

PROJECT DESCRIPTION:

25 X HANWHA Q CELLS 320W MODULES
 ROOF MOUNTED SOLAR PHOTOVOLTAIC MODULES SYSTEM
 SIZE: 8.00 kW DC STC

ARRAY AREA:ROOF #1- 219.6 SQ FT.
 ARRAY AREA:ROOF #2- 146.4 SQ FT.
 ARRAY AREA:ROOF #3- 91.5 SQ FT.

EQUIPMENT SUMMARY

- 25 HANWHA Q CELLS 320W MODULES
- 04 GENERAC PV LINK S2502 POWER OPTIMIZERS
- 01 GENERAC PWRCELL X7602 INVERTER


AUTHORITIES HAVING JURISDICTION

BUILDING: HARNETT COUNTY
 ZONING: HARNETT COUNTY
 UTILITY: SOUTH RIVER EMC

COMMONWEALTH of VIRGINIA
 Department of Professional and Occupational Regulation

BOARD FOR CONTRACTORS
 TRADESMAN
 NUMBER: 2710068113 EXPIRES: 08-31-2022

BRYAN DOUGLAS LAW
 919 N MAIN ST
 MOORESVILLE, NC 28115



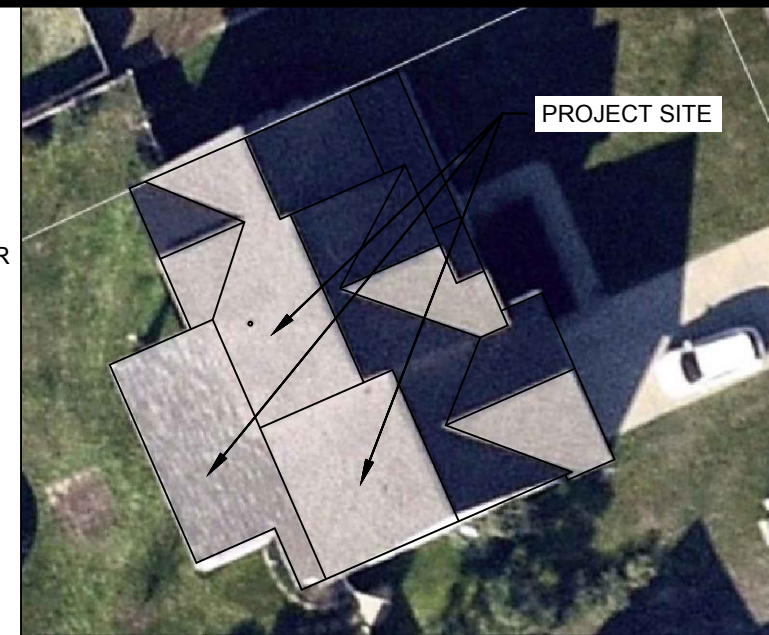
Status can be verified at <http://www.dpor.virginia.gov>

APPLICABLE CODES & STANDARDS

BUILDING: NCBC 2018
 ELECTRICAL: NEC 2017

DESIGN SPECIFICATION

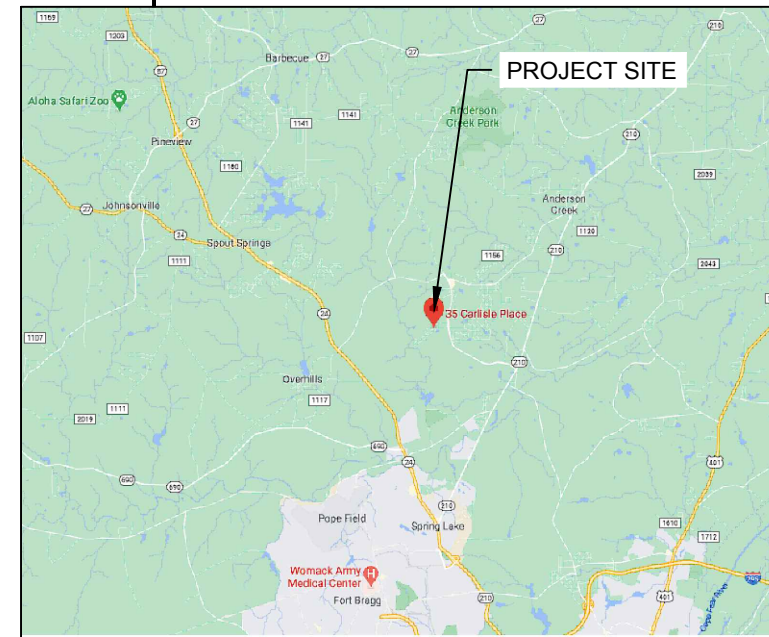
OCCUPANCY: II
 CONSTRUCTION: SINGLE-FAMILY
 ZONING: RESIDENTIAL
 GROUND SNOW LOAD: SEE STRUCTURAL LETTER
 WIND EXPOSURE: SEE STRUCTURAL LETTER
 WIND SPEED: SEE STRUCTURAL LETTER



PROJECT SITE

2 HOUSE PHOTO

PV-1 SCALE: NTS



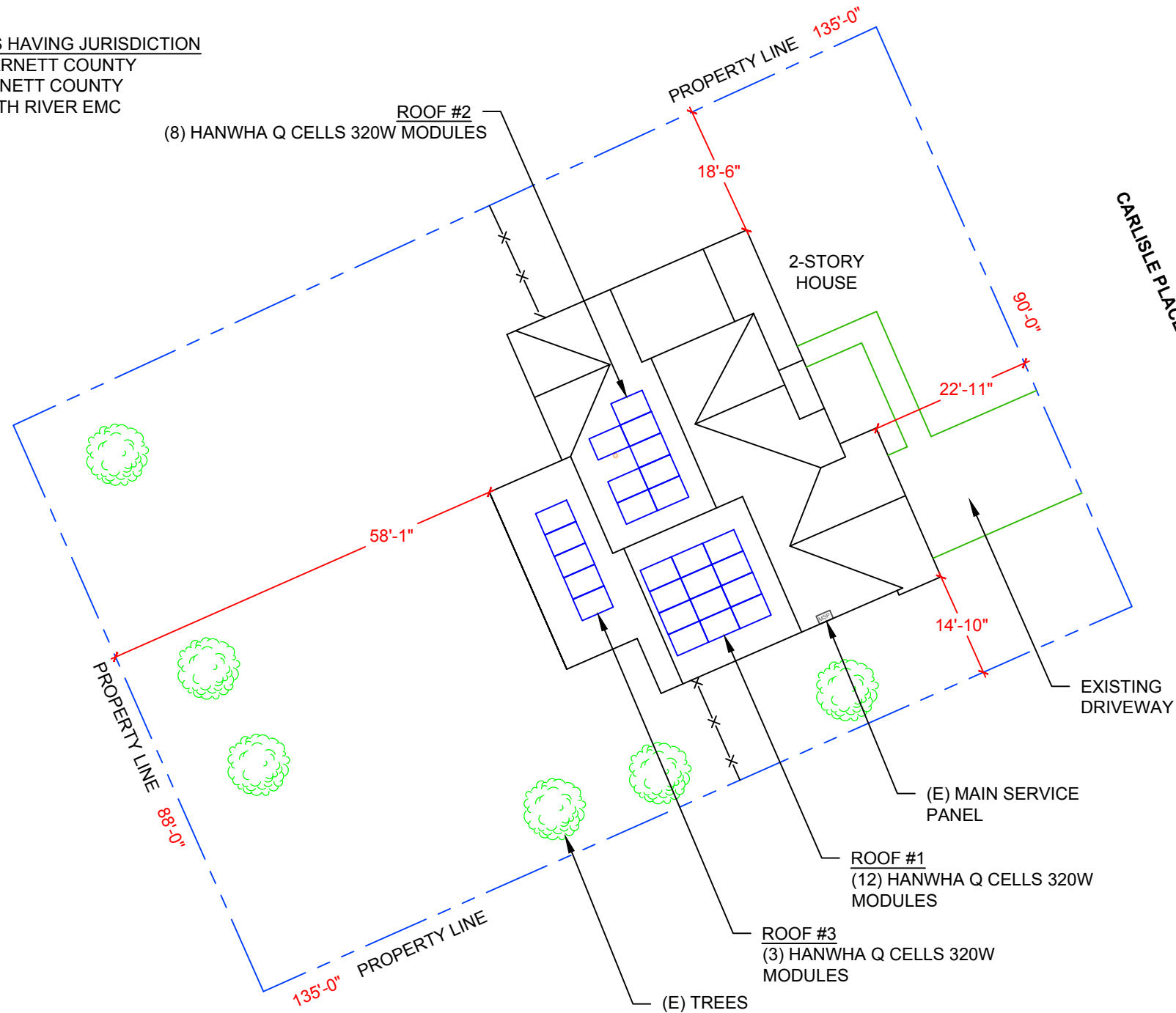
PROJECT SITE

3 VICINITY MAP

PV-1 SCALE: NTS

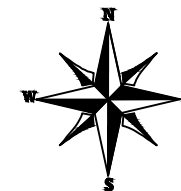
SHEET INDEX

- 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 to 12 EQUIPMENT SPECIFICATIONS



1 PLOT PLAN WITH ROOF PLAN

PV-1 SCALE: 1"=20'-0"



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 MOORESVILLE, NC 28115
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 Email: info@powerhome.com
 Web: www.powerhome.com

REVISIONS

DESCRIPTION	DATE	REV

Signature with Seal

DATE:08/31/2020

PROJECT NAME & ADDRESS

**JOHN ROBERT RICH
 RESIDENCE**
 35 CARLISLE PLACE,
 SPRING LAKE, NC 28390

DESIGNED BY

PHS

SHEET NAME

**PLOT PLAN &
 VICINITY MAP**

SHEET SIZE

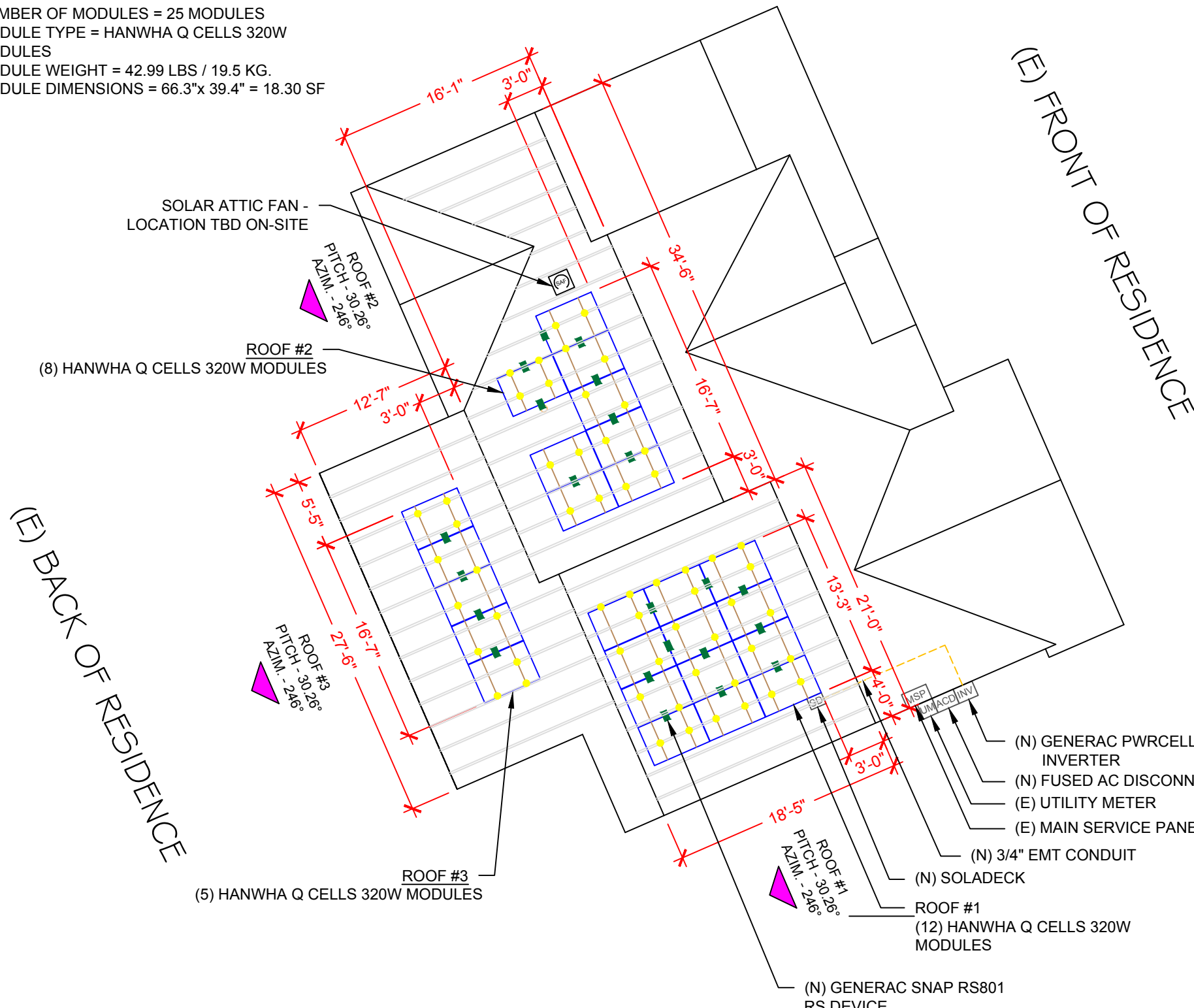
**ANSI B
 11" X 17"**

SHEET NUMBER

PV-1

MODULE TYPE, DIMENSIONS & WEIGHT

NUMBER OF MODULES = 25 MODULES
 MODULE TYPE = HANWHA Q CELLS 320W
 MODULES
 MODULE WEIGHT = 42.99 LBS / 19.5 KG.
 MODULE DIMENSIONS = 66.3"x 39.4" = 18.30 SF



ROOF DESCRIPTION				
ROOF TYPE		COMPOSITE SHINGLE		
ROOF LAYER		1 LAYERS		
ROOF	ROOF PITCH	AZIMUTH	FRAMING SIZE	FRAMING SPACING
#1	30.26°	246°	SEE STRUCTURAL LETTER	
#2	30.26°	246°	SEE STRUCTURAL LETTER	
#3	30.26°	246°	SEE STRUCTURAL LETTER	

ARRAY AREA & ROOF AREA CALC'S				
ROOF	# OF MODULES	ARRAY AREA (Sq. Ft.)	ROOF AREA (Sq. Ft.)	ROOF AREA COVERED BY ARRAY (%)
#1	12	219.60	386.42	57
#2	8	146.40	437.59	33
#3	5	91.50	395.69	23

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SHEET NAME
**ROOF PLAN &
 MODULES**

SHEET SIZE
**ANSI B
 11" X 17"**

SHEET NUMBER
PV-2

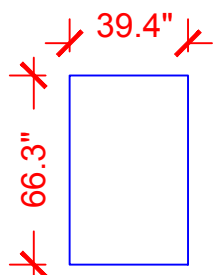
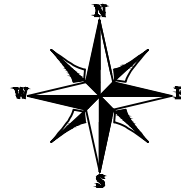
(SAF) SOLAR ATTIC FAN

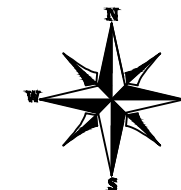
NOTES:

- 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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PHS

SHEET NAME

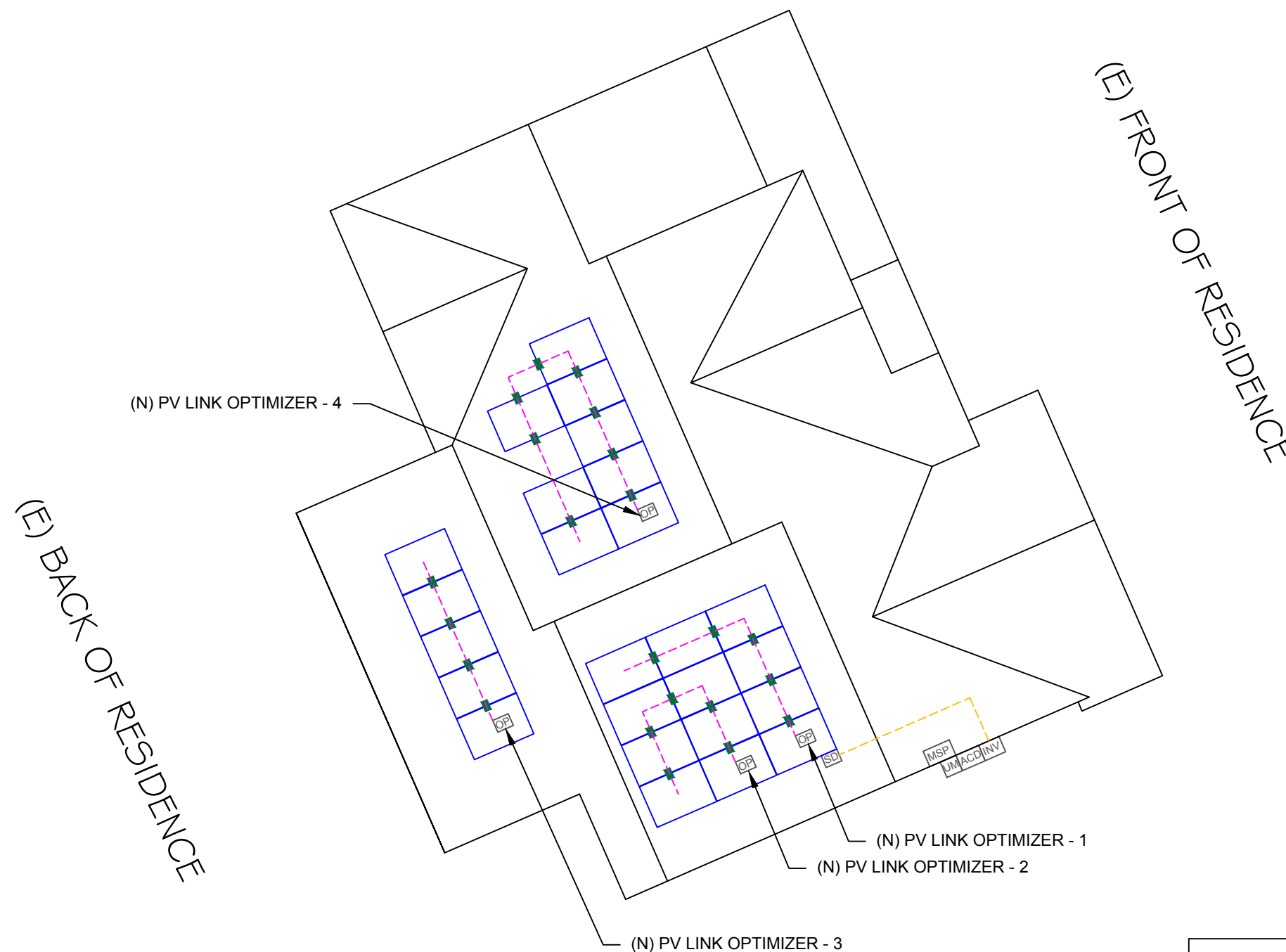
STRING
 LAYOUT

SHEET SIZE

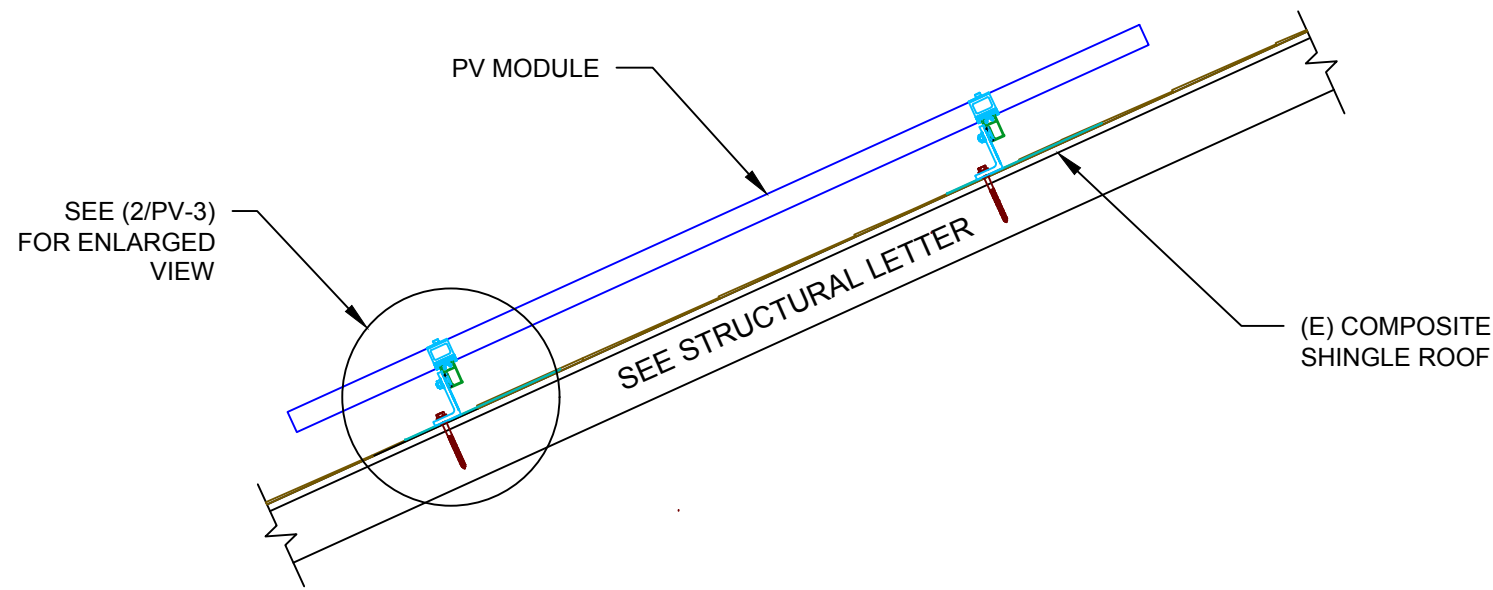
ANSI B
 11" X 17"

SHEET NUMBER

PV-2A

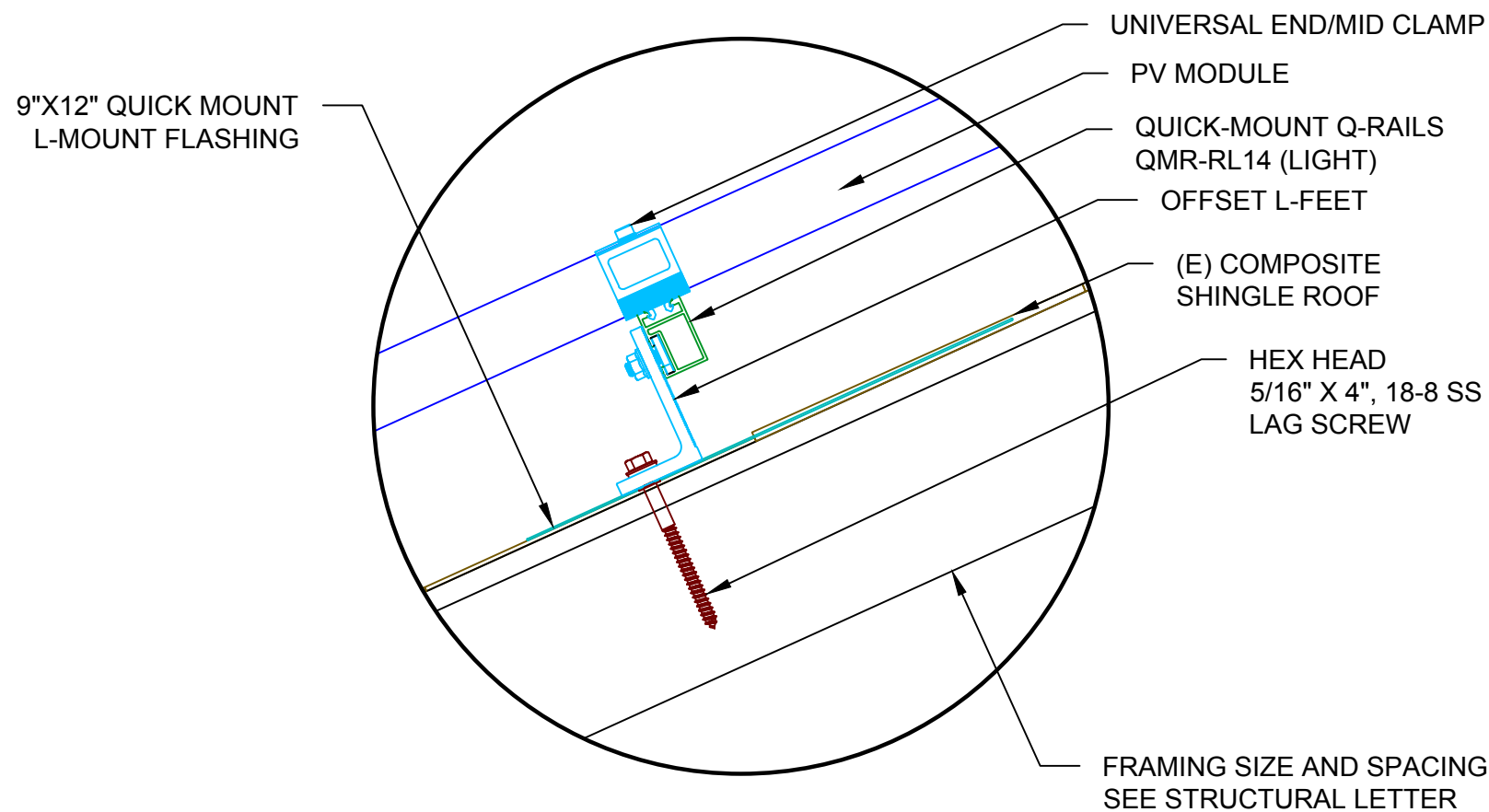


BILL OF MATERIALS		
EQUIPMENT	QTY	DESCRIPTION
SOLAR PV MODULE	25	HANWHA Q CELLS 320W MODULES
OPTIMIZER	4	GENERAC PV LINK S2502 POWER OPTIMIZERS
GENERAC SNAP RS	25	GENERAC SNAPRS MODEL RS801
INVERTER	01	GENERAC PWRCELL X7602 INVERTER
AC DISCONNECT	1	60A FUSED, (2) 40A FUSES, 240V, NEMA 3R, UL LISTED
SOLAR DECK	3	SOLAR DECKS
RAILS	13	QRAIL LIGHT 14 FT. BLACK
SPLICE KIT	4	QSPLICE INTERNAL LIGHT
WEEB BMC	4	WEEB BMC MILL
MODULE CLAMPS	36	UNIVERSAL MID CLAMP
GROUNDING LUG	7	WEEB LUG W/ T-BOLT
END CLAMPS	28	UNIVERSAL END CLAMPS
ATTACHMENT	56	L-MOUNT ATTACHMENT (QUICKMOUNT)
SQUARE-BOLT	56	T-BOLT W/ NUT M8 X 20MM



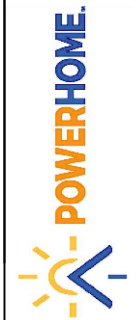
1 ATTACHMENT DETAIL

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



2 ATTACHMENT DETAIL (enlarged view)

PV-3 SCALE: NTS



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SHEET NAME

**ATTACHMENT
 DETAIL**

SHEET SIZE

**ANSI B
 11" X 17"**

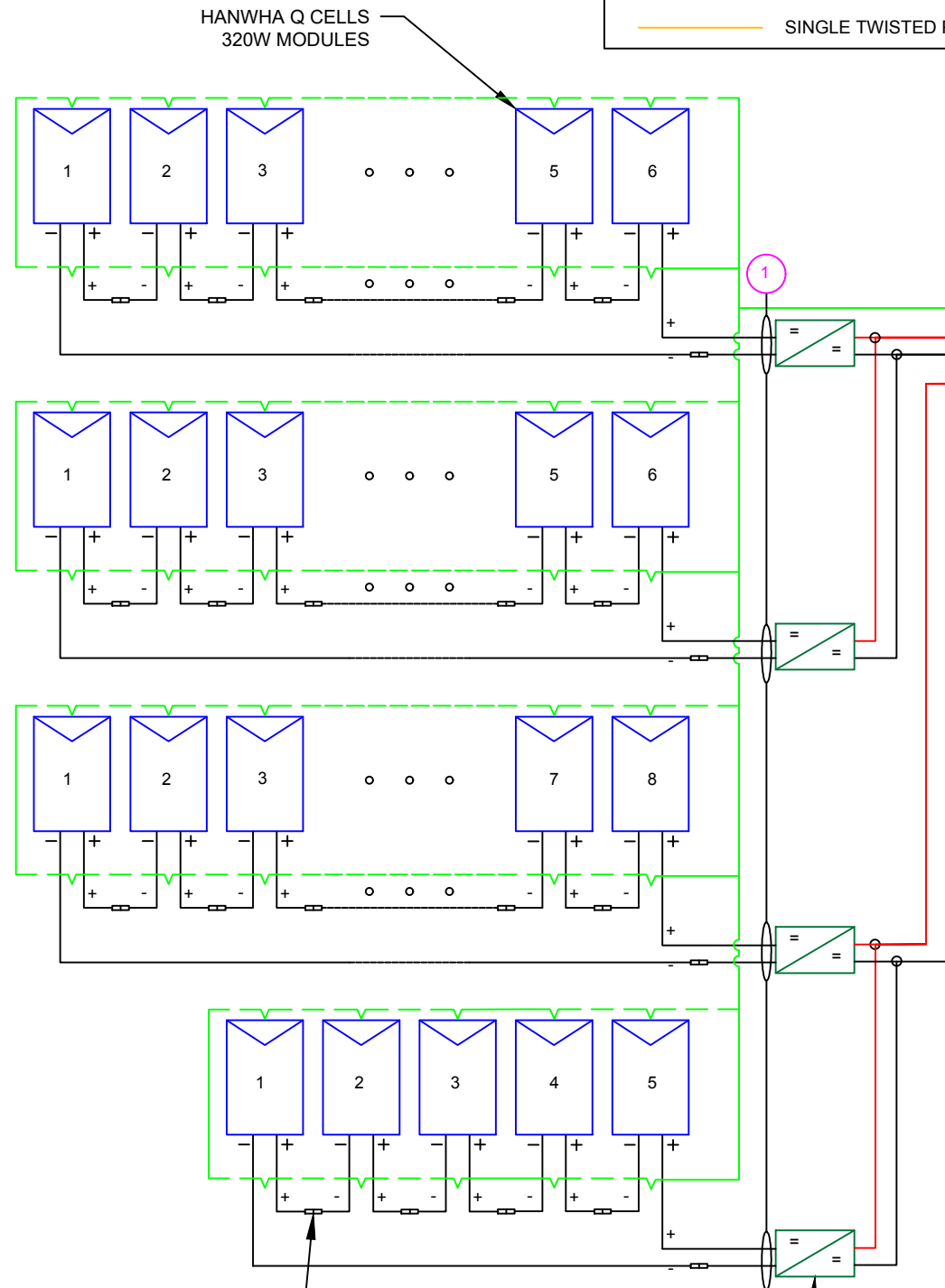
SHEET NUMBER

PV-3

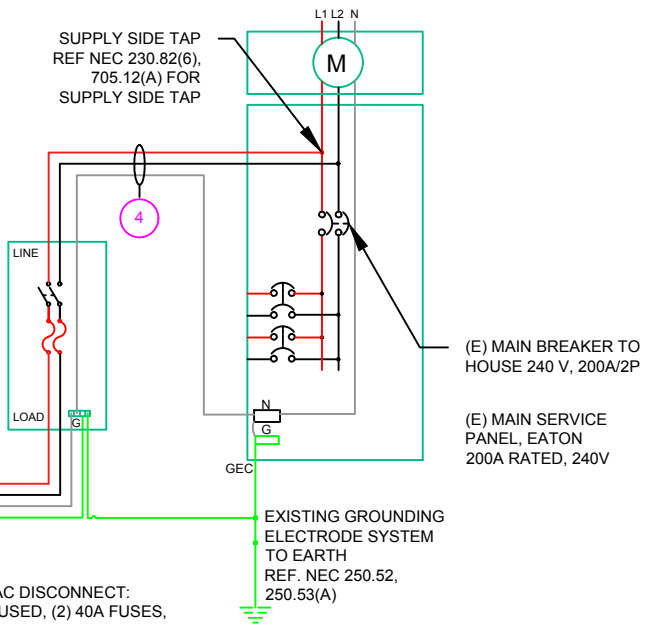
(25) HANWHA Q CELLS 320W MODULES
 (1) PV LINK OF 8 MODULES,
 (2) PV LINK OF 6 MODULES &
 (1) PV LINK OF 5 MODULES
 CONNECTED IN SERIES

WIRE LEGEND	
	PV ARRAY +VE CONDUCTOR AND L1
	PV ARRAY -VE CONDUCTOR AND L2
	NEUTRAL CONDUCTOR
	EGC AND GEC
	SINGLE TWISTED PAIR, CAT 5 WIRE

SERVICE INFO	
UTILITY PROVIDER:	SOUTH RIVER EMC
MAIN SERVICE VOLTAGE:	240V
MAIN PANEL BRAND:	EATON
MAIN SERVICE PANEL:	200A
MAIN CIRCUIT BREAKER RATING:	200A
MAIN SERVICE LOCATION:	SOUTH
SERVICE FEED SOURCE:	OVERHEAD



GENERAC PWRCELL X7602 (7.6kW)
 INVERTER (240V)
 OUTPUT: 240V, 32A
 96.5% CEC WEIGHTED EFFICIENCY
 NEMA 3R RATED, UL 1741 LISTED, INTERNAL
 GFDI WITH INTEGRATED DC DISCONNECT



- ! WARNING !**
 PHOTOVOLTAIC POWER SOURCE
LABEL 1
 ON ALL CONDUITS
 SPACED AT MAX 10FT
- ! CAUTION !**
 SOLAR ELECTRIC
 SYSTEM CONNECTED
 AND ENERGIZED
LABEL 3
 AT INVERTER
- ! WARNING !**
 ELECTRIC SHOCK HAZARD
 DO NOT TOUCH TERMINALS
 TERMINALS ON BOTH LINE AND LOAD SIDES
 MAY BE ENERGIZED IN THE OPEN POSITION
LABEL 5
 AT EACH AC DISCONNECT
- ! WARNING !**
 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 2
 AT INVERTER
- ! CAUTION !**
 SOLAR ELECTRIC
 SYSTEM CONNECTED
 AND ENERGIZED
LABEL 4
 AT EACH DC DISCONNECT
- ! WARNING !**
 PHOTOVOLTAIC
 AC
 DISCONNECT
LABEL 6
 AT EACH AC DISCONNECT

- ! WARNING !**
 DUAL POWER SOURCES
 SECOND SOURCE IS PV SYSTEM
LABEL 8
 AT MEP
- ! CAUTION !**
 SOLAR POINT OF
 INTERCONNECTION
LABEL 10
 AT UTILITY METER
- ! WARNING !**
 SOLAR SYSTEM
 CONNECTED
 AND ENERGIZED
LABEL 9
 AT MEP
- ! WARNING !**
 THE SERVICE METER IS ALSO SERVED
 BY A PHOTOVOLTAIC SYSTEM
LABEL 11
 AT UTILITY METER

SNAP RS (RS801)
 MAX INPUT CURRENT - 13 A
 UL 1741 LISTED
 MODULE LEVEL RAPID
 SHUTDOWN (PVRSS)
 COMPLIANT
 NEMA 6P RATED

PVLINK SUBSTRING OPTIMIZER (S2502)
 RATED POWER : 2500W
 MPPT VOLTAGE RANGE: 60 TO 360 V
 MAX OUTPUT VOLTAGE: 420V
 MAX OUTPUT CURRENT: 8A
 RAPID SHUTDOWN COMPLIANT
 GROUND-FAULT PROTECTION COMPLIANT

QTY	CONDUCTOR INFORMATION	CONDUIT TYPE	CONDUIT SIZE
(8)	#10AWG - PV WIRE/USE-2	N/A	N/A
(1)	#6AWG - BARE COPPER IN FREE AIR	N/A	N/A
(4)	#10AWG - THWN-2	EMT OR FLEX IN ATTIC	3/4"
(1)	#6AWG - THWN-2 GND		
(3)	#6AWG - THWN-2	EMT OR FLEX	3/4"
(1)	#6AWG - THWN-2 GND		
(3)	#6AWG - THWN-2	EMT OR FLEX	3/4"

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DESCRIPTION	DATE	REV

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 35 CARLISLE PLACE,
 SPRING LAKE, NC 28390

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 320W MODULES
VMP	33.32V
IMP	9.60A
VOC	40.13V
ISC	10.09A
TEMP. COEFF. VOC	-0.301%/°C
MODULE DIMENSION	66.3"L x 39.4"W x 1.50"D (In Inch)

INVERTER SPECIFICATIONS	
MANUFACTURER / MODEL #	GENERAC PWRCELL X7602
AC POWER OUTPUT (LOADS/GRID)	7600VA
AC POWER OUTPUT (BACKUP)	8000VA
NOMINAL OUTPUT VOLTAGE	240 VAC
MAX OUTPUT CURRENT @240V (LOADS/GRID)	32A
MAX OUTPUT CURRENT @240V (BACKUP)	50A
NOMINAL DC INPUT VOLTAGE	380Vdc
MAX DC INPUT VOLTAGE	420Vdc
CEC WEIGHTED EFFICIENCY	96.5%
MAX INPUT CURRENT (PV)	10000W
MAX INPUT CURRENT (PV)	20Adc
CONT. PEAK POWER (BATTERY)	8000W

SERIES SUB STRING OPTIMIZER SPECIFICATIONS	
MANUFACTURER / MODEL #	PV LINK S2502
RATED POWER	2500W
MPPT VOLTAGE RANGE	60-360 Vmp
MAXIMUM INPUT VOLTAGE	420Voc
MAXIMUM OUTPUT	420 Adc
NOMINAL OUTPUT	380 Vdc
MAXIMUM OUTPUT CURRENT	8 A
MAXIMUM SHORT CIRCUIT CURRENT	18 A

AMBIENT TEMPERATURE SPECS	
RECORD LOW TEMP	-10°
AMBIENT TEMP (HIGH TEMP 2%)	36°
CONDUIT HEIGHT	0.5"
ROOF TOP TEMP	58°

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

DC CONDUCTOR AMPACITY CALCULATIONS: ARRAY TO SOLADECK:

EXPECTED WIRE TEMP (In Celsius)	58°
TEMP CORRECTION PER TABLE 310.15 (B) (2) (a)	0.71
NO. OF CURRENT CARRYING CONDUCTORS	8
CONDUIT FILL CORRECTION PER NEC 310.15 (B) (3) (a)	0.7
CIRCUIT CONDUCTOR SIZE	10 AWG
CIRCUIT CONDUCTOR AMPACITY	40A

REQUIRED CIRCUIT CONDUCTOR AMPACITY PER NEC 690.8(A&B)	10A
1.25 X I _{max}	
DERATED AMPACITY OF CIRCUIT CONDUCTORS : 310.15 (B) (16)	
CONDUIT FILL CORRECTION PER NEC 310.15 (B) (3) (a) X CIRCUIT CONDUCTOR AMPACITY X TEMP CORRECTION PER TABLE 310.15 (B) (2) (a)	19.88A
Result should be greater than (10A) otherwise less the entry for circuit conductor size and ampacity	

FROM SOLADECK 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 310.15 (B) (2) (a)	0.71
NO. OF CURRENT CARRYING CONDUCTORS	4
CONDUIT FILL CORRECTION PER NEC 310.15 (B) (3) (a)	0.8
CIRCUIT CONDUCTOR SIZE	10AWG
CIRCUIT CONDUCTOR AMPACITY	40A

REQUIRED CIRCUIT CONDUCTOR AMPACITY PER NEC 690.8(A&B)	20A
1.25 X I _{max} X # of PV LINKS PER INPUT	
DERATED AMPACITY OF CIRCUIT CONDUCTORS : 310.15 (B) (16)	
CONDUIT FILL CORRECTION PER NEC 310.15 (B) (3) (a) X CIRCUIT CONDUCTOR AMPACITY X TEMP CORRECTION PER TABLE 310.15 (B) (2) (a)	22.72A
Result should be greater than (20A) 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 310.15 (B) (2) (a)	0.91
NO. OF CURRENT CARRYING CONDUCTORS	3
CONDUIT FILL CORRECTION PER NEC 310.15 (B) (3) (a)	1
CIRCUIT CONDUCTOR SIZE	6 AWG
CIRCUIT CONDUCTOR AMPACITY	75A

REQUIRED CIRCUIT CONDUCTOR AMPACITY PER NEC 690.8(B)	40A
1.25 X MAX INVERTER OUTPUT CURRENT (LOADS/GRID)	
DERATED AMPACITY OF CIRCUIT CONDUCTORS : 310.15 (B) (16)	
CONDUIT FILL CORRECTION PER NEC 310.15 (B) (3) (a) X CIRCUIT CONDUCTOR AMPACITY X TEMP CORRECTION PER TABLE 310.15 (B) (2) (a)	68.25A
Result should be greater than (40A) otherwise less the entry for circuit conductor size and ampacity	



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PHS

SHEET NAME

WIRING
CALCULATIONS

SHEET SIZE

ANSI B
11" X 17"

SHEET NUMBER

PV-5



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 (5400 Pa) and wind loads (4000 Pa) 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.



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

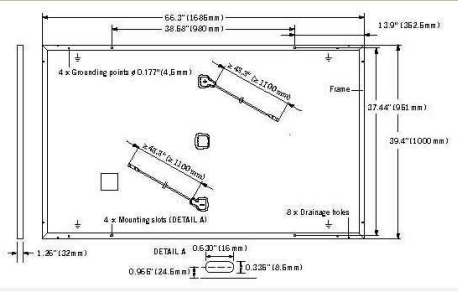


Engineered in Germany



MECHANICAL SPECIFICATION

Format	66.3 in × 39.4 in × 1.26 in (including frame) (1685 mm × 1000 mm × 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 × 20 monocrystalline Q.ANTUM solar half-cells
Junction box	2.76-3.35 in × 1.97-2.76 in × 0.51-0.83 in (70-85 mm × 50-70 mm × 13-21 mm), decentralized, IP67
Cable	4 mm ² Solar cable; (+) ≥ 43.3 in (1100 mm), (-) ≥ 43.3 in (1100 mm)
Connector	Multi-Contact MC4, IP68

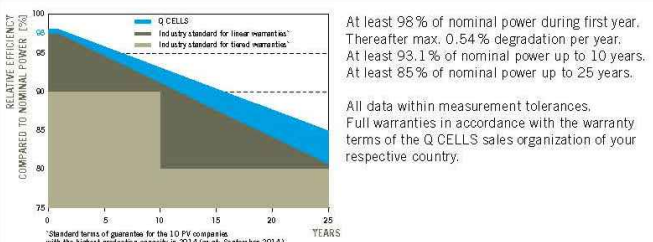


ELECTRICAL CHARACTERISTICS

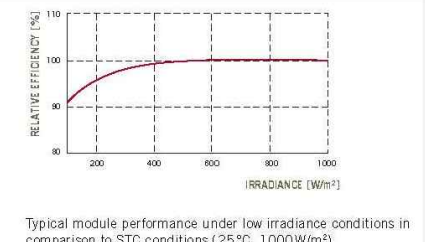
POWER CLASS	315	320	325	330	
MINIMUM PERFORMANCE AT STANDARD TEST CONDITIONS, STC ¹ (POWER TOLERANCE +5W / -0W)					
Power at MPP¹	P _{MPP} [W]	315	320	325	330
Short Circuit Current¹	I _{sc} [A]	10.04	10.09	10.14	10.20
Open Circuit Voltage¹	V _{oc} [V]	39.87	40.13	40.40	40.66
Current at MPP¹	I _{MPP} [A]	9.55	9.60	9.66	9.71
Voltage at MPP	V _{MPP} [V]	32.98	33.32	33.65	33.98
Efficiency¹	η [%]	≥ 18.7	≥ 19.0	≥ 19.3	≥ 19.6
MINIMUM PERFORMANCE AT NORMAL OPERATING CONDITIONS, NMOT ²					
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

¹ Measurement 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; ² 800 W/m², NMOT, spectrum AM 1.5 G

Q CELLS PERFORMANCE WARRANTY



PERFORMANCE AT LOW IRRADIANCE



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_{sys}	[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, push²	[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 / Pull²	[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 × W × H)	69.3 in × 45.3 in × 46.9 in (1760 mm × 1150 mm × 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.

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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 changes © Hanwha Q CELLS Q.PEAK DUO-G5-315-330_2018-03_Rev03_NA



REVISIONS

DESCRIPTION	DATE	REV

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DATE:08/31/2020

PROJECT NAME & ADDRESS

JOHN ROBERT RICH
RESIDENCE

35 CARLISLE PLACE,
SPRING LAKE, NC 28390

DESIGNED BY

PHS

SHEET NAME EQUIPMENT SPECIFICATION

SHEET SIZE

ANSI B
11" X 17"

SHEET NUMBER

PV-7

GENERAC[®] PWRCELL

7.6kW 1Ø, 11.4kW 3Ø PWRcell Inverter with CTs
Model: APKE00014, APKE00013
Certification Model Reference: X7602, X11402



Solar + storage is simple with the Generac PWRcell™ Inverter. This bi-directional, REbus™-powered inverter offers a simple, efficient design for integrating smart batteries with solar. Ideal for self-supply, backup power, zero-export and energy cost management, the PWRcell Inverter is the industry's most feature-rich line of inverters, available in single-phase and three-phase models.

FEATURES & BENEFITS

- Single inverter for grid-tied solar with smart battery integration
- Simplified system design: No autotransformer or battery inverter needed
- User-selectable modes for backup power, self-supply, time-of-use and zero-export
- Free system monitoring included via PWRview™ Web Portal and Mobile App

AC OUTPUT/GRID-TIE	MODEL APKE00014	MODEL APKE00013
RATED AC POWER OUTPUT:	7600W	11400W
AC OUTPUT VOLTAGE:	120/240, 1Ø VAC	120/208, 3Ø VAC
AC FREQUENCY:	60 Hz	60 Hz
MAXIMUM CONTINUOUS OUTPUT CURRENT:	32 A, RMS	32 A, RMS
GROUND-FAULT ISOLATION DETECTION:	Included	Included
CHARGE BATTERY FROM AC:	Yes	Yes
THD (CURRENT):	< 2%	< 2%
TYPICAL NIGHTTIME POWER CONSUMPTION:	< 7W	< 7W

DC INPUT	MODEL APKE00014	MODEL APKE00013
DC INPUT VOLTAGE RANGE:	360-420 VDC	360-420 VDC
NOMINAL DC BUS VOLTAGE:	380 VDC	380 VDC
MAX IMPORT CURRENT ¹ :	20 A	30 A
MAX INPUT CURRENT ² :	30 A	30 A
REVERSE-POLARITY PROTECTION:	Yes	Yes
GROUND-FAULT ISOLATION DETECTION:	Yes	Yes
TRANSFORMERLESS, UNGROUNDED:	Yes	Yes
TYPICAL NIGHTTIME POWER CONSUMPTION:	< 7W	< 7W

AC OUTPUT/BACKUP	MODEL APKE00014	MODEL APKE00013
RATED AC BACKUP POWER OUTPUT (ISLANDED):	8000W	8000W
MAXIMUM AC BACKUP POWER OUTPUT:	10000W	10000W
AC BACKUP OUTPUT VOLTAGE:	120/240, 1Ø VAC	120/240, 1Ø VAC
AC FREQUENCY:	60 Hz	60 Hz
AC CIRCUIT BREAKER:	50 A	50 A
THD (VOLTAGE):	< 2%	< 2%
AUTOMATIC SWITCHOVER TIME:	< 1 Seconds	< 1 Seconds
TYPICAL NIGHTTIME POWER CONSUMPTION:	30W	30W

DC INPUT/ BATTERY	MODEL APKE00014	MODEL APKE00013
MAXIMUM CONTINUOUS POWER:	8000W	8000W
INTERNAL DC DISTRIBUTION BREAKERS:	4x 2p30A	4x 2p30A
DC FUSES ON PLUS AND MINUS:	40 A	40 A
2-POLE DISCONNECTION:	Yes	Yes

EFFICIENCY	MODEL APKE00014	MODEL APKE00013
PEAK EFFICIENCY:	97%	98%
CEC WEIGHTED EFFICIENCY:	96.50%	97.50%

¹Inverter limits DC current import to AC power rating. Total DC current from multiple DC inputs may safely exceed this value up to Max. Input Current. The inverter safely limits the amount utilized
²Per input, four DC inputs total

Specifications

FEATURES AND MODES

ISLANDING ³ :	Yes
GRID SELL:	Yes
SELF CONSUMPTION:	Yes
PRIORITIZED CHARGING FROM RENEWABLES:	Yes
GRID SUPPORT - ZERO EXPORT:	Yes

ADDITIONAL FEATURES

SUPPORTED COMMUNICATION INTERFACES:	REbus™, CANbus, RS485 ⁴ , Ethernet
SYSTEM MONITORING:	PWRview™ Web Portal and Mobile App
BACKUP LOADS DISCONNECT ⁵ :	Yes
MANUAL INVERTER BYPASS SWITCH:	Automatic
WARRANTY:	10 Years

STANDARDS COMPLIANCE

SAFETY:	UL1741 SA, CSA 22.2
GRID CONNECTION STANDARDS:	IEEE1547, Rule 21, Rule 14H, CSIP
EMISSIONS:	FCC Part 15 Class B

DIMENSIONS AND INSTALLATION SPECIFICATIONS

ENCLOSURE KNOCKOUTS - QTY, SIZE - IN (MM):	6 x Combo 3/4" x 1" (19 x 25.4) 7 x Combo 1/2" x 3/4" (12.7 x 19)
DIMENSIONS L x W x H - IN (MM):	24.5" x 19.25" x 8" (622.3 x 488.9 x 203.2)
WEIGHT - LB (KG):	62.7 (28.4)
COOLING:	Forced convection
NOISE:	< 40 dBA
OPERATING TEMPERATURE - FAHRENHEIT (CELSIUS):	-4 to 122 °F (-20 to 50 °C) ⁵
PROTECTION RATING:	NEMA 3R

INSTALLATION GUIDELINES

BATTERY TYPES SUPPORTED:	PWRcell™ Battery
MODULE STRING SIZE PER PV LINK OPTIMIZER:	Varies, refer to PV Link Installation Manual
MAXIMUM RECOMMENDED DC POWER FROM PV:	15kW

³3Ø inverters offer islanding for 1Ø loads

⁴Modbus

⁵Reduced power at extreme temperatures

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ANSI B
11" X 17"

SHEET NUMBER

PV-7

GENERAC

PV Link™

2500W MPPT Substring Optimizer
Model: APKE00010
Certification Model Reference: S2502

PV Link is the simple solar optimizer for quick installation and long-lasting performance. Connect PV modules to each PV Link to overcome shading and challenging roof lines.

FEATURES & BENEFITS

- Fast, simple installation
- Lower failure risk than module-level optimizers
- 2017/2020 NEC rapid shutdown compliant with SnapRS™
- Quick connections with MC4 connectors
- Exports up to 2500W
- Compatible with PWRcell™ Inverters
- Cost-effective solution for high-performance PV
- Ground-fault protection

SINGLE-STRING PV ARRAY WITH SnapRS DEVICES

Where PV module-level rapid shutdown is required (NEC 690.12), a SnapRS device (RS) is installed to negative (-) lead of each PV module.

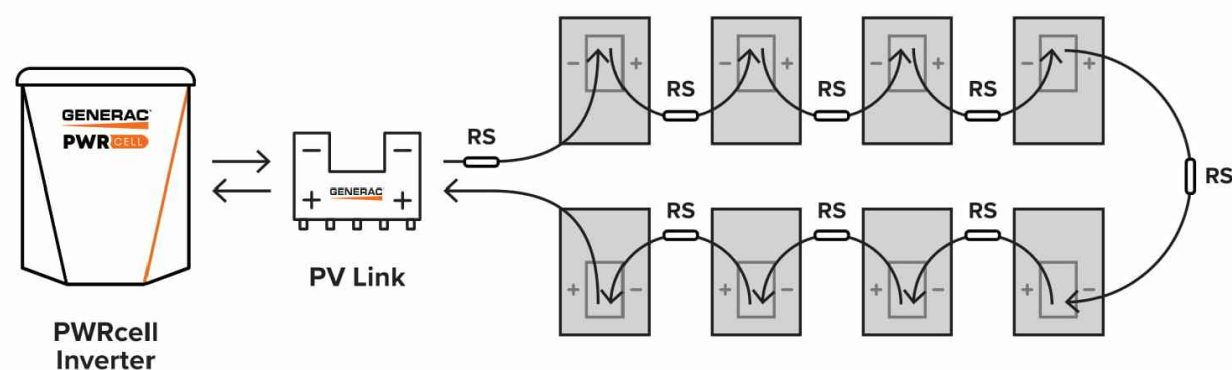


Diagram is applicable for most 60 cell PV modules. Modules with higher cell count may require a different arrangement. Contact Generac for more details.



Specifications

PV Link™ (APKE00010)	
RATED POWER*:	2500W
PEAK EFFICIENCY:	99%
MPPT VOLTAGE RANGE:	60-360 VMP
MAX INPUT VOLTAGE:	420 VOC; max when cold
MAX OUTPUT:	420 VOC
NOMINAL OUTPUT (REbus™):	380 VDC
MAX OUTPUT CURRENT (CONTINUOUS):	8 A
MAX OUTPUT CURRENT (FAULT):	10 A
MAX INPUT CURRENT (CONTINUOUS):	13 A @ 50°C, 10 A @ 70°C
MAX INPUT SHORT CIRCUIT CURRENT (ISC):	18 A
STANDBY POWER:	< 1 W
PROTECTIONS:	Ground-fault, Arc-fault (Arc-fault Type 1 AFCEI, Integrated), PVRSE
MAX OPERATING TEMP: FAHRENHEIT (CELSIUS):	158 °F (70 °C)
SYSTEM MONITORING:	PWRview™ Web Portal and Mobile App
ENCLOSURE:	Type 3R
WEIGHT - LB (KG):	7.3 lb (3.3 kg)
DIMENSIONS, L x W x H - IN (MM):	15.4" x 2" x 9.6" (391.2 x 50.8 x 243.8)
COMPLIANCE:	UL 1741, CSA 22.2
WARRANTY:	25 Years

*PV Link can tolerate higher than rated power at its input if Max Input Voltage and Short Circuit Current specifications are not exceeded



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DESIGNED BY

PHS

SHEET NAME
EQUIPMENT
SPECIFICATION

SHEET SIZE

ANSI B
11" X 17"

SHEET NUMBER

PV-8

GENERAC

SnapRS™

Inline Disconnect Switch
 Model: APKE00011
 Certification Model Reference: RS801



Generac SnapRS are a simple way to satisfy rapid shutdown compliance for solar + storage systems. Generac SnapRS are 2017/2020 NEC 690.12 compliant, don't require any extra hardware to mount, and need no pairing or fussy digital communications.

FEATURES & BENEFITS

- Fast, easy, and simple to install
- One SnapRS device per PV module
- Achieves PVRSS Compliance
- Low cost, high efficiency solution

SYSTEM DESIGN

Snap a Generac SnapRS disconnect device (RS) to the negative lead (-) of each module in the solar array for simple module-level rapid shutdown compliance. SnapRS devices isolate array voltage when a rapid shutdown is initiated at a PWRcell™ Inverter. When rapid shutdown is initiated, SnapRS units isolate each PV module in the array, reducing array voltage to <80V in seconds.

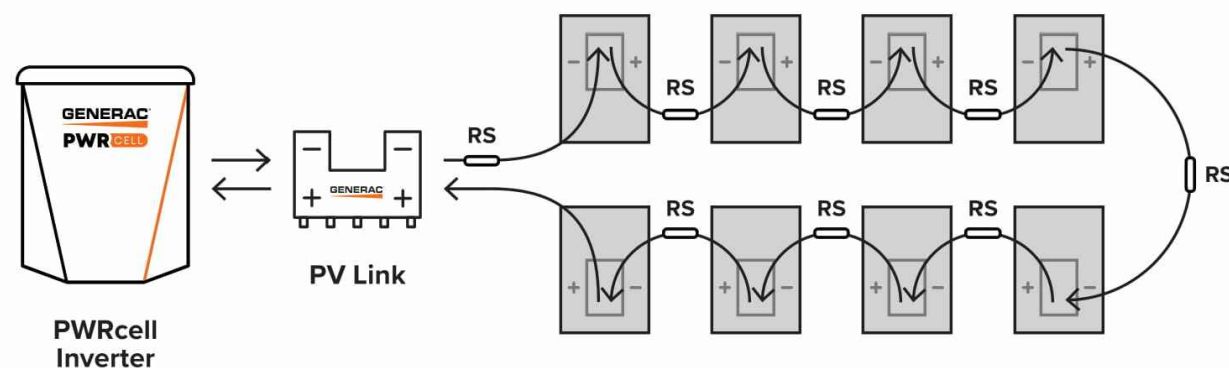


Diagram is applicable for most 60 cell PV modules. Modules with higher cell count may require a different arrangement. Contact Generac for more details.

Specifications

SnapRS™ (APKE00011)	
PV MODULE MAX VOC:	75 V
EFFICIENCY:	99.8%*
MAX INPUT CURRENT:	13 A
SHUTDOWN TIME:	< 10 Seconds
ENCLOSURE RATING:	NEMA 6P
OPERATING TEMPERATURE - FAHRENHEIT (CELSIUS):	-40 to 158 °F (-40 to 70 °C)
CERTIFICATIONS:	UL1741
PROTECTIONS:	PVRSE
WEIGHT - LB (KG):	0.17 (0.08)
DIMENSIONS, L x W x H - IN (MM):	7" x 1" x 1" (177.8 x 25.4 x 25.4)
WARRANTY:	25 Years

*When used with a 50V panel

Connect one SnapRS device to the negative lead of each PV module in the PV Link controlled array for complete PV Rapid shutdown performance



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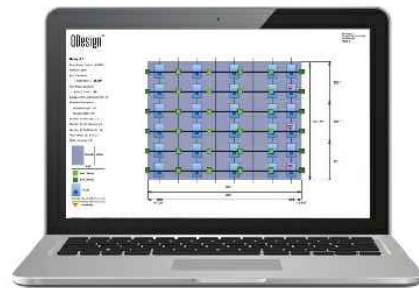
SHEET NUMBER

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.

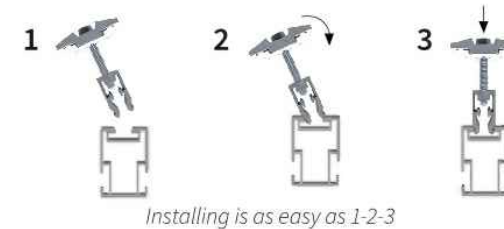


QRails come in two lengths —
168 inches (14 ft) and 208 inches (17.3 ft)
Mill and Black Finish

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.



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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REVISIONS

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PROJECT NAME & ADDRESS

**JOHN ROBERT RICH
RESIDENCE**
**35 CARLISLE PLACE,
SPRING LAKE, NC 28390**

DESIGNED BY

PHS

SHEET NAME

**EQUIPMENT
SPECIFICATION**

SHEET SIZE

**ANSI B
11" X 17"**

SHEET NUMBER

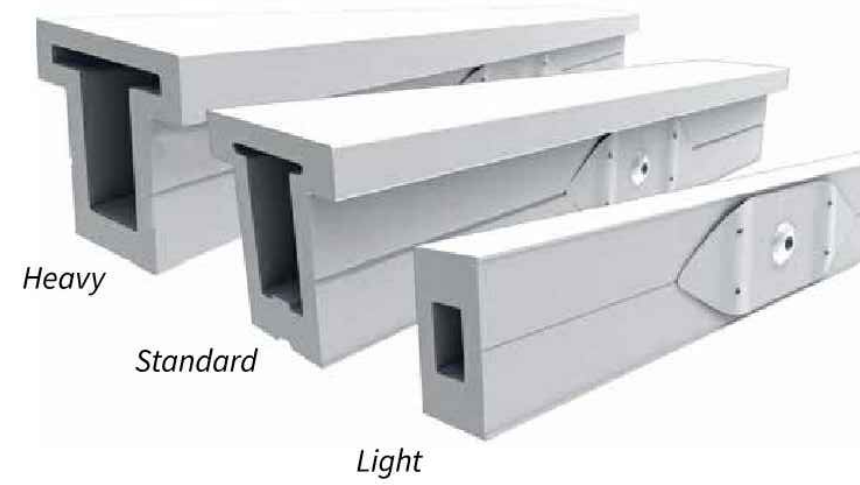
PV-10

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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**EQUIPMENT
SPECIFICATION**

SHEET SIZE

**ANSI B
11" X 17"**

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

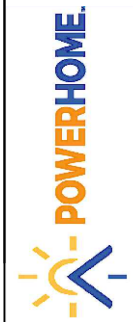


Heavy

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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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

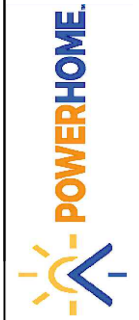


Item Code	Part Number	Description	Finish
QMR-GL A 50	890	WEEB Lug w/ T-Bolt, 50 Pack	n/a

WEEB BMC



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



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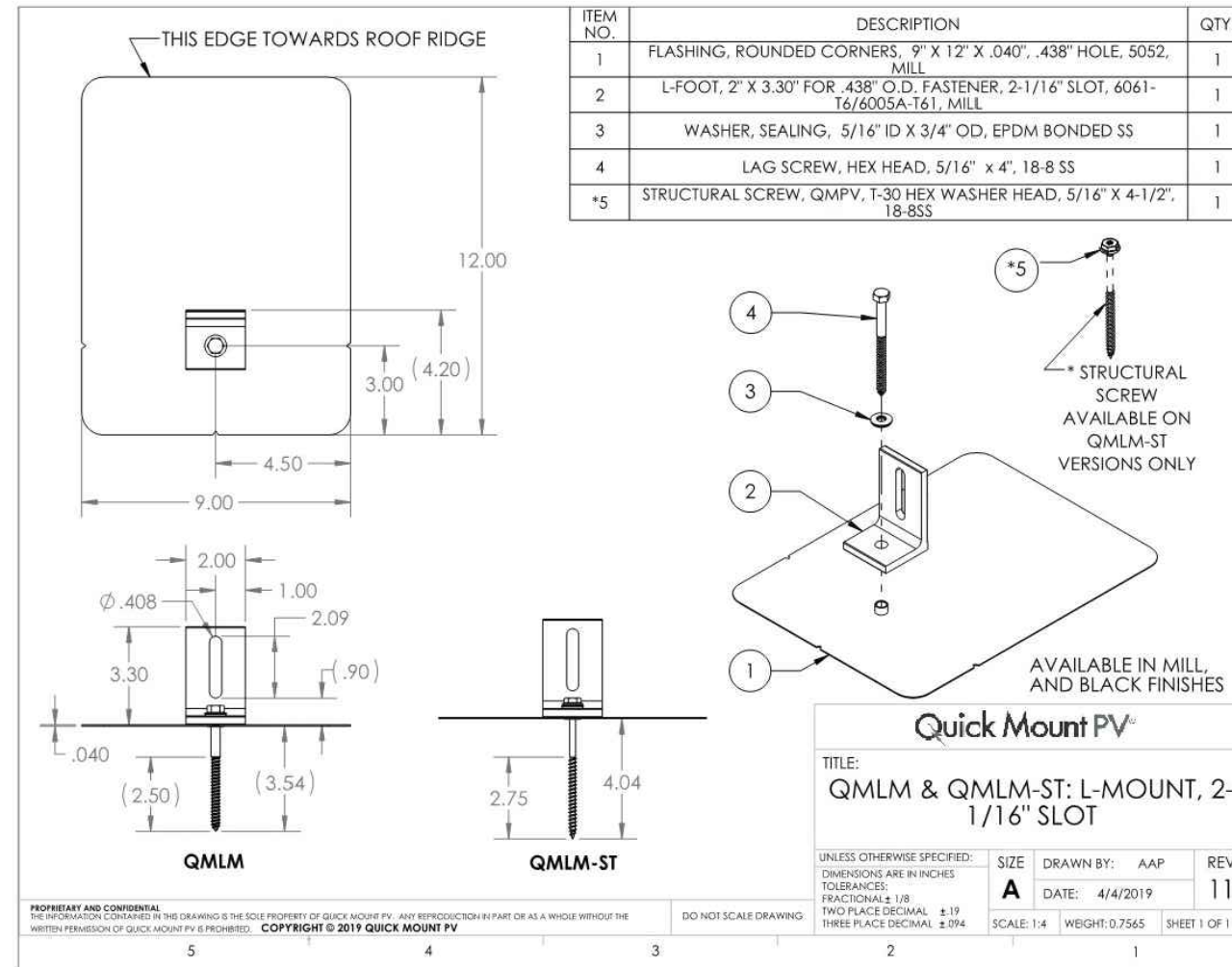
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PV-11C

L-Mount | QMLM / QMLM-ST

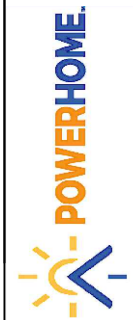
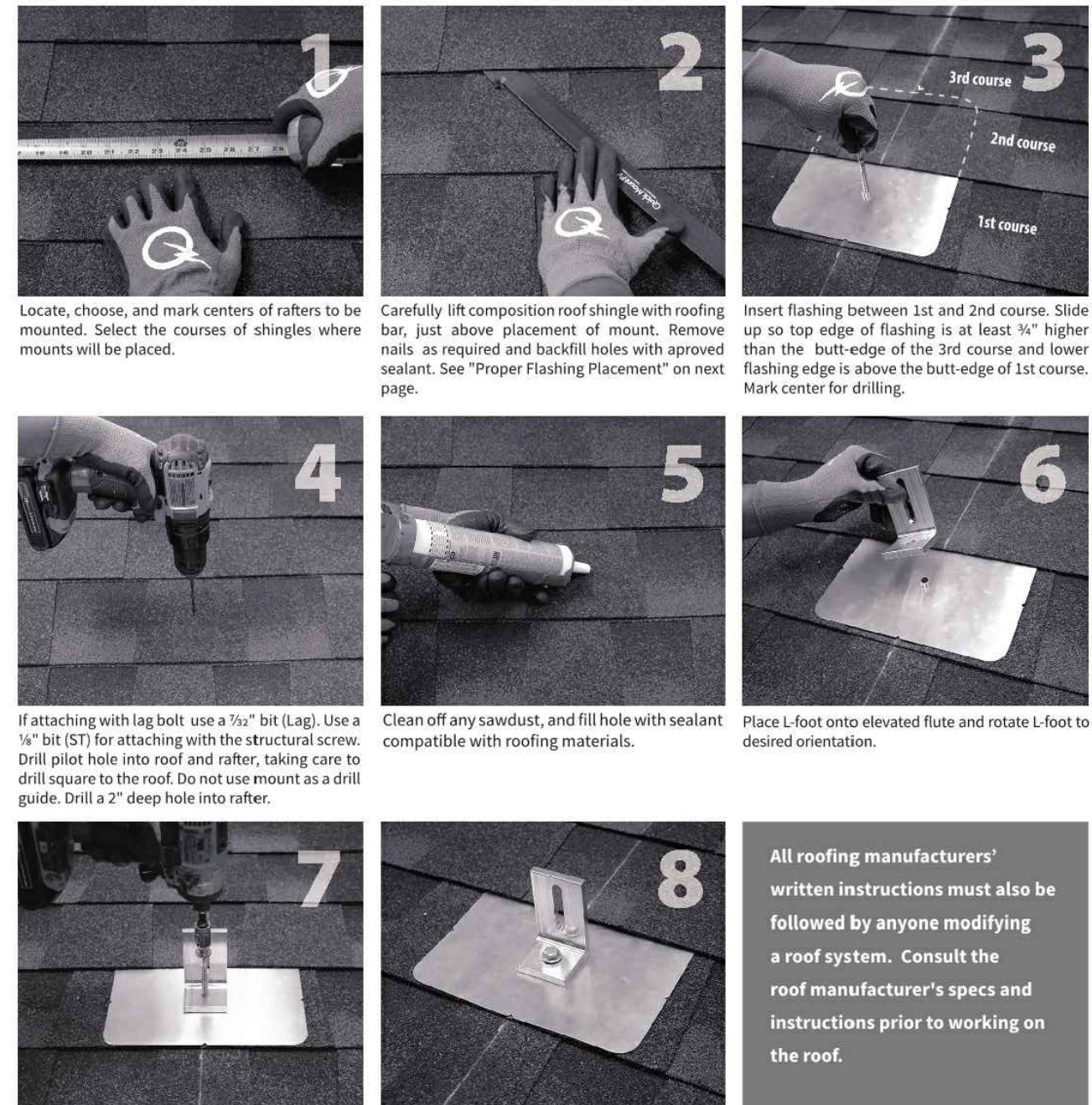
Elevated Water Seal Technology®



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.



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PROJECT NAME & ADDRESS

JOHN ROBERT RICH
RESIDENCE

35 CARLISLE PLACE,
SPRING LAKE, NC 28390

DESIGNED BY
PHS

SHEET NAME
EQUIPMENT
SPECIFICATION

SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
PV-12

