

GENERAL NOTES

- 1.1.1 PROJECT NOTES:**
- 1.1.2 THIS PHOTOVOLTAIC (PV) SYSTEM SHALL COMPLY WITH THE NATIONAL ELECTRIC CODE (NEC) ARTICLE 690, ALL MANUFACTURERS'S LISTING AND INSTALLATION INSTRUCTIONS, AND THE RELEVANT CODES AS SPECIFIED BY THE AUTHORITY HAVING JURISDICTION'S (AHJ) APPLICABLE CODES.
- 1.1.3 THE UTILITY INTERCONNECTION APPLICATION MUST BE APPROVED AND PV SYSTEM INSPECTED PRIOR TO PARALLEL OPERATION
- 1.1.4 ALL PV SYSTEM COMPONENTS; MODULES, UTILITY-INTERACTIVE INVERTERS, AND SOURCE CIRCUIT COMBINER BOXES ARE IDENTIFIED AND LISTED FOR USE IN PHOTOVOLTAIC SYSTEMS AS REQUIRED BY NEC 690.4: **PV MODULES:** UL1703, IEC61730, AND IEC61215, AND NFPA 70 CLASS C FIRE **INVERTERS:** UL 1741 CERTIFIED, IEEE 1547, 929, 519 **COMBINER BOX(ES):** UL 1703 OR UL 1741 ACCESSORY
- 1.1.5 MAX DC VOLTAGE CALCULATED USING MANUFACTURER PROVIDED TEMP COEFFICIENT FOR VOC. IF UNAVAILABLE, MAX DC VOLTAGE CALCULATED ACCORDING TO NEC 690.7.
- 1.1.6 ALL INVERTERS, PHOTOVOLTAIC MODULES, PHOTOVOLTAIC PANELS, AND SOURCE CIRCUIT COMBINERS INTENDED FOR USE IN A PHOTOVOLTAIC POWER SYSTEM WILL BE IDENTIFIED AND LISTED FOR THE APPLICATION PER 690.4 (D). SHALL BE INSTALLED ACCORDING TO ANY INSTRUCTIONS FROM LISTING OR LABELING [NEC 110.3].
- 1.1.7 ALL SIGNAGE TO BE PLACED IN ACCORDANCE WITH LOCAL BUILDING CODE. IF EXPOSED TO SUNLIGHT, IT SHALL BE UV RESISTANT. ALL PLAQUES AND SIGNAGE WILL BE INSTALLED AS REQUIRED BY THE NEC AND AHJ.
- 1.2.1 SCOPE OF WORK:**
- 1.2.2 PRIME CONTRACTOR IS RESPONSIBLE FOR THE DESIGN AND SPECIFICATIONS OF THE GRID-TIED PHOTOVOLTAIC SYSTEM RETROFIT. PRIME CONTRACTOR WILL BE RESPONSIBLE FOR COLLECTING EXISTING ONSITE REQUIREMENTS TO DESIGN, SPECIFY, AND INSTALL THE EXTERIOR ROOF-MOUNTED PORTION OF THE PHOTOVOLTAIC SYSTEMS DETAILED IN THIS DOCUMENT.
- 1.3.1 WORK INCLUDES:**
- 1.3.2 PV ROOF ATTACHMENTS - QUICK MOUNT PV QMSC CLASSIC COMPOSITION MOUNT
- 1.3.3 PV RACKING SYSTEM INSTALLATION - QUICK MOUNT PV QMR-RS: QRAIL STANDARD
- 1.3.4 PV MODULE AND INVERTER INSTALLATION - LG ELECTRONICS LG320N1K-A5 / SOLAR EDGE SE7600H-US (240V)
- 1.3.5 PV EQUIPMENT GROUNDING
- 1.3.6 PV SYSTEM WIRING TO A ROOF-MOUNTED JUNCTION BOX
- 1.3.7 PV LOAD CENTERS (IF INCLUDED)
- 1.3.8 PV METERING/MONITORING (IF INCLUDED)
- 1.3.9 PV DISCONNECTS
- 1.3.10 PV FINAL COMMISSIONING
- 1.3.11 (E) ELECTRICAL EQUIPMENT RETROFIT FOR PV
- 1.3.12 SIGNAGE PLACED IN ACCORDANCE WITH LOCAL BUILDING CODE

SCOPE OF WORK

SYSTEM SIZE: STC: 27 x 320 = 8.640 kW
 PTC: 27 x 294.7 = 7.957 kW DC
 (27) LG ELECTRONICS LG320N1K-A5
 (1) SOLAR EDGE SE7600H-US (240V)
 (1) TESLA POWERWALL

ATTACHMENT TYPE: QUICK MOUNT PV QMSC CLASSIC COMPOSITION MOUNT
 MSP UPGRADE: NO

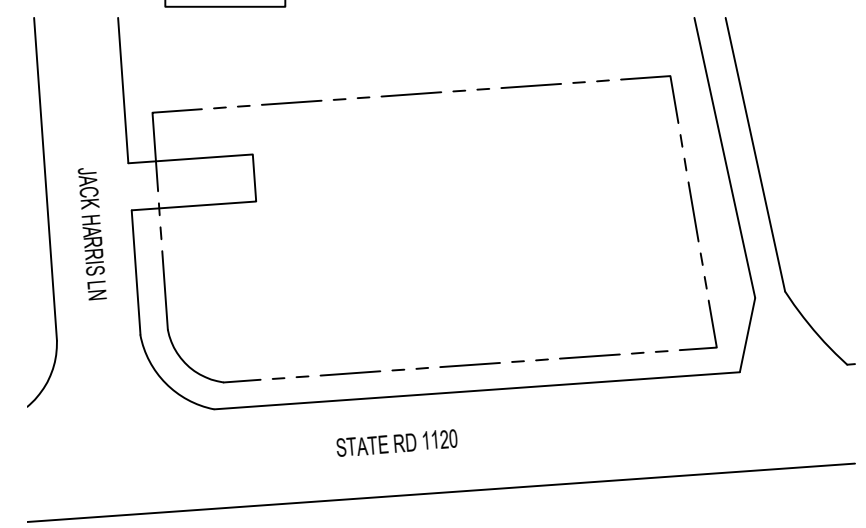
NEW PV SYSTEM: 8.640 kWp

HASKIN RESIDENCE

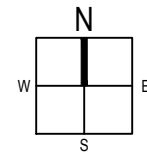
16 JACK HARRIS LN
 SPRING LAKE, NC 28390
 ASSESSOR'S #: 010514000201



01 AERIAL PHOTO
 NOT TO SCALE



02 PLAT MAP
 NOT TO SCALE



SHEET LIST TABLE

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PROJECT INFORMATION

OWNER
 NAME: TIFFANY HASKIN

PROJECT MANAGER
 NAME: ANDREW O'DONNELL
 PHONE: 7045256767

CONTRACTOR
 NAME: RENU ENERGY SOLUTIONS, LLC
 PHONE: 704-525-6767

AUTHORITIES HAVING JURISDICTION
 BUILDING: HARNETT COUNTY
 ZONING: HARNETT COUNTY
 UTILITY: SOUTH RIVER ELECTRIC

DESIGN SPECIFICATIONS

OCCUPANCY: II
 CONSTRUCTION: SINGLE-FAMILY
 ZONING: RESIDENTIAL
 GROUND SNOW LOAD: 10 PSF
 WIND EXPOSURE: B
 WIND SPEED: 119 MPH

APPLICABLE CODES & STANDARDS

BUILDING: NCSBC 2018 NCSRC 2018
 ELECTRICAL: NEC 2017
 FIRE: NCSFC 2018



CONTRACTOR

RENU ENERGY SOLUTIONS, LLC

PHONE: 704-525-6767
 ADDRESS: 801 PRESSLEY ROAD SUITE 100,
 CHARLOTTE, NC 28217

LIC. NO.: 76615
 HIC. NO.:
 ELE. NO.: 20334U

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NEW PV SYSTEM: 8.640 kWp

HASKIN RESIDENCE

16 JACK HARRIS LN
 SPRING LAKE, NC 28390
 APN: 010514000201

ENGINEER OF RECORD

PAPER SIZE: 11" x 17" (ANSI B)

COVER PAGE

DATE: 10.25.2019

DESIGN BY: A.O.

CHECKED BY: M.M.

REVISIONS

T-001.00
 (SHEET 1)

	A	B	C	D	E	F	G	H
1	2.1.1	SITE NOTES:		2.4.9	THE GROUNDING ELECTRODE SYSTEM COMPLIES WITH NEC 690.47 AND NEC 250.50 THROUGH 250.106. IF EXISTING SYSTEM IS INACCESSIBLE, OR INADEQUATE, A GROUNDING ELECTRODE SYSTEM PROVIDED ACCORDING TO NEC 250, NEC 690.47 AND AHJ.	2.7.5	PV WIRE BLACK WIRE MAY BE FIELD-MARKED WHITE [NEC 200.6 (A)(6)].	
	2.1.2	A LADDER WILL BE IN PLACE FOR INSPECTION IN COMPLIANCE WITH OSHA REGULATIONS.				2.7.6	MODULE WIRING SHALL BE LOCATED AND SECURED UNDER THE ARRAY.	
	2.1.3	THE PV MODULES ARE CONSIDERED NON-COMBUSTIBLE AND THIS SYSTEM IS A UTILITY INTERACTIVE SYSTEM WITH STORAGE BATTERIES.		2.4.10	DC PV ARRAYS SHALL BE PROVIDED WITH DC GROUND-FAULT PROTECTION MEETING THE REQUIREMENTS OF 690.41(B)(1) AND (2) TO REDUCE FIRE HAZARDS	2.7.7	ACCORDING TO NEC 200.7, UNGROUNDED SYSTEMS DC CONDUCTORS COLORED OR MARKED AS FOLLOWS: DC POSITIVE- RED, OR OTHER COLOR EXCLUDING WHITE, GREY AND GREEN DC NEGATIVE- BLACK, OR OTHER COLOR EXCLUDING WHITE, GREY AND GREEN	
	2.1.4	THE SOLAR PV INSTALLATION WILL NOT OBSTRUCT ANY PLUMBING, MECHANICAL, OR BUILDING ROOF VENTS.						
	2.1.5	PROPER ACCESS AND WORKING CLEARANCE AROUND EXISTING AND PROPOSED ELECTRICAL EQUIPMENT WILL BE PROVIDED AS PER SECTION NEC 110.26.		2.5.1	INTERCONNECTION NOTES:			
	2.1.6	ROOF COVERINGS SHALL BE DESIGNED, INSTALLED, AND MAINTAINED IN ACCORDANCE WITH THIS CODE AND THE APPROVED MANUFACTURER'S INSTRUCTIONS SUCH THAT THE ROOF COVERING SERVES TO PROTECT THE BUILDING OR STRUCTURE.		2.5.2	LOAD-SIDE INTERCONNECTION SHALL BE IN ACCORDANCE WITH [NEC 705.12 (B)]	2.7.8	AC CONDUCTORS COLORED OR MARKED AS FOLLOWS: PHASE A OR L1- BLACK PHASE B OR L2- RED, OR OTHER CONVENTION IF THREE PHASE PHASE C OR L3- BLUE, YELLOW, ORANGE*, OR OTHER CONVENTION NEUTRAL- WHITE OR GREY	
2	2.2.1	EQUIPMENT LOCATIONS		2.5.3	THE SUM OF THE UTILITY OCPD AND INVERTER CONTINUOUS OUTPUT MAY NOT EXCEED 120% OF BUSBAR RATING [NEC 705.12(B)(2)(3)].			
	2.2.2	ALL EQUIPMENT SHALL MEET MINIMUM SETBACKS AS REQUIRED BY NEC 110.26.		2.5.4	THE SUM OF 125 PERCENT OF THE POWER SOURCE(S) OUTPUT CIRCUIT CURRENT AND THE RATING OF THE OVERCURRENT DEVICE PROTECTING THE BUSBAR SHALL NOT EXCEED 120 PERCENT OF THE AMPACITY OF THE BUSBAR, PV DEDICATED BACKFEED BREAKERS MUST BE LOCATED OPPOSITE END OF THE BUS FROM THE UTILITY SOURCE OCPD [NEC 705.12(B)(2)(3)].			
	2.2.3	WIRING SYSTEMS INSTALLED IN DIRECT SUNLIGHT MUST BE RATED FOR EXPECTED OPERATING TEMPERATURE AS SPECIFIED BY NEC 690.31 (A),(C) AND NEC TABLES 310.15 (B)(2)(A) AND 310.15 (B)(3)(C).		2.5.5	AT MULTIPLE ELECTRIC POWER SOURCES OUTPUT COMBINER PANEL, TOTAL RATING OF ALL OVERCURRENT DEVICES SHALL NOT EXCEED AMPACITY OF BUSBAR. HOWEVER, THE COMBINED OVERCURRENT DEVICE MAY BE EXCLUDED ACCORDING TO NEC 705.12 (B)(2)(3)(C).			
	2.2.3	JUNCTION AND PULL BOXES PERMITTED INSTALLED UNDER PV MODULES ACCORDING TO NEC 690.34.		2.5.6	FEEDER TAP INTERCONNECTION (LOAD SIDE) ACCORDING TO NEC 705.12 (B)(2)(1)			
	2.2.4	ADDITIONAL AC DISCONNECT(S) SHALL BE PROVIDED WHERE THE INVERTER IS NOT WITHIN SIGHT OF THE AC SERVICING DISCONNECT.		2.5.7	SUPPLY SIDE TAP INTERCONNECTION ACCORDING TO NEC 705.12 (A) WITH SERVICE ENTRANCE CONDUCTORS IN ACCORDANCE WITH NEC 230.42			
	2.2.5	ALL EQUIPMENT SHALL BE INSTALLED ACCESSIBLE TO QUALIFIED PERSONNEL ACCORDING TO NEC APPLICABLE CODES.		2.5.8	BACKFEEDING BREAKER FOR ELECTRIC POWER SOURCES OUTPUT IS EXEMPT FROM ADDITIONAL FASTENING [NEC 705.12 (B)(5)].			
	2.2.6	ALL COMPONENTS ARE LISTED FOR THEIR PURPOSE AND RATED FOR OUTDOOR USAGE WHEN APPROPRIATE.						
3	2.3.1	STRUCTURAL NOTES:						
	2.3.2	RACKING SYSTEM & PV ARRAY WILL BE INSTALLED ACCORDING TO CODE-COMPLIANT INSTALLATION MANUAL. TOP CLAMPS REQUIRE A DESIGNATED SPACE BETWEEN MODULES, AND RAILS MUST ALSO EXTEND A MINIMUM DISTANCE BEYOND EITHER EDGE OF THE ARRAY/SUBARRAY, ACCORDING TO RAIL MANUFACTURER'S INSTRUCTIONS.		2.6.1	DISCONNECTION AND OVER-CURRENT PROTECTION NOTES:			
	2.3.3	JUNCTION BOX WILL BE INSTALLED PER MANUFACTURERS' SPECIFICATIONS. IF ROOF-PENETRATING TYPE, IT SHALL BE FLASHED & SEALED PER LOCAL REQUIREMENTS.		2.6.2	DISCONNECTING SWITCHES SHALL BE WIRED SUCH THAT WHEN THE SWITCH IS OPENED THE CONDUCTORS REMAINING ENERGIZED ARE CONNECTED TO THE TERMINALS MARKED "LINE SIDE" (TYPICALLY THE UPPER TERMINALS).			
	2.3.4	ROOFTOP PENETRATIONS FOR PV RACEWAY WILL BE COMPLETED AND SEALED W/ APPROVED CHEMICAL SEALANT PER CODE BY A LICENSED CONTRACTOR.		2.6.3	DISCONNECTS TO BE ACCESSIBLE TO QUALIFIED UTILITY PERSONNEL, BE LOCKABLE, AND BE A VISIBLE-BREAK SWITCH.			
4	2.3.5	ALL PV RELATED ROOF ATTACHMENTS TO BE SPACED NO GREATER THAN THE SPAN DISTANCE SPECIFIED BY THE RACKING MANUFACTURER.		2.6.4	BOTH POSITIVE AND NEGATIVE PV CONDUCTORS ARE UNGROUNDED. THEREFORE BOTH MUST OPEN WHERE A DISCONNECT IS REQUIRED, ACCORDING TO NEC 690.13.			
	2.3.6	WHEN POSSIBLE, ALL PV RELATED RACKING ATTACHMENTS WILL BE STAGGERED AMONGST THE ROOF FRAMING MEMBERS.		2.6.5	ISOLATING DEVICES OR EQUIPMENT DISCONNECTING MEANS SHALL BE INSTALLED IN CIRCUITS CONNECTED TO EQUIPMENT AT A LOCATION WITHIN THE EQUIPMENT, OR WITHIN SIGHT AND WITHIN 10 FT OF THE EQUIPMENT. AN EQUIPMENT DISCONNECTING MEANS SHALL BE PERMITTED TO BE REMOTE FROM THE EQUIPMENT WHERE THE EQUIPMENT DISCONNECTING MEANS CAN BE REMOTELY OPERATED FROM WITHIN 10 FT OF THE EQUIPMENT, ACCORDING TO NEC 690.15 (A).			
	2.4.1	GROUNDING NOTES:		2.6.6	PV SYSTEM CIRCUITS INSTALLED ON OR IN BUILDINGS SHALL INCLUDE A RAPID SHUTDOWN FUNCTION TO REDUCE SHOCK HAZARD FOR EMERGENCY RESPONDERS IN ACCORDANCE WITH 690.12(A) THROUGH (D)			
	2.4.2	GROUNDING SYSTEM COMPONENTS SHALL BE LISTED FOR THEIR PURPOSE, AND GROUNDING DEVICES EXPOSED TO THE ELEMENTS SHALL BE RATED FOR SUCH USE.		2.6.7	ALL OCPD RATINGS AND TYPES SPECIFIED ACCORDING TO NEC 690.8, 690.9, AND 240.			
	2.4.3	PV SYSTEMS REQUIRE AN EQUIPMENT GROUNDING CONDUCTOR. ALL METAL ELECTRICAL EQUIPMENT AND STRUCTURAL COMPONENTS BONDED TO GROUND, IN ACCORDANCE WITH 250.134 OR 250.136(A). ONLY THE DC CONDUCTORS ARE UNGROUNDED.		2.6.8	BOTH POSITIVE AND NEGATIVE PV CONDUCTORS ARE UNGROUNDED, THEREFORE BOTH REQUIRE OVER-CURRENT PROTECTION, ACCORDING TO NEC 240.21. (SEE EXCEPTION IN NEC 690.9)			
5	2.4.4	PV EQUIPMENT SHALL BE GROUNDED ACCORDING TO NEC 690.43 AND MINIMUM NEC TABLE 250.122.		2.6.9	IF REQUIRED BY AHJ, SYSTEM WILL INCLUDE ARC-FAULT CIRCUIT PROTECTION ACCORDING TO NEC 690.11 AND UL1699B.			
	2.4.5	METAL PARTS OF MODULE FRAMES, MODULE RACKING, AND ENCLOSURE CONSIDERED GROUNDED IN ACCORD WITH 250.134 AND 250.136(A).						
	2.4.6	EACH MODULE WILL BE GROUNDED USING WEEB GROUNDING CLIPS AS SHOWN IN MANUFACTURER DOCUMENTATION AND APPROVED BY THE AHJ. IF WEEBS ARE NOT USED, MODULE GROUNDING LUGS MUST BE INSTALLED AT THE SPECIFIED GROUNDING LUG HOLES PER THE MANUFACTURERS' INSTALLATION REQUIREMENTS.		2.7.1	WIRING & CONDUIT NOTES:			
	2.4.7	THE GROUNDING CONNECTION TO A MODULE SHALL BE ARRANGED SUCH THAT THE REMOVAL OF A MODULE DOES NOT INTERRUPT A GROUNDING CONDUCTOR TO ANOTHER MODULE.		2.7.2	ALL CONDUIT AND WIRE WILL BE LISTED AND APPROVED FOR THEIR PURPOSE. CONDUIT AND WIRE SPECIFICATIONS ARE BASED ON MINIMUM CODE REQUIREMENTS AND ARE NOT MEANT TO LIMIT UP-SIZING.			
6	2.4.8	GROUNDING AND BONDING CONDUCTORS, IF INSULATED, SHALL BE COLORED GREEN OR MARKED GREEN IF #4 AWG OR LARGER [NEC 250.119]		2.7.3	ALL CONDUCTORS SIZED ACCORDING TO NEC 690.8, NEC 690.7.			
				2.7.4	EXPOSED PV SOURCE CIRCUITS AND OUTPUT CIRCUITS SHALL USE WIRE LISTED AND IDENTIFIED AS PHOTOVOLTAIC (PV) WIRE [690.31 (C)]. PV MODULES WIRE LEADS SHALL BE LISTED FOR USE ON PV ARRAYS, ACCORDING TO NEC 690.31 (A).			



CONTRACTOR

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NEW PV SYSTEM: 8.640 kWp

HASKIN RESIDENCE
16 JACK HARRIS LN
SPRING LAKE, NC 28390
APN: 010514000201

ENGINEER OF RECORD

PAPER SIZE: 11" x 17" (ANSI B)

NOTES

DATE: 10.25.2019

DESIGN BY: A.O.

CHECKED BY: M.M.

REVISIONS

G-001.00
(SHEET 2)

GENERAL NOTES

1. FIELD VERIFY ALL MEASUREMENTS
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----- PROPERTY LINE



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SITE PLAN

DATE: 10.25.2019

DESIGN BY: A.O.

CHECKED BY: M.M.

REVISIONS

A-101.00

(SHEET 3)

INVERTER
GENERATION PANEL
AC DISCONNECT
BACKUP GATEWAY SERVING
METER

22'-6"

110'-8"

64'-8"

ENTRANCE

AREA OF WORK

42'-2"

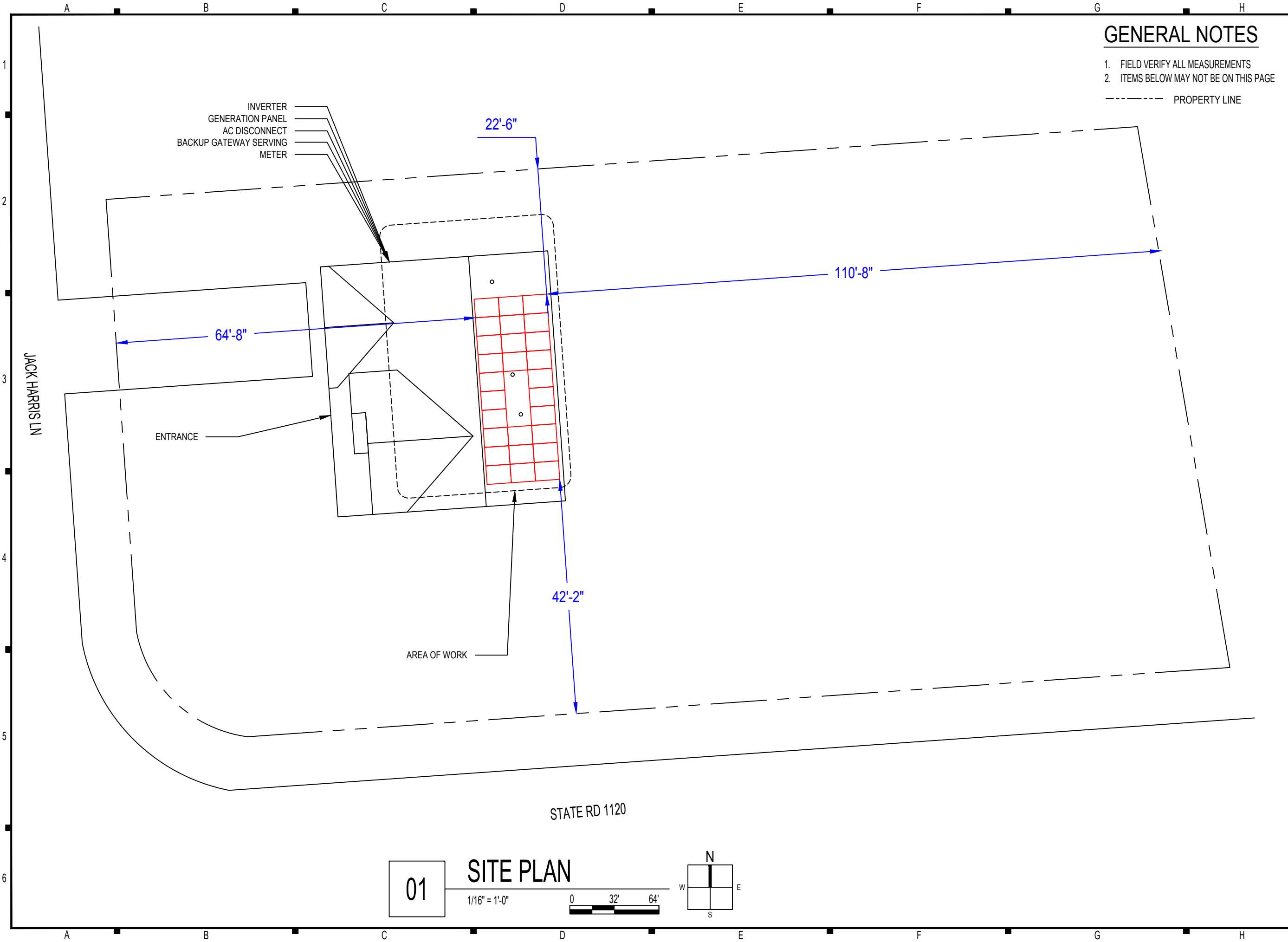
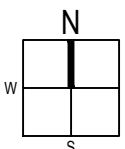
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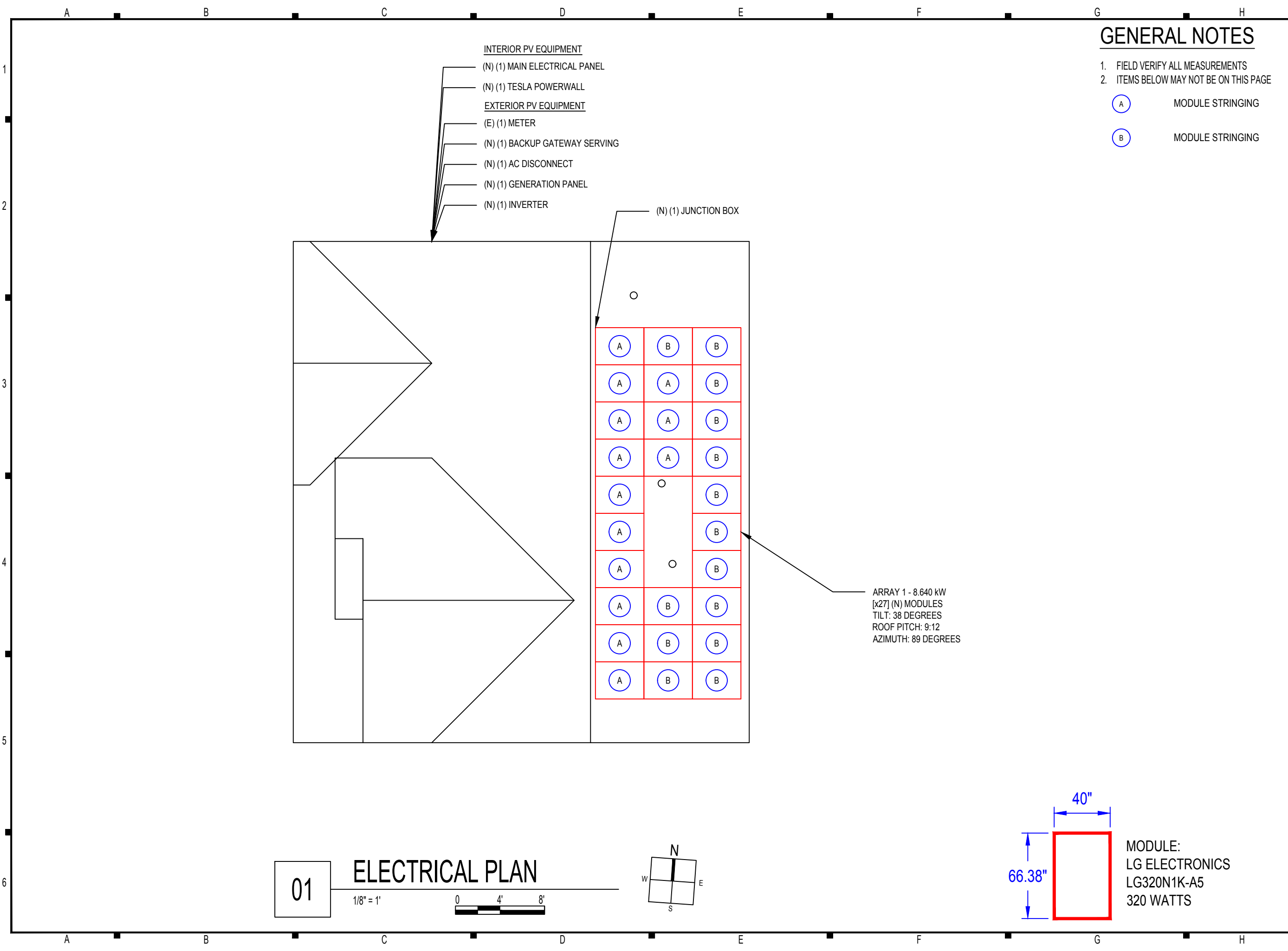
01

SITE PLAN

1/16" = 1'-0"

0 32' 64'





GENERAL NOTES

- 1. FIELD VERIFY ALL MEASUREMENTS
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- (A) MODULE STRINGING
- (B) MODULE STRINGING



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**HASKIN
 RESIDENCE**

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ELECTRICAL PLAN

DATE: 10.25.2019

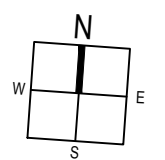
DESIGN BY: A.O.

CHECKED BY: M.M.

REVISIONS

A-102.00
 (SHEET 4)

01 ELECTRICAL PLAN
 1/8" = 1'
 0 4' 8'



40"
 66.38"
 MODULE:
 LG ELECTRONICS
 LG320N1K-A5
 320 WATTS

GENERAL NOTES

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--- ROOF TRUSSES



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SOLAR ATTACHMENT PLAN

DATE: 10.25.2019

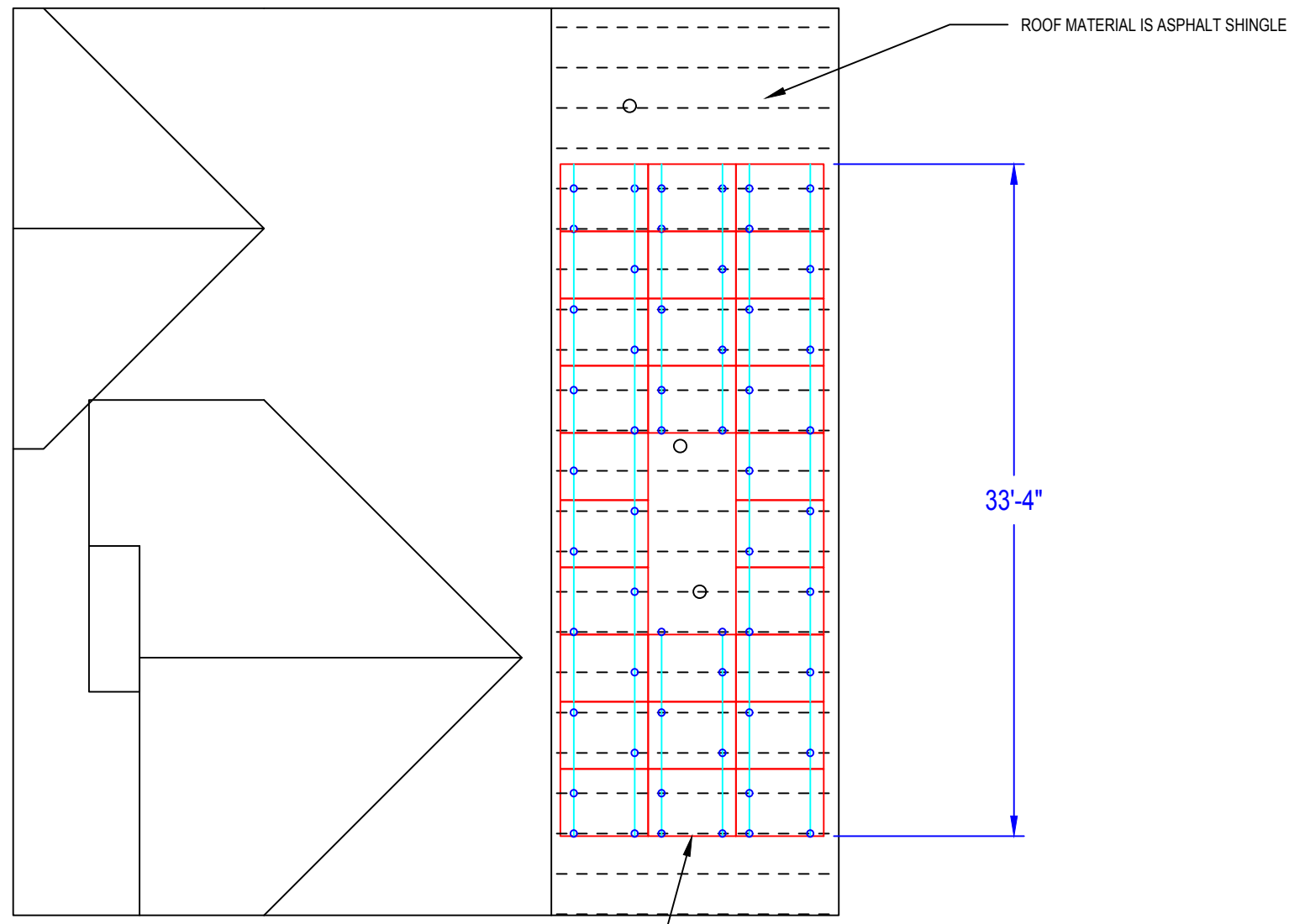
DESIGN BY: A.O.

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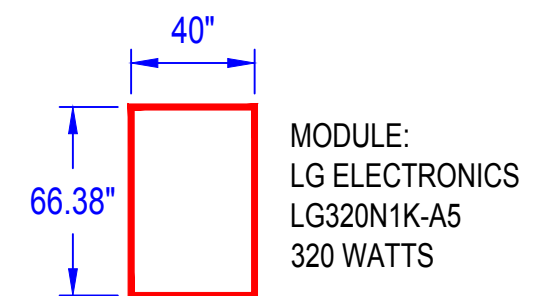
(SHEET 5)



ROOF MATERIAL IS ASPHALT SHINGLE

33'-4"

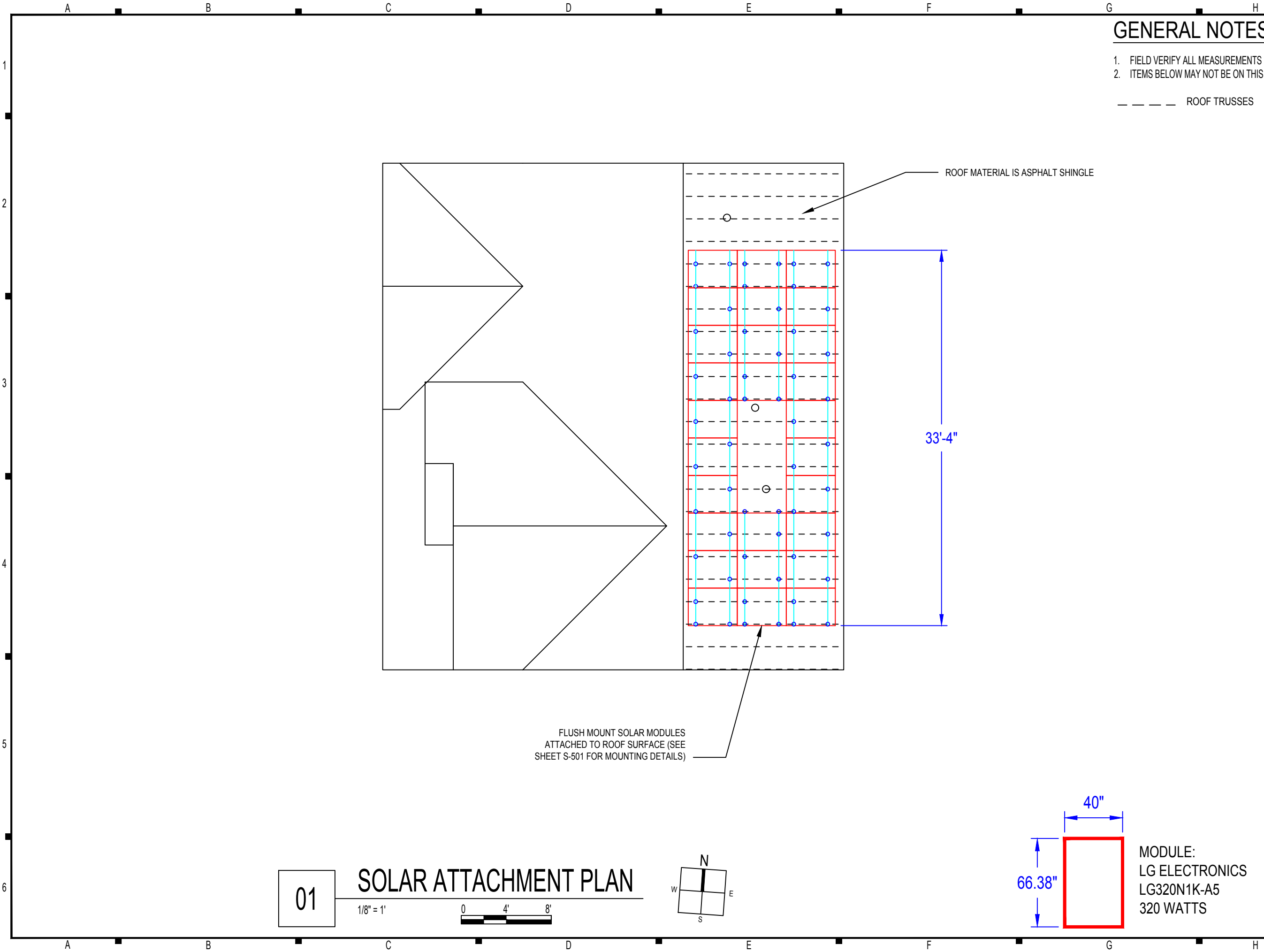
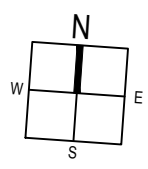
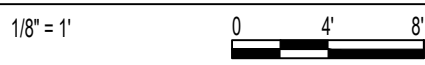
FLUSH MOUNT SOLAR MODULES
ATTACHED TO ROOF SURFACE (SEE
SHEET S-501 FOR MOUNTING DETAILS)



MODULE:
LG ELECTRONICS
LG320N1K-A5
320 WATTS

01

SOLAR ATTACHMENT PLAN



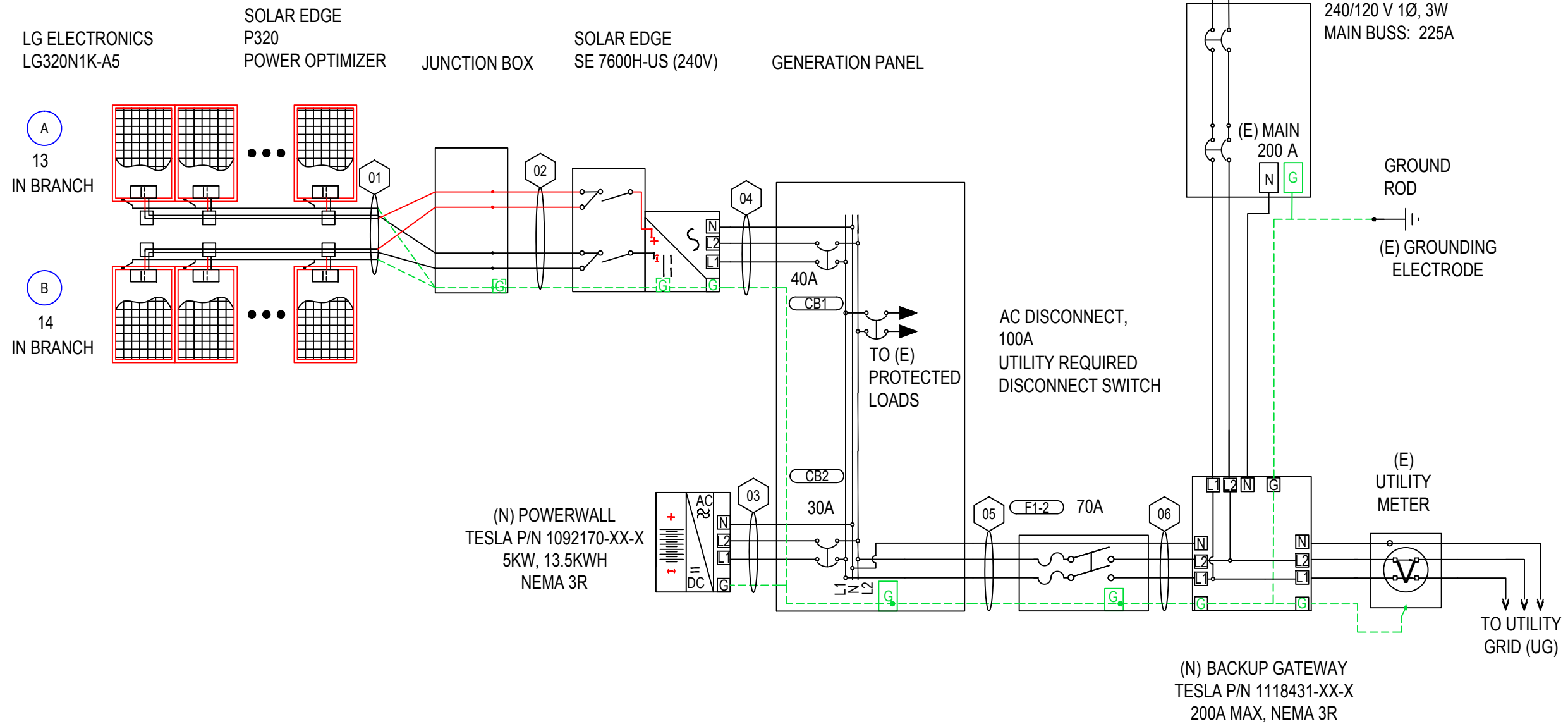
CONDUCTOR AND CONDUIT SCHEDULE W/ELECTRICAL CALCULATIONS

ID	TYPICAL	CONDUCTOR	CONDUIT	CURRENT-CARRYING CONDUCTORS IN CONDUIT	OCPD	EGC	TEMP. CORR. FACTOR	CONDUIT FILL FACTOR	CONT. CURRENT	MAX. CURRENT (125%)	BASE AMP.	DERATED AMP.	TERM. TEMP. RATING	AMP. @ TERMINAL
01	2	10 AWG PV WIRE, COPPER	FREE AIR	2	N/A	6 AWG BARE, COPPER	0.71 (58.2°C)	1	15A	18.75A	55A	39.05A	75°C	50A
02	1	10 AWG THWN-2, COPPER	0.75" DIA EMT	4	N/A	6 AWG THWN-2, COPPER	0.71 (58.2°C)	0.8	15A	18.75A	40A	22.72A	75°C	35A
03	1	10 AWG THWN-2, COPPER	0.75" DIA.	2	30A	6 AWG THWN-2, COPPER	0.91 (36.2°C)	1	-	30A	40A	36.4A	75°C	35A
04	1	8 AWG THWN-2, COPPER	0.75" DIA	2	40A	6 AWG THWN-2, COPPER	0.91 (36.2°C)	1	32A	40A	55A	50.05A	75°C	50A
05	1	4/O AWG THWN-2, COPPER	2" DIA	2	70A	4/O AWG THWN-2, COPPER	0.91 (36.2°C)	1	32A	40A	260A	236.6A	75°C	230A
06	1	4/O AWG THWN-2, COPPER	2" DIA	2	N/A	4/O AWG THWN-2, COPPER	0.91 (36.2°C)	1	32A	40A	260A	236.6A	75°C	230A

- (A) MODULE STRINGING
- (B) MODULE STRINGING

1. SYSTEM EQUIPPED WITH RAPID SHUTDOWN DISCONNECT PER NEC 690.12
 2. SYSTEM COMPLIANT WITH NEC 690.17

DC PV SOURCE CIRCUITS AND PV OUTPUT CIRCUITS TO BE INSTALL IN METAL RACEWAY OR METAL ENCLOSURES PER NEC 690.31 (G)



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PAPER SIZE: 11" x 17" (ANSI B)

LINE DIAGRAM

DATE: 10.25.2019

DESIGN BY: A.O.

CHECKED BY: M.M.

REVISIONS

E-601.00
 (SHEET 6)

SYSTEM SUMMARY

	STRING #1	STRING #2
POWERBOX MAX OUTPUT CURRENT	15A	15A
OPTIMIZERS IN SERIES	13	14
NOMINAL STRING VOLTAGE	400V	400V
ARRAY OPERATING CURRENT	10.4A	11.2A
ARRAY STC POWER	8,640W	
ARRAY PTC POWER	7,957W	
MAX AC CURRENT	32A	
MAX AC POWER	7,600W	
DERATED (CEC) AC POWER	7,600W	

DESIGN TEMPERATURES

ASHRAE EXTREME LOW	-11.9°C (10.6°F), SOURCE: POPE AFB (35.17°; -79.03°)
ASHRAE 2% HIGH	36.2°C (97.2°F), SOURCE: POPE AFB (35.17°; -79.03°)

MODULES

REF.	QTY.	MAKE AND MODEL	PMAX	PTC	ISC	IMP	VOC	VMP	TEMP. COEFF. OF VOC	FUSE RATING
PM1-27	27	LG ELECTRONICS LG320N1K-A5	320W	294.7W	10.19A	9.62A	40.8V	33.3V	-0.11V/°C (-0.27%/°C)	20A

POWER OPTIMIZERS

REF.	QTY.	MODEL	RATED INPUT POWER	MAX OUTPUT CURRENT	MAX INPUT ISC	MAX DC VOLTAGE	WEIGHTED EFFICIENCY
PO1-27	27	SOLAR EDGE P320	320W	15A	11A	48V	98.8%

INVERTERS

REF.	QTY.	MAKE AND MODEL	AC VOLTAGE	GROUND	OCPD RATING	RATED POWER	MAX OUTPUT CURRENT	MAX INPUT CURRENT	MAX INPUT VOLTAGE	CEC WEIGHTED EFFICIENCY
I1	1	SOLAR EDGE SE7600H-US (240V)	240V	FLOATING	40A	7600W	32A	20A	480V	99.0%

DISCONNECTS

REF.	QTY.	MAKE AND MODEL	RATED CURRENT	MAX RATED VOLTAGE
SW1	1	EATON DG223NRB OR EQUIV.	100A	240VAC

OCPDS

REF.	QTY.	RATED CURRENT	MAX VOLTAGE
CB1	1	40A	240VAC
CB2	1	30A	240VAC
F1-2	2	70A	240VAC

BILL OF MATERIALS

CATEGORY	MAKE	MODEL NUMBER	REF	QTY	UNIT	QTY/UNIT	DESCRIPTION
MODULE	LG ELECTRONICS	LG320N1K-A5	PM1-27	27	PIECES	1	LG ELECTRONICS LG320N1K-A5 320W 60 CELLS, MONOCRYSTALLINE SILICON
INVERTER	SOLAR EDGE	SE7600H-US (240V)	I1	1	PIECE	1	SOLAR EDGE SE7600H-US (240V) 7600W INVERTER
MODULE OPTIMIZER	SOLAR EDGE	P320	PO1-27	27	PIECES	1	SOLAR EDGE P320 OPTIMIZER (REQUIRED PART OF INVERTER'S DISTRIBUTED DC ARCHITECTURE)
DISCONNECT	EATON	DG223NRB	SW1	1	PIECE	1	EATON DG223NRB, 2-POLE, 100A, 240VAC OR EQUIVALENT
BACKUP GATEWAY	TESLA	BACKUP GATEWAY SERVING		1	PIECE	1	TESLA BACKUP GATEWAY SERVING
INVERTER/GENERATION	TESLA	POWERWALL2		2	PIECES	1	TESLA POWERWALL2
WIRING		GEN-10-AWG-PV-WIRE-CU	WR1	180	FEET	1	10 AWG PV WIRE, COPPER (POSITIVE AND NEGATIVE)
WIRING		GEN-6-AWG-BARE-CU	WR1	90	FEET	1	6 AWG BARE, COPPER AND/OR THWN-2 (GROUND)
WIRING		GEN-10-AWG-THWN-2-CU-RD	WR2	40	FEET	1	10 AWG THWN-2, COPPER, RED (POSITIVE)
WIRING		GEN-10-AWG-THWN-2-CU-BLK	WR2	40	FEET	1	10 AWG THWN-2, COPPER, BLACK (NEGATIVE)
WIRING		GEN-10-AWG-THWN-2-CU-RD	WR3	20	FEET	1	10 AWG THWN-2, COPPER, RED (LINE 2)
WIRING		GEN-10-AWG-THWN-2-CU-BLK	WR3	20	FEET	1	10 AWG THWN-2, COPPER, BLACK (LINE 1)
WIRING		GEN-10-AWG-THWN-2-CU-WH	WR3	20	FEET	1	10 AWG THWN-2, COPPER, WHITE (NEUTRAL)
WIRING		GEN-8-AWG-THWN-2-CU-RD	WR4	10	FEET	1	8 AWG THWN-2, COPPER, RED (LINE 1)
WIRING		GEN-8-AWG-THWN-2-CU-BLK	WR4	10	FEET	1	8 AWG THWN-2, COPPER, BLACK (LINE 2)
WIRING		GEN-8-AWG-THWN-2-CU-WH	WR4	10	FEET	1	8 AWG THWN-2, COPPER, WHITE (NEUTRAL)
WIRING		GEN-6-AWG-THWN-2-CU-GR	WR2-4	60	FEET	1	6 AWG THWN-2, COPPER, GREEN (GROUND)
WIRING		GEN-4/0-AWG-THWN-2-CU-RD	WR5-6	20	FEET	1	4/0 AWG THWN-2, COPPER, RED (LINE 2)
WIRING		GEN-4/0-AWG-THWN-2-CU-BLK	WR5-6	20	FEET	1	4/0 AWG THWN-2, COPPER, BLACK (LINE 1)
WIRING		GEN-4/0-AWG-THWN-2-CU-WH	WR5-6	20	FEET	1	4/0 AWG THWN-2, COPPER, WHITE (NEUTRAL)
WIRING		GEN-4/0-AWG-THWN-2-CU-GR	WR5-6	20	FEET	1	4/0 AWG THWN-2, COPPER, GREEN (GROUND)
WIREWAY		GEN-EMT-0_75DIA	WW2	20	FEET	1	EMT CONDUIT, 0.75 DIA.
WIREWAY		GEN-0_75DIA	WW3-4	40	FEET	1	CONDUIT, 0.75 DIA.
WIREWAY		GEN-2DIA	WW5-6	20	FEET	1	CONDUIT, 2 DIA.
OCPD	GENERIC MANUFACTURER	GEN-CB-40A-240VAC	CB1	1	PIECE	1	CIRCUIT BREAKER, 40A, 240VAC
OCPD	GENERIC MANUFACTURER	GEN-CB-30A-240VAC	CB2	1	PIECES	1	CIRCUIT BREAKER, 30A, 240VAC
OCPD	GENERIC MANUFACTURER	GEN-FU-70A-240VAC	F1-2	2	PIECES	1	FUSE, 70A, 240VAC
TRANSITION BOX	GENERIC MANUFACTURER	GEN-JB	JB1	1	PIECE	1	JUNCTION BOX



CONTRACTOR

RENU ENERGY SOLUTIONS, LLC

PHONE: 704-525-6767

ADDRESS: 801 PRESSLEY ROAD SUITE 100,
CHARLOTTE, NC 28217

LIC. NO.: 76615

HIC. NO.:

ELE. NO.: 20334U

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AND WILL BE SUBJECT TO CIVIL
DAMAGES AND PROSECUTIONS.

NEW PV SYSTEM: 8.640 kWp

**HASKIN
RESIDENCE**

16 JACK HARRIS LN
SPRING LAKE, NC 28390
APN: 010514000201

ENGINEER OF RECORD

PAPER SIZE: 11" x 17" (ANSI B)

DESIGN TABLES

DATE: 10.25.2019

DESIGN BY: A.O.

CHECKED BY: M.M.

REVISIONS

E-602.00

(SHEET 7)

SOLAR PV SYSTEM EQUIPPED WITH RAPID SHUTDOWN

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

LABEL 1
AT RAPID SHUTDOWN SYSTEM
[NEC 690.56(C)(1)(A)].

! WARNING !
ELECTRIC SHOCK HAZARD
TERMINALS ON THE LINE AND LOAD SIDES MAY BE ENERGIZED IN THE OPEN POSITION.
DC VOLTAGE IS ALWAYS PRESENT WHEN SOLAR MODULES ARE EXPOSED TO SUNLIGHT

LABEL 3
AT EACH DISCONNECTING MEANS FOR PHOTOVOLTAIC EQUIPMENT
[NEC 690.15]

ALL SIGNAGE MUST BE PERMANENTLY ATTACHED AND BE WEATHER RESISTANT/SUNLIGHT RESISTANT AND CANNOT BE HAND-WRITTEN PER NEC 110.21(B)

! WARNING !
ELECTRIC SHOCK HAZARD
TERMINALS ON BOTH LINE AND LOAD SIDES MAY BE ENERGIZED IN THE OPEN POSITION.

LABEL 4
AT EACH DISCONNECTING MEANS FOR PHOTOVOLTAIC EQUIPMENT
[NEC 690.13 AND 690.15]

MAXIMUM VOLTAGE: 480 V DC
MAXIMUM CIRCUIT CURRENT: 30 A DC
MAX RATED OUTPUT CURRENT OF THE CHARGE CONTROLLER OR DC-TO-DC CONVERTER (IF INSTALLED): 15 A DC

LABEL 5
AT EACH DC DISCONNECTING MEANS
[NEC 690.53]

PHOTOVOLTAIC AC DISCONNECT
OPERATING CURRENT: 32 A AC
OPERATING VOLTAGE: 240 V AC

LABEL 6
AT POINT OF INTERCONNECTION, MARKED AT DISCONNECTING MEANS
[NEC 690.54]

RAPID SHUTDOWN SWITCH FOR SOLAR PV SYSTEM

LABEL 7
AT RAPID SHUTDOWN DISCONNECT SWITCH
[NEC 690.56(C)(3)].

! WARNING !
DUAL POWER SOURCES. SECOND SOURCE IS PV SYSTEM

LABEL 8
AT POINT OF INTERCONNECTION; LABEL, SUCH AS LABEL 5 OR LABEL 6 MUST IDENTIFY PHOTOVOLTAIC SYSTEM
[NEC 705.12(B)(4)]

! CAUTION !
PHOTOVOLTAIC SYSTEM CIRCUIT IS BACKFED

LABEL 9

INTERACTIVE PHOTOVOLTAIC SYSTEM CONNECTED
PHOTOVOLTAIC SYSTEM DISCONNECT LOCATED NORTH SIDE OF THE HOUSE

PLAQUE

DIRECTORY
PERMANENT PLAQUE OR DIRECTORY PROVIDING THE LOCATION OF THE SERVICE DISCONNECTING MEANS AND THE PHOTOVOLTAIC SYSTEM DISCONNECTING MEANS IF NOT IN THE SAME LOCATION
[NEC 690.56(B)]
WHERE THE PV SYSTEMS ARE REMOTELY LOCATED FROM EACH OTHER, A DIRECTORY IN ACCORDANCE WITH 705.10 SHALL BE PROVIDED AT EACH PV SYSTEM DISCONNECTING MEANS. PV SYSTEM EQUIPMENT AND DISCONNECTING MEANS SHALL NOT BE INSTALLED IN BATHROOMS
[NEC 690.4(D),(E)]

INTERACTIVE PHOTOVOLTAIC SYSTEM CONNECTED

LABEL 10
AT UTILITY METER
[NEC 690.56(B)]

PHOTOVOLTAIC DC DISCONNECT

LABEL 11
AT EACH DC DISCONNECTING MEANS
[NEC 690.13(B)]

PHOTOVOLTAIC SYSTEM EQUIPPED WITH RAPID SHUTDOWN

LABEL 12
AT RAPID SHUTDOWN SWITCH
[NEC 690.56(C)].
LETTERS AT LEAST 3/8 INCH; WHITE ON RED BACKGROUND; REFLECTIVE
[IFC 605.11.1.1]

WARNING: PHOTOVOLTAIC POWER SOURCE

LABEL 13
AT EXPOSED RACEWAYS, CABLE TRAYS, AND OTHER WIRING METHODS; SPACED AT MAXIMUM 10 FT SECTION OR WHERE SEPARATED BY ENCLOSURES, WALLS, PARTITIONS, CEILINGS, OR FLOORS.
[NEC 690.31(G)]
LETTERS AT LEAST 3/8 INCH; WHITE ON RED BACKGROUND; REFLECTIVE
[IFC 605.11.1.1]

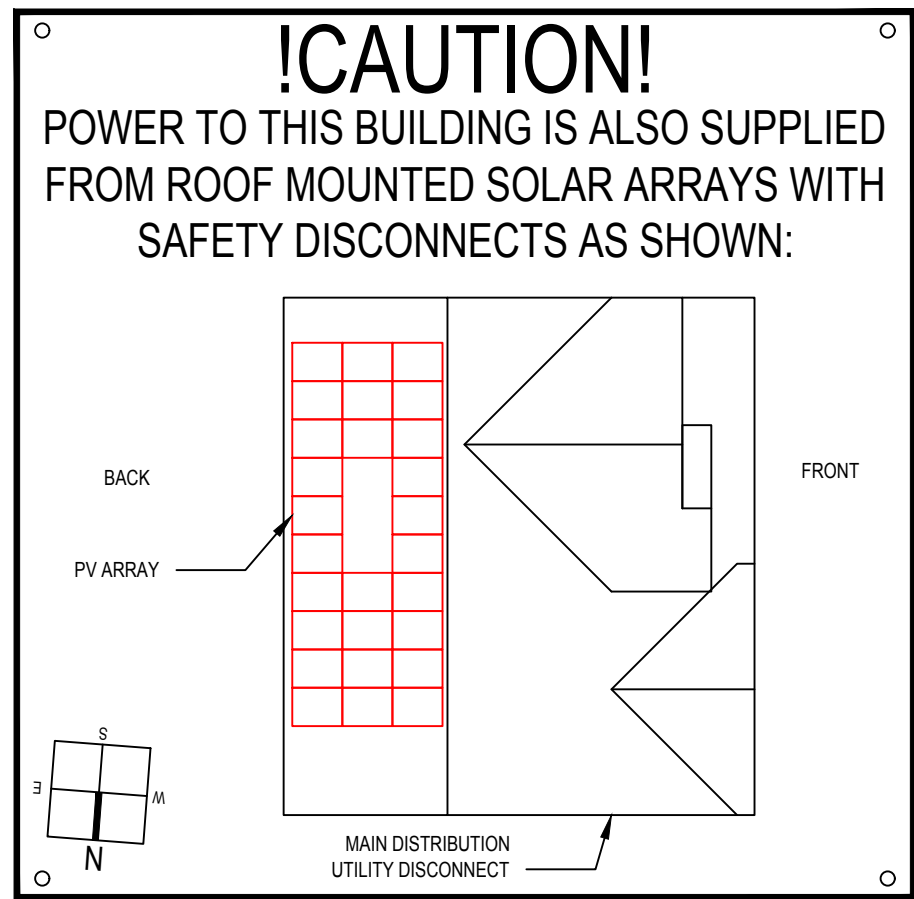
PHOTOVOLTAIC AC DISCONNECT

LABEL 14
AT EACH AC DISCONNECTING MEANS
[NEC 690.13(B)]

! WARNING !
POWER SOURCE OUTPUT CONNECTION - DO NOT RELOCATE THIS OVERCURRENT DEVICE

LABEL 15
AT POINT OF INTERCONNECTION OVERCURRENT DEVICE
[NEC 705.12(B)(2)(3)(B)]

LABELING NOTES
1.1 LABELING REQUIREMENTS BASED ON THE 2017 NATIONAL ELECTRICAL CODE, INTERNATIONAL FIRE CODE 605.11, OSHA STANDARD 1910.145, ANSI Z535
1.2 MATERIAL BASED ON THE REQUIREMENTS OF THE AUTHORITY HAVING JURISDICTION.
1.3 LABELS TO BE OF SUFFICIENT DURABILITY TO WITHSTAND THE ENVIRONMENT INVOLVED.
1.4 LABELS TO BE A MINIMUM LETTER HEIGHT OF 3/8" AND PERMANENTLY AFFIXED.
1.5 ALERTING WORDS TO BE COLOR CODED. "DANGER" WILL HAVE RED BACKGROUND; "WARNING" WILL HAVE ORANGE BACKGROUND; "CAUTION" WILL HAVE YELLOW BACKGROUND. [ANSI Z535]



CONTRACTOR

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ELE. NO.: 20334U

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NEW PV SYSTEM: 8.640 kWp

HASKIN RESIDENCE

16 JACK HARRIS LN
SPRING LAKE, NC 28390
APN: 010514000201

ENGINEER OF RECORD

PAPER SIZE: 11" x 17" (ANSI B)

PLACARDS

DATE: 10.25.2019

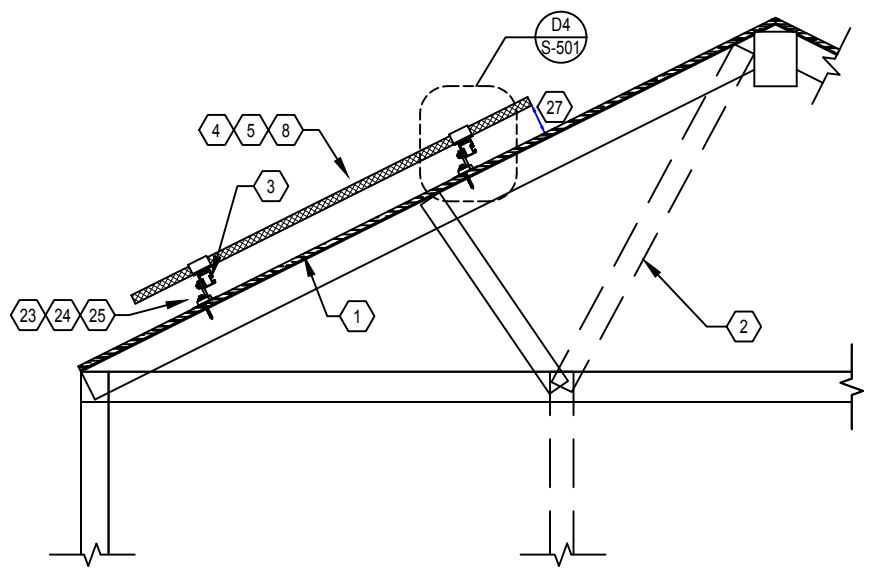
DESIGN BY: A.O.

CHECKED BY: M.M.

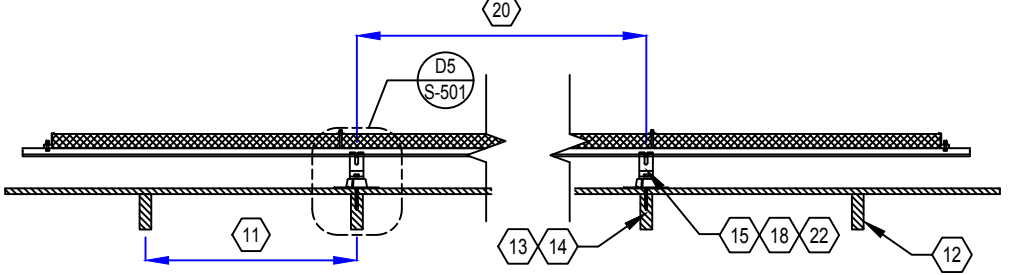
REVISIONS

E-603.00
(SHEET 8)

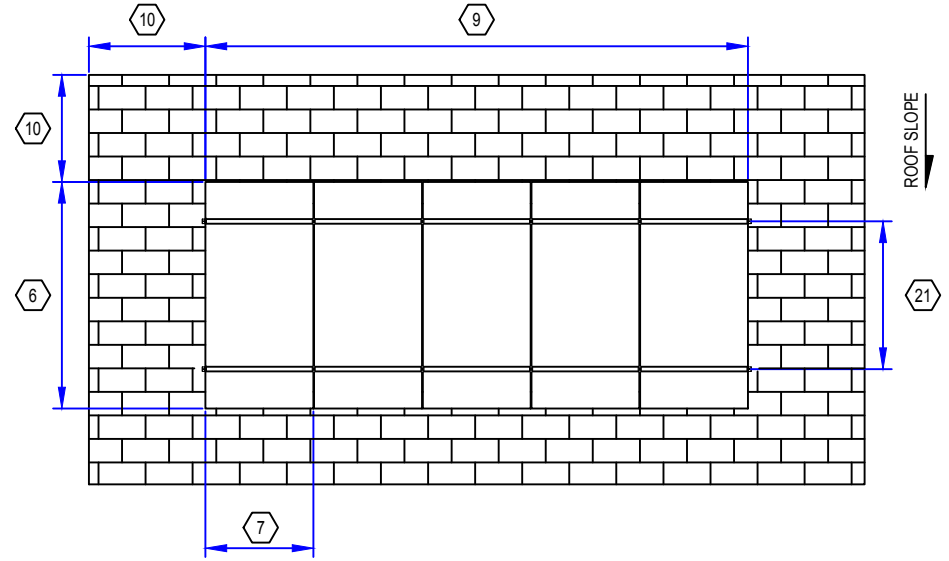
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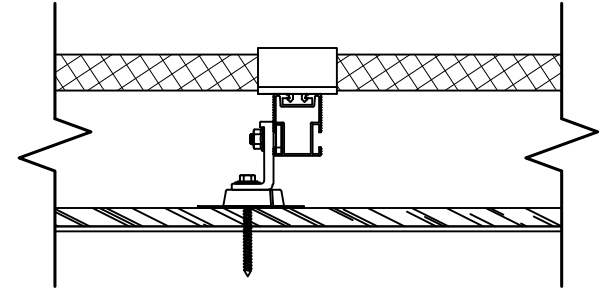
D1 RACKING DETAIL (TRANSVERSE)
NOT TO SCALE



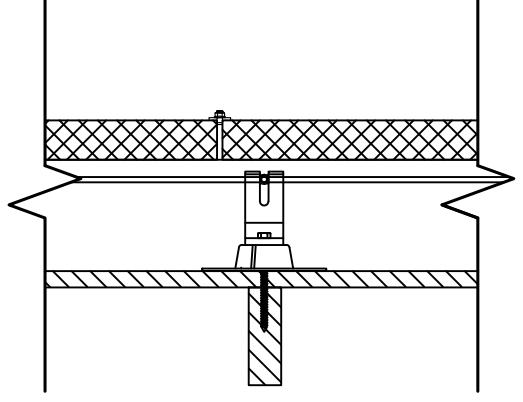
D2 RACKING DETAIL (LONGITUDINAL)
NOT TO SCALE



D3 RACKING DETAIL (TOP)
NOT TO SCALE



D4 DETAIL (TRANSVERSE)
NOT TO SCALE



D5 DETAIL (LONGITUDINAL)
NOT TO SCALE

GENERAL NOTES

1. FIELD VERIFY ALL MEASUREMENTS

SHEET KEYNOTES

1. ROOF MATERIAL: ASPHALT SHINGLE
2. ROOF STRUCTURE: TRUSS
3. ATTACHMENT TYPE: QUICK MOUNT PV QMSC CLASSIC COMPOSITION MOUNT
4. MODULE MANUFACTURER: LG ELECTRONICS
5. MODULE MODEL: LG320N1K-A5
6. MODULE LENGTH: 66.38"
7. MODULE WIDTH: 40"
8. MODULE WEIGHT: 39.68 LBS.
9. SEE SHEET A-103 FOR DIMENSION(S)
10. MIN. FIRE OFFSET: NO FIRE CODE ENFORCED
11. TRUSS SPACING: 24 IN. O.C.
12. TRUSS SIZE: 2X4 NOMINAL
13. LAG BOLT DIAMETER: 5/16 IN.
14. LAG BOLT EMBEDMENT: 3 IN.
15. TOTAL # OF ATTACHMENTS: 55
16. TOTAL AREA: 497.85 SQ. FT.
17. TOTAL WEIGHT: 1226.16 LBS.
18. WEIGHT PER ATTACHMENT: 22.29 LBS.
19. DISTRIBUTED LOAD: 2.46 PSF
20. MAX. HORIZONTAL STANDOFF: 48 IN.
21. MAX. VERTICAL STANDOFF: LANDSCAPE: 26 IN., PORTRAIT: 33 IN.
22. STANDOFF STAGGERING: YES
23. RAIL MANUFACTURER (OR EQUIV.): QUICK MOUNT PV QMR-RS
24. RAIL MODEL (OR EQUIVALENT): QRAIL STANDARD
25. RAIL WEIGHT: 0.65 PLF.
26. MAX. TRUSS SPAN: 10 FT.
27. MODULE CLEARANCE: 3 IN. MIN., 6 IN. MAX.



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ASSEMBLY DETAILS

DATE: 10.25.2019
DESIGN BY: A.O.
CHECKED BY: M.M.

REVISIONS

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(SHEET 9)

A B C D E F G H



Innovation for a Better Life



LG NeON²Black LG320N1K-A5

60 cell

LG's new module, LG NeON², adopts Cello technology. Cello technology replaces 3 busbars with 12 thin wires to enhance power output and reliability. LG NeON² demonstrates LG's efforts to increase customer's values beyond efficiency. It features enhanced warranty, durability, performance under real environment, and aesthetic design suitable for roofs.



Enhanced Performance Warranty

LG NeON² Black has an enhanced performance warranty. The annual degradation has fallen from -0.6%/yr to -0.55%/yr. Even after 25 years, the cell guarantees 1.2%p more output than the previous LG NeON² Black modules.



Aesthetic Roof

LG NeON² Black has been designed with aesthetics in mind; thinner wires that appear all black at a distance. The product may help increase the value of a property with its modern design.



Better Performance on a Sunny Day

LG NeON² Black now performs better on sunny days thanks to its improved temperature coefficient.



High Power Output

Compared with previous models, the LG NeON² Black has been designed to significantly enhance its output efficiency, thereby making it efficient even in limited space.



Outstanding Durability

With its newly reinforced frame design, LG has extended the warranty of the LG NeON² Black for an additional 2 years. Additionally, LG NeON² Black can endure a front load up to 6000 Pa, and a rear load up to 5400 Pa.



Double-Sided Cell Structure

The rear of the cell used in LG NeON² Black will contribute to generation, just like the front; the light beam reflected from the rear of the module is reabsorbed to generate a great amount of additional power.

LG NeON²Black LG320N1K-A5

Mechanical Properties

Cells	6 x 10
Cell Vendor	LG
Cell Type	Monocrystalline / N-type
Cell Dimensions	161.7 x 161.7 mm / 6 inches
# of Busbar	12 (Multi Wire Busbar)
Dimensions (L x W x H)	1686 x 1016 x 40 mm
	66.38 x 40 x 1.57 inch
Front Load	6000Pa
Rear Load	5400Pa
Weight	18 kg
Connector Type	MC4
Junction Box	IP68 with 3 Bypass Diodes
Cables	1000 mm x 2 ea
Glass	High Transmission Tempered Glass
Frame	Anodized Aluminium

Certifications and Warranty

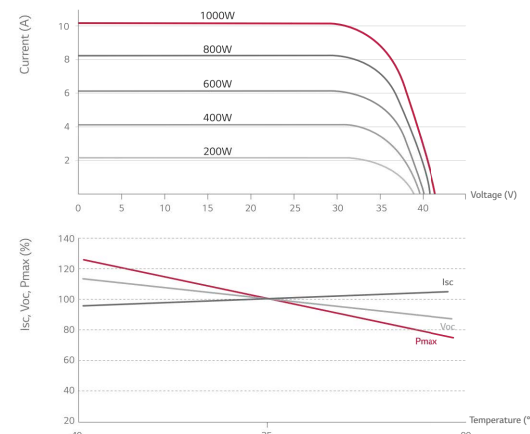
Certifications	IEC 61215, IEC 61730-1/-2, UL 1703, IEC 61701 (Salt mist corrosion test), IEC 62716 (Ammonia corrosion test), ISO 9001
Module Fire Performance (USA)	Type 2
Fire Rating (CANADA)	Class C
Product Warranty	12 years
Output Warranty of Pmax	Linear warranty**

** 1) 1st year: 98%, 2) After 1st year: 0.55% annual degradation, 3) 25 years: 84.8%

Temperature Characteristics

NOCT	45 ± 3 °C
Pmpp	-0.37%/°C
Voc	-0.27%/°C
Isc	0.03%/°C

Characteristic Curves



Electrical Properties (STC *)

Module	LG320N1K-A5
Maximum Power (Pmax)	320
MPP Voltage (Vmpp)	33.3
MPP Current (Impp)	9.62
Open Circuit Voltage (Voc)	40.8
Short Circuit Current (Isc)	10.19
Module Efficiency	18.7
Operating Temperature	-40 ~ +90
Maximum System Voltage	1,000
Maximum Series Fuse Rating	20
Power Tolerance (%)	0 ~ +3

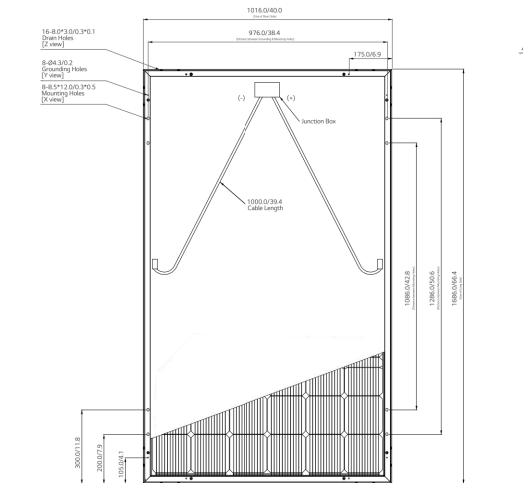
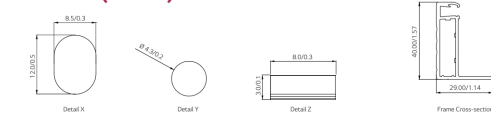
* STC (Standard Test Condition): Irradiance 1,000 W/m², Ambient Temperature 25 °C, AM 1.5
* The nameplate power output is measured and determined by LG Electronics at its sole and absolute discretion.
* The typical change in module efficiency at 200 W/m² in relation to 1000 W/m² is -2.0%.

Electrical Properties (NOCT*)

Module	LG320N1K-A5
Maximum Power (Pmax)	236
MPP Voltage (Vmpp)	30.8
MPP Current (Impp)	7.67
Open Circuit Voltage (Voc)	38.0
Short Circuit Current (Isc)	8.20

* NOCT (Nominal Operating Cell Temperature): Irradiance 800W/m², ambient temperature 20 °C, wind speed 1m/s

Dimensions (mm/in)



About LG Electronics

LG Electronics is a global player who has been committed to expanding its capacity, based on solar energy business as its future growth engine. We embarked on a solar energy source research program in 1985, supported by LG Group's rich experience in semi-conductor, LCD, chemistry, and materials industry. We successfully released the first Mono X[®] series to the market in 2010, which were exported to 32 countries in the following 2 years, thereafter. In 2013, LG NeON² (previously known as Mono X[®] NeON) won "Intersolar Award", which proved LG is the leader of innovation in the industry.



North America Solar Business Team
LG Electronics U.S.A. Inc
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Contact: lg.solar@lge.com
www.lgsolarusa.com

Product specifications are subject to change without notice.

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01/01/2017

Innovation for a Better Life



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RESOURCE DOCUMENT

DATE: 10.25.2019

DESIGN BY: A.O.

CHECKED BY: M.M.

REVISIONS

R-001.00

(SHEET 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	V
Maximum AC Power Output	3000	3800 @ 240V 3300 @ 208V	5000	6000 @ 240V 5000 @ 208V	7600	10000	11400 @ 240V 10000 @ 208V	V
AC Output Voltage Min.-Nom.-Max. (211 - 240 - 264)	✓	✓	✓	✓	✓	✓	✓	V _i
AC Output Voltage Min.-Nom.-Max. (183 - 208 - 229)	-	✓	-	✓	-	-	✓	V _i
AC Frequency (Nominal)	59.3 - 60 - 60.5 ¹⁾							H
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	V
Maximum DC Power @208V	-	5100	-	7750	-	-	15500	V
Transformer-less, Ungrounded	Yes							
Maximum Input Voltage	480							V _c
Nominal DC Input Voltage	380					400		V _c
Maximum Input Current @240V ²⁾	8.5	10.5	13.5	16.5	20	27	30.5	A _c
Maximum Input Current @208V ²⁾	-	9	-	13.5	-	-	27	A _c
Max. Input Short Circuit Current	45							A _c
Reverse-Polarity Protection	Yes							
Ground-Fault Isolation Detection	600ka Sensitivity							
Maximum Inverter Efficiency	99				99.2			%
CEC Weighted Efficiency			99				99 @ 240V 98.5 @ 208V	%
Nighttime Power Consumption	< 2.5							V
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	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 / m
Weight with Safety Switch	22 / 10	25.1 / 11.4	26.2 / 11.9	38.8 / 17.6				lb /
Noise	< 25				< 50			dB
Cooling	Natural Convection							
Operating Temperature Range	-40 to +140 / -25 to +60 ⁴⁾ (-40°F / -40°C option) ⁵⁾							°F /
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: SxxxxH-US000NINC2
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: SxxxxH-US000NNU4

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NEW PV SYSTEM: 8.640 kWp

HASKIN RESIDENCE

16 JACK HARRIS LN
SPRING LAKE, NC 28390
APN: 010514000201

ENGINEER OF RECORD

PAPER SIZE: 11" x 17" (ANSI B)

RESOURCE DOCUMENT

DATE: 10.25.2019

DESIGN BY: A.O.

CHECKED BY: M.M.

REVISIONS

R-002.00

(SHEET 11)

Power Optimizer

For North America

P320 / P340 / 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
- 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



Power Optimizer

For North America

P320 / P340 / P370 / P400 / P405 / 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)	P405 (for thin film modules)	P505 (for higher current modules)	
INPUT							
Rated Input DC Power ⁽¹⁾	320	340	370	400	405	505	W
Absolute Maximum Input Voltage (Voc at lowest temperature)	48		60	80	125 ⁽²⁾	83 ⁽²⁾	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		98.6	%
Overvoltage Category				II			
OUTPUT DURING OPERATION (POWER OPTIMIZER CONNECTED TO OPERATING SOLAREEDGE INVERTER)							
Maximum Output Current				15			Adc
Maximum Output Voltage			60		85		Vdc
OUTPUT DURING STANDBY (POWER OPTIMIZER DISCONNECTED FROM SOLAREEDGE INVERTER OR SOLAREEDGE 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)	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 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	845 / 1.9	1064 / 2.3		gr / lb
Input Connector	MC4 ⁽³⁾						
Output Wire Type / Connector	Double Insulated; MC4						
Output Wire Length	0.95 / 3.0				1.2 / 3.9		m / ft
Input Wire Length	0.16 / 0.52						
Operating Temperature Range	-40 - +85 / -40 - +185						
Protection Rating	IP68 / NEMA6P						
Relative Humidity	0 - 100						

⁽¹⁾ Rated STC power of the module. Module of up to +5% power tolerance allowed
⁽²⁾ NEC 2017 requires max input voltage be not more than 80V
⁽³⁾ For other connector types please contact SolarEdge

PV System Design Using a SolarEdge Inverter ⁽⁴⁾⁽⁵⁾	Single Phase HD-Wave	Single phase	Three Phase 208V	Three Phase 480V	
Minimum String Length (Power Optimizers)	P320, P340, P370, P400	8	10	18	
	P405 / P505	6	8	14	
Maximum String Length (Power Optimizers)		25	25	50 ⁽⁶⁾	
Maximum Power per String	5700 (6000 with SE7600-US - SE11400-US)	5250	6000 ⁽⁷⁾	12750 ⁽⁸⁾	W
Parallel Strings of Different Lengths or Orientations	Yes				

⁽⁴⁾ For detailed string sizing information refer to: http://www.solaredge.com/sites/default/files/string_sizing_na.pdf
⁽⁵⁾ It is not allowed to mix P405/P505 with P320/P340/P370/P400 in one string
⁽⁶⁾ A string with more than 30 optimizers does not meet NEC rapid shutdown requirements; safety voltage will be above the 30V requirement
⁽⁷⁾ For SE14.4KUS/SE43.2KUS: It is allowed to install up to 6,500W per string when 3 strings are connected to the inverter (3 strings per unit for SE43.2KUS) and when the maximum power difference between the strings is up to 1,000W
⁽⁸⁾ For SE30KUS/SE33.3KUS/SE66.6KUS/SE100KUS: It is allowed to install up to 15,000W per string when 3 strings are connected to the inverter (3 strings per unit for SE66.6KUS/SE100KUS) and when the maximum power difference between the strings is up to 2,000W

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APN: 010514000201

ENGINEER OF RECORD

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REVISIONS

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(SHEET 12)

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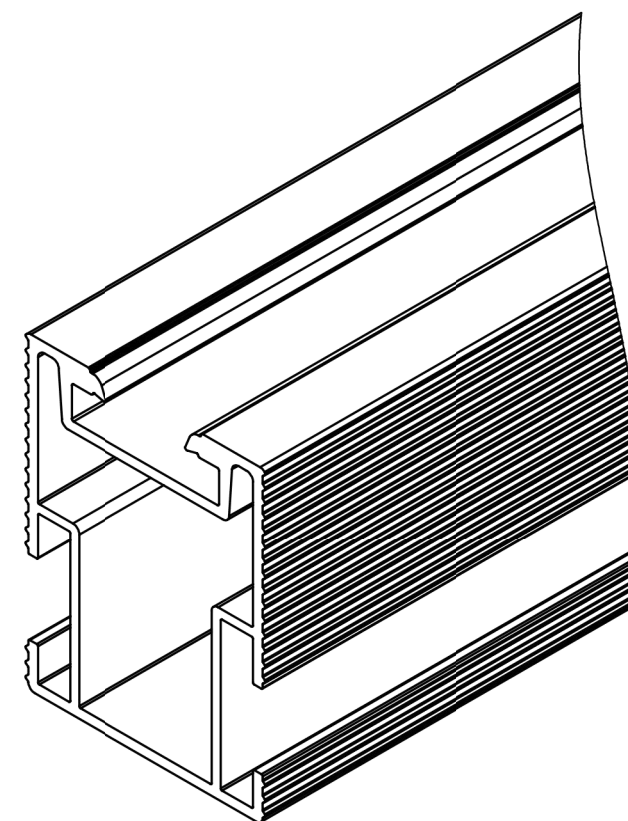
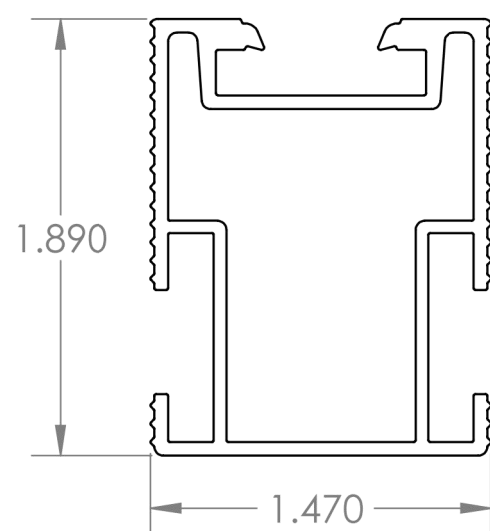
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R-004.00

(SHEET 13)

ITEM NO.	DESCRIPTION	QTY.
1	QRAIL, STANDARD, AL, MILL	1



NOTES:
1. AVAILABLE IN MILL FINISH AND BLACK FINISH

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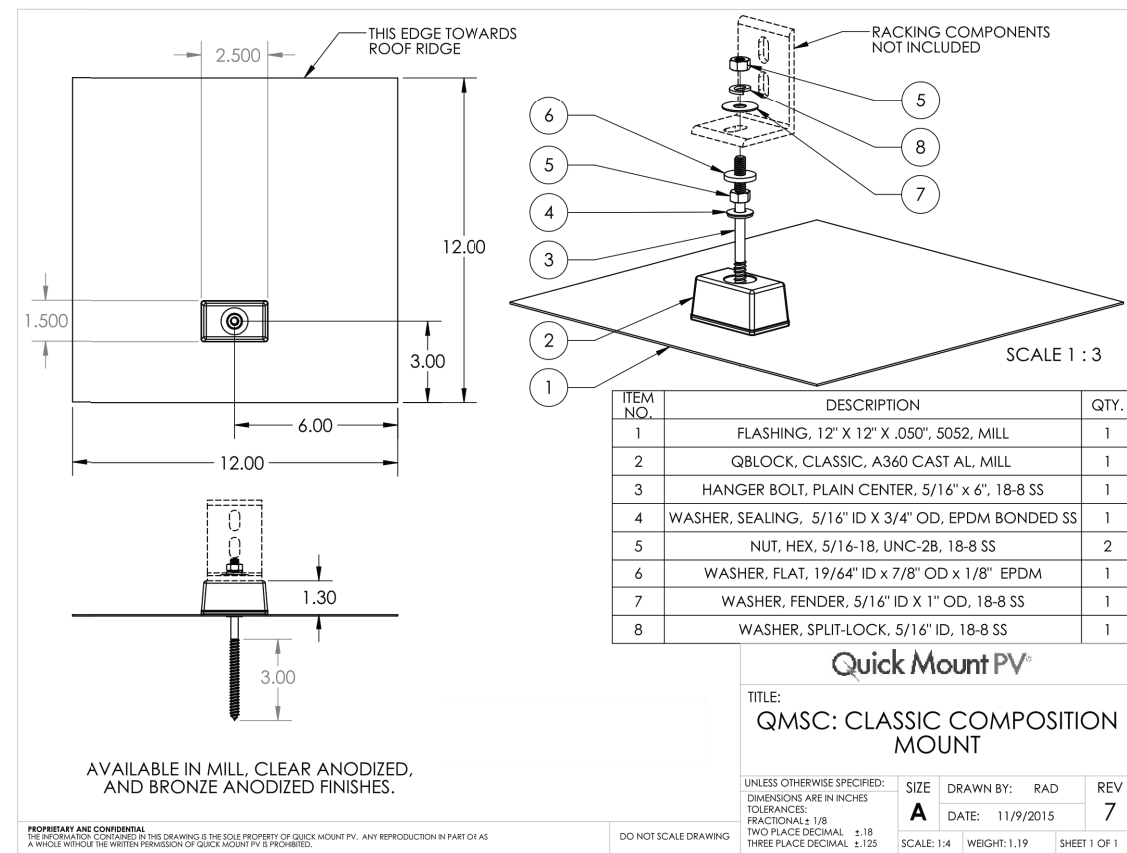
Quick Mount PV[®]

TITLE:
QMR-RS: QRAIL STANDARD

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL ± 1/8 TWO PLACE DECIMAL ±.19 THREE PLACE DECIMAL ±.094	SIZE	DRAWN BY: RAD	REV
	A	DATE: 8/13/2018	3
SCALE: 1:1		WEIGHT: 0.65	SHEET 1 OF 1

Classic Composition Mount | QMSC

Elevated Water Seal Technology™



AVAILABLE IN MILL, CLEAR ANODIZED, AND BRONZE ANODIZED FINISHES.

Lag pull-out (withdrawal) capacities (lbs) in typical lumber:

	Lag Bolt Specifications		
	Specific Gravity	5/16" shaft per 3" thread depth	5/16" shaft per 1" thread depth
Douglas Fir, Larch	.50	798	266
Douglas Fir, South	.46	705	235
Engelmann Spruce, Lodgepole Pine (MSR 1650 f & higher)	.46	705	235
Hem, Fir	.43	636	212
Hem, Fir (North)	.46	705	235
Southern Pine	.55	921	307
Spruce, Pine, Fir	.42	615	205
Spruce, Pine, Fir (E of 2 million psi and higher grades of MSR and MEL)	.50	798	266

Sources: American Wood Council, NDS 2005, Table 11.2 A, 11.3.2 A

Notes:

- 1) Thread must be embedded in a rafter or other structural roof member.
- 2) See NDS Table 11.5.1C for required edge distances.



BI 7.2.3-7

Jan-2017, Rev 8

Classic Composition Mounting Instructions

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

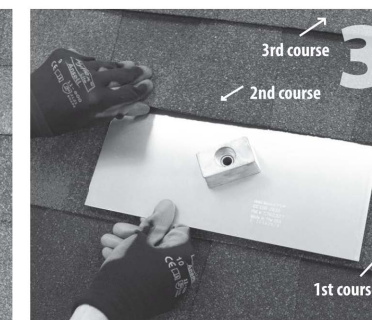
WARNING: Quick Mount PV products are NOT designed for and should NOT be used to anchor fall protection equipment.



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



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



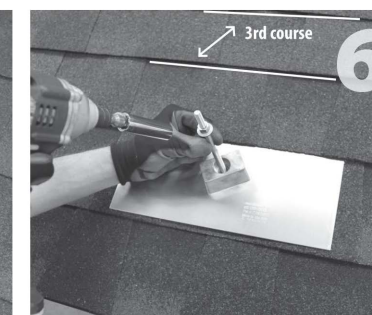
Insert flashing between 1st and 2nd course. Slide up so top edge of flashing is at least 3/4" higher than the drip edge of the 3rd course and lower flashing edge is above the drip edge of 1st course. Mark center for drilling.



Using drill with 7/32" bit, drill pilot hole into roof and rafter, taking care to drill square to the roof. Do not use mount as a drill guide. Drill should be 'long style bit' aka 'aircraft extension bit' to drill a 3" deep hole into rafter.



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



Slide flashing into position. Prepare hanger bolt with hex nut and sealing washer. Insert into hole and drive hanger bolt until QBlock stops rotating easily. **Do NOT over torque.**



Insert EPDM rubber washer over hanger bolt into block.



Using the rack kit hardware, secure the racking (L-foot) to the mount using torque specs from racking manufacturer. If racking manufacturer does not specify torque setting, tighten to 13 ft.-lbs.

You are now ready for the rack of your choice. Follow all the directions of the rack manufacturer as well as the module manufacturer.

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

BI 7.2.3-7

Jan-2017, Rev 8

CONTRACTOR

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NEW PV SYSTEM: 8.640 kWp

HASKIN RESIDENCE
 16 JACK HARRIS LN
 SPRING LAKE, NC 28390
 APN: 010514000201

ENGINEER OF RECORD

PAPER SIZE: 11" x 17" (ANSI B)

RESOURCE DOCUMENT

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REVISIONS

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 (SHEET 14)

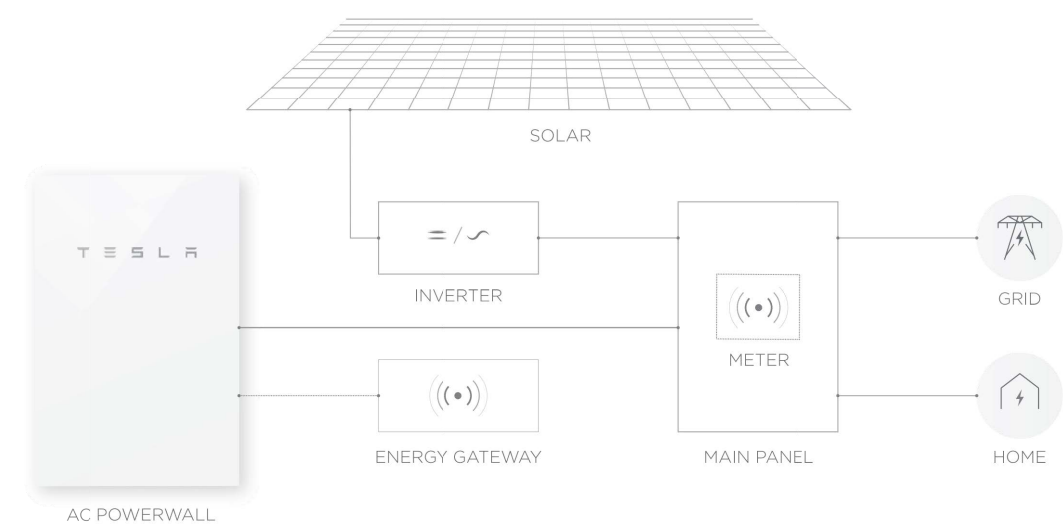


POWERWALL 2 AC

The Tesla Powerwall is a fully-integrated AC battery system for residential or light commercial use. Its rechargeable lithium-ion battery pack provides energy storage for solar self-consumption, load shifting and backup power.

Powerwall's electrical interface provides a simple connection to any home or building. Its revolutionary compact design achieves market-leading energy density and is easy to install, enabling owners to quickly realize the benefits of reliable, clean power.

TYPICAL SYSTEM LAYOUT



PERFORMANCE SPECIFICATIONS

AC Voltage (Nominal)	208 V, 220 V, 230 V, 277 V, 100/200 V, 120/240 V
Feed-In Type	Single & Split-Phase
Grid Frequency	50 and 60 Hz
AC Energy ¹	13.2 kWh
Real Power, max continuous ²	5 kW (charge and discharge)
Real Power, peak (10s) ²	7 kW (discharge only)
Apparent Power, max continuous ²	5.8 kVA (charge and discharge)
Apparent Power, peak (10s) ²	7.2 kVA (discharge only)
Imbalance for Single-Phase Loads	100%
Power Factor Output Range	+/- 1.0 adjustable
Power Factor (full-rated power)	+/- 0.85
Depth of Discharge	100%
Internal Battery DC Voltage	50 V
Round Trip Efficiency ^{1,3}	89.0%
Warranty	10 years

¹Values provided for 25°C (77°F), 3.3 kW charge/discharge power.
²Values region-dependent.
³AC to battery to AC, at beginning of life.

ENERGY GATEWAY SPECIFICATIONS

User Interface	Tesla App
Connectivity	Wi-Fi, Ethernet, 3G
AC Meter	Revenue grade
Operating Modes	Support for wide range of usage scenarios
Backup Operation	Optional automatic disconnect switch
Modularity	Supports up to 9 AC-coupled Powerwalls

ENVIRONMENTAL SPECIFICATIONS

Operating Temperature	-20°C to 50°C (-4°F to 122°F)
Storage Temperature	-30°C to 60°C (-22°F to 140°F)
Operating Humidity (RH)	Up to 100%, condensing
Maximum Altitude	3000 m (9843 ft)
Environment	Indoor and outdoor rated
Enclosure Type	NEMA 3R
Ingress Rating	IP67 (Battery & Power Electronics) IP56 (Wiring)
Noise Level @ 1m	<40 dBA at 30°C (86°F)

MECHANICAL SPECIFICATIONS

Dimensions	1150 mm x 755 mm x 155 mm (45.3 in x 29.7 in x 6.1 in)
Weight	122 kg (269 lbs)
Mounting options	Floor or wall mount

COMPLIANCE INFORMATION

Safety	UL 1642, UL 1741, UL 1973, UL 9540, UN 38.3, IEC 62109-1, IEC 62619, CSA C22.2.107.1
Grid Standards	Worldwide Compatibility
Emissions	FCC Part 15 Class B, ICES 003, EN 61000 Class B
Environmental	RoHS Directive 2011/65/EU, WEEE Directive 2012/19/EU, 2006/66/EC
Seismic	AC156, IEEE 693-2005 (high)

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 (SHEET 11)

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REVISIONS

R-007.00

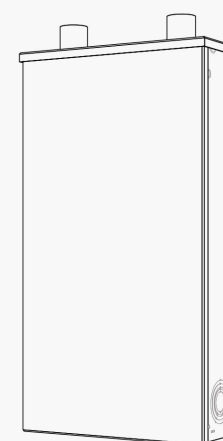
(SHEET 12)

POWERWALL
Backup Gateway

The Backup Gateway for Tesla Powerwall provides energy management and monitoring for solar self-consumption, time-based control, and backup.

The Backup Gateway controls connection to the grid, automatically detecting outages and providing a seamless transition to backup power. When equipped with a circuit breaker, the Backup Gateway can be installed at the service entrance.

The Backup Gateway communicates directly with Powerwall, allowing you to monitor energy use and manage backup energy reserves from any mobile device with the Tesla app.



PERFORMANCE SPECIFICATIONS

AC Voltage (Nominal)	230 V, 120/240 V
Feed-In Type	Single & Split Phase
Grid Frequency	50 and 60 Hz
Disconnect Current	200 A
Maximum Input Short Circuit Current	10 kA
Overcurrent Protection Device ¹	100–200 A; Service Entrance Rated
Overvoltage Category	Category IV
AC Meter	Revenue grade (+/- 1%)
Connectivity	Ethernet, Cellular (3G) ² , Wi-Fi
User Interface	Tesla App
Operating Modes	Support for solar self-consumption, time-based control, and backup
Backup Operation	Automatic disconnect for seamless backup transition
Modularity	Supports up to 10 AC-coupled Powerwalls
Warranty	10 years

¹Circuit breaker required for installation at service entrance.

²Cellular connectivity subject to network operator service coverage and signal strength.

COMPLIANCE INFORMATION

Certifications	UL 1642, UL 1741, IEC 62109-1, CSA C22.2.107.1
Grid Connection	Worldwide Compatibility
Emissions	FCC Part 15 Class B, ICES 003, IEC 61000-6-3, EN 55024, EN 301489-1, EN 301489-7, EN 301489-17
Environmental	RoHS Directive 2011/65/EU, WEEE Directive 2012/19/EU, Battery Directive 2006/66/EC REACH Regulation
Seismic	AC156, IEEE 693-2005 (high)

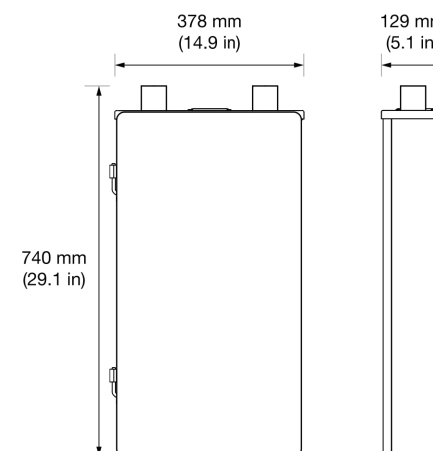
TESLA

2018-03-22

TESLA.COM/ENERGY

MECHANICAL SPECIFICATIONS

Dimensions	740 mm x 378 mm x 129 mm (29.1 in x 14.9 in x 5.1 in)
Weight	16.4 kg (36 lbs)
Mounting options	Wall mount



ENVIRONMENTAL SPECIFICATIONS

Operating Temperature	-20°C to 50°C (-4°F to 122°F)
Operating Humidity (RH)	Up to 100%, condensing
Maximum Elevation	3000 m (9843 ft)
Environment	Indoor and outdoor rated
Enclosure Type	NEMA 3R
Ingress Rating	IP44