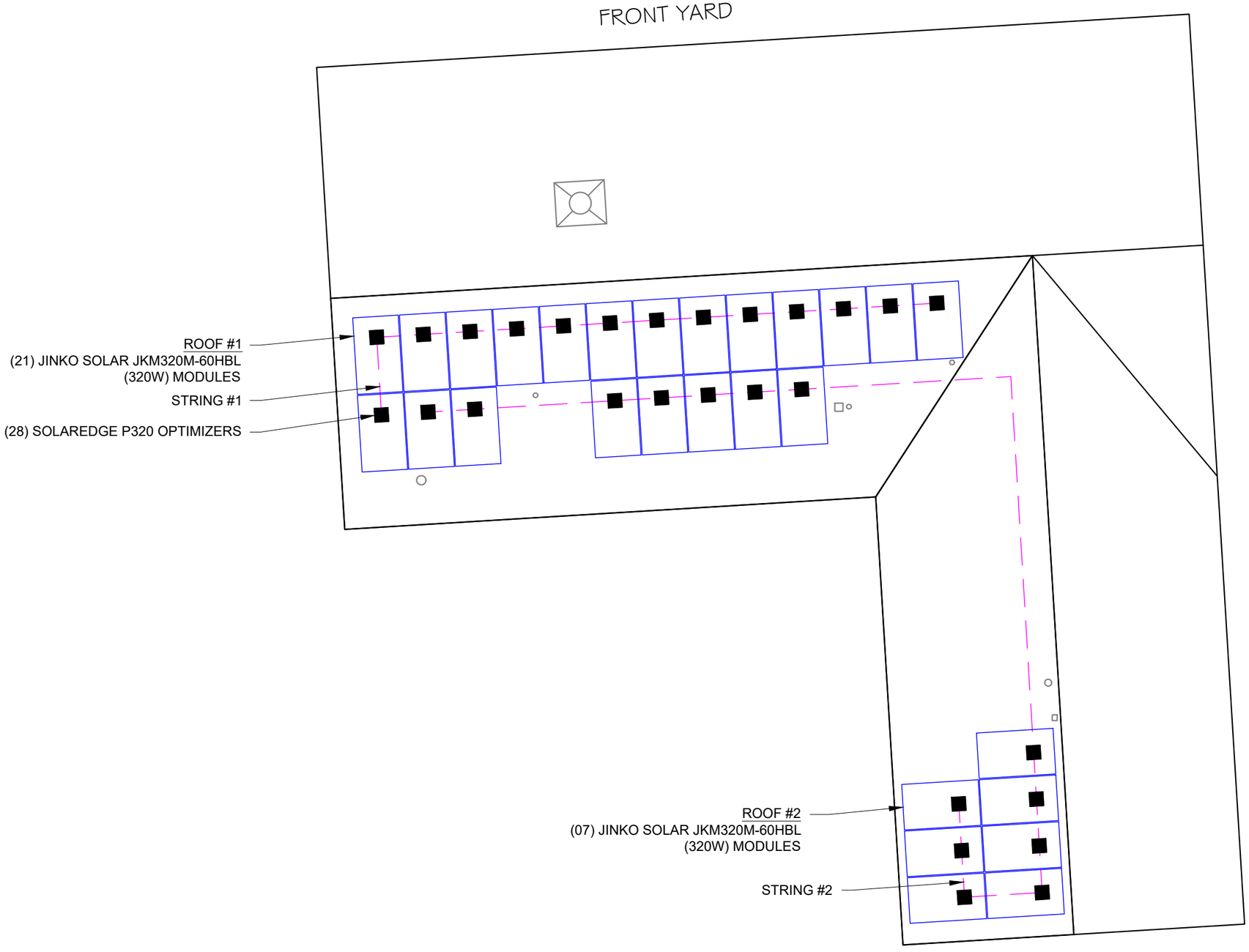
SHEET NUMBER

PV-3

(28) JINKO SOLAR JKM320M-60HBL (320W) MODULES
(28) SOLAREDGE P320 POWER OPTIMIZERS
(02) STRINGS OF 14 MODULES CONNECTED IN SERIES PER STRING

PHOTOVOLTAIC MODULES
JINKO SOLAR
JKM320M-60HBL (320W)





1 STRING LAYOUT
SCALE: 1/8" = 1'-0"

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APN# 0705990180
UTILITY: DUKE PROGRESS
AHJ: COATS

SHEET NAME

STRING LAYOUT

SHEET NUMBER

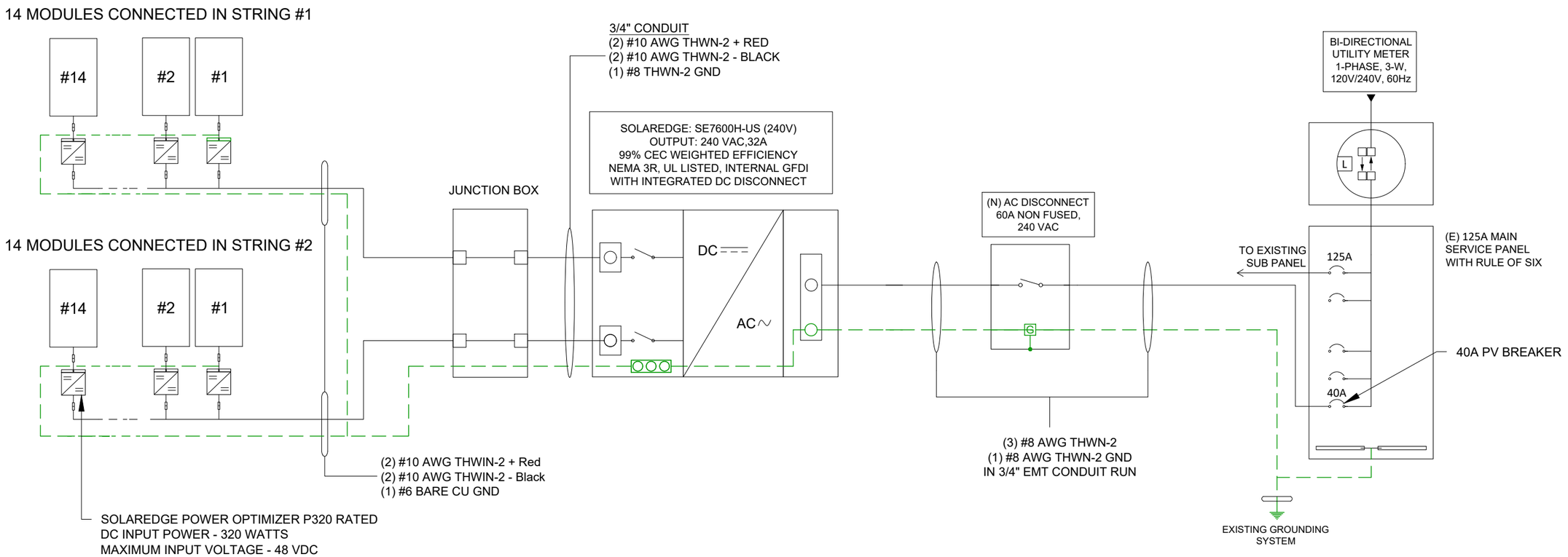
PV-4

(28) JINKO SOLAR JKM320M-60HBL (320W) MODULES
(28) SOLAREDGE P320 POWER OPTIMIZERS
(02) STRINGS OF 14 MODULES CONNECTED IN SERIES PER STRING

SYSTEM SIZE:- 28 x 320W = 8.96 kWDC
1 x 7600W = 7.60 kWAC

BILL OF MATERIALS

EQUIPMENT	QTY	DESCRIPTION
SOLAR PV MODULE	28	JINKO SOLAR JKM320M-60HBL (320W) MODULES
INVERTER	1	SOLAREDGE SE7600H-US INVERTER
OPTIMIZER	28	SOLAREDGE P320 POWER OPTIMIZERS
JUNCTION BOX	1	600V, 55A MAX, 4 INPUTS, MOUNTED ON ROOF FOR WIRE & CONDUIT TRANSITION
AC DISCONNECT	1	240VAC, 60A NON FUSED, NEMA 3R, UL LISTED



1 ELECTRICAL LINE DIAGRAM

SCALE: NTS

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UTILITY: DUKE PROGRESS
AHJ: COATS

SHEET NAME

ELECTRICAL LINE DIAGRAM

SHEET NUMBER

PV-5

SOLAR MODULE SPECIFICATIONS	
MANUFACTURER / MODEL #	JINKO SOLAR JKM320M-60HBL (320W) MODULES
VMP	33.4V
IMP	9.59 A
VOC	40.9 V
ISC	10.15 A
MODULE DIMENSION	66.30"L x 39.45"W x 1.38"D

(#1) INVERTER SPECIFICATIONS	
MANUFACTURER / MODEL #	SOLAREDGE SE7600H-US
NOMINAL OUTPUT VOLTAGE	240 VAC
NOMINAL OUTPUT CURRENT	32A

AMBIENT TEMPERATURE SPECS	
WEATHER STATION: SOUTH ST PAUL MUNI	
RECORD LOW TEMP	-10°
AMBIENT TEMP (HIGH TEMP 2%)	35°
CONDUIT HEIGHT	0.5"
ROOF TOP TEMP	57°
CONDUCTOR TEMPERATURE RATE	90°
MODULE TEMPERATURE COEFFICIENT OF Voc	-0.28%/°C

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

OPTIMIZER SPECIFICATIONS	
MANUFACTURER / MODEL #	SOLAREDGE P-320 POWER OPTIMIZER
NOMINAL OUTPUT CURRENT	15A

DC CONDUCTOR AMPACITY CALCULATIONS: ARRAY TO JUNCTION BOX:

EXPECTED WIRE TEMP (In Celsius)	35°
TEMP. CORRECTION PER TABLE (310.16)	0.96
NO. OF CURRENT CARRYING CONDUCTORS	4
CONDUIT FILL CORRECTION PER NEC 310.15(B)(2)(a)	0.80
CIRCUIT CONDUCTOR SIZE	10 AWG
CIRCUIT CONDUCTOR AMPACITY	40A

REQUIRED CIRCUIT CONDUCTOR AMPACITY PER NEC 690.8(A&B)	18.75A
1.25 X MAX DC OUTPUT CURRENT	
DERATED AMPACITY OF CIRCUIT CONDUCTOR PER NEC TABLE 310.16	30.72A
TEMP. CORRECTION PER TABLE (310.16) X CONDUIT FILL CORRECTION PER NEC 310.15(B)(2)(a) X CIRCUIT CONDUCTOR AMPACITY	
Result should be greater than (18.75A) otherwise less the entry for circuit conductor size and ampacity	

DC CONDUCTOR AMPACITY CALCULATIONS: FROM JUNCTION BOX TO INVERTER:

AMBIENT TEMPERATURE ADJUSTMENT FOR EXPOSED CONDUIT PER NEC 310.15(B)(2)(c)	+22°
EXPECTED WIRE TEMP (In Celsius)	35°+22° =57°
TEMP. CORRECTION PER TABLE (310.16)	0.71
NO. OF CURRENT CARRYING CONDUCTORS	4
CONDUIT FILL CORRECTION PER NEC 310.15(B)(2)(a)	0.80
CIRCUIT CONDUCTOR SIZE	10AWG
CIRCUIT CONDUCTOR AMPACITY	40A

REQUIRED CIRCUIT CONDUCTOR AMPACITY PER NEC 690.8(A&B)	18.75A
1.25 X MAX DC OUTPUT CURRENT	
DERATED AMPACITY OF CIRCUIT CONDUCTOR PER NEC TABLE 310.16	22.72A
TEMP. CORRECTION PER TABLE (310.16) X CONDUIT FILL CORRECTION PER NEC 310.15(B)(2)(a) X CIRCUIT CONDUCTOR AMPACITY	
Result should be greater than (18.75A) otherwise less the entry for circuit conductor size and ampacity	

AC CONDUCTOR AMPACITY CALCULATIONS: INVERTER TO AC DISCONNECT:

No. OF INVERTER	1
EXPECTED WIRE TEMP (In Celsius)	35°
TEMP. CORRECTION PER TABLE (310.16)	0.96
NO. OF CURRENT CARRYING CONDUCTORS	3
CONDUIT FILL CORRECTION PER NEC 310.15(B)(2)(a)	1.0
#1 - #2 CIRCUIT CONDUCTOR SIZE	8AWG
CIRCUIT CONDUCTOR AMPACITY	55A

REQUIRED CIRCUIT CONDUCTOR AMPACITY PER NEC 690.8(B)	40.00A
1.25 X MAX INVERTER OUTPUT CURRENT	
DERATED AMPACITY OF CIRCUIT CONDUCTOR PER NEC TABLE 310.16	52.80A
TEMP. CORRECTION PER TABLE (310.16) X CONDUIT FILL CORRECTION PER NEC 310.15(B)(2)(a) X CIRCUIT CONDUCTOR AMPACITY	
Result should be greater than (40.00A) otherwise less the entry for circuit conductor size and ampacity	

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 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

1 ELECTRICAL CALCULATION
SCALE: NTS

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AHJ: COATS

SHEET NAME

ELECTRICAL CALCULATION

SHEET NUMBER

PV-6

⚠ WARNING

ELECTRIC SHOCK HAZARD

TERMINALS ON THE LINE AND LOAD SIDES MAY BE ENERGIZED IN THE OPEN POSITION

LABEL LOCATION:
AC & DC DISCONNECT AND SUB PANEL
(PER CODE: NEC 690.13(B))

⚠ WARNING

ELECTRIC SHOCK HAZARD

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

DC VOLTAGE IS ALWAYS PRESENT WHEN SOLAR MODULES ARE EXPOSED TO SUNLIGHT

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

WARNING

ELECTRIC SHOCK HAZARD

IF GROUND FAULT IS INDICATED ALL NORMALLY GROUNDED CONDUCTORS MAY BE UNGROUNDED AND ENERGIZED

LABEL LOCATION:
AC & DC DISCONNECT AND SUB PANEL
(PER CODE: NEC 690.41(B))

⚠ WARNING DUAL POWER SOURCE
SECOND SOURCE IS PHOTOVOLTAIC SYSTEM

LABEL LOCATION:
PRODUCTION METER & BREAKER PANEL
(PER CODE: NEC 705.12(D)(3) & NEC 690.59)

⚠ WARNING

THE DISCONNECTION OF THE GROUNDED CONDUCTOR(S) MAY RESULT IN OVERVOLTAGE ON THE EQUIPMENT

LABEL LOCATION:
INVERTER
(PER CODE: NEC 690.31(I)

⚠ CAUTION

PHOTOVOLTAIC SYSTEM CIRCUIT IS BACKFED

LABEL LOCATION:
MSP
(PER CODE: NEC 690.13 (F), NEC 705.12(B)(3-4) & NEC 690.59)

PHOTOVOLTAIC SYSTEM AC DISCONNECT
RATED AC OPERATING CURRENT 32 AMPS
AC NOMINAL OPERATING VOLTAGE 240 VOLTS

LABEL LOCATION:
AC DISCONNECT & INVERTER
(PER CODE: NEC690.54)

⚠ WARNING
POWER SOURCE OUTPUT CONNECTION
DO NOT RELOCATE THIS OVERCURRENT DEVICE

LABEL LOCATION:
SERVICE PANEL IF SUM OF BREAKERS EXCEEDS PANEL RATING
(PER CODE: NEC 705.12 (B)(2)(c)

WARNING:PHOTOVOLTAIC POWER SOURCE

LABEL LOCATION:
CONDUIT, COMBINER BOX
(PER CODE: NEC 690.31(G)(3)(4)

PHOTOVOLTAIC

AC DISCONNECT

LABEL LOCATION:
AC DISCONNECT
(PER CODE: NEC 690.13(B)

RAPID SHUTDOWN SWITCH FOR SOLAR PV SYSTEM

LABEL LOCATION:
RAPID SHUTDOWN
(PER CODE: NEC 690.56(C)(3)

INVERTER #1

WARNING
DC PHOTOVOLTAIC POWER SOURCE
RATED MPP VOLTAGE = 400 VDC
MAX SYSTEM VOLTAGE = 480 VDC
RATED MPP CURRENT = 22.4 AMPS
SHORT CIRCUIT CURRENT = 30 AMPS

LABEL LOCATION:
DC DISCONNECT, INVERTER
(PER CODE: CEC690.53)

MAIN PHOTOVOLTAIC SYSTEM DISCONNECT

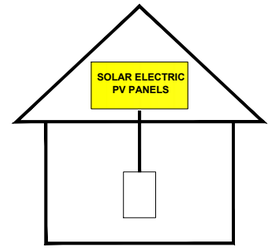
LABEL LOCATION:
PRODUCTION / UTILITY METER
(BI-DIRECTIONAL
(PER CODE: NEC 690.13(B))

MAIN PHOTOVOLTAIC SYSTEM DISCONNECT

LABEL LOCATION:
MAIN SERVICE DISCONNECT / UTILITY METER
(PER CODE: NEC 690.13(B))

SOLAR PV SYSTEM EQUIPPED WITH RAPID SHUTDOWN

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

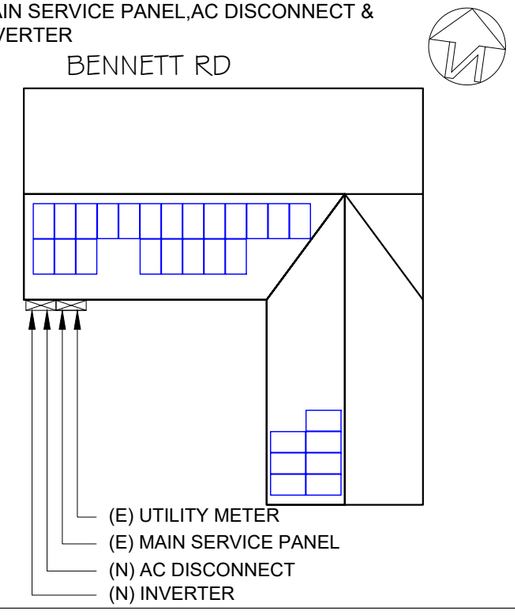


LABEL LOCATION
AT RAPID SHUTDOWN SYSTEM
[NEC 690.56(C)(1)(a)]

CAUTION

POWER TO THIS BUILDING IS ALSO SUPPLIED FROM THE FOLLOWING SOURCES WITH DISCONNECTS LOCATED AS SHOWN

AT: ☒ MAIN SERVICE PANEL,AC DISCONNECT & INVERTER



TOTAL SOLAR SOLUTIONS

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3463 MAGIC DR SUITE 2003,SAN ANTONIO, TX, 78229
TEL: (801) 989-3585
Email: tbright@totalsolarsolutions.co

VERSION

DESCRIPTION	DATE	REV
INITIAL RELEASE	8/28/2020	UR

ENGINEER'S STAMP

PROJECT NAME

CHRISTOPHER PETOLETTI
93 BENNETT RD,
COATS, NC 27521 USA
APN# 0705990180
UTILITY: DUKE PROGRESS
AHJ: COATS

SHEET NAME

PLACARDS & WARNING LABELS

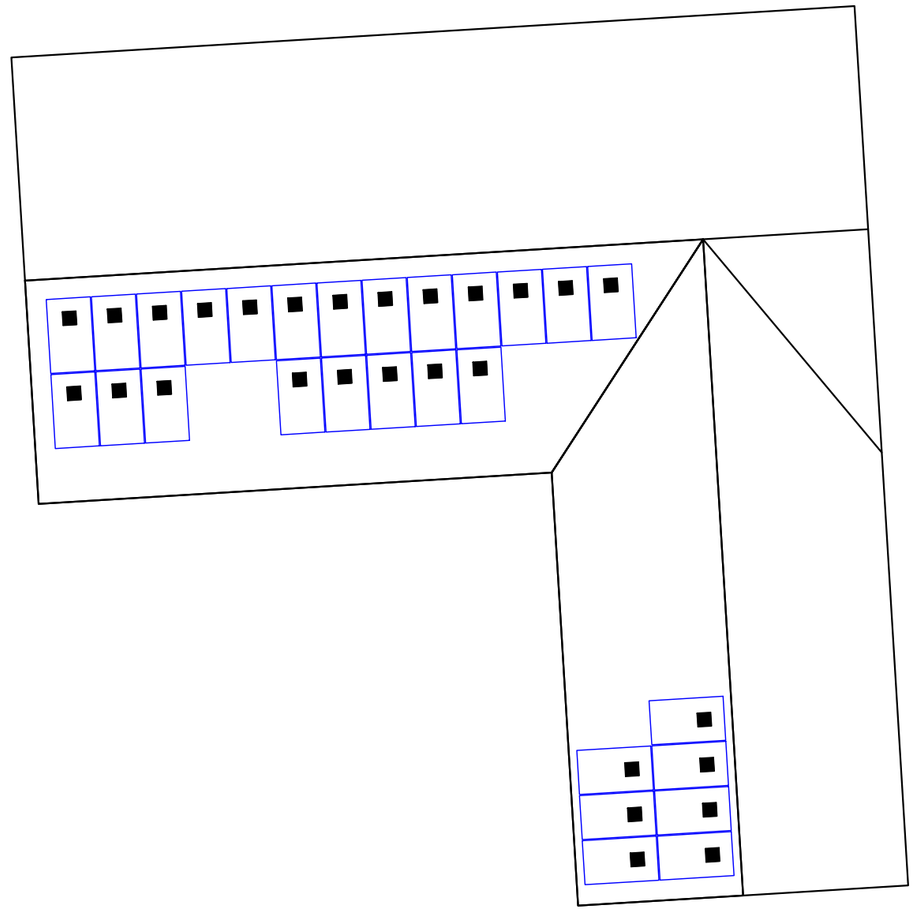
SHEET NUMBER

PV-7

	1-10	11-20	21-30	31-40	41-50	51-60
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						

POWER OPTIMIZER CHART

BENNETT RD



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SHEET NAME

OPTIMIZER CHART

SHEET NUMBER

PV-8

1. EACH MODULE TO BE GROUNDED USING THE SUPPLIED CONNECTION POINT PER MANUFACTURER'S REQUIREMENTS. ALL SOLAR MODULES, EQUIPMENT, AND METALLIC COMPONENTS ARE TO BE BONDED. IF THE EXISTING GROUNDING ELECTRODE SYSTEM CAN NOT BE VERIFIED OR IS ONLY METALLIC WATER PIPING, IT IS THE CONTRACTOR'S RESPONSIBILITY TO INSTALL A SUPPLEMENTAL GROUNDING ELECTRODE.

2. ALL PLAQUES AND SIGNAGE REQUIRED BY THE LATEST EDITION OF NATIONAL ELECTRICAL CODE. LABEL SHALL BE METALLIC OR PLASTIC, ENGRAVED OR MACHINE PRINTED IN A CONTRASTING COLOR TO THE PLAQUE. PLAQUE SHALL BE UV RESISTANT IF EXPOSED TO SUNLIGHT.

3. DC CONDUCTORS SHALL BE RUN IN EMT AND SHALL BE LABELED, "CAUTION DC CIRCUIT" OR EQUIV. EVERY 5 FT.

4. EXPOSED NON-CURRENT CARRYING METAL PARTS OF ELECTRICAL EQUIPMENT SHALL BE GROUNDED IN ACCORDANCE WITH 250.134 OR 250.136(A).

5. CONFIRM LINE SIDE VOLTAGE AT ELECTRIC UTILITY SERVICE PRIOR TO CONNECTING INVERTER. VERIFY SERVICE VOLTAGE IS WITHIN INVERTER VOLTAGE OPERATIONAL RANGE.

6. OUTDOOR EQUIPMENT SHALL BE NEMA-3R RATED OR BETTER.

7. ELECTRICAL CONTRACTOR TO PROVIDE CONDUIT EXPANSION JOINTS AND ANCHOR CONDUIT RUNS AS REQUIRED PER NEC.

8. ALL WIRING MUST BE PROPERLY SUPPORTED BY DEVICES OR MECHANICAL MEANS DESIGNED AND LISTED FOR SUCH USE, AND FOR ROOF-MOUNTED SYSTEMS, WIRING MUST BE PERMANENTLY AND COMPLETELY HELP OFF OF THE ROOF SURFACE. NEC 110.2 - 110.4 / 300.4

9. ALL ROOF PENETRATIONS MUST BE FLASHED. SIMPLY CAULKING DOES NOT SUFFICE.

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AHJ: COATS

SHEET NAME

ADDITIONAL NOTES

SHEET NUMBER

PV-9

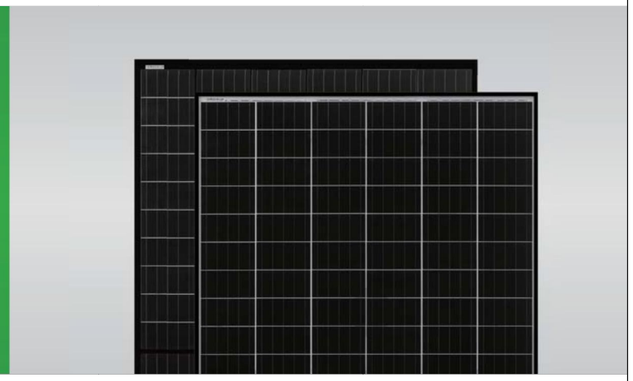
jinkosolar.us

Jinko Solar
Building Your Trust in Solar

Eagle HC 60M G2
315-335 Watt

MONO PERC HALF CELL MODULE

Positive power tolerance of 0~+3%



KEY FEATURES

Diamond Cell Technology
Uniquely designed high performance 5 busbar mono PERC half cell

Higher Module Power
Decrease in current loss yields higher module efficiency

Shade Tolerance
More shade tolerance due to twin arrays

PID FREE
Reinforced cell prevents potential induced degradation

Strength and Durability
Certified for high snow (5400Pa) and wind (2400 Pa) loads

- ISO9001:2008 Quality Standards
- ISO14001:2004 Environmental Standards
- OHSAS18001 Occupational Health & Safety Standards
- IEC61215, IEC61730 certified products
- UL1703 certified products

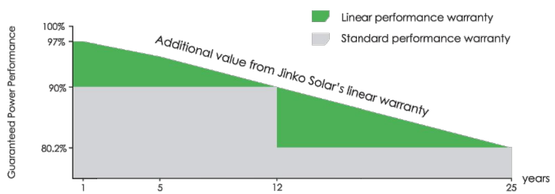
Nomenclature:

JKM335M-60HBL

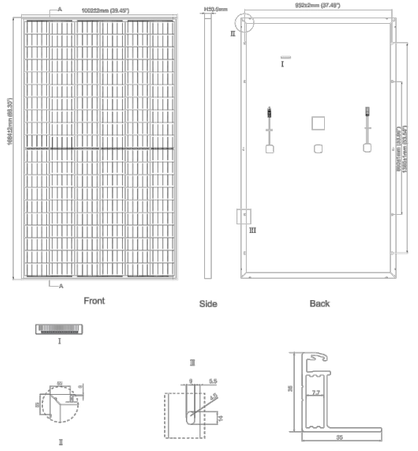
Code	Cell	Code	Backsheet	Code	Cell
null	Full	null	White	null	Normal
H	Half	B	Black	L	Diamond

LINEAR PERFORMANCE WARRANTY

10 Year Product Warranty • 25 Year Linear Power Warranty



Engineering Drawings

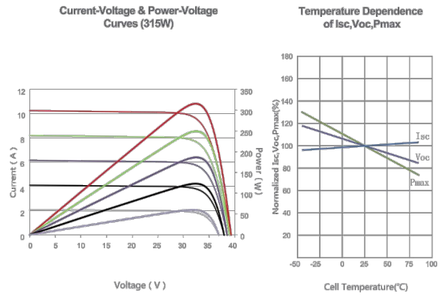


Packaging Configuration

(Two pallets = One stack)

30pcs/pallet, 60pcs/stack, 780pcs/40'HQ Container

Electrical Performance & Temperature Dependence



Mechanical Characteristics

Cell Type	Mono PERC Diamond Cell (158.75 x 158.75 mm)
No.of Half-cells	120 (6×20)
Dimensions	1684×1002×35mm (65.30×39.45×1.38 inch)
Weight	19.0 kg (41.9 lbs)
Front Glass	3.2mm, Anti-Reflection Coating, High Transmission, Low Iron, Tempered Glass
Frame	Anodized Aluminum Alloy
Junction Box	IP67 Rated
Output Cables	12AWG, Anode 1525mm (60.04 in), Cathode 1525mm (60.04 in) or Customized Length
Fire Type	Type 1

SPECIFICATIONS

Module Type	JKM315M-60HL		JKM320M-60HL		JKM325M-60HL		JKM330M-60HL		JKM335M-60HL	
	STC	NOCT	STC	NOCT	STC	NOCT	STC	NOCT	STC	NOCT
Maximum Power (Pmax)	315Wp	235Wp	320Wp	239Wp	325Wp	242Wp	330Wp	246Wp	335Wp	250Wp
Maximum Power Voltage (Vmp)	33.2V	31.2V	33.4V	31.4V	33.6V	31.6V	33.8V	31.8V	34.0V	32.0V
Maximum Power Current (Imp)	9.49A	7.56A	9.59A	7.62A	9.68A	7.66A	9.77A	7.74A	9.87A	7.82A
Open-circuit Voltage (Voc)	40.7V	37.6V	40.9V	37.8V	41.1V	38.0V	41.3V	38.2V	41.5V	38.4V
Short-circuit Current (Isc)	10.04A	8.33A	10.15A	8.44A	10.20A	8.54A	10.31A	8.65A	10.36A	8.74A
Module Efficiency STC (%)	18.67%		18.96%		19.26%		19.56%		19.85%	
Operating Temperature (℃)	-40℃~+85℃									
Maximum System Voltage	1000VDC(UL)/1000VDC(IEC)									
Maximum Series Fuse Rating	20A									
Power Tolerance	0~+3%									
Temperature Coefficients of Pmax	-0.36%/℃									
Temperature Coefficients of Voc	-0.28%/℃									
Temperature Coefficients of Isc	0.048%/℃									
Nominal Operating Cell Temperature (NOCT)	45±2℃									

STC: Irradiance 1000W/m² | Cell Temperature 25°C | AM=1.5

NOCT: Irradiance 800W/m² | Ambient Temperature 20°C | AM=1.5 | Wind Speed 1m/s

* Power measurement tolerance: ± 3%

JKM315-335M-60HL-A1-US

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93 BENNETT RD,
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APN# 0705990180
UTILITY: DUKE PROGRESS
AHJ: COATS

SHEET NAME

SPEC SHEETS

SHEET NUMBER

PV-10

Single Phase Inverter with HD-Wave Technology

for North America

SE3000H-US / SE3800H-US / SE5000H-US / SE6000H-US / SE7600H-US / SE10000H-US / SE11400H-US

12-25 YEAR WARRANTY

INVERTERS

Optimized installation with HD-Wave technology

- Specifically designed to work with power optimizers
- Record-breaking efficiency
- Fixed voltage inverter for longer strings
- Integrated arc fault protection and rapid shutdown for NEC 2014 and 2017, per article 690.11 and 690.12
- UL1741 SA certified, for CPUC Rule 21 grid compliance
- Extremely small
- Built-in module-level monitoring
- Outdoor and indoor installation
- Optional: Revenue grade data, ANSI C12.20 Class 0.5 (0.5% accuracy)

solaredge.com

Single Phase Inverter with HD-Wave Technology for North America

SE3000H-US / SE3800H-US / SE5000H-US / SE6000H-US/ SE7600H-US / SE10000H-US / SE11400H-US

	SE3000H-US	SE3800H-US	SE5000H-US	SE6000H-US	SE7600H-US	SE10000H-US	SE11400H-US	
OUTPUT								
Rated AC Power Output	3000	3800 @ 240V 3300 @ 208V	5000	6000 @ 240V 5000 @ 208V	7600	10000	11400 @ 240V 10000 @ 208V	VA
Maximum AC Power Output	3000	3800 @ 240V 3300 @ 208V	5000	6000 @ 240V 5000 @ 208V	7600	10000	11400 @ 240V 10000 @ 208V	VA
AC Output Voltage Min.-Nom.-Max. (211 - 240 - 264)	✓	✓	✓	✓	✓	✓	✓	Vac
AC Output Voltage Min.-Nom.-Max. (183 - 208 - 229)	-	✓	-	✓	-	-	✓	Vac
AC Frequency (Nominal)	59.3 - 60 - 60.5[1]							Hz
Maximum Continuous Output Current @240V	12.5	16	21	25	32	42	47.5	A
Maximum Continuous Output Current @208V	-	16	-	24	-	-	48.5	A
GFDI Threshold	1							A
Utility Monitoring, Islanding Protection, Country Configurable Thresholds	Yes							
INPUT								
Maximum DC Power @240V	4650	5900	7750	9300	11800	15500	17650	W
Maximum DC Power @208V	-	5100	-	7750	-	-	15500	W
Transformer-less, Ungrounded	Yes							
Maximum Input Voltage	480							Vdc
Nominal DC Input Voltage	380				400			Vdc
Maximum Input Current @240V[2]	8.5	10.5	13.5	16.5	20	27	30.5	Adc
Maximum Input Current @208V[2]	-	9	-	13.5	-	-	27	Adc
Max. Input Short Circuit Current	45							Adc
Reverse-Polarity Protection	Yes							
Ground-Fault Isolation Detection	600kΩ Sensitivity							
Maximum Inverter Efficiency	99	99.2						%
CEC Weighted Efficiency	99						99 @ 240V 98.5 @ 208V	%
Nighttime Power Consumption	< 2.5							W
ADDITIONAL FEATURES								
Supported Communication Interfaces	RS485, Ethernet, ZigBee (optional), Cellular (optional)							
Revenue Grade Data, ANSI C12.20	Optional[3]							
Rapid Shutdown - NEC 2014 and 2017 690.12	Automatic Rapid Shutdown upon AC Grid Disconnect							
STANDARD COMPLIANCE								
Safety	UL1741, UL1741 SA, UL1699B, CSA C22.2, Canadian AFCI according to T.I.L. M-07							
Grid Connection Standards	IEEE1547, Rule 21, Rule 14 (HI)							
Emissions	FCC Part 15 Class B							
INSTALLATION SPECIFICATIONS								
AC Output Conduit Size / AWG Range	1" Maximum / 14-6 AWG					1" Maximum /14-4 AWG		
DC Input Conduit Size / # of Strings / AWG Range	1" Maximum / 1-2 strings / 14-6 AWG					1" Maximum / 1-3 strings / 14-6 AWG		
Dimensions with Safety Switch (HxWxD)	17.7 x 14.6 x 6.8 / 450 x 370 x 174					21.3 x 14.6 x 7.3 / 540 x 370 x 185		in / mm
Weight with Safety Switch	22 / 10		25.1 / 11.4	26.2 / 11.9		38.8 / 17.6		lb / kg
Noise	< 25				<50			dBA
Cooling	Natural Convection							
Operating Temperature Range	-13 to +140 / -25 to +60[4] (-40°F / -40°C option)[5]							°F / °C
Protection Rating	NEMA 4X (Inverter with Safety Switch)							

(1) For other regional settings please contact SolarEdge support
(2) A higher current source may be used; the inverter will limit its input current to the values stated
(3) Revenue grade inverter P/N: SExxxxH-US000NNC2
(4) For power de-rating information refer to: https://www.solaredge.com/sites/default/files/se-temperature-derating-note-na.pdf
(5) -40 version P/N: SExxxxH-US000NNU4

RoHS

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93 BENNETT RD,
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APN# 0705990180
UTILITY: DUKE PROGRESS
AHJ: COATS

SHEET NAME

SPEC SHEETS

SHEET NUMBER

PV-11

Power Optimizer

For North America

P320 / P340 / P370 / P400 / P401 / P405 / P485 / P505

POWER OPTIMIZER

PV power optimization at the module-level

- Specifically designed to work with SolarEdge inverters
- Up to 25% more energy
- Superior efficiency (99.5%)
- Mitigates all types of module mismatch losses, from manufacturing tolerance to partial shading
- Flexible system design for maximum space utilization
- Fast installation with a single bolt
- Next generation maintenance with module-level monitoring
- Meets NEC requirements for arc fault protection (AFCI) and Photovoltaic Rapid Shutdown System (PVRSS)
- Module-level voltage shutdown for installer and firefighter safety

solaredge.com

solaredge

Power Optimizer

For North America

P320 / P340 / P370 / P400 / P401 / P405 / P485 / P505

Optimizer model (typical module compatibility)	P320 (for 60-cell modules)	P340 (for high-power 60-cell modules)	P370 (for higher-power 60 and 72-cell modules)	P400 (for 72 & 96-cell modules)	P401 (for high power 60 and 72 cell modules)	P405 (for high-voltage modules)	P485 (for high-voltage modules)	P505 (for higher current modules)	
INPUT									
Rated Input DC Power[1]	320	340	370	400		405	485	505	W
Absolute Maximum Input Voltage (Voc at lowest temperature)	48		60	80	60	125[2]		83[2]	Vdc
MPPT Operating Range	8 - 48		8 - 60	8 - 80	8-60	12.5 - 105		12.5 - 83	Vdc
Maximum Short Circuit Current (Isc)	11			10.1	11.75	11		14	Adc
Maximum DC Input Current	13.75			12.5	14.65	12.5		17.5	Adc
Maximum Efficiency	99.5								%
Weighted Efficiency	98.8							98.6	%
Overvoltage Category	II								
OUTPUT DURING OPERATION (POWER OPTIMIZER CONNECTED TO OPERATING SOLAREDGE INVERTER)									
Maximum Output Current	15								Adc
Maximum Output Voltage	60					85			Vdc
OUTPUT DURING STANDBY (POWER OPTIMIZER DISCONNECTED FROM SOLAREDGE INVERTER OR SOLAREDGE INVERTER OFF)									
Safety Output Voltage per Power Optimizer	1 ± 0.1								Vdc
STANDARD COMPLIANCE									
EMC	FCC Part15 Class B, IEC61000-6-2, IEC61000-6-3								
Safety	IEC62109-1 (class II safety), UL1741								
Material	UL94 V-0 , UV Resistant								
RoHS	Yes								
INSTALLATION SPECIFICATIONS									
Maximum Allowed System Voltage	1000								Vdc
Compatible inverters	All SolarEdge Single Phase and Three Phase inverters								
Dimensions (W x L x H)	129 x 153 x 27.5 / 5.1 x 6 x 1.1		129 x 153 x 33.5 / 5.1 x 6 x 1.3	129 x 153 x 29.5 /5.1 x 6 x 1.16		129 x 159 x 49.5 / 5.1 x 6.3 x 1.9		129 x 162 x 59 / 5.1 x 6.4 x 2.3	mm / in
Weight (including cables)	630 / 1.4		750 / 1.7	655 / 1.5		845 / 1.9		1064 / 2.3	gr / lb
Input Connector	MC4[3]						Single or dual MC4[3][4]	MC4[3]	
Input Wire Length	0.16 / 0.52								m / ft
Output Wire Type / Connector	Double Insulated / MC4								
Output Wire Length	0.9 / 2.95		1.2 / 3.9						m / ft
Operating Temperature Range[5]	-40 - +85 / -40 - +185								°C / °F
Protection Rating	IP68 / NEMA6P								
Relative Humidity	0 - 100								%

(1) Rated power of the module at STC will not exceed the optimizer "Rated Input DC Power". Modules with up to +5% power tolerance are allowed
(2) NEC 2017 requires max input voltage be not more than 80V
(3) For other connector types please contact SolarEdge
(4) For dual version for parallel connection of two modules use P485-4NMDMRM. In the case of an odd number of PV modules in one string, installing one P485 dual version power optimizer connected to one PV module. When connecting a single module seal the unused input connectors with the supplied pair of seals.
(5) For ambient temperature above +85°C / +185°F power de-rating is applied. Refer to Power Optimizers Temperature De-Rating Technical Note for more details.

PV System Design Using a SolarEdge Inverter[6][7]		Single Phase HD-Wave	Single phase	Three Phase for 208V grid	Three Phase for 277/480V grid	
Minimum String Length (Power Optimizers)	P320, P340, P370, P400, P401	8		10	18	
	P405, P485, P505	6		8	14	
Maximum String Length (Power Optimizers)		25		25	50[8]	
Maximum Power per String		5700 (6000 with SE7600-US - SE11400-US)	5250	6000[9]	12750[10]	W
Parallel Strings of Different Lengths or Orientations		Yes				

(6) For detailed string sizing information refer to: http://www.solaredge.com/sites/default/files/string_sizing_na.pdf
(7) It is not allowed to mix P405/P485/P505 with P320/P340/P370/P400/P401 in one string
(8) A string with more than 30 optimizers does not meet NEC rapid shutdown requirements; safety voltage will be above the 30V requirement
(9) For 208V grid: it is allowed to install up to 6,500W per string when the maximum power difference between each string is 1,000W
(10) For 277/480V grid: it is allowed to install up to 15,000W per string when the maximum power difference between each string is 2,000W

Intertek RoHS

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AHJ: COATS

SHEET NAME

SPEC SHEETS

SHEET NUMBER

PV-12

PEGASUS SOLAR™

A BETTER DAY ON THE JOB

COMP MOUNT

WATERTIGHT FOR LIFE

Pegasus Solar's Comp Mount is a cost effective, high-quality option for rail installations on composition shingle roofs. Designed to last decades, the one-piece flashing with elevated cone means there is simply nothing to fail.

25-year Warranty
Manufactured with advanced materials and coatings to outlast the roof itself

Superior Waterproofing
Tested to AC286 without sealant
0.9″ elevated water seal

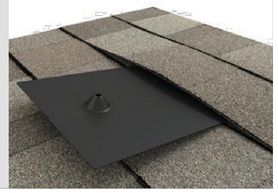
Code Compliant
Fully IBC/CBC Code Compliant
Exceeds ASCE 7-10 Standards

All-In-One Kit Packaging
Flashings, L-feet and SS lags with bonded EPDM washers are included in each 24-pack

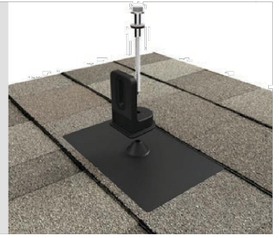
COMP MOUNT

1. Drill pilot hole in center of rafter.

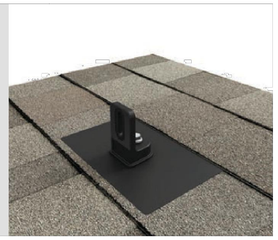
2. Optional: Apply a "U-shape" of sealant to underside of flashing and position under 2nd shingle course, cone over pilot hole.

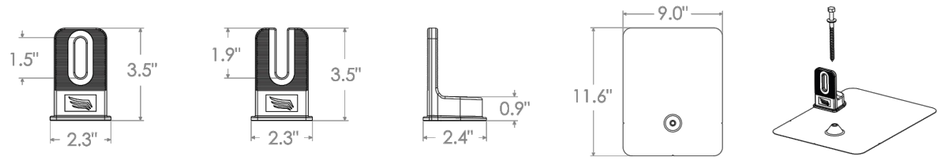


3. Place L-Foot over cone and install lag with washer through L-Foot.



4. Drive lag to required embedment. Attach rail per rail manufacturer's instructions.





Specifications	Comp Mount Install Kit		
SKU	PSCR-C0	PSCR-U0	SPCR-CH
L-foot Type	Closed Slot	Open Slot	Closed Slot
Kit Contents	L-Foot, Flashing, 5/16″ SS Lag w/ EPDM washer	L-Foot, Flashing, 5/16″ SS Lag w/ EPDM washer	L-Foot, Flashing, 5/16″ SS Lag w/ EPDM washer, M10 Hex Bolt
Finish	Black (L-foot and Flashing)		
Roof Type	Composition Shingle		
Certifications	IBC, ASCE/SEI 7-10, AC286		
Install Application	Railed Systems		
Compatible Rail	All		
Flashing Material	Painted Galvalume Plus		
L-Foot Material	Aluminum		
Kit Quantity	24		
Boxes Per Pallet	72		

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DESCRIPTION	DATE	REV
INITIAL RELEASE	8/28/2020	UR

ENGINEER'S STAMP

PROJECT NAME

CHRISTOPHER PETOLETTI
93 BENNETT RD,
COATS, NC 27521 USA
APN# 0705990180
UTILITY: DUKE PROGRESS
AHJ: COATS

SHEET NAME

SPEC SHEETS

SHEET NUMBER

PV-13

Tech Brief

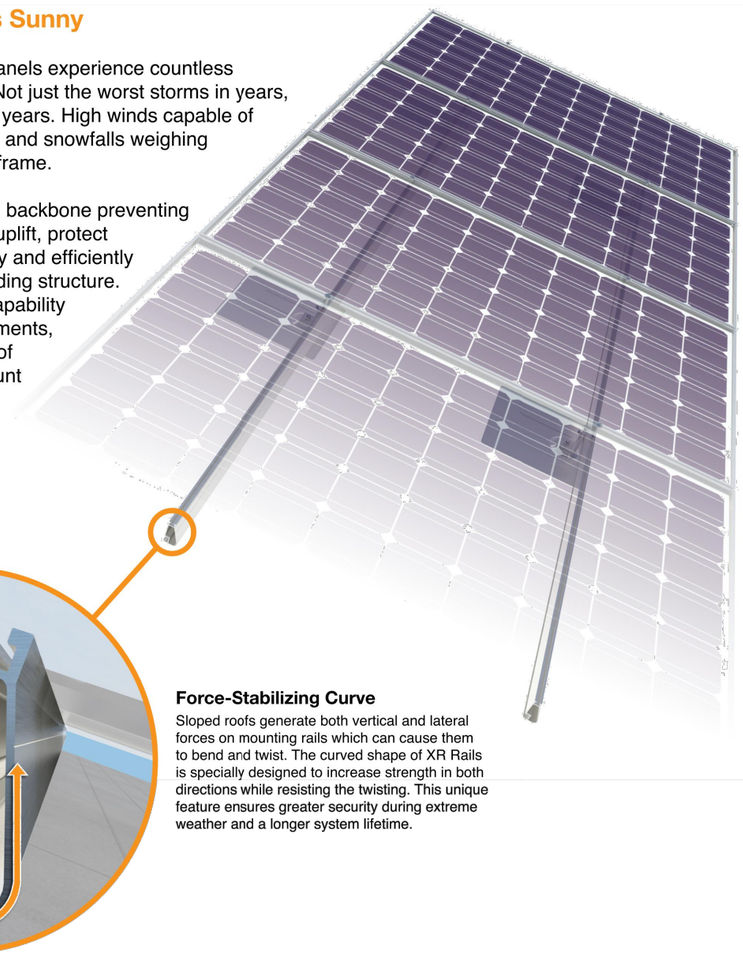
IRONRIDGE

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.

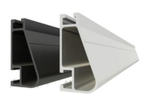
Compatible with Flat & Pitched Roofs

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 6000-series aluminum alloy, then protected with an anodized finish. Anodizing prevents surface and structural corrosion, while also providing a more attractive appearance.



Tech Brief

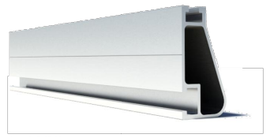
XR Rail Family

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 spans up to 6 feet, while remaining light and economical.

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



XR100

XR100 is the ultimate residential mounting rail. It supports a range of wind and snow conditions, while also maximizing spans up to 10 feet.

- 10' 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 up to 12 feet for commercial applications.

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

Rail Selection

The table below was prepared in compliance with applicable engineering codes and standards.* Values are based on the following criteria: ASCE 7-16, Gable Roof Flush Mount, Roof Zones 1 & 2e, Exposure B, Roof Slope of 8 to 20 degrees and Mean Building Height of 30 ft. Visit IronRidge.com for detailed certification letters.

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

*Table is meant to be a simplified span chart for conveying general rail capabilities. Use approved certification letters for actual design guidance.

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SPEC SHEETS

SHEET NUMBER

PV-14

Tech Brief

IRONRIDGE

Class A Fire Rating

Background

All roofing products are tested and classified for their ability to resist fire.

Recently, these fire resistance standards were expanded to include solar equipment as part of the roof system. Specifically, this requires the modules, mounting hardware and roof covering to be tested together as a system to ensure they achieve the same fire rating as the original roof covering.

These new requirements are being adopted throughout the country in 2016.

IronRidge Certification

IronRidge was the first company to receive a Class A Fire Rating—the highest possible rating—from Intertek Group plc., a Nationally Recognized Testing Laboratory.

IronRidge Flush Mount and Tilt Mount Systems were tested on sloped and flat roofs in accordance with the new UL 1703 & UL 2703 test standards. The testing evaluated the system's ability to resist flame spread, burning material and structural damage to the roof.

Refer to the table below to determine the requirements for achieving a Class A Fire Rating on your next project.

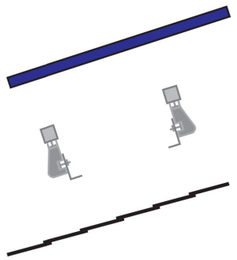
Fire Testing Process

Test Setup

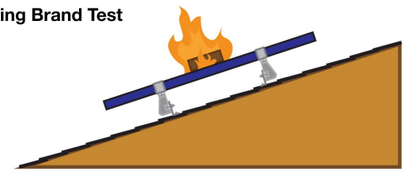
Solar Modules
Solar modules are given a Type classification based on their materials and construction.

Mounting System
Mounting is tested as part of a system that includes type-tested modules and fire-rated roof covering.

Roof Covering
Roof covering products are given a Fire Class Rating of A, B or C based on their tested fire resistance.

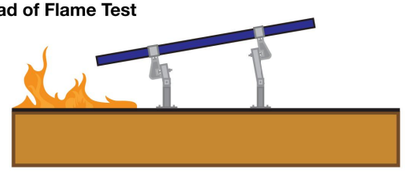


Burning Brand Test



A burning wooden block is placed on module as a fan blows at 12 mph. Flame cannot be seen on underside of roof within 90 minutes.

Spread of Flame Test



Flame at southern edge of roof is aimed up the roof as a fan blows at 12 mph. The flame cannot spread 6 feet or more in 10 minutes.

System	Roof Slope	Module	Fire Rating*
Flush Mount	Any Slope	Type 1, 2, & 3	Class A
Tilt Mount	≤ 6 Degrees	Type 1, 2, & 3	Class A

*Class A rated PV systems can be installed on Class A, B, and C roofs.

Tech Brief

Frequently Asked Questions

What is a "module type"?

The new UL1703 standard introduces the concept of a PV module type, based on 4 construction parameters and 2 fire performance parameters. The purpose of this classification is to certify mounting systems without needing to test it with every module.

What roofing materials are covered?

All fire rated roofing materials are covered within this certification including composition shingle, clay and cement tile, metal, and membrane roofs.

What if I have a Class C roof, but the jurisdiction now requires Class A or B?

Generally, older roofs will typically be "grandfathered in", and will not require re-roofing. However, if 50% or more of the roofing material is replaced for the solar installation the code requirement will be enforced.

Where is the new fire rating requirement code listed?

2012 IBC: 1509.7.2 Fire classification. Rooftop mounted photovoltaic systems shall have the same fire classification as the roof assembly required by Section 1505.

Where is a Class A Fire Rating required?

The general requirement for roofing systems in the IBC refers to a Class C fire rating. Class A or B is required for areas such as Wildland Urban Interface areas (WUI) and for very high fire severity areas. Many of these areas are found throughout the western United States. California has the most Class A and B roof fire rating requirements, due to wild fire concerns.

Are standard mid clamps covered?

Mid clamps and end clamps are considered part of the PV "system", and are covered in the certification.

What attachments and flashings are deemed compatible with Class A?

Attachments and their respective flashings are not constituents of the rating at this time. All code-compliant flashing methods are acceptable from a fire rating standpoint.

What mounting height is acceptable?

UL fire testing was performed with a gap of 5", which is considered worst case in the standard. Therefore, the rating is applicable to any module to roof gap.

Am I required to install skirting to meet the fire code?

No, IronRidge achieved a Class A fire rating without any additional racking components.

What determines Fire Classification?

Fire Classification refers to a fire-resistance rating system for roof covering materials based on their ability to withstand fire exposure.

Class A - effective against severe fire exposure
Class B - effective against moderate fire exposure
Class C - effective against light fire exposure

What if the roof covering is not Class A rated?

The IronRidge Class A rating will not diminish the fire rating of the roof, whether Class A, B, or C.

What tilts is the tilt mount system fire rated for?

The tilt mount system is rated for 1 degrees and up and any roof to module gap, or mounting height.

More Resources

Installation Manuals
Visit our website for manuals that include UL 2703 Listing and Fire Rating Classification.
Go to IronRidge.com

Engineering Certification Letters
We offer complete engineering resources and pre-stamped certification letters.
Go to IronRidge.com

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PV-15

Tech Brief

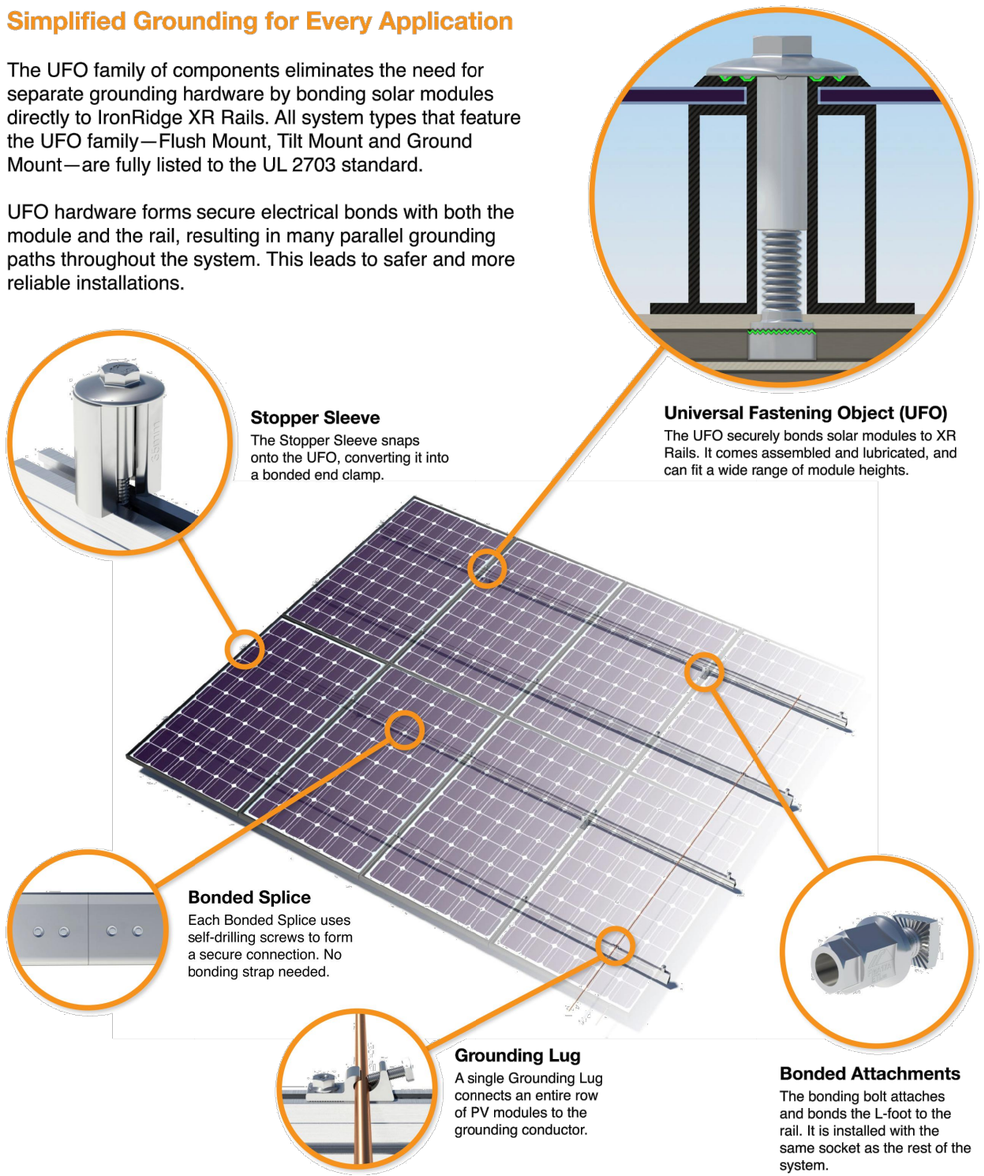
IRONRIDGE

UFO Family of Components

Simplified Grounding for Every Application

The UFO family of components eliminates the need for separate grounding hardware by bonding solar modules directly to IronRidge XR Rails. All system types that feature the UFO family—Flush Mount, Tilt Mount and Ground Mount—are fully listed to the UL 2703 standard.

UFO hardware forms secure electrical bonds with both the module and the rail, resulting in many parallel grounding paths throughout the system. This leads to safer and more reliable installations.



Stopper Sleeve
The Stopper Sleeve snaps onto the UFO, converting it into a bonded end clamp.

Universal Fastening Object (UFO)
The UFO securely bonds solar modules to XR Rails. It comes assembled and lubricated, and can fit a wide range of module heights.

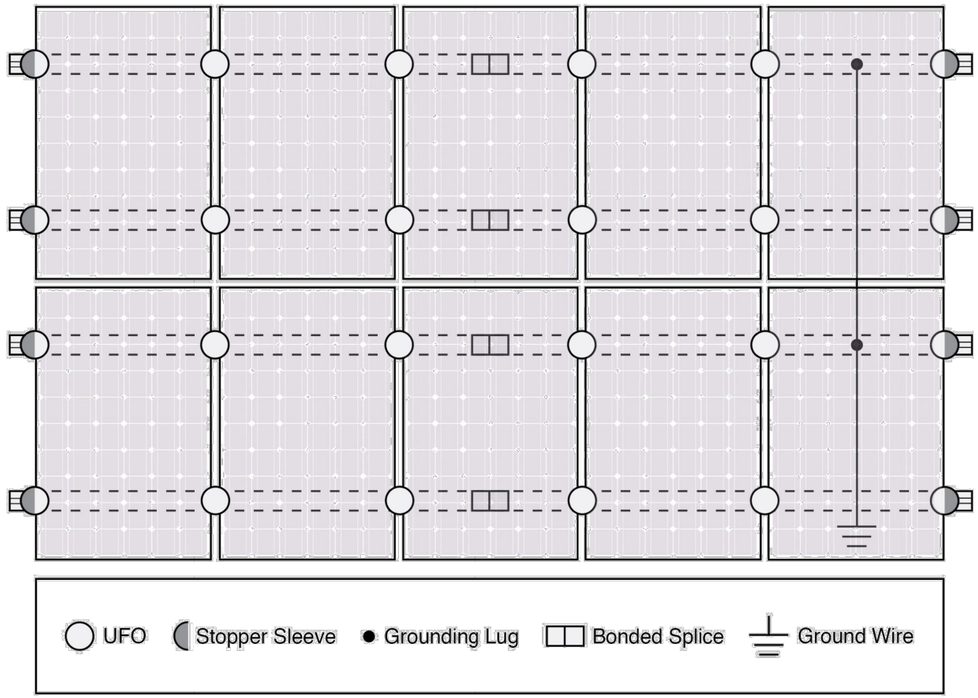
Bonded Splice
Each Bonded Splice uses self-drilling screws to form a secure connection. No bonding strap needed.

Grounding Lug
A single Grounding Lug connects an entire row of PV modules to the grounding conductor.

Bonded Attachments
The bonding bolt attaches and bonds the L-foot to the rail. It is installed with the same socket as the rest of the system.

Tech Brief

System Diagram



Approved Enphase microinverters can provide equipment grounding of IronRidge systems, eliminating the need for grounding lugs and field installed equipment ground conductors (EGC). A minimum of two microinverters mounted to the same rail and connected to the same Engage cable is required. Refer to installation manuals for additional details.

UL Certification

The IronRidge Flush Mount, Tilt Mount, and Ground Mount Systems have been listed to UL 2703 by Intertek Group plc.

UL 2703 is the standard for evaluating solar mounting systems. It ensures these devices will maintain strong electrical and mechanical connections over an extended period of time in extreme outdoor environments.

Go to IronRidge.com/UFO

Cross-System Compatibility			
Feature	**Flush Mount**	**Tilt Mount**	**Ground Mount**
XR Rails	✔	✔	XR1000 Only
UFO/Stopper	✔	✔	✔
Bonded Splice	✔	✔	N/A
Grounding Lugs	1 per Row	1 per Row	1 per Array
Microinverters & Power Optimizers	Enphase - M250-72, M250-60, M215-60, C250-72 Darfon - MIG240, MIG300, G320, G640 SolarEdge - P300, P320, P400, P405, P600, P700, P730		
Fire Rating	Class A	Class A	N/A
Modules	Tested or Evaluated with over 400 Framed Modules Refer to installation manuals for a detailed list.		

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PV-16

8431 Murphy Drive
Middleton, WI 53562 USA

Telephone: 608.836.4400
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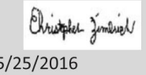
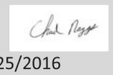
www.intertek.com

Test Verification of Conformity

In the basis of the tests undertaken, the sample(s) of the below product have been found to comply with the requirements of the referenced specifications at the time the tests were carried out.

Applicant Name & Address:	IronRidge, Inc. 1495 Zephyr Ave. Hayward, CA 94544 USA
Product Description:	Flush Mount System with XR Rails.
Ratings & Principle Characteristics:	Fire Class Resistance Rating: -Flush Mount (Symmetrical). Class A Fire Rated for Low Slope applications when using Type 1, 2 and 3, listed photovoltaic modules. Class A Fire Rated for Steep Slope applications with Type1, 2 and 3, listed photovoltaic modules. Tested with a 5" gap (distance between the bottom the module frame and the roof covering), per the standard this system can be installed at any gap allowed by the manufacturers installation instructions. No perimeter guarding is required. This rating is applicable with any IronRidge or 3'rd party roof anchor.
Models:	IronRidge Flush Mount with XR Rails
Brand Name:	IronRidge Flush Mount
Relevant Standards:	UL 2703 (Section 15.2 and 15.3) Standard for Safety Mounting Systems, Mounting Devices, Clamping/Retention Devices, and Ground Lugs for Use with Flat-Plate Photovoltaic Modules and Panels, First Edition dated Jan. 28, 2015 **Referencing** UL1703 Third Edition dated Nov. 18, 2014, (Section 31.2) Standard for Safety for Flat-Plate Photovoltaic Modules and Panels.
Verification Issuing Office:	Intertek Testing Services NA, Inc. 8431 Murphy Drive Middleton, WI 53562
Date of Tests:	08/27/2014 to 03/17/2015
Test Report Number(s):	101769343MID-001r1, 101769343MID-001a, 101915978MID-001 & 101999492MID-001ar1-cr1.

This verification is part of the full test report(s) and should be read in conjunction with them. This report does not automatically imply product certification.

Completed by:	Chris Zimbrich	**Reviewed by:**	Chad Naggs
Title:	Technician II, Fire Resistance	**Title:**	Technician I, Fire Resistance
Signature:		**Signature:**	
Date:	05/25/2016	**Date:**	05/25/2016

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