

PROJECT DESCRIPTION:

32 X HANWHA Q CELLS SOLAR Q.PEAK DUO-G5 320
 320W MONO MODULES
 SYSTEM SIZE: 10.24 kW DC STC
 ARRAY AREA: ROOF #1- 308.38 SQ FT.
 ARRAY AREA: ROOF #2- 272.10 SQ FT.

EQUIPMENT SUMMARY

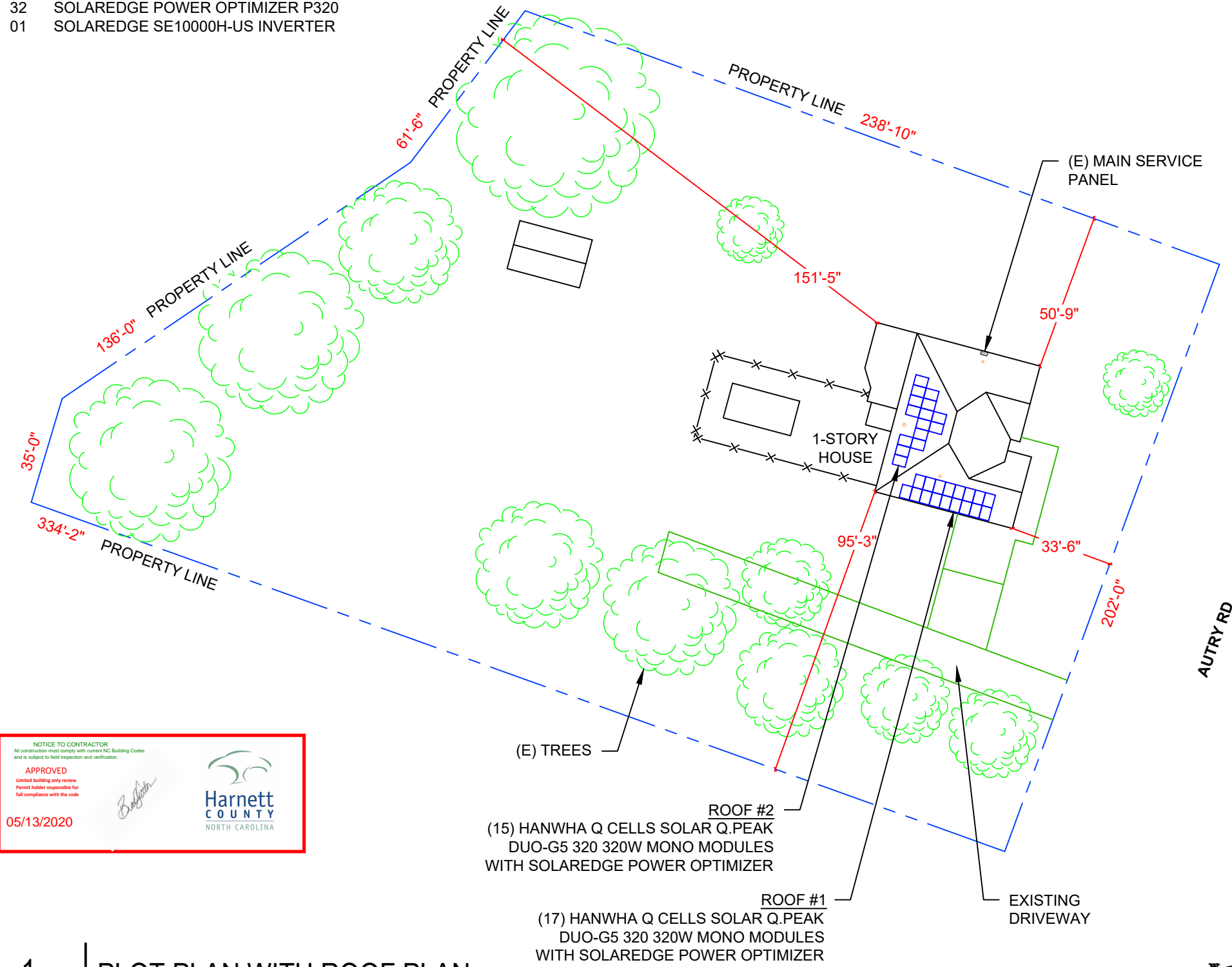
32 HANWHA Q CELLS SOLAR Q.PEAK DUO-G5 320
 320W MONO MODULES
 32 SOLAREEDGE POWER OPTIMIZER P320
 01 SOLAREEDGE SE10000H-US INVERTER

AUTHORITIES HAVING JURISDICTION
 BUILDING: HARNETT COUNTY
 ZONING: HARNETT COUNTY
 UTILITY: SOUTH RIVER ELECTRIC
 MEMBERSHIP CO-OPERATION

APPLICABLE CODES & STANDARDS
 BUILDING: NCBC 2018
 ELECTRICAL: NEC 2017

DESIGN SPECIFICATION

OCCUPANCY: II
 CONSTRUCTION: SINGLE-FAMILY
 ZONING: RESIDENTIAL
 GROUND SNOW LOAD: SEE STRUCTURAL LETTER
 WIND EXPOSURE: SEE STRUCTURAL LETTER
 WIND SPEED: SEE STRUCTURAL LETTER



NOTICE TO CONTRACTOR
 All construction must comply with current NC Building Codes and is subject to field inspection and verification.

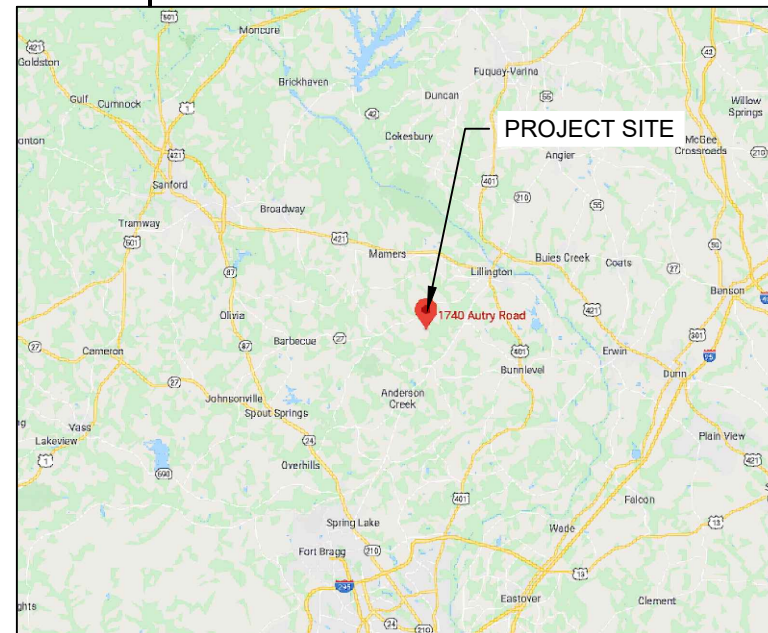
APPROVED
 Limited building only review
 Permit holder responsible for full compliance with the code

05/13/2020

1 PLOT PLAN WITH ROOF PLAN
 PV-1 SCALE: 1"=40'-0"



2 HOUSE PHOTO
 PV-1 SCALE: NTS



3 VICINITY MAP
 PV-1 SCALE: NTS

SHEET INDEX

PV-1	PLOT PLAN & VICINITY MAP
PV-2	ROOF PLAN & MODULES
PV-2A	STRING LAYOUT
PV-3	ATTACHMENT DETAIL
PV-4	ELECTRICAL LINE DIAGRAM
PV-5	WIRING CALCULATIONS
PV-6	SOLAREEDGE OPTIMIZER CHART
PV-7 to 12	EQUIPMENT SPECIFICATIONS

POWER HOME SOLAR, LLC
 "POWER YOUR FUTURE"
 919 N. MAIN ST.
 MOORESVILLE, NC 28115
 Phone: 704-800-6591 (OFFICE)
 Email: info@powerhome.com
 Web: www.powerhome.com

REVISIONS

DESCRIPTION	DATE	REV

Signature with Seal
 DATE: 05/08/2020

PROJECT NAME & ADDRESS
 VALLIE NAYLOR
 RESIDENCE
 1740 AUTRY RD.,
 LILLINGTON, NC 27546

DESIGNED BY
 PHS

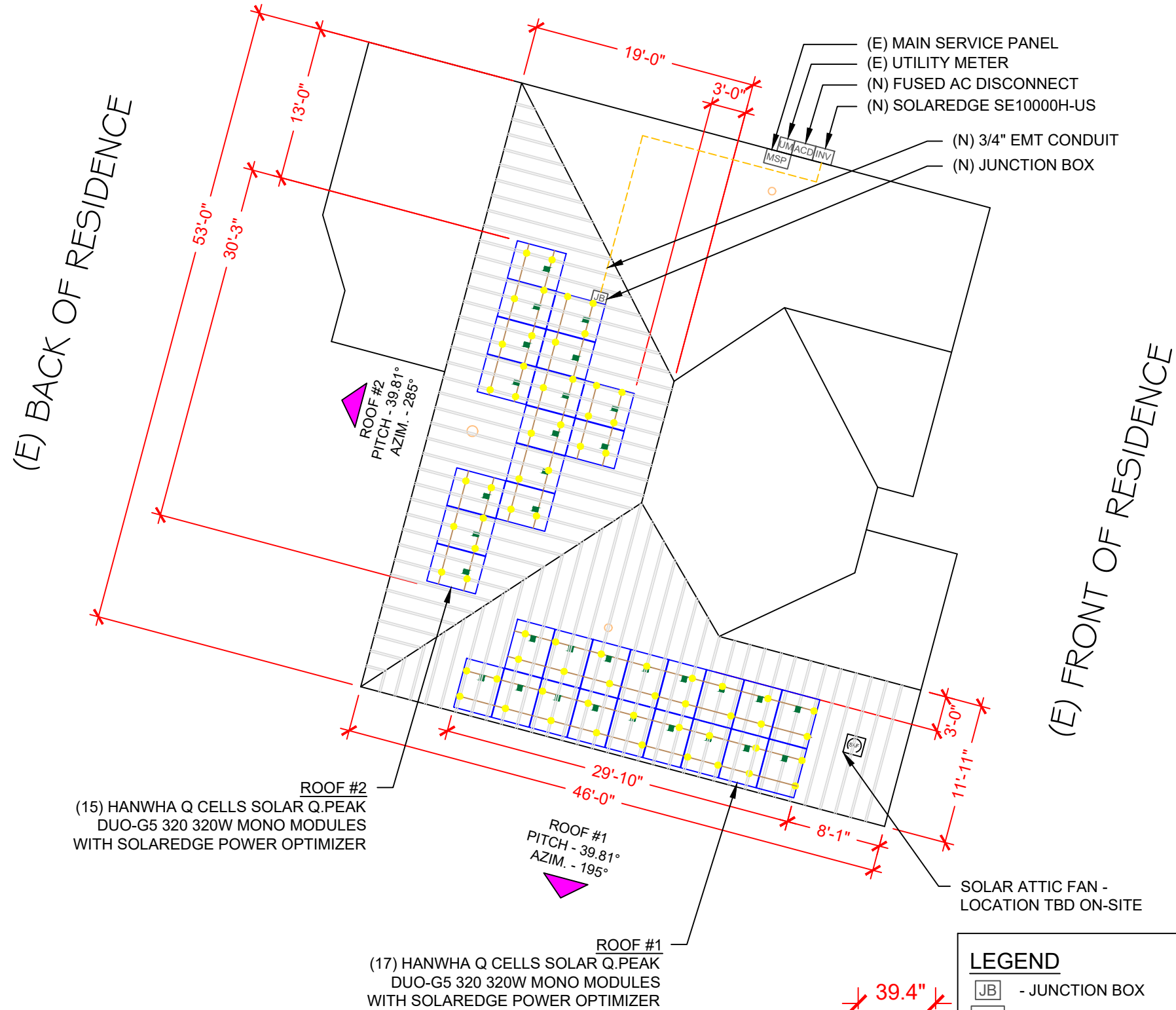
SHEET NAME
PLOT PLAN & VICINITY MAP

SHEET SIZE
 ANSI B
 11" X 17"

SHEET NUMBER
 PV-1

MODULE TYPE, DIMENSIONS & WEIGHT

NUMBER OF MODULES = 32 MODULES
 MODULE TYPE = HANWHA Q CELLS SOLAR Q.PEAK
 DUO-G5 320 320W MONO MODULES
 MODULE WEIGHT = 41.2 LBS / 18.7 KG.
 MODULE DIMENSIONS = 66.3"x 39.4" = 18.14 SF



ROOF DESCRIPTION				
ROOF TYPE		COMPOSITE SHINGLE		
ROOF LAYER		1 LAYERS		
ROOF	ROOF PITCH	AZIMUTH	FRAME SIZE	FRAME SPACING
#1	39.81°	195°	SEE STRUCTURAL LETTER	
#2	39.81°	285°		

ARRAY AREA & ROOF AREA CALC'S				
ROOF	# OF MODULES	ARRAY AREA (Sq. Ft.)	ROOF AREA (Sq. Ft.)	ROOF AREA COVERED BY ARRAY (%)
#1	17	308.38	566.26	54
#2	15	272.10	604.67	45

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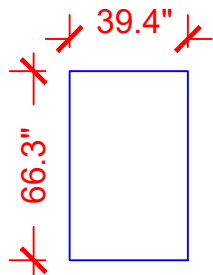
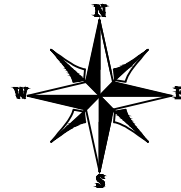
SAF SOLAR ATTIC FAN

NOTES:

- THE LOCATION OF THE SAF SHOULD BE DETERMINED ON SITE.
- THE SAF SHOULD BE LOCATED 30"-36" FROM THE PEAK OF THE ROOF OR ABOUT 5 ROWS DOWN FROM THE RIDGE.
- THE SAF SHOULD NOT BE MOUNTED ON ANY STRUCTURAL MEMBER LIKE TRUSS/RAFTER.
- "CAN VENTS" CAN BE REPLACED BY SAF.
- SAF CANNOT BE MOUNTED ON A METAL ROOF. PLEASE CARRY GABLE VENT FANS FOR METAL ROOF INSTALLATION (IF APPLICABLE).

LEGEND

JB	- JUNCTION BOX	○	- VENT, ATTIC FAN (ROOF OBSTRUCTION)
INV	- INVERTER	☑	- ROOF ATTACHMENT
DC	- INTEGRATED DC DISCONNECT	—	- RAFTERS
SLD	- SOLAR LOAD CENTER	---	- CONDUIT
PM	- PRODUCTION METER	CB	- COMBINER BOX
MSP	- MAIN SERVICE PANEL		





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DESIGNED BY

PHS

SHEET NAME

STRING
 LAYOUT

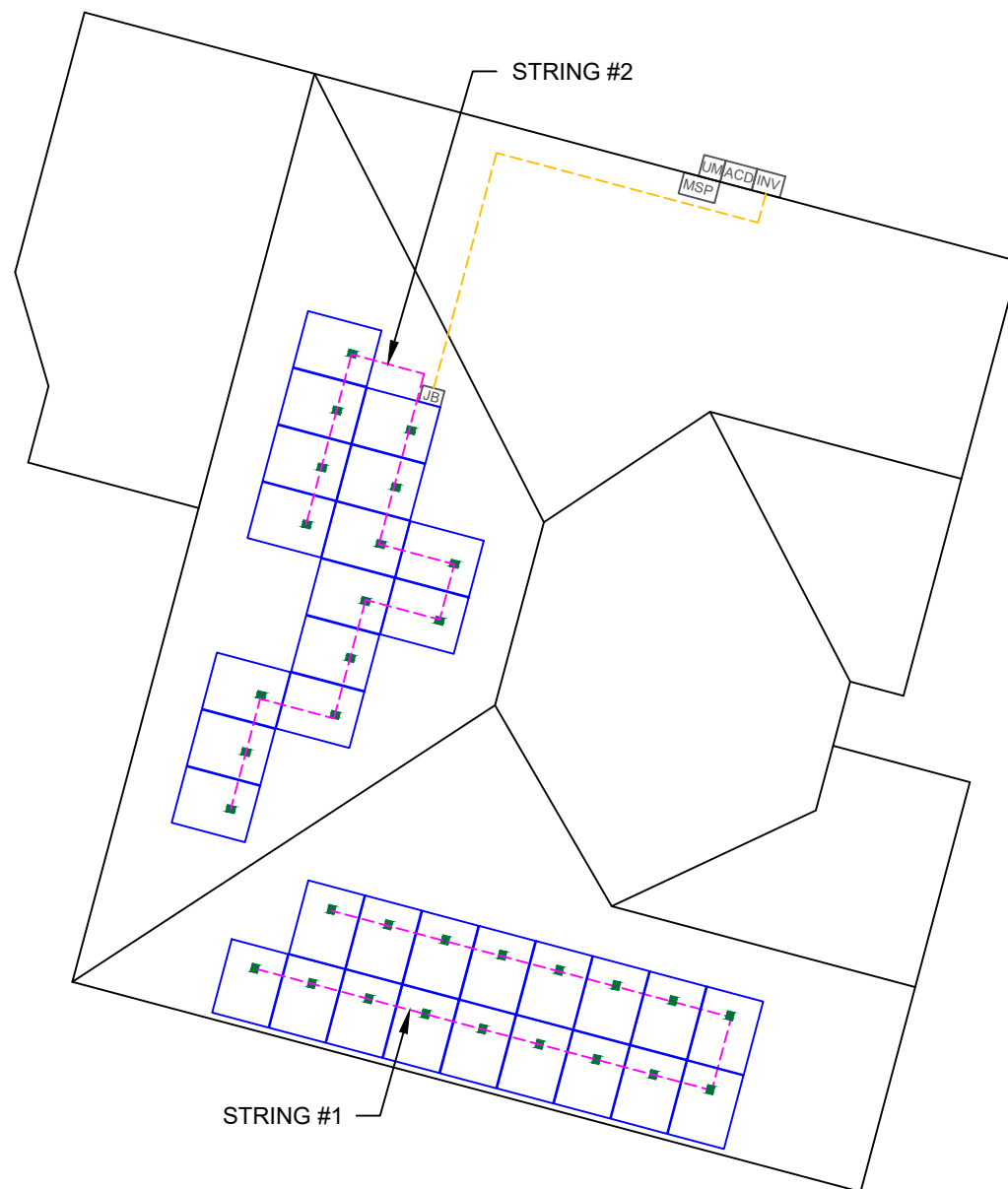
SHEET SIZE

ANSI B
 11" X 17"

SHEET NUMBER

PV-2A

(E) BACK OF RESIDENCE



(E) FRONT OF RESIDENCE

BILL OF MATERIALS

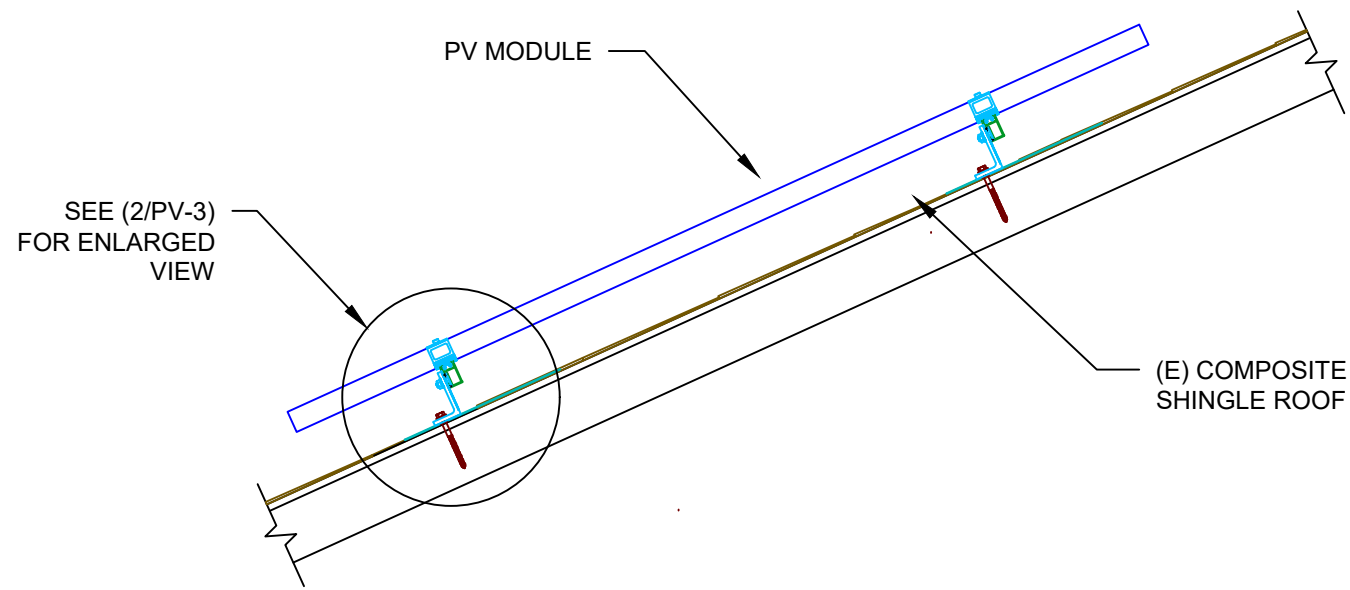
EQUIPMENT	QTY	DESCRIPTION
SOLAR PV MODULE	32	HANWHA Q CELLS SOLAR Q.PEAK DUO-G5 320 320W MONO MODULES
OPTIMIZER	32	SOLAREGE POWER OPTIMIZER P320
INVERTER	01	SOLAREGE SE10000H-US INVERTER
AC DISCONNECT	1	60A FUSED, (2) 60A FUSES, 240V, NEMA 3R, UL LISTED
SOLAR DECK	2	SOLAR DECKS
RAILS	18	QRAIL LIGHT 14 FT. BLACK
SPLICE KIT	8	QSPLICE INTERNAL LIGHT
TRUNK CABLE	0	TRUNK/PV CABLE CLIP
MODULE CLAMPS	52	UNIVERSAL MID CLAMP
GROUNDING LUG	6	WEEB LUG W/ T-BOLT
END CLAMPS	52	UNIVERSAL END CLAMPS
ATTACHMENT	70	L-MOUNT ATTACHMENT (QUICKMOUNT)
SQUARE-BOLT	102	T-BOLT W/ NUT M8 X 20MM

1

ROOF PLAN WITH STRING LAYOUT

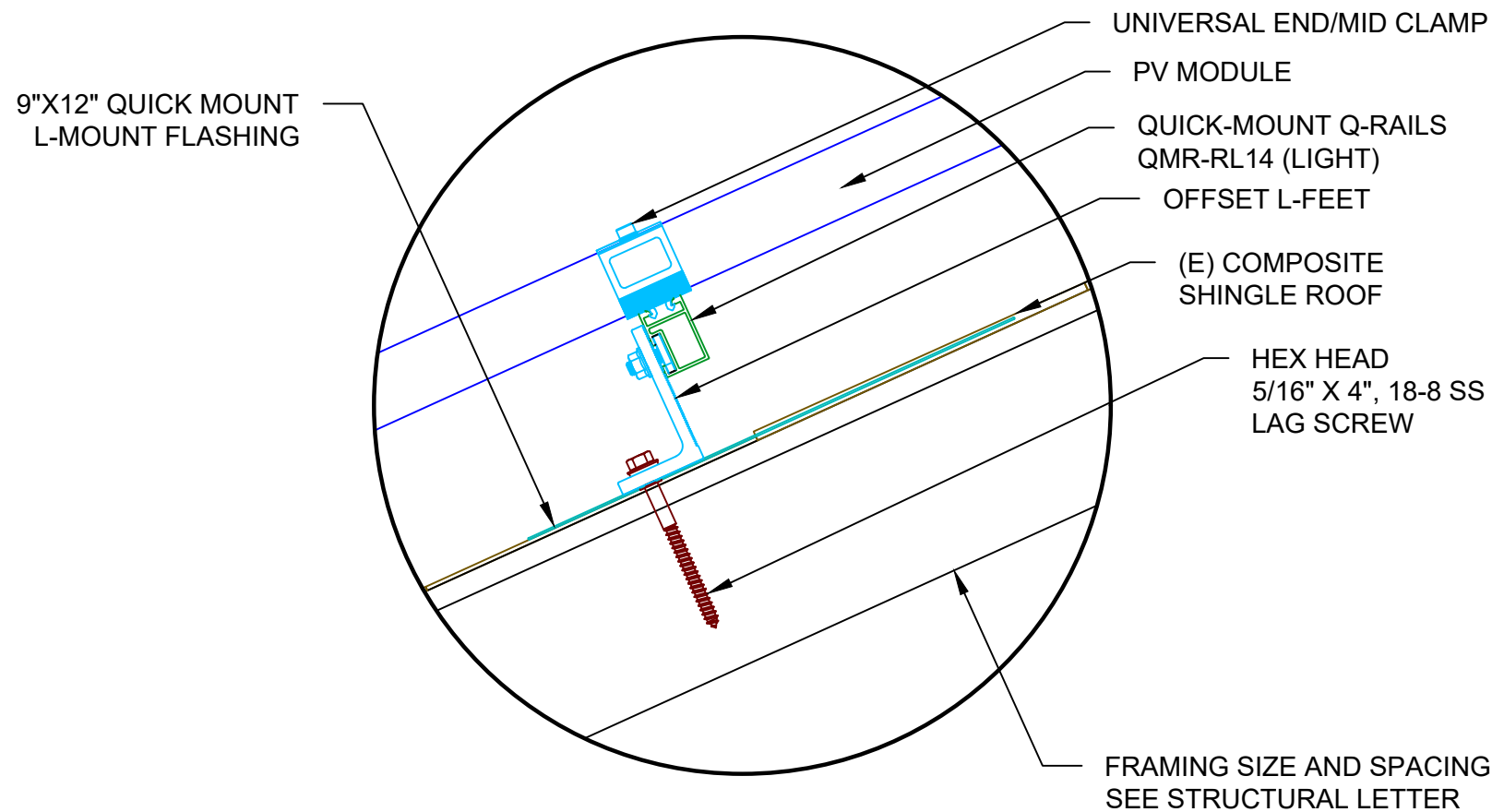
SCALE: 3/32" = 1'-0"

PV-2A



1 ATTACHMENT DETAIL

PV-3 SCALE: 1" = 1'-0"



2 ATTACHMENT DETAIL (enlarged view)

PV-3 SCALE: NTS



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 LILLINGTON, NC 27546

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SHEET NAME

ATTACHMENT
 DETAIL

SHEET SIZE

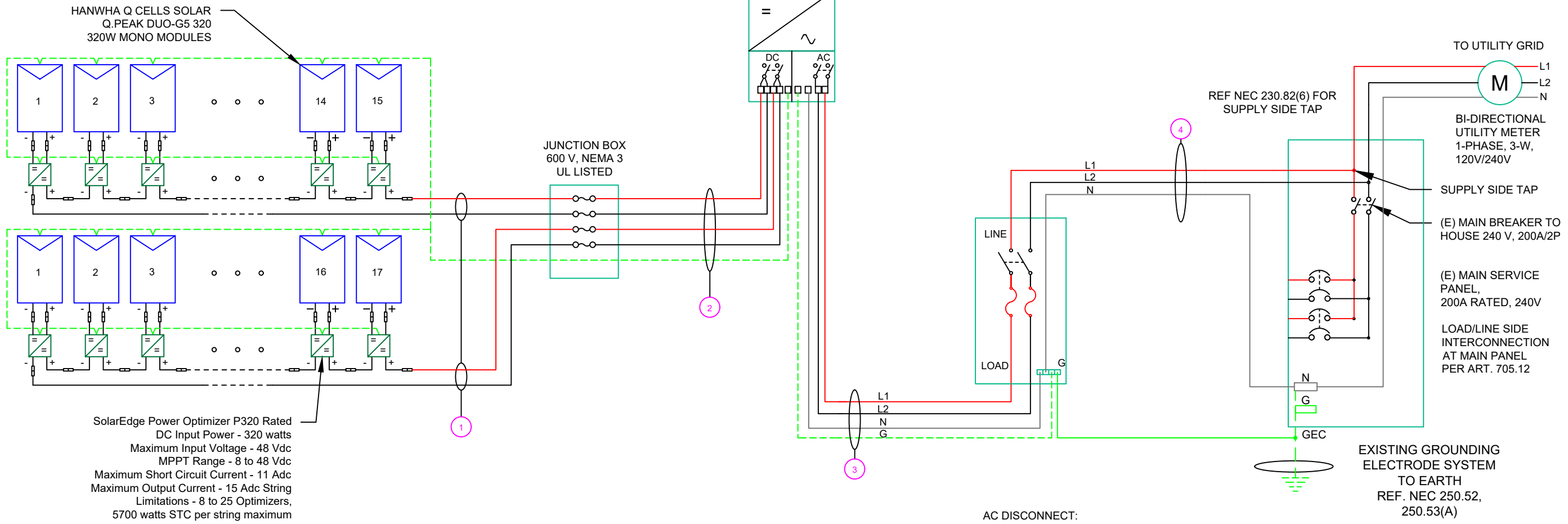
ANSI B
 11" X 17"

SHEET NUMBER

PV-3

(32) HANWHA Q CELLS SOLAR Q.PEAK DUO-G5 320 320W MONO MODULES
 (1) STRING OF 15 MODULES CONNECTED IN SERIES
 (1) STRING OF 17 MODULES CONNECTED IN SERIES

SOLAREGE SE10000H-US (240V)
 OUTPUT: 240 VAC, 42A
 99% CEC WEIGHTED EFFICIENCY
 NEMA 3R, UL LISTED, INTERNAL GFDI
 WITH INTEGRATED DC DISCONNECT



SolarEdge Power Optimizer P320 Rated
 DC Input Power - 320 watts
 Maximum Input Voltage - 48 Vdc
 MPPT Range - 8 to 48 Vdc
 Maximum Short Circuit Current - 11 Adc
 Maximum Output Current - 15 Adc String
 Limitations - 8 to 25 Optimizers,
 5700 watts STC per string maximum

! WARNING !
 PHOTOVOLTAIC
 POWER SOURCE
LABEL 1
 ON ALL CONDUITS SPACED AT MAX 10FT

! CAUTION !
 SOLAR ELECTRIC
 SYSTEM CONNECTED
 AND ENERGIZED
LABEL 2
 AT INVERTER
 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 3
 AT INVERTER
 PHOTOVOLTAIC
 DC DISCONNECT
LABEL 4
 AT EACH DC DISCONNECT

! WARNING !
 ELECTRIC SHOCK HAZARD
 DO NOT TOUCH TERMINALS
 TERMINALS FOR BOTH LINE AND LOAD SIDES
 MAY BE ENERGIZED IN THE OPEN POSITION
LABEL 5
 AT EACH AC DISCONNECT
 PHOTOVOLTAIC
 AC
 DISCONNECT
LABEL 6
 AT EACH AC DISCONNECT

! WARNING !
 DUAL POWER SOURCES
 SECOND SOURCE IS PV SYSTEM
LABEL 8
 AT MEP
! WARNING !
 SOLAR SYSTEM
 CONNECTED
 AND ENERGIZED
LABEL 9
 AT MEP

! CAUTION !
 SOLAR POINT OF
 INTERCONNECTION
LABEL 10
 AT UTILITY METER
! WARNING !
 THE SERVICE METER IS ALSO SERVED
 BY A PHOTOVOLTAIC SYSTEM
LABEL 11
 AT UTILITY METER

QTY	CONDUCTOR INFORMATION	CONDUIT TYPE	CONDUIT SIZE
(4)	#10AWG - PV WIRE/USE-2	N/A	N/A
(1)	#6AWG - BARE COPPER IN FREE AIR		
(4)	#10AWG - THWN-2	EMT OR LFMC IN ATTIC	3/4"
(1)	#6AWG - THWN-2 GND		
(3)	#6AWG - THWN-2	PVC, LFNC OR LFMC	3/4"
(1)	#6AWG - THWN-2 GND		
(3)	#6AWG - THWN-2	PVC, LFNC OR LFMC	3/4"

SERVICE INFO
 UTILITY PROVIDER: SOUTH RIVER ELECTRIC
 MEMBERSHIP CO-OPERATION
 MAIN SERVICE VOLTAGE: 240V
 MAIN PANEL BRAND:
 MAIN SERVICE PANEL: 200A
 MAIN CIRCUIT BREAKER RATING: 200A
 MAIN SERVICE LOCATION: NORTH
 SERVICE FEED SOURCE: OVERHEAD

REVISIONS

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PROJECT NAME & ADDRESS
 VALLIE NAYLOR
 RESIDENCE
 1740 AUTRY RD.,
 LILLINGTON, NC 27546

DESIGNED BY
PHS
 SHEET NAME
**ELECTRICAL LINE
 DIAGRAM**
 SHEET SIZE
**ANSI B
 11" X 17"**
 SHEET NUMBER
PV-4

SOLAR MODULE SPECIFICATIONS	
MANUFACTURER / MODEL #	HANWHA Q CELLS SOLAR Q.PEAK DUO-G5 320 320W MONO MODULES
VMP	33.32V
IMP	9.60A
VOC	40.13V
ISC	10.09A
TEMP. COEFF. VOC	-0.280%/°C
MODULE DIMENSION	66.3"L x 39.4"W x 1.26"D (In Inch)

INVERTER #1 SPECIFICATIONS	
MANUFACTURER / MODEL #	SOLAREEDGE SE10000H-US
NOMINAL AC POWER	10.0 KW
NOMINAL OUTPUT VOLTAGE	240 VAC
NOMINAL OUTPUT CURRENT	42A

POWER OPTIMIZER (OPTIMIZER P320-2NM4ARS)	
MAXIMUM INPUT POWER	320W
MINIMUM INPUT VOLTAGE	8 VDC
MAXIMUM INPUT VOLTAGE	48VDC
MAXIMUM MODULE ISC	11 ADC
MAXIMUM OUTPUT CURRENT	15 ADC

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

AMBIENT TEMPERATURE SPECS	
RECORD LOW TEMP	-10°
AMBIENT TEMP (HIGH TEMP 2%)	36°
CONDUIT HEIGHT	0.5"
ROOF TOP TEMP	58°
CONDUCTOR TEMPERATURE RATE	90°
MODULE TEMPERATURE COEFFICIENT OF Voc	-0.29%/°K

DC CONDUCTOR AMPACITY CALCULATIONS: ARRAY TO JUNCTION BOX:

EXPECTED WIRE TEMP (In Celsius)	58°
TEMP. CORRECTION PER TABLE (310.16)	0.71
NO. OF CURRENT CARRYING CONDUCTORS	4
CONDUIT FILL CORRECTION PER NEC 310.15(B)(3)(a)	0.8
CIRCUIT CONDUCTOR SIZE	10 AWG
CIRCUIT CONDUCTOR AMPACITY	40A

REQUIRED CIRCUIT CONDUCTOR AMPACITY PER NEC 690.8(A&B)	18.75A
1.25 X Isc	
DERATED AMPACITY OF CIRCUIT CONDUCTOR PER NEC TABLE 310.16	
CONDUIT FILL CORRECTION PER NEC 310.15(B)(3)(a) X CIRCUIT CONDUCTOR AMPACITY	32A
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)	36°+22° = 58°
TEMP. CORRECTION PER TABLE (310.16)	0.71
NO. OF CURRENT CARRYING CONDUCTORS	4
CONDUIT FILL CORRECTION PER NEC 310.15(B)(2)(a)	0.8
CIRCUIT CONDUCTOR SIZE	10AWG
CIRCUIT CONDUCTOR AMPACITY	40A

REQUIRED CIRCUIT CONDUCTOR AMPACITY PER NEC 690.8(A&B)	18.75A
1.25 X Isc	
DERATED AMPACITY OF CIRCUIT CONDUCTOR PER NEC TABLE 310.16	
CONDUIT FILL CORRECTION PER NEC 310.15(B)(2)(a) X CIRCUIT CONDUCTOR AMPACITY	32A
Result should be greater than (18.75A) otherwise less the entry for circuit conductor size and ampacity	

AC CONDUCTOR AMPACITY CALCULATIONS:

No. OF INVERTER	1
EXPECTED WIRE TEMP (In Celsius)	36°
TEMP. CORRECTION PER TABLE (310.16)	0.91
NO. OF CURRENT CARRYING CONDUCTORS	3
CONDUIT FILL CORRECTION PER NEC 310.15(B)(2)(a)	1
CIRCUIT CONDUCTOR SIZE	6 AWG
CIRCUIT CONDUCTOR AMPACITY	75A

REQUIRED CIRCUIT CONDUCTOR AMPACITY PER NEC 690.8(B)	52.5A
1.25 X MAX INVERTER OUTPUT CURRENT	
DERATED AMPACITY OF CIRCUIT CONDUCTOR PER NEC TABLE 310.16	
TEMP. CORRECTION PER TABLE (310.16) X CONDUIT FILL CORRECTION PER NEC 310.15(B)(2)(a) X CIRCUIT CONDUCTOR AMPACITY	68.25A
Result should be greater than (52.5A) otherwise less the entry for circuit conductor size and ampacity	



REVISIONS		
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RESIDENCE

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LILLINGTON, NC 27546

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SHEET NAME
WIRING
CALCULATIONS

SHEET SIZE
ANSI B
11" X 17"

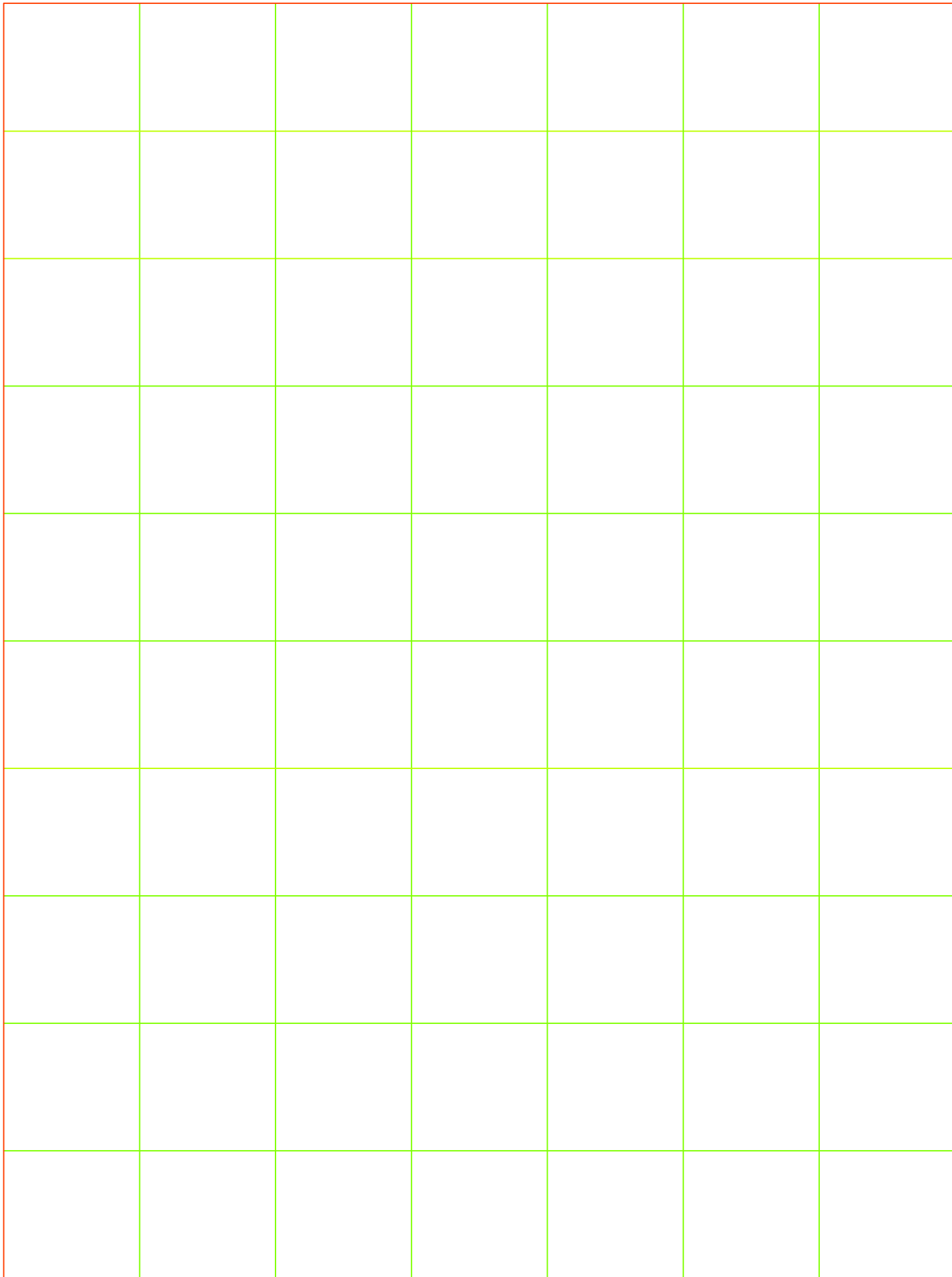
SHEET NUMBER
PV-5

ELECTRICAL NOTES

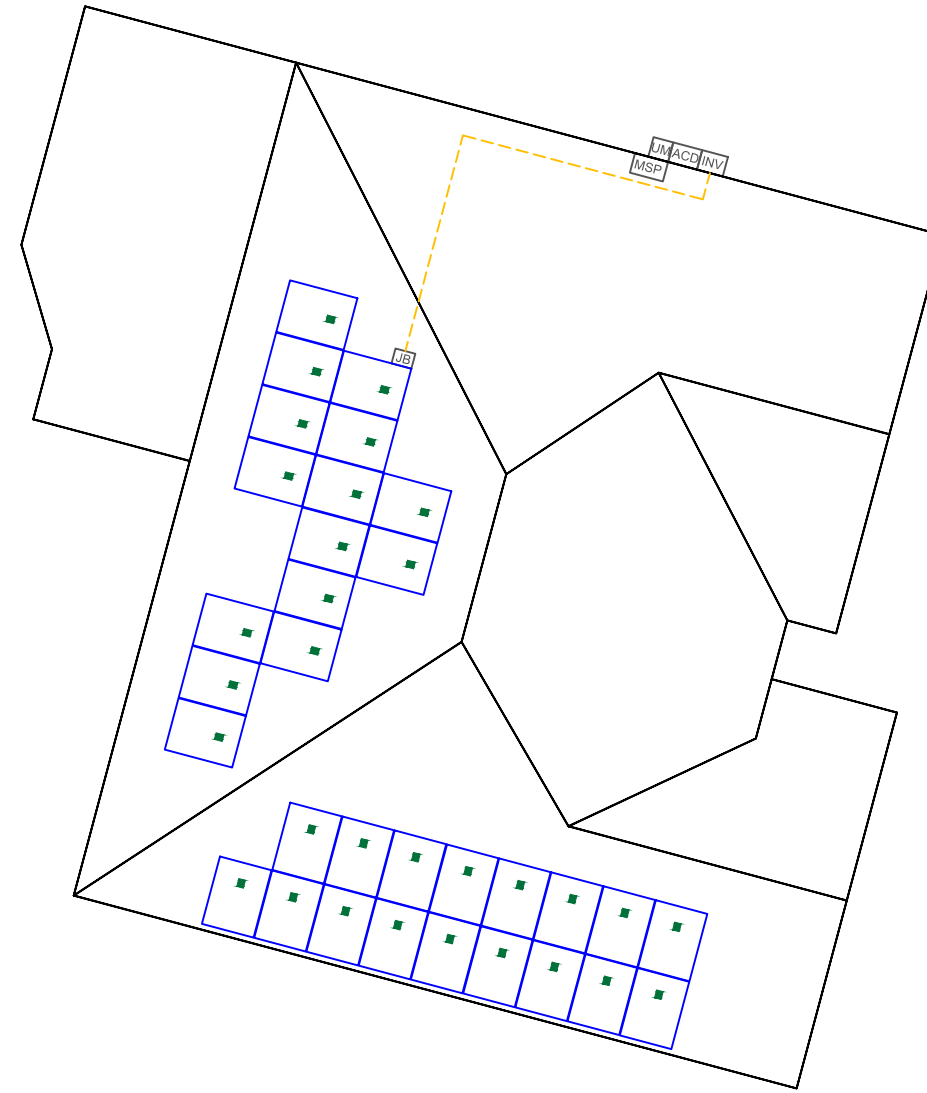
- 1.) ALL EQUIPMENT TO BE LISTED BY UL OR OTHER NRTL, AND LABELED FOR ITS APPLICATION.
- 2.) ALL CONDUCTORS SHALL BE COPPER, RATED FOR 600 V AND 90 DEGREE C WET ENVIRONMENT.
- 3.) WIRING, CONDUIT, AND RACEWAYS MOUNTED ON ROOFTOPS SHALL BE ROUTED DIRECTLY TO, AND LOCATED AS CLOSE AS POSSIBLE TO THE NEAREST 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 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

1-10 11-20 21-30 31-40 41-50 51-60 61-70

1
2
3
4
5
6
7
8
9
10



SOLAREEDGE OPTIMIZER CHART



REVISIONS		
DESCRIPTION	DATE	REV

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LILLINGTON, NC 27546

DESIGNED BY

PHS

SHEET NAME

**SOLAREEDGE
OPTIMIZER CHART**

SHEET SIZE

**ANSI B
11" X 17"**

SHEET NUMBER

PV-6

powered by
Q.ANTUM DUO

Q.PEAK DUO-G5 315-330

Q.ANTUM SOLAR MODULE

The new Q.PEAK DUO-G5 solar module from Q CELLS impresses thanks to innovative Q.ANTUM DUO Technology, which enables particularly high performance on a small surface. Q.ANTUM's world-record-holding cell concept has now been combined with state-of-the-art circuitry half cells and a six-busbar design, thus achieving outstanding performance under real conditions - both with low-intensity solar radiation as well as on hot, clear summer days.



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 19.9%.



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 Technology¹, Hot-Spot Protect and Traceable Quality Tra.Q™.



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



A RELIABLE INVESTMENT
Inclusive 12-year product warranty and 25-year linear performance guarantee².



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

THE IDEAL SOLUTION FOR:



Engineered in Germany

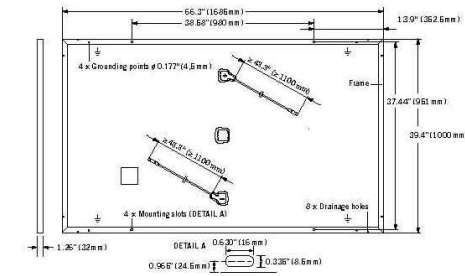


¹ APT test conditions according to IEC/TS 62804-1:2015, method B (-1500V, 168 h)
² See data sheet on rear for further information.



MECHANICAL SPECIFICATION

Format	66.3 in x 39.4 in x 1.26 in (including frame) (1685 mm x 1000 mm x 32 mm)
Weight	41.2 lbs (18.7 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 x 20 monocrystalline Q.ANTUM solar half-cells
Junction box	2.76-3.35 in x 1.97-2.76 in x 0.51-0.83 in (70-85 mm x 50-70 mm x 13-21 mm), decentralized, IP67
Cable	4 mm ² Solar cable; (+) ≥ 43.3 in (1100 mm), (-) ≥ 43.3 in (1100 mm)
Connector	Multi-Contact MCA, IP68

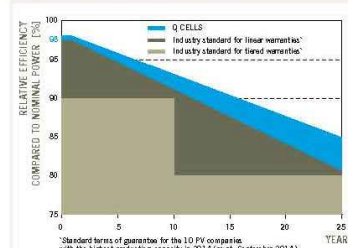


ELECTRICAL CHARACTERISTICS

POWER CLASS		315	320	325	330	
MINIMUM PERFORMANCE AT STANDARD TEST CONDITIONS, STC ¹ (POWER TOLERANCE +5 W / -0 W)						
Minimum	Power at MPP ¹	P _{MPP} [W]	315	320	325	330
	Short Circuit Current ¹	I _{SC} [A]	10.04	10.09	10.14	10.20
	Open Circuit Voltage ¹	V _{OC} [V]	39.87	40.13	40.40	40.66
	Current at MPP ¹	I _{MPP} [A]	9.55	9.60	9.66	9.71
	Voltage at MPP	V _{MPP} [V]	32.98	33.32	33.65	33.98
	Efficiency ¹	η [%]	≥ 18.7	≥ 19.0	≥ 19.3	≥ 19.6
MINIMUM PERFORMANCE AT NORMAL OPERATING CONDITIONS, NMOT ²						
Minimum	Power at MPP	P _{MPP} [W]	235.3	239.0	242.8	246.5
	Short Circuit Current	I _{SC} [A]	8.09	8.13	8.17	8.22
	Open Circuit Voltage	V _{OC} [V]	37.52	37.77	38.02	38.27
	Current at MPP	I _{MPP} [A]	7.52	7.56	7.60	7.64
	Voltage at MPP	V _{MPP} [V]	31.30	31.62	31.94	32.25

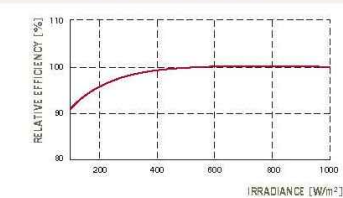
¹Measurement tolerances P_{MPP} ± 3%; I_{SC}, V_{OC} ± 5% at STC; 1000 W/m², 25 ± 2°C, AM 1.5 G according to IEC 60904-3; ²800 W/m², NMOT, spectrum AM 1.5 G

Q CELLS PERFORMANCE WARRANTY



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]	-0.28
Temperature Coefficient of P _{MPP}	γ [%/K]	-0.37	Normal Module Operating Temperature	NMOT [°F]	109 ± 5.4 (43 ± 3°C)

PROPERTIES FOR SYSTEM DESIGN

Maximum System Voltage V _{YS}	[V]	1000 (IEC) / 1000 (UL)	Safety Class	II
Maximum Series Fuse Rating	[A DC]	20	Fire Rating	C (IEC) / TYPE 1 (UL)
Max. Design Load, push ²	[lbs/ft ²]	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 ²	[lbs/ft ²]	113 (5400 Pa) / 84 (4000 Pa)		² see installation manual

QUALIFICATIONS AND CERTIFICATES

UL 1703; VDE Quality Tested; CE-compliant; IEC 61215:2016; IEC 61730:2011, application class A



PACKAGING INFORMATION

Number of Modules per Pallet	32
Number of Pallets per 53' Trailer	30
Number of Pallets per 40' High Cube Container	26
Pallet Dimensions (L x W x H)	69.3 in x 45.3 in x 46.9 in (1760 mm x 1150 mm x 1190 mm)
Pallet Weight	1415 lbs (642 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., 300 Spectrum Center Drive, Suite 1250, Irvine, CA 92618, USA | TEL +1 949 748 59 96 | EMAIL inquiry@us.q-cells.com | WEB www.q-cells.us

Specifications subject to technical change © Hanwha Q CELLS Q.PEAK DUO-G5-315-330_2018-03_Rev03_JNA



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Web: www.powerhome.com

REVISIONS

DESCRIPTION	DATE	REV

Signature with Seal

DATE:05/08/2020

PROJECT NAME & ADDRESS

VALLIE NAYLOR
RESIDENCE
1740 AUTRY RD.,
LILLINGTON, NC 27546

DESIGNED BY

PHS

SHEET NAME
EQUIPMENT
SPECIFICATION

SHEET SIZE

ANSI B
11" X 17"

SHEET NUMBER

PV-7

Single Phase Inverter with HD-Wave Technology

for North America

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



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)

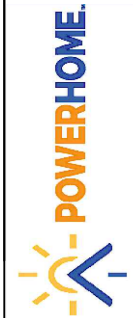
solaredge.com



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	
APPLICABLE TO INVERTERS WITH PART NUMBER	SEXXXXH-XXXXBXX4							
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 ⁽ⁿ⁾							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
Power Factor	1, adjustable -0.85 to 0.85							
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 ⁽ⁿ⁾	8.5	10.5	13.5	16.5	20	27	30.5	Adc
Maximum Input Current @208V ⁽ⁿ⁾	-	9	-	13.5	-	-	27	Adc
Max. Input Short Circuit Current	45							Adc
Reverse-Polarity Protection	Yes							
Ground-Fault Isolation Detection	600 μ A Sensitivity							
Maximum Inverter Efficiency	99	99.2				99 @ 240V 98.5 @ 208V		%
CEC Weighted Efficiency	99							%
Nighttime Power Consumption	< 2.5							W
ADDITIONAL FEATURES								
Supported Communication Interfaces	RS485, Ethernet, ZigBee (optional), Cellular (optional)							
Revenue Grade Data, ANSI C12.20	Optional ⁽ⁿ⁾							
Inverter Commissioning	with the SetApp mobile application using built-in Wi-Fi station for local connection							
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	3/4" minimum / 14-6 AWG				3/4" minimum / 14-4 AWG			
DC Input Conduit Size / # of Strings / AWG Range	3/4" minimum / 1-2 strings / 14-6 AWG				3/4" minimum / 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			dB(A)
Cooling	Natural Convection							
Operating Temperature Range	-40 to +140 / -40 to +60 ⁽ⁿ⁾							*F / °C
Protection Rating	NEMA 4X (Inverter with Safety Switch)							



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1740 AUTRY RD., LILLINGTON, NC 27546

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PHS

SHEET NAME
EQUIPMENT SPECIFICATION

SHEET SIZE

ANSI B
11" X 17"

SHEET NUMBER

PV-8



Power Optimizer

P320 / P370 / P400 / P405 / 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
- Compliant with arc fault protection and rapid shutdown NEC requirements (when installed as part of the SolarEdge system)
- Module-level voltage shutdown for installer and firefighter safety

www.solaredge.us

solaredge Power Optimizer

P320 / P370 / P400 / P405 / P505

OPTIMIZER MODEL (typical module compatibility)	P320 (for high-power 60-cell modules)	P370 (for higher-power 60 and 72-cell modules)	P400 (for 72 & 96-cell modules)	P405 (for thin film modules)	P505 (for higher current modules)	
INPUT						
Rated Input DC Power ⁽¹⁾	320	370	400	405	505	W
Absolute Maximum Input Voltage (Voc at lowest temperature)	48	60	80	125	83	Vdc
MPPT Operating Range	8 - 48	8 - 60	8 - 80	12.5 - 105	12.5 - 83	Vdc
Maximum Short Circuit Current (Isc)	11		10.1		14	Adc
Maximum DC Input Current	13.75		12.63		17.5	Adc
Maximum Efficiency	99.5					%
Weighted Efficiency	98.8					%
Overvoltage Category	II					
OUTPUT DURING OPERATION (POWER OPTIMIZER CONNECTED TO OPERATING SOLAREGE INVERTER)						
Maximum Output Current	15					Adc
Maximum Output Voltage	60			85		Vdc
OUTPUT DURING STANDBY (POWER OPTIMIZER DISCONNECTED FROM SOLAREGE INVERTER OR SOLAREGE 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					
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)	128 x 152 x 28 / 5 x 5.97 x 1.1	128 x 152 x 36 / 5 x 5.97 x 1.42	128 x 152 x 50 / 5 x 5.97 x 1.96	128 x 152 x 59 / 5 x 5.97 x 2.32		mm / in
Weight (including cables)	630 / 1.4	750 / 1.7	845 / 1.9	1064 / 2.3		gr / lb
Input Connector	MC4 ⁽²⁾					
Output Wire Type / Connector	Double Insulated; MC4					
Output Wire Length	0.95 / 3.0				1.2 / 3.9	m / ft
Operating Temperature Range	-40 - +85 / -40 - +185					°C / °F
Protection Rating	IP68 / NEMA6P					
Relative Humidity	0 - 100					%

⁽¹⁾ Rated STC power of the module. Module of up to +5% power tolerance allowed.

⁽²⁾ For other connector types please contact SolarEdge

PV SYSTEM DESIGN USING A SOLAREGE INVERTER ⁽³⁾⁽⁴⁾	SINGLE PHASE HD-WAVE	SINGLE PHASE	THREE PHASE 208V	THREE PHASE 480V	
Minimum String Length (Power Optimizers)	P320, P370, P400 P405 / P505	8	10	18	
Maximum String Length (Power Optimizers)		6	8	14	
Maximum String Length (Power Optimizers)		25	25	50 ⁽⁵⁾	
Maximum Power per String	5700 (6000 with SE7600-US - SE11400- US)	5250	6000	12750	W
Parallel Strings of Different Lengths or Orientations	Yes				

⁽³⁾ For detailed string sizing information refer to: http://www.solaredge.com/sites/default/files/string_sizing_na.pdf.

⁽⁴⁾ It is not allowed to mix P405/P505 with P320/P370/P400/P500/P700/P800 in one string.

⁽⁵⁾ A string with more than 30 optimizers does not meet NEC rapid shutdown requirements; safety voltage will be above the 30V requirement



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DESIGNED BY

PHS

SHEET NAME
EQUIPMENT
SPECIFICATION

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ANSI B
11" X 17"

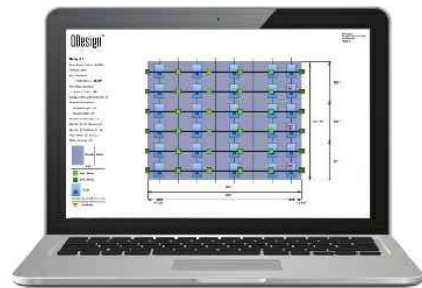
SHEET NUMBER

PV-9



QRail™ — Fully Integrated Mounting and Racking System

The QRail Series is a strong and versatile solar array mounting system that provides unrivaled benefits to solar designers and installers. Combined with Quick Mount PV's industry-leading waterproof mounts, QRail offers a complete racking solution for mounting solar modules on any roof.



Easily design array configurations with the QDesign software application. Generate complete engineering reports and calculate a precise bill of materials for all the mounting, racking and accessories needed for a complete solar array.

Comprehensive, One-Source Solution

QRail, together with Quick Mount PV's waterproof mounting products, provides the benefit of a single-sourced, seamlessly integrated rooftop installation that works with all roof types — composition/asphalt shingles, flat or curved tile, metal shingle, shake, slate and low slope roofs. The QRail system also works with any roof attachment system for maximum flexibility.

Superior Strength and Versatility

QRail is engineered for optimal structural performance. The system is certified to UL 2703, fully code compliant and backed by a 25-year warranty. QRail is available in Light, Standard and Heavy versions to match all geographic locations. QRail is compatible with virtually all modules and works on a wide range of pitched roof surfaces. Modules can be mounted in portrait or landscape orientation in standard or shared-rail configurations.

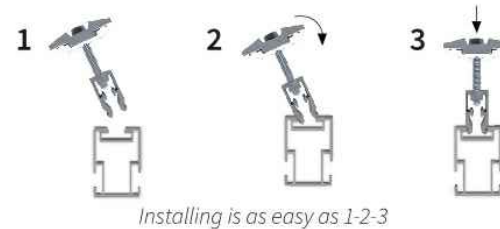


QRails come in two lengths —
168 inches (14 ft) and 208 inches (17.3 ft)
Mill and Black Finish

Fast, Simple Installation: It Just Clicks

QClick Technology™

The universal mid and end clamps use QClick technology to simply "click" into the rail channel and remain upright, ready to accept the module. The pre-assembled clamps fit virtually all module frames and require no extra hardware, eliminating pre-loading and reducing installation time.



Installing is as easy as 1-2-3



UNIVERSAL END CLAMP

2 clamps for modules from
30-45mm or 38-50mm thick



UNIVERSAL BONDED MID CLAMP

2 clamps for modules from
30-45mm or 38-50mm thick

QSplice™ Technology

QRail's innovative internal QSplice installs in seconds, requiring no tools or screws. Simply insert QSplice into the rail and slide the other rail on to create a fully structural, bonded splice. An external splice is also available.



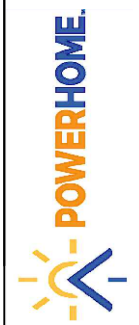
QSPlice



Installs in seconds — no tools or hardware required

Fully Integrated Electrical Bonding

The QRail system provides an integrated electrical bonding path, ensuring that all exposed metal parts and the solar module frames are electrically connected. All electrical bonds are created when the components are installed and tightened down.



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LILLINGTON, NC 27546

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SHEET NAME

EQUIPMENT
SPECIFICATION

SHEET SIZE

ANSI B
11" X 17"

SHEET NUMBER

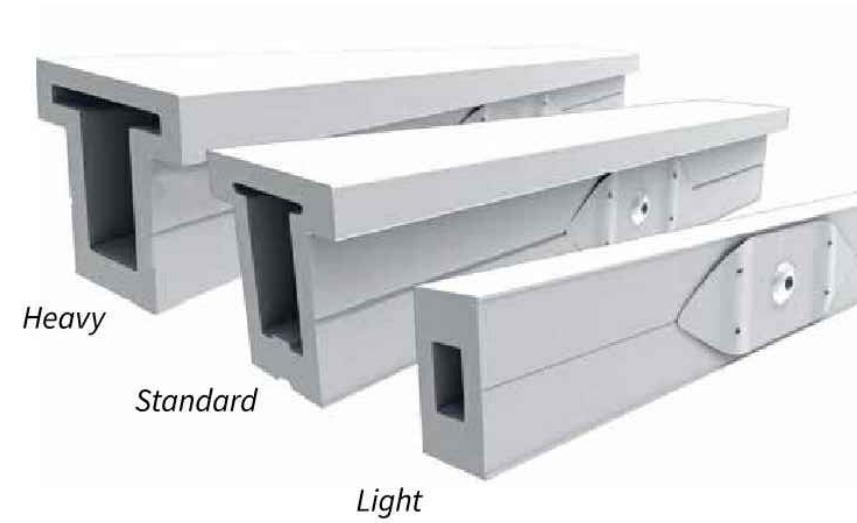
PV-10

QRail™ Configurations



Item Code	Part Number	Description	Finish
QMR-RL14 A 60	800	QRail Light, 14 ft., 60 Pack	Mill
QMR-RL17.3 A 60	801	QRail Light, 17.3 ft., 60 Pack	Mill
QMR-RL14 B 60	805	QRail Light, 14 ft., 60 Pack	Black
QMR-RL17.3 B 60	806	QRail Light, 17.3 ft., 60 Pack	Black
QMR-RS14 A 60	810	QRail Standard, 14 ft., 60 Pack	Mill
QMR-RS17.3 A 60	811	QRail Standard, 17.3 ft., 60 Pack	Mill
QMR-RS14 B 60	815	QRail Standard, 14 ft., 60 Pack	Black
QMR-RS17.3 B 60	816	QRail Standard, 17.3 ft., 60 Pack	Black
QMR-RH14 A 60	820	QRail Heavy, 14 ft., 60 Pack	Mill
QMR-RH17.3 A 60	821	QRail Heavy, 17.3 ft., 60 Pack	Mill
QMR-RH14 B 60	825	QRail Heavy, 14 ft., 60 Pack	Black
QMR-RH17.3 B 60	826	QRail Heavy, 17.3 ft., 60 Pack	Black

QSplice™ Internal Structural Splice



Item Code	Part Number	Description	Finish
QMR-ISL A 15	830	QSplice Internal, Light, 15 Pack	Mill
QMR-ISS A 15	831	QSplice Internal, Standard, 15 Pack	Mill
QMR-ISH A 15	832	QSplice Internal, Heavy, 15 Pack	Mill

QSplice™ External Structural Splice



Item Code	Part Number	Description	Finish
QMR-ESS A 15	834	QSplice External, Standard, 15 Pack	Mill
QMR-ESH A 15	835	QSplice External, Heavy, 15 Pack	Mill



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ANSI B
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SHEET NUMBER

PV-11A

Universal End Clamp with QClick™ Technology



Black

Mill

Item Code	Part Number	Description	Finish
QMR-UEC3045 A 20	860	Universal End Clamp, 30-45mm, 20 Pack	Mill
QMR-UEC3850 A 20	861	Universal End Clamp, 38-50mm, 20 Pack	Mill
QMR-UEC3045 B 20	865	Universal End Clamp, 30-45mm, 20 Pack	Black
QMR-UEC3850 B 20	866	Universal End Clamp, 38-50mm, 20 Pack	Black
QMR-UEC3045BP A 20	862	Universal End Clamp, 30-45mm, w/ Bonding, 20 Pack	Mill
QMR-UEC3850BP A 20	863	Universal End Clamp, 38-50mm, w/ Bonding, 20 Pack	Mill
QMR-UEC3045BP B 20	867	Universal End Clamp, 30-45mm, w/ Bonding, 20 Pack	Black
QMR-UEC3850BP B 20	868	Universal End Clamp, 38-50mm, w/ Bonding, 20 Pack	Black

Mid Clamp with QClick™ Technology



Black

Mill

Item Code	Part Number	Description	Finish
QMR-UMC3045BP 1.2 A 20	872	Universal Mid Clamp, 30-45mm, w/ Bonding, 20 Pack	Mill
QMR-UMC3850BP 1.2 A 20	873	Universal Mid Clamp, 38-50mm, w/ Bonding, 20 Pack	Mill
QMR-UMC3045BP 1.2 B 20	877	Universal Mid Clamp, 30-45mm, w/ Bonding, 20 Pack	Black
QMR-UMC3850BP 1.2 B 20	878	Universal Mid Clamp, 38-50mm, w/ Bonding, 20 Pack	Black

Single-Slot L-Foot



Item Code	Part Number	Description	Finish
QMC-LF A 12	692	Single-slot L-foot, 12 Pack	Mill
QMC-LF B 12	693	Single-slot L-foot, 12 Pack	Black

End Caps

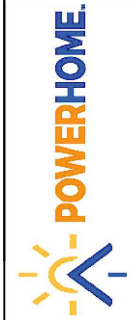


Heavy

Standard

Light

Item Code	Part Number	Description	Finish
QMR-CPL B 50	885	End Cap Light, 50 Pack	Black
QMR-CPS B 50	886	End Cap Standard, 50 Pack	Black
QMR-CPH B 50	887	End Cap Heavy, 50 Pack	Black



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 SPECIFICATION

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ANSI B
 11" X 17"

SHEET NUMBER

PV-11B

T-Bolt



Item Code	Part Number	Description	Finish
QMR-TBA 300	880	T-Bolt w/ Nut, 300 Pack	stainless steel

Wire Clip



Works with both PV and Trunk Cabling

Item Code	Part Number	Description	Finish
QMR-WC A 300	892	Trunk/PV Cable, 300 Pack	stainless steel

Grounding Lug

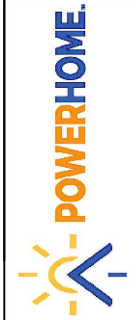


Item Code	Part Number	Description	Finish
QMR-GL A 50	890	WEEB Lug w/ T-Bolt, 50 Pack	n/a

WEEB BMC



Item Code	Part Number	Description	Finish
QMR-ECW A 50	891	WEEB BMC, 50 Pack	stainless steel



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EQUIPMENT
 SPECIFICATION

SHEET SIZE

ANSI B
 11" X 17"

SHEET NUMBER

PV-11C

L-Mount | QMLM / QMLM-ST

Elevated Water Seal Technology®

ITEM NO.	DESCRIPTION	QTY.
1	FLASHING, ROUNDED CORNERS, 9" X 12" X .040", .438" HOLE, 5052, MILL	1
2	L-FOOT, 2" X 3.30" FOR .438" O.D. FASTENER, 2-1/16" SLOT, 6061-T6/6005A-T61, MILL	1
3	WASHER, SEALING, 5/16" ID X 3/4" OD, EPDM BONDED SS	1
4	LAG SCREW, HEX HEAD, 5/16" X 4", 18-8 SS	1
*5	STRUCTURAL SCREW, QMPV, T-30 HEX WASHER HEAD, 5/16" X 4-1/2", 18-8SS	1

THIS EDGE TOWARDS ROOF RIDGE

QMLM

QMLM-ST

Quick Mount PV®

TITLE: QMLM & QMLM-ST: L-MOUNT, 2-1/16" SLOT

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES. TOLERANCES: FRACTIONAL ± 1/8, TWO PLACE DECIMAL ± .19, THREE PLACE DECIMAL ± .094. SCALE: 1:4. WEIGHT: 0.7565. SHEET 1 OF 1.

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L-Mount Installation Instructions

Installation Tools Required: tape measure, roofing bar, chalk line, stud finder, caulking gun, sealant compatible with roofing materials, drill with 7/32" or 1/8" bit, drill or impact gun with 1/2" socket.

WARNING: Quick Mount PV products are NOT designed for and should NOT be used to anchor fall protection equipment.

1 Locate, choose, and mark centers of rafters to be mounted. Select the courses of shingles where mounts will be placed.

2 Carefully lift composition roof shingle with roofing bar, just above placement of mount. Remove nails as required and backfill holes with approved sealant. See "Proper Flashing Placement" on next page.

3 Insert flashing between 1st and 2nd course. Slide up so top edge of flashing is at least 3/4" higher than the butt-edge of the 3rd course and lower flashing edge is above the butt-edge of 1st course. Mark center for drilling.

4 If attaching with lag bolt use a 7/32" bit (Lag). Use a 1/8" bit (ST) for attaching with the structural screw. Drill pilot hole into roof and rafter, taking care to drill square to the roof. Do not use mount as a drill guide. Drill a 2" deep hole into rafter.

5 Clean off any sawdust, and fill hole with sealant compatible with roofing materials.

6 Place L-foot onto elevated flute and rotate L-foot to desired orientation.

7 Prepare lag bolt or structural screw with sealing washer. Using a 1/2-inch socket on an impact gun, drive prepared lag bolt through L-foot until L-foot can no longer easily rotate. **DO NOT over-torque.** NOTE: Structural screw can be driven with T-30 hex head bit.

8 You are now ready for the rack of your choice. Follow all the directions of the rack manufacturer as well as the module manufacturer. NOTE: Make sure top of L-Foot makes solid contact with racking.

All roofing manufacturers' written instructions must also be followed by anyone modifying a roof system. Consult the roof manufacturer's specs and instructions prior to working on the roof.

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SHEET NAME
EQUIPMENT SPECIFICATION

SHEET SIZE
ANSI B 11" X 17"

SHEET NUMBER
PV-12

Quick Mount PV®
RESPECT THE ROOF



Scott E. Wyssling, PE, PP, CME

Wyssling Consulting
76 North Meadowbrook Drive
Alpine, UT 84004
office (201) 874-3483
swyssling@wysslingconsulting.com

May 9, 2020

POWERHOME Solar
919 North Main Street
Mooresville, NC 28115

Re: Engineering Services
Jones Residence
1740 Audrey Road, Lillington, NC
10.240 kW System Size

To Whom it May Concern:

Pursuant to your request, we have reviewed the following information regarding solar panel installation on the roof of the above referenced home:

1. Site Visit/Verification Form prepared by a POWERHOME Solar representative identifying specific site information including size and spacing of rafters for the existing roof structure.
2. Photographs of the interior and exterior of the roof system identifying existing structural members and their conditions.

Based on the above information we have evaluated the structural capacity of the existing roof system to support the additional loads imposed by the solar panels and have the following comments related to our review and evaluation:

Description of Residence:

The existing residence is typical wood framing construction with the roof system consisting of 2 x 8 dimensional lumber at 16" on center. The attic space is unfinished and photos indicate that there was free access to visually inspect the size and condition of the roof rafters. All wood material utilized for the roof system is assumed to be Doug-Fir #2 or better with standard construction components. The existing roofing material consists of composite asphalt shingles. Photos of the dwelling also indicate that there is a permanent foundation.

A. Loading Criteria Used

- 120 MPH wind loading based on ASCE 7-10 Exposure Category "C" at a slope of 40 degrees
- 7 PSF = Dead Load roofing/framing Live Load = 20 PSF Snow Load = 10 PSF
- 3 PSF = Dead Load solar panels/mounting hardware

Total Dead Load = 10 PSF

The above values are within acceptable limits of recognized industry standards for similar structures in accordance with the North Carolina Residential Code (2018). Analysis performed of the existing roof structure utilizing the above loading criteria indicates that the existing rafters will support the additional panel loading without damage, if installed correctly.

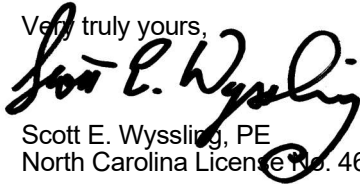
B. Solar Panel Anchorage

1. The solar panels shall be mounted in accordance with the most recent “QuickMount PV Installation Manual”, which can be found on the QuickMount website (<http://quickmountpv.com/>). If during solar panel installation, the roof framing members appear unstable or deflect non-uniformly, our office should be notified before proceeding with the installation.
2. Maximum allowable pullout per lag screw is 235 lbs/inch of penetration as identified in the National Design Standards (NDS) of timber construction specifications for Southern Pine *assumed*. Based on our evaluation, the pullout value, utilizing a penetration depth of 3”, is less than what is allowable per connection and therefore is adequate. Based on the variable factors for the existing roof framing and installation tolerances, using a thread depth of 3” with a minimum size of 5/16” lag screw per attachment point for panel anchor mounts should be adequate with a sufficient factor of safety.
3. Considering the roof slopes, the size, spacing, condition of roof, the panel supports shall be placed no greater than 72” o/c.
4. Panel supports connections shall be staggered to distribute load to adjacent rafters.

Based on the above evaluation, it is the opinion of this office that with appropriate panel anchors being utilized the roof system will adequately support the additional loading imposed by the solar panels. This evaluation is in conformance with the North Carolina Residential Code, current industry and standards, and based on information supplied to us at the time of this report.

Should you have any questions regarding the above or if you require further information do not hesitate to contact me.

Very truly yours,



Scott E. Wyssling, PE
North Carolina License No. 46546

