GENERAL NOTES

1. ALL ELECTRICAL MATERIALS SHALL BE NEW AND LISTED BY RECOGNIZED ELECTRICAL TESTING LABORATORY

CUSTOM MADE EQUIPMENT SHALL HAVE COMPLETE TEST DATA SUBMITTED BY THE MANUFACTURER ATTESTING TO ITS SAFETY

2. OUTDOOR EQUIPMENT SHALL BE NEMA 3R RATED OR BETTER

3. ALL METALLIC EQUIPMENT SHALL BE GROUNDED

4. CONTRACTOR SHALL OBTAIN ELECTRICAL PERMITS PRIOR TO INSTALLATION AND SHALL COORDINATE ALL INSPECTIONS, TESTING COMMISSIONING AND ACCEPTANCE WITH THE CLIENT, UTILITY CO. AND CITY INSPECTORS AS NEEDED.

5. THE ELECTRICAL CONTRACTOR SHALL VERIFY THE EXACT LOCATIONS OF SERVICE POINTS AND SERVICE SIZES WITH THE SERVING UTILITY COMPANY AND COMPLY WITH ALL UTILITY COMPANIES REQUIREMENTS.

6. DRAWINGS ARE DIAGRAMMATIC ONLY, ROUTING OF RACEWAYS SHALL BE OPTION OF THE CONTRACTOR UNLESS OTHERWISE NOTED AND SHALL BE COORDINATED WITH OTHER TRADES.

7. IF THE ROOF MATERIAL OR ROOF STRUCTURE NOT ADEQUATE FOR PV INSTALLATION, CALL ENGINEER PRIOR TO INSTALL. THE CONTRACTOR IS RESPONSIBLE TO VERIFY THAT THE ROOF IS CAPABLE OF WITHSTANDING THE EXTRA WEIGHT.

8. IF THE DISTANCES FOR CABLE RUNS ARE DIFFERENT THAN SHOWN, THE CONTRACTOR SHALL NOTIFY THE ELECTRICAL ENGINEER TO VALIDATE THE WIRE SIZE. FINAL DRAWINGS WILL BE RED-LINED AND UPDATED AS APPROPRIATE.

9. WHENEVER A DISCREPANCY IN QUALITY OF EQUIPMENT ARISES ON THE DRAWING OR SPECIFICATIONS, THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING AND INSTALLING ALL MATERIAL AND SERVICES REQUIRED BY THE STRICTEST CONDITIONS NOTED ON THE DRAWINGS OR IN THE SPECIFICATIONS TO ENSURE COMPLETE COMPLIANCE AND LONGEVITY OF THE OPERABLE SYSTEM REQUIRED BY THE ARCHITECT/ENGINEERS.

10. ALL BROCHURES, OPERATION MANUALS, CATALOGS, SHOP DRAWINGS, ETC. SHALL BE HANDED OVER TO OWNER'S REPRESENTATIVE AT THE COMPLETION OF WORK

PHOTOVOLTAIC NOTES:

1. ROOFTOP MOUNTED PHOTOVOLTAIC PANELS AND MODULES SHALL BE TESTED, LISTED AND IDENTIFIED BY RECOGNIZED ELECTRICAL TESTING LABORATORY

2. SOLAR SYSTEM SHALL NOT COVER ANY PLUMBING OR MECHANICAL VENTS

3. MODULES AND SUPPORT STRUCTURES SHALL BE GROUNDED.

4. SOLAR INVERTER SHALL BE LISTED TO UL1741.

5. REMOVAL OF AN INTERACTIVE INVERTER OR OTHER EQUIPMENT SHALL NOT DISCONNECT THE BONDING CONNECTION BETWEEN THE GROUNDING ELECTRODE CONDUCTOR AND THE PHOTOVOLTAIC SOURCE AND/OR OUTPUT CIRCUIT GROUNDED CONDUCTORS.

6. ALL PV MODULES AND ASSOCIATED EQUIPMENT AND WIRING SHALL BE PROTECTED FROM PHYSICAL DAMAGE.

7. LIVE PARTS OF PV SOURCE CIRCUITS AND PV OUTPUT CIRCUITS OVER 150V TO GROUND SHALL NOT BE ACCESSIBLE TO OTHER THAN QUALIFIED PERSONS WHILE ENERGIZED.

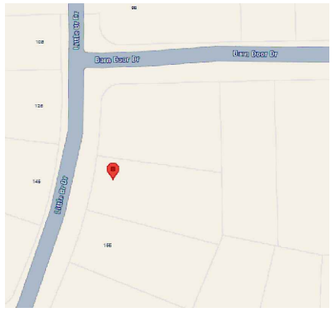
8. INVERTER IS EQUIPED WITH INTEGRATED GFDI, THUS PROVIDING GROUND FAULT PROTECTION

9. ALL CONDUCTORS SHALL BE COPPER AND 90 DEG RATED

10. ALL ELECTRICAL EQUIPMENT SHALL BE LISTED BY A RECOGNIZED ELECTRICAL TESTING LABORATORY.

11. A SINGLE CONDUCTOR SHALL BE PERMITTED TO BE USED TO PERFORM THE MULTIPLE FUNCTIONS OF DC GROUNDING, AC GROUNDING AND BONDING BETWEEN AC AND DC SYSTEMS.

12. NON-CURRENT CARRYING METAL PARTS OF EQUIPMENT SHALL BE EFFECTIVELY BONDED TOGETHER. BOND BOTH ENDS OF RACEWAYS.



VICINITY MAP
SCALE: NTS

SATELLITE VIEW
SCALE: NTS

INDEX

MAIN

THE INSTALLATION OF SOLAR ARRAYS AND PHOTOVOLTAIC POWER SYSTEMS SHALL COMPLY WITH THE FOLLOWING CODES:

- *2020 NATIONAL ELECTRICAL CODE*
- *2018 NORTH CAROLINA STATE BUILDING CODE: RESIDENTIAL*
- *2018 NORTH CAROLINA STATE BUILDING CODE: BUILDING*
- *2018 NORTH CAROLINA STATE BUILDING CODE: FIRE*

AS ADOPTED BY THE STATE OF NORTH CAROLINA
ALL OTHER ORDINANCE ADOPTED BY THE
LOCAL GOVERNING AGENCIES

PV SOLAR SYSTEM DETAILS

SYSTEM SIZE: DC STC: 5.520 KW
SYSTEM SIZE: AC CEC: 5.800 KW
SOLAR MODULES: (12) Aptos Solar 460 WATT
SOLAR SHITDOWNS: (4) MCI-2 Solar Shutdowns
TESLA BACKUP SWITCH

ELECTRICAL INFORMATION:
EXISTING
MAIN SERVICE PANEL BUS SIZE: 200A
MAIN SERVICE BREAKER SIZE: 200A
MOUNTING SYSTEM: IRONRIDGE XR-100

BUILDING INFORMATION:
CONSTRUCTION TYPE: V-B
OCCUPANCY: R3
ROOF: COMP. SHINGLE

Project Name:
Joshua Newnam
Property address:
141 Little Br Dr, Lillington, NC 27546

NORTH CAROLINA PROFESSIONAL SEAL 055158 ENGINEER JOUNGHO CHOI

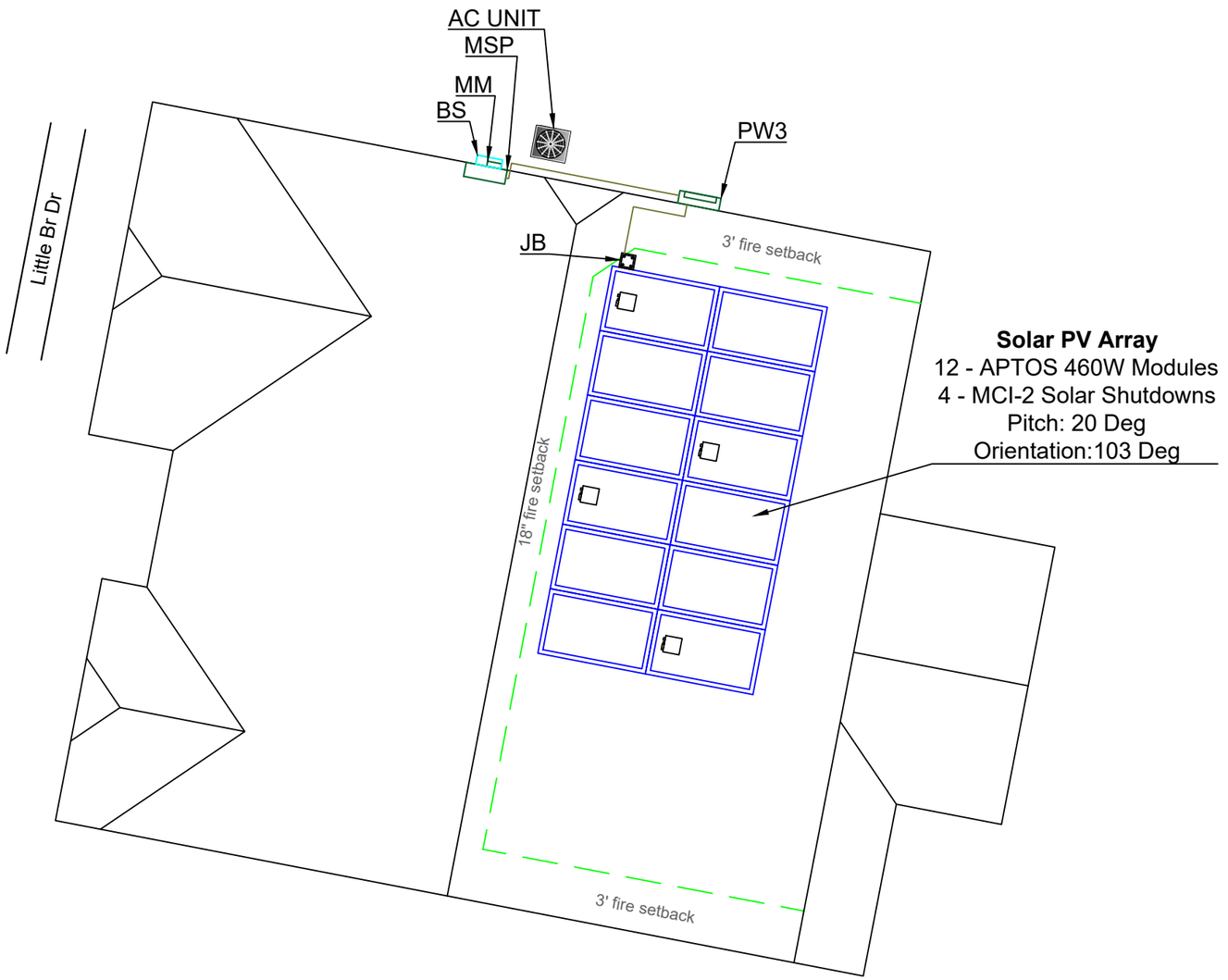
Joungho Choi
Digitally signed by Joungho Choi
Date: 2025.08.25 12:34:07 -04'00'

Wiring Solutions Plus LLC
Address:
4724 Hargrove Rd, Raleigh, NC 27616
Phone Number:
984-200-7489
E-Mail.
wiringsolutionsoffice@gmail.com
License Number:
25181-L

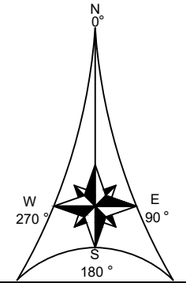
Date: ***08/21/2025***

INDEX	
MM	(E) Main Meter
MSP	(E) Main Service Panel
BS	(N) Backup Switch
PW3	(N) Powerwall 3
	(N) Solar Shutdowns
	(N) Solar Modules
	EMT Conduit
	Setback

Total Roof Area: 2275
Total Module Area: 280
12.31% of Coverage



Solar PV Array
12 - APTOS 460W Modules
4 - MCI-2 Solar Shutdowns
Pitch: 20 Deg
Orientation:103 Deg



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

1 ROOF PLAN

Project Name:
Joshua Newnam
Property address:
141 Little Br Dr, Lillington, NC 27546

Avial Lumagui

Digitally signed by Avial Lumagui
Date: 2025.08.25 13:50:59 -04'00'

NORTH CAROLINA PROFESSIONAL SEAL 054960 ENGINEER AVIAL LUMAGUI

STRUCTURAL ONLY

Wiring Solutions Plus LLC
Address:
4724 Hargrove Rd, Raleigh, NC 27616
Phone Number:
984-200-7489
E-Mail.
wiringsolutionsoffice@gmail.com
License Number:
25181-L

Wiring Solutions Plus

Date: ***08/21/2025***

#	ITEM	DESCRIPTION	QTY
1	PV MODULE	APTOS SOLAR 460WATT DNA-120-MF10-460 Voc = 41.97V, Vmp = 35.36V Isc = 13.75A, Imp = 13.00A	12
2.1	INVERTER	TESLA POWERWALL 3 / 11.5KW MODEL #1707000-xx-y MAX. CONTINUOUS CURRENT - 48A PV DC INPUT VOLTAGE RANGE 60-550V DC PV DC MPPT VOLTAGE RANGE 150.480V DC SOLAR HOME/GRID EFFICIENCY 97.5%	1
2.2	BATTERY	TESLA POWERWALL 3 MODEL #: 1707000-xx-y NOMINAL BATTERY ENERGY - 13.5KWH	1
3	SOLAR SHUTDOWNS	MCI-2 SOLAR SHUTDOWNS MAX. INPUT DC CURRENT - 13A MAX. INPUT SHORT CIRCUIT CURRENT - 17A MAX. SYSTEM VOLTAGE - 1000V DC MAX. DISCONNECT VOLTAGE - 165V DC	4
4	JUNCTION BOX	4"x4"x2" UL LISTED WATER TIGHT NEMA TYPE 3	1
5	MAIN SERVICE PANEL	EXISTING MAIN SERVICE PANEL 200A BUSBAR & 200A BREAKER	1
6	MAIN METER	UTILITY METER	1
7	BACKUP SWITCH	(N)200A TESLA BACKUP SWITCH MODEL #1624171-xx-y, 120/240V	1

PCS Controller Current Setting: **32A**

The maximum output current from this system towards the main panel is controlled electronically, Refer to manufacturer's instructions for more information

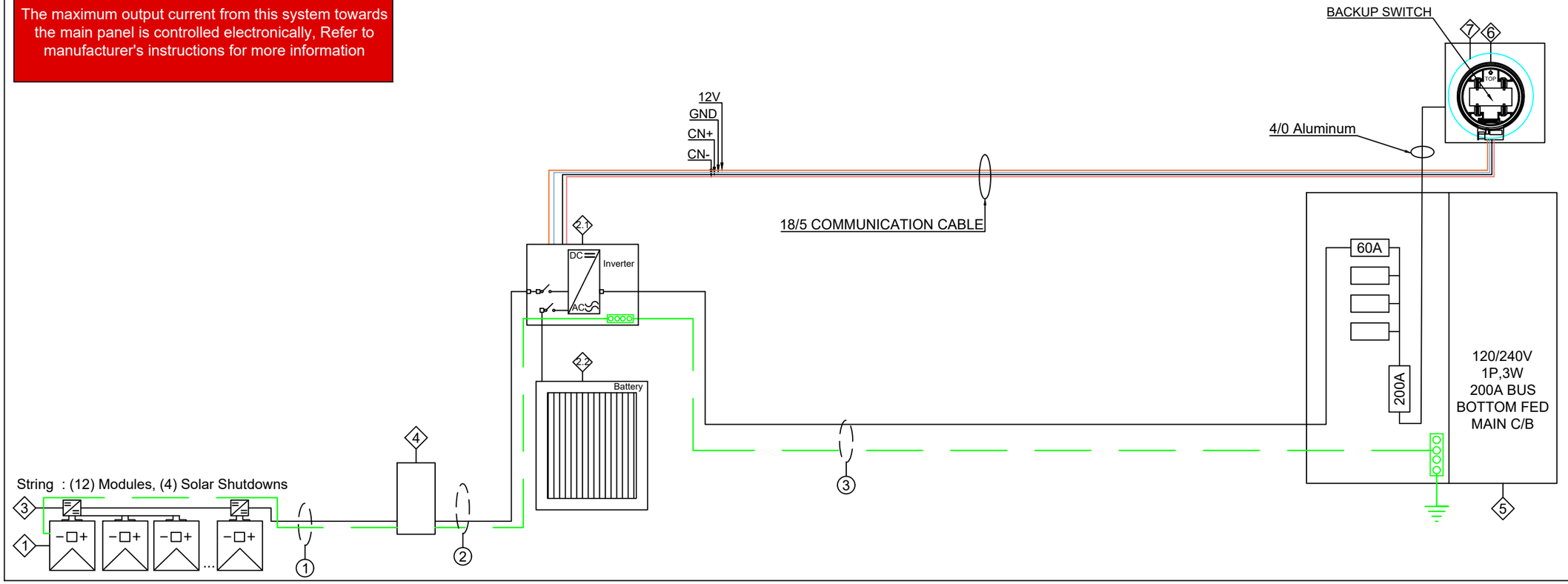
WIRE CHART

#	CONTINUES CURRENT x NECMULT x COMBINED STRING =DESIGN AMPS	BREAKER SIZE (A)	WIRE TYPE	EGC	WIRE RATING X TEMP DERATE X CONDUCTOR DERATE = ERATED WIRE	CONDUIT SIZE
1	13.75 X 1.25 = 17.18A	20	(2) #10 AWG, PV WIRE	(1) #6 BARE SOLID COPPER GEC	40 X .71 X 1 = 28.4 >= 17.18	IN FREE AIR
2	13.75 X 1.25 = 17.18 A	20	(2) #10 AWG, CU-THWN-2	(1) #10 AWG CU-THWN-2 EGC	40 X .71 X 1 = 28.4 >= 17.18	3/4" EMT
3	48 X 1.25 = 60 A	60	(3) #6 AWG, CU-THWN-2	(1) #10 AWG CU-THWN-2 EGC	75 X .91 X 1 = 68.25 >= 60	3/4" EMT

600V CALCULATION		
MAX NUMBER MODULES PER STRING:	12	
Voc:	41.97	V
CORRECTION FACTOR:	1.12	
MAX SYSTEM VOLTAGE	12 x 41.97 x 1.12	= 564.07V

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

All DC Connectors to modules or invertersmust be of matching manufacture brand andstyle. Do not us 'compatible' connectors whichhave not been UL listed for compatibility. Performance and fire damage may result frommis-matched connector useage.



2 SINGLE LINE DIAGRAM

Project Name:
Joshua Newnam
Property address:
141 Little Br Dr, Lillington, NC 27546

NORTH CAROLINA PROFESSIONAL SEAL 055158 ENGINEER JOUNGHO CHOI

Wiring Solutions Plus LLC
Address:
4724 Hargrove Rd, Raleigh, NC 27616
Phone Number:
984-200-7489
E-Mail.
wiringsolutionsoffice@gmail.com
License Number:
25181-L

Date: ***08/21/2025***

1

WARNING

SOURCES: UTILITY GRID AND
PV SOLAR ELECTRICAL SYSTEM

2

PHOTOVOLTAIC AC DISCONNECT

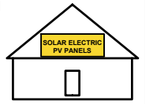
RATED OUTPUT CURRENT: ____

NOMINAL OPERATING VOLTAGE: ____

3

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



4

WARNING: PHOTOVOLTAIC POWER SOURCE

5

PV SOLAR BREAKER

DO NOT RELOCATE THIS OVERCURRENT DEVICE

6

WARNING

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

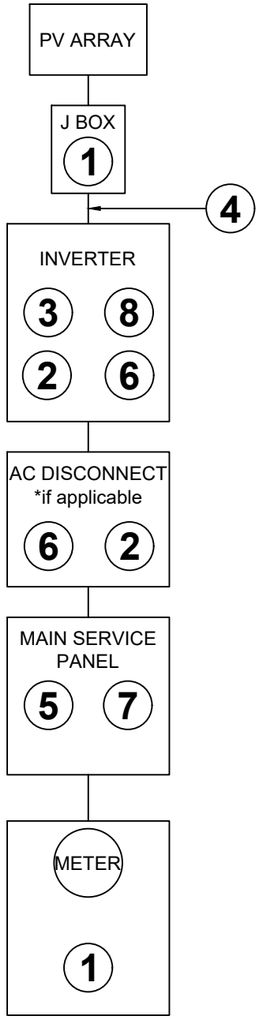
7

WARNING!
INVERTER OUTPUT CONNECTION. DO NOT RELOCATE THIS OVERCURRENT DEVICE

8

MAXIMUM VOLTAGE: ____ V

MAXIMUM CIRCUIT CURRENT: ____ A
MAX RATED OUTPUT CURRENT OF THE CHARGE CONTROLLER OR DC-TO-DC CONVERTER (IF INSTALLED): ____ A

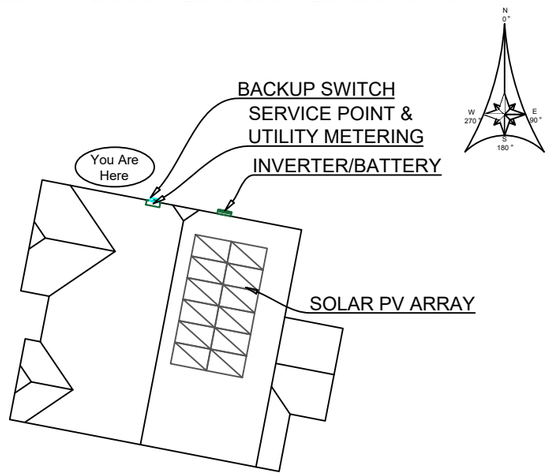


MARKINGS, LABELS AND WIRING SIGNS

A. Purpose: Provide emergency responders with appropriate warning and guidance with respect to isolating solar electric system.
This can facilitate identifying energized electrical lines that connect solar panels to the inverter, as these should not be cut when venting for smoke removal
B. Main Service Disconnect.
1. Residential buildings - The marking main be placed within the main service disconnect. The marking shall be placed
outside cover if the main service disconnect is operable with the service panel closed.
2. Commercial buildings - Tha marking shall be placed adjacent to the main service disconnect clearly visible from the location where the level is operated
3. Markings: Verbiage, Format and Type of Material.
a. Verbiage: CAUTION: SOLAR ELECTRIC SYSTEM CONNECTED
b. Format: White lettering on a red background. Minimum 3/8 inches letter height. All letters shall be capitalized. Arial or similar font, non bold.
c. Material: Reflective, weather resistant material suitable for the environment (use UL - 969 as standard for weather rating). Durable adhesive materials meet this requirement.
C.Marking Requirements on DC conduit, raceways, enclosures, cable assemblies, DC combiners and junction boxes:
1. Markings: Verbiage, Format and Type of Material.
a. Placement : Markings shall be placed every 10 feet on all interior and exterior DC conduits, raceways, enclosures, and cable assemblies,
at turns, above and for below penetrations, all DC combiners and junction boxes
b. Verbiage: CAUTION: SOLAR CIRCUIT Note: The format and type of material shall adhere to "V. V-3b, c" of this requirement.
c. Inverters are not required to have caution markings
1.Marking is required on all interior and exterior DC conduit raceways,enclosures,cable assemblies,and junction boxes,combiner boxes and disconnects.
2.The materials used for marking shall be reflective,weather resistant material suitable for the environment.
Minimum 3/8 "letter height; all upper case letters Arial or similar font; Red background with white lettering.
3.Marcking shall contain the words: **WARNING : PHOTOVOLTAIC POWER SOURCE**.
4.Marking shall be placed adjacent to the main service disconnect in a location clearly visible from the location where the disconnect is operated

CAUTION

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



3 **SIGNAGE**

Project Name:
Joshua Newnam
Property address:
141 Little Br Dr, Lillington, NC 27546

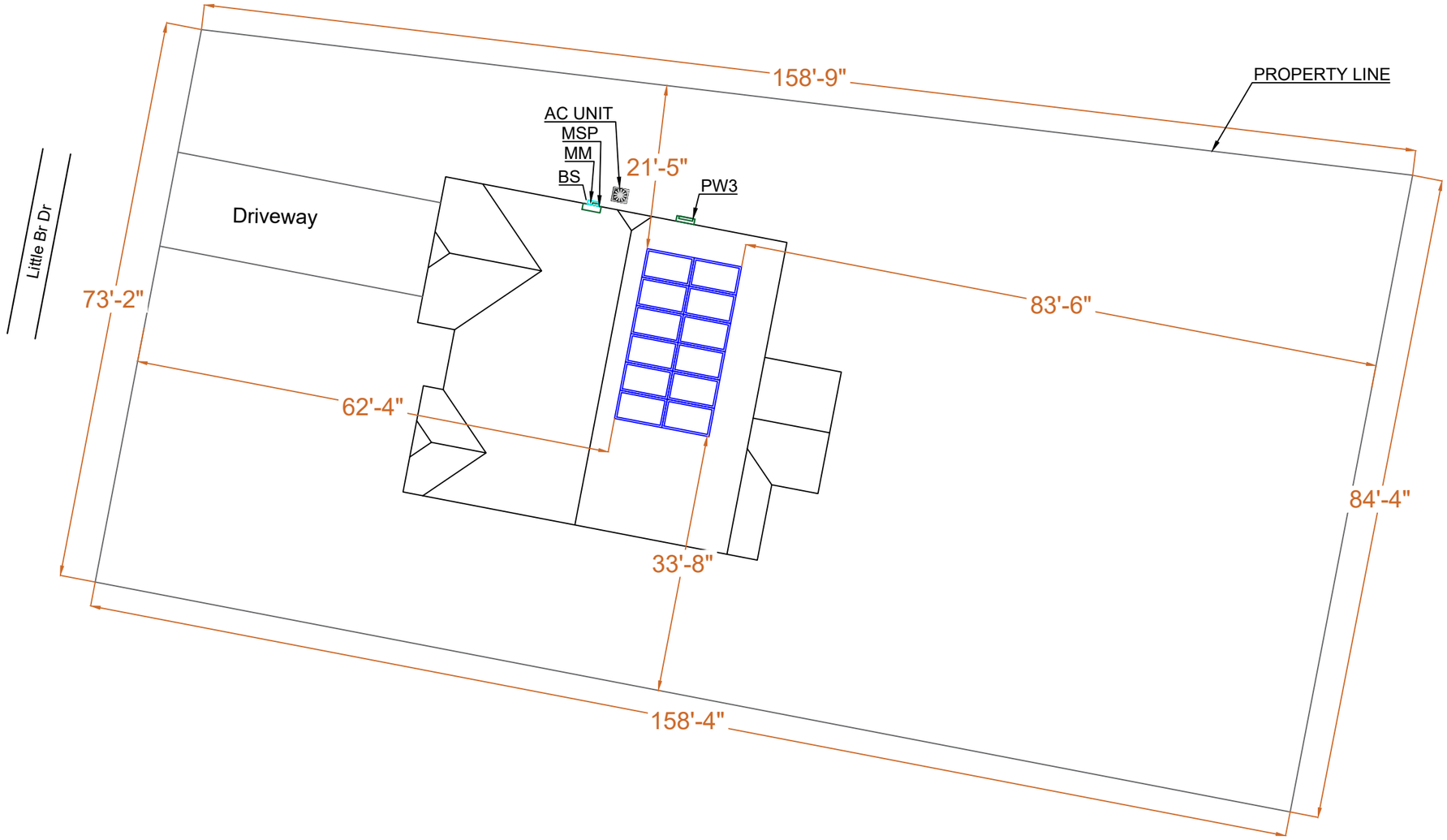
NORTH CAROLINA PROFESSIONAL
SEAL
055158
ENGINEER
JOUNGHO CHOI

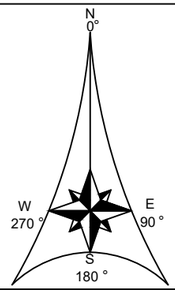
Wiring Solutions Plus LLC
Address:
4724 Hargrove Rd, Raleigh, NC 27616
Phone Number:
984-200-7489
E-Mail.
wiringsolutionsoffice@gmail.com
License Number:
25181-L

Wiring Solutions Plus

Date: ***08/21/2025***

INDEX	
MM	(E) Main Meter
MSP	(E) Main Service Panel
BS	(N) Backup Switch
PW3	(N) Powerwall 3
	(N) Solar Modules





SCALE: 1/16" = 1'-0"

4 SITE PLAN

Project Name:
Joshua Newnam
Property address:
141 Little Br Dr, Lillington, NC 27546

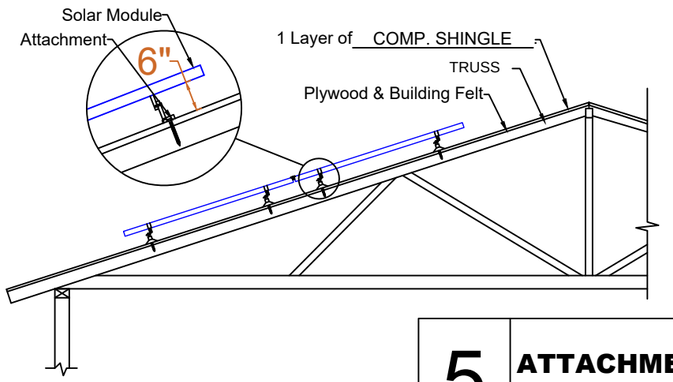
Wiring Solutions Plus LLC
Address:
4724 Hargrove Rd, Raleigh, NC 27616
Phone Number:
984-200-7489
E-Mail.
wiringsolutionsoffice@gmail.com
License Number:
25181-L

Wiring Solutions Plus

Date: ***08/21/2025***

MODULE WEIGHT (lbs)	52.9
# OF MODULES	12
TOTAL MODULE WEIGHT (lbs)	634.8
RACK WEIGHT (lbs)	126.96
SOLAR SHUTDOWNS WEIGHT (lbs)	3.12
TOTAL SYSTEM WEIGHT (lbs)	764.88
# OF STANDOFFS	26
MAX SPAN BETWEEN STANDOFFS (in)	48
LOADING PER STANDOFF (lbs)	29.41
TOTAL AREA (sq.ft.)	280
LOADING (PSF)	2.91

1. Ironridge XR-10 Racking System (XR-10-168A)
2. Ironridge Halo Ultra Grip Attachment (QM-HUG-01-M1)
3. Roof attachment hardware to be mounted to existing structure (TRUSS) with 48" O.C.rail spans less.
4. Roof sheathed with 1/2" plywood and upper surface is faced with felt paper. Finished roof surface is **One layer of** COMP. SHINGLE .



ATTACHMENT
RAIL
TRUSS

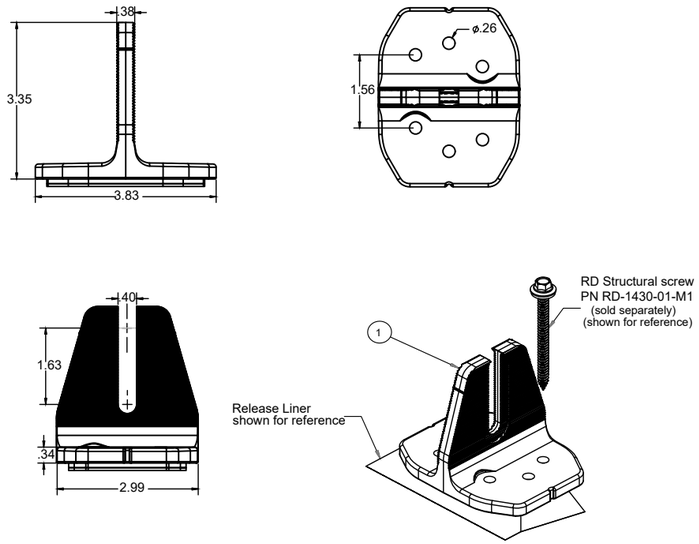
QUICKMOUNT® HALO ULTRAGRIP

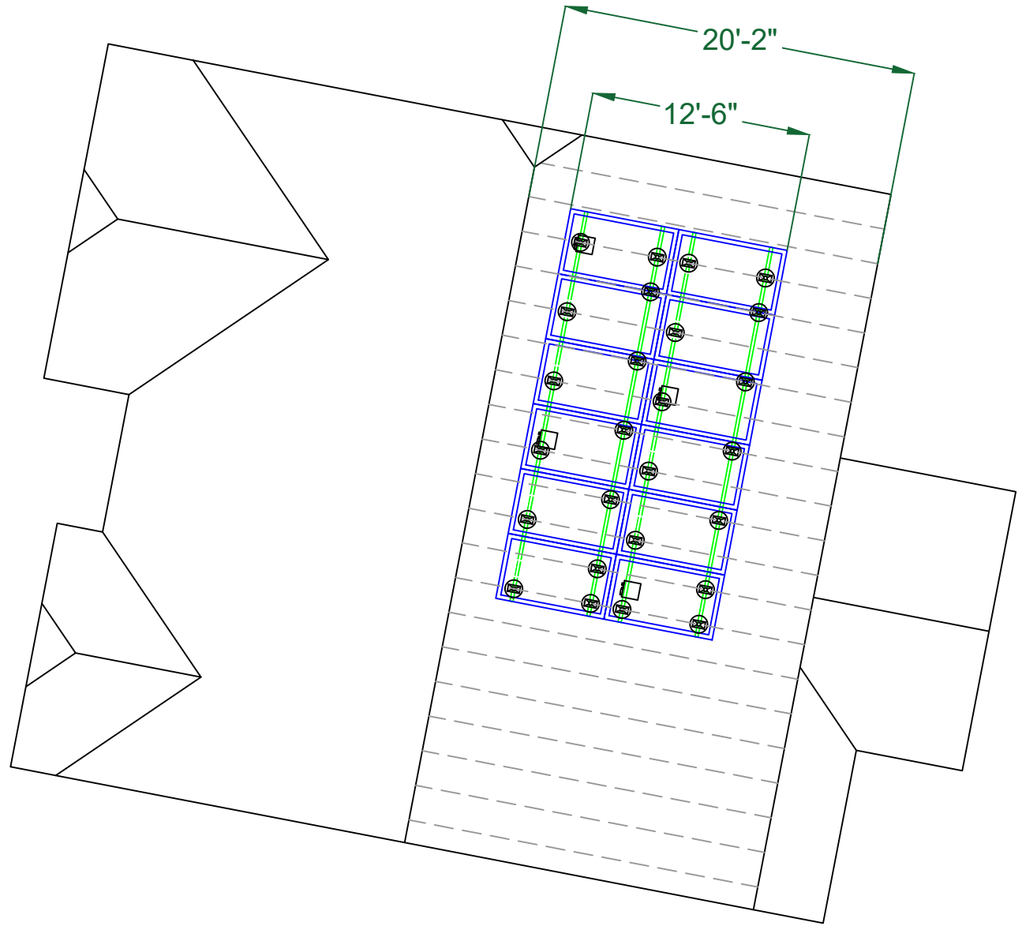
ITEM NO	DESCRIPTION	QTY IN KIT
1	QM Halo UltraGrip(Mill or Black)	1

PART NUMBER	DESCRIPTION
QM-HUG-01-M1	Halo UltraGrip - Mill
QM-HUG-01-B1	Halo UltraGrip - Black

Property	Value
Material	3000 Series Aluminium
Finish	Mill or Black

1. Halo UltraGrip





5 ATTACHMENT LAYOUT

Project Name:
Joshua Newnam
Property address:
141 Little Br Dr, Lillington, NC 27546

NORTH CAROLINA PROFESSIONAL SEAL 054960 ENGINEER AVIAL LUMAGUI
STRUCTURAL ONLY

Wiring Solutions Plus LLC
Address:
4724 Hargrove Rd, Raleigh, NC 27616
Phone Number:
984-200-7489
E-Mail.
wiringsolutionsoffice@gmail.com
License Number:
25181-L

Date: ***08/21/2025***

Powerwall 3

Power Everything

—

Powerwall 3 is a fully integrated solar and battery system, designed to accelerate the transition to sustainable energy. Customers can receive whole home backup, cost savings, and energy independence by producing and consuming their own energy while participating in grid services. Once installed, customers can manage their system using the Tesla App to customize system behavior to meet their energy goals.

Powerwall 3 achieves this by supporting up to 20 kW DC of solar and providing up to 11.5 kW AC of continuous power per unit. It has the ability to start heavy loads rated up to 185 LRA, meaning a single unit can support the power needs of most homes. Powerwall 3 Expansions make it easier and more affordable to scale up customers' systems to meet their current or future needs. Powerwall 3 is designed for fast and efficient installations, modular system expansion, and simple connection to any electrical service.

Powerwall 3 Technical Specifications

System Technical Specifications	**Model Number**	1707000-xx-y			
	Nominal Grid Voltage (Input & Output)	120/240 VAC			
	Grid Type	Split phase			
	Frequency	60 Hz			
	Nominal Battery Energy	13.5 kWh AC[1]			
	Nominal Output Power (AC)	5.8 kW	7.6 kW	10 kW	11.5 kW
	Maximum Apparent Power	5,800 VA	7,600 VA	10,000 VA	11,500 VA
	Maximum Continuous Current	24 A	31.7 A	41.7 A	48 A
	Overcurrent Protection Device[2]	30 A	40 A	60 A	60 A
	Configurable Maximum Continuous Discharge Power Off-Grid (PV Only, -20°C to 25°C)	15.4 kW[3]			
	Maximum Continuous Charge Current / Power (Powerwall 3 only)	20.8 A AC / 5 kW			
	Maximum Continuous Charge Current / Power (Powerwall 3 with up to (3) Expansion units)	33.3 A AC / 8 kW			
	Output Power Factor Rating	0 - 1 (Grid Code configurable)			
	Maximum Output Fault Current (1 s)	160 A			
	Maximum Short-Circuit Current Rating	10 kA			
	Load Start Capability	185 LRA			
	Solar to Battery to Home/Grid Efficiency	89%[1,4]			
	Solar to Home/Grid Efficiency	97.5%[5]			
	Power Scalability	Up to 4 Powerwall 3 units supported			
	Energy Scalability	Up to 3 Expansion units (for a maximum total of 7 units)			
	Supported Islanding Devices	Gateway 3, Backup Switch, Backup Gateway 2			
	Connectivity	Wi-Fi (2.4 and 5 GHz), Ethernet, Cellular (LTE/4G[6])			
	Hardware Interface	Dry contact relay, Rapid Shutdown (RSD) certified switch and 2-pin connector, RS-485 for meters			
	AC Metering	Revenue Grade (+/- 0.5%, ANSI C12.20)			
	Protections	Integrated arc fault circuit interrupter (AFCI), Isolation Monitor Interrupter (IMI), PV Rapid Shutdown (RSD) using Tesla Mid-Circuit Interrupters			
	Customer Interface	Tesla Mobile App			
	Warranty	10 years			

[1] Values provided for 25°C (77°F), at beginning of life. 3.3 kW charge/discharge power.
[2] See Powerwall 3 Installation Manual for fuse requirements if using fuse for overcurrent protection.
[3] If enabling the 15.4 kW off-grid maximum continuous discharge power, Powerwall 3 must be installed with an 80 A breaker and appropriately sized conductors.
[4] Typical solar shifting use case.
[5] Tested using CEC weighted efficiency methodology.
[6] The customer is expected to provide internet connectivity for Powerwall 3; cellular should not be used as the primary mode of connectivity. Cellular connectivity subject to network operator service coverage and signal strength.

Powerwall 3 Technical Specifications

Solar Technical Specifications	**Maximum Solar STC Input**	20 kW
	Withstand Voltage	600 V DC
	PV DC Input Voltage Range	60 — 550 V DC
	PV DC MPPT Voltage Range	60 — 480 V DC
	MPPTs	6
	Maximum Current per MPPT (I_{mp})	13 A[7]
	Maximum Short Circuit Current per MPPT (I_{sc})	15 A[7]

[7] Where the DC input current exceeds the MPPT rating, a jumper can be used to combine two MPPTs into a single input to intake DC current up to 26 A I_{mp} / 30 A I_{sc}.

Environmental Specifications	**Operating Temperature**	–20°C to 50°C (–4°F to 122°F)[8]
	Operating Humidity (RH)	Up to 100%, condensing
	Storage Temperature	–20°C to 30°C (–4°F to 86°F), up to 95% RH, non-condensing, State of Energy (SOE): 25% initial
	Maximum Elevation	3000 m (9843 ft)
	Environment	Indoor and outdoor rated
	Enclosure Rating	NEMA 3R
	Ingress Rating	IP67 (Battery & Power Electronics) IP55 (Wiring Compartment)
	Pollution Rating	PD3
	Operating Noise @ 1 m	< 50 db(A) typical < 62 db(A) maximum

[8] Performance may be de-rated at operating temperatures above 40°C (104°F).

Compliance Information	**Certifications**	UL 1741, UL 9540, UL 9540A, UL 3741, UL 1741 PCS, UL 1741 SA, UL 1741 SB, UL 1973, UL 1699B, UL 1998, CSA C22.2 No. 0.8, CSA C22.2 No. 107.1, CSA C22.2 No. 330, CSA 22.3 No. 9, IEEE 1547, IEEE 1547A, IEEE 1547.1, CA Rule No.21
	Grid Connection	United States and Canada
	Emissions	FCC Part 15 Class B, ICES 003
	Environmental	RoHS Directive 2011/65/EU
	Seismic	AC156, IEEE 693-2005 (high)
	Fire Testing	Meets the unit level performance criteria of UL 9540A

6 **POWERWALL 3 DATA SHEET**

Project Name:
Joshua Newnam
Property address:
141 Little Br Dr, Lillington, NC 27546

Wiring Solutions Plus LLC
Address:
4724 Hargrove Rd, Raleigh, NC 27616
Phone Number:
984-200-7489
E-Mail.
wiringsolutionsoffice@gmail.com
License Number:
25181-L

Wiring Solutions Plus

Date: ***08/21/2025***

DNA™ 120-Monofacial

Solar for Innovators

aptos™
solar technology

DNA-120-MF10-460W

Residential | Commercial

Our DNA Split Cell Series uses advanced selective emitter PERC technology with thin film layers to improve heat tolerance, maximize energy harvest, minimize resistive loss, and use 5% more of the available active area for optimal power performance.

Industry Leading 30 Years
Product and Performance Warranty

445W | 450W | 455W | 460W

Linear Performance Warranty

Designed & Engineered In Silicon Valley

Key Features

Advanced Technology
Patented DNA™ technology boosts power performance & module efficiency.

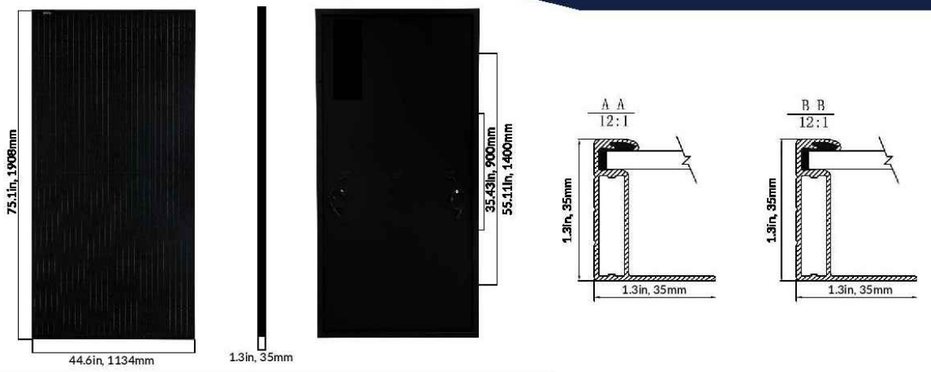
Miami-Dade Approved
Maximum Durability: LEVEL 6 SALT MIST Tested, 5400 Pa Wind Load Certified Panels

Awards
Winners of the Leadership in Solar Energy award for three consecutive years and listed as one of the Top Solar Products from 2021-2022.

Bankable Investment
Comprehensive warranty that covers both **30-year product** and **30-year power** performance.

Aesthetics
All black design with advanced split cell technology features 10 ultra-thin busbars that allow for less resistance and greater energy harvest.

DNA™ 120 Monofacial



Electrical Specifications	DNA-120-MF10-445W		DNA-120-MF10-450W		DNA-120-MF10-455W		DNA-120-MF10-460W	
	STC	NOCT	STC	NOCT	STC	NOCT	STC	NOCT
STC Rated Output P_{mpp} (W)	445W	333W	450W	336W	455W	341W	460W	344W
Open Circuit Voltage V_{VOC} (V)	41.79	39.42	41.79	39.50	41.88	39.58	41.97	39.67
Short Circuit Current I_{sc} (A)	13.36	11.89	13.51	11.99	13.63	12.09	13.75	12.20
Rated Voltage V_{mp} (V)	35.03	32.32	35.15	32.39	35.27	32.46	35.36	32.53
Rated Voltage I_{mp} (A)	12.70	10.31	12.80	10.40	12.90	10.49	13.00	10.58
Module Efficiency	20.57%		20.79%		21.03%		21.26%	

STC for front-face of panel: 1000 W/m², 25°C, measurement uncertainty ≤3%
NOCT for front-face of panel: 800W/m², 45°C, Wind speed 1 m/s

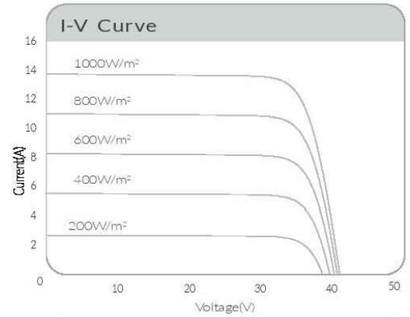
Mechanical Properties

Cell Type	SE-PERC
Glass	3.2mm, anti-reflection coating, high transmission, low iron, tempered glass
Frame	Anodized Aluminum Alloy
Junction Box	IP68
Dimensions	75.1 X 44.6 X 1.3 in, 1908 X 1134 X 35 mm
Weight	52.9lbs.(24.2kg)
Output Cable	4mm2 (EU)12AWG,39.37in.(1200mm)
Cable Length	47.2 in
Encapsulant	POE
Connector Type	Staubli EVO2

Temperature Coefficients

Temperature Coefficients P_{mpp}	-0.35%/°C
Temperature Coefficients I_{sc}	+0.054%/°C
Temperature Coefficients V_{OC}	-0.27%/°C
Nominal Operating Cell Temperature (NOCT)	45±2°C

I-V Curve



Test Operating Conditions

Maximum Series Fuse	25A
Maximum System Voltage	1,500 VDC (UL&IEC)
Maximum Load Capacity (Per UL 1703)	5400 PA Snow Load / 5400 Pa Wind Load
Fire Performance Type	Type 1

Packaging Configuration

Number of Modules per Pallet	31
Number of Pallets per 40ft. Container	24
Pallet Dimensions	76.29 X 44.48 X 49.76 in, 1938 X 1130 X 1264 mm
Pallet Weight (lbs)	1640
Module per 40ft Container	744

Certifications

CE
intertek — UL61730-1, UL61730-2
TÜV SÜD — IEC61730-1 IEC61730-2

Ref: _11.13.24

aptos solar technology
8207 Callaghan Rd, Ste 100,
San Antonio, Texas 78230
www.aptossolar.com | sales@aptossolar.com

7 **MODULE DATA SHEET**

Project Name:
Joshua Newnam
Property address:
141 Little Br Dr, Lillington, NC 27546

Wiring Solutions Plus LLC
Address:
4724 Hargrove Rd, Raleigh, NC 27616
Phone Number:
984-200-7489
E-Mail.
wiringsolutionsoffice@gmail.com
License Number:
25181-L

Wiring Solutions Plus

Date: ***08/21/2025***

Datasheet

IRONRIDGE

Flush Mount System

Built for solar's toughest roofs.

IronRidge builds the strongest mounting system for pitched roofs in solar. Every component has been tested to the limit and proven in extreme environments.

Our rigorous approach has led to unique structural features, such as curved rails and reinforced flashings, and is also why our products are fully certified, code compliant and backed by a 25-year warranty.

Strength Tested
All components evaluated for superior structural performance.

PE Certified
Pre-stamped engineering letters available in most states.

Class A Fire Rating
Certified to maintain the fire resistance rating of the existing roof.

Design Assistant
Online software makes it simple to create, share, and price projects.

UL 2703 Listed System
Entire system and components meet newest effective UL 2703 standard.

25-Year Warranty
Products guaranteed to be free of impairing defects.

Datasheet

XR Rails

XR10 Rail

A low-profile mounting rail for regions with light snow.
- 6' spanning capability
- Moderate load capability
- Clear and black finish

XR100 Rail

The ultimate residential solar mounting rail.
- 8' spanning capability
- Heavy load capability
- Clear and black finish

XR1000 Rail

A heavyweight mounting rail for commercial projects.
- 12' spanning capability
- Extreme load capability
- Clear anodized finish

Bonded Splices

All rails use internal splices for seamless connections.
- Self-drilling screws
- Varying versions for rails
- Forms secure bonding

Clamps & Grounding

UFOs

Universal Fastening Objects bond modules to rails.
- Fully assembled & lubed
- Single, universal size
- Clear and black finish

Stopper Sleeves

Snap onto the UFO to turn into a bonded end clamp.
- Bonds modules to rails
- Sized to match modules
- Clear and black finish

CAMO

Bond modules to rails while staying completely hidden.
- Universal end-cam clamp
- Tool-less installation
- Fully assembled

Grounding Lugs

Connect arrays to equipment ground.
- Low profile
- Single tool installation
- Mounts in any direction

Attachments

FlashFoot2

Flash and mount XR Rails with superior waterproofing.
- Twist-on Cap eases install
- Wind-driven rain tested
- Mill and black finish

Conduit Mount

Flash and mount conduit, strut, or junction boxes.
- Twist-on Cap eases install
- Wind-driven rain tested
- Secures ¾" or 1" conduit

Slotted L-Feet

Drop-in design for rapid rail attachment.
- Secure rail connections
- Slot for vertical adjusting
- Clear and black finish

Bonding Hardware

Bond and attach XR Rails to roof attachments.
- T & Square Bolt options
- Nut uses 7/16" socket
- Assembled and lubricated

Resources

Design Assistant
Go from rough layout to fully engineered system. For free.
Go to IronRidge.com/design

NABCEP Certified Training
Earn free continuing education credits, while learning more about our systems.
Go to IronRidge.com/training

8 **RACKING DATA SHEET**

Project Name:
Joshua Newnam
Property address:
141 Little Br Dr, Lillington, NC 27546

Wiring Solutions Plus LLC
Address:
4724 Hargrove Rd, Raleigh, NC 27616
Phone Number:
984-200-7489
E-Mail.
wiringsolutionsoffice@gmail.com
License Number:
25181-L

Wiring Solutions Plus

Date: *08/21/2025*

Tech Brief

IRONRIDGE

QuickMount® HUG

The Respect Your Roof Deserves

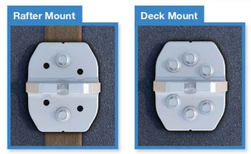
When integrating with a home, solar attachments must be dependable for the lifetime of the rooftop. Due to recent innovations, many asphalt shingles have bonded courses. A mount that protects without the need to pry shingles can really speed things up.

Halo UltraGrip™ (HUG™) is here to respect the roof. Its Halo is a cast-aluminum barrier that encases the UltraGrip, our industrial-grade, foam-and-mastic seal. This allows HUG to accelerate the installation process and provide the utmost in waterproofing protection. Give your roof a HUG.™

Multi-Tiered Waterproofing
HUG utilizes a multi-tiered stack of components to provide revolutionary waterproofing protection. The Halo cast-aluminum, raised-perimeter foundation surrounds the UltraGrip base—a foam-backed mastic seal combination that prevents water intrusion by adhering and sealing with the shingle surface.

Halo UltraGrip™ is part of the QuickMount® product line.

UltraGrip™ Seal Technology
HUG UltraGrip utilizes a state-of-the-art seal design that uses a unique, foam-and-mastic combination. The foam-backed adhesive provides an entirely new flashing system that conforms and adheres to every nook and cranny of composition shingles, filling gaps and shingle step-downs (up to 1/8" in height).



Rafter & Deck Mounting Options
Mount HUG to the roof rafters, the roof deck, or both with our custom-engineered RD (rafter-or-deck) Structural Screw. The RD Structural Screw anchors HUG to the roof with an EPDM sealing washer, completing the stack of waterproofing barriers. See backside for more installation information.

Triple Rated & Certified to Respect the Roof™
UL 2703, 441 (27)
TAS 100(A)-95

Intertek

Tech Brief

Adaptive, Rafter-Friendly Installation

Hit the rafter? Good to go!
When you find a rafter, you can move on. Only 2 RD Structural Screws are needed.

Miss the rafter? Try it again.
Place another screw to the left or right. If rafter is found, install 3rd and final screw.

Still no luck? Install the rest.
If more than 3 screws miss the rafter, secure six screws to deck mount it.

Trusted Strength & Less Hassle

25-Year Warranty
Product guaranteed free of impairing defects.

Structural capacities of HUG™ were reviewed in many load directions, with racking rail running cross-slope or up-slope in relation to roof pitch.

For further details, see the HUG certification letters for attaching to rafters and decking.

IronRidge designed the HUG, in combination with the RD Structural Screw to streamline installs, which means the following:

- No prying shingles
- No roof nail interference
- No pilot holes necessary
- No sealant (in most cases)
- No butyl shims needed

Attachment Loading

The rafter-mounted HUG has been tested and rated to support 1004 (lbs) of uplift and 368 (lbs) of lateral load.

Structural Design

Parts are designed and certified for compliance with the International Building Code & ASCE/SEI-7.

Water Seal Ratings

HUG passed both the UL 441 Section 27 "Rain Test" and TAS 100(A)-95 "Wind Driven Rain Test" by Intertek.

UL 2703 System

Systems conform to UL 2703 mechanical and bonding requirements. See Flush Mount Manual for more info.

9 **ATTACHMENT DATA SHEET**

Project Name:
Joshua Newnam
Property address:
141 Little Br Dr, Lillington, NC 27546

Wiring Solutions Plus LLC
Address:
4724 Hargrove Rd, Raleigh, NC 27616
Phone Number:
984-200-7489
E-Mail.
wiringsolutionsoffice@gmail.com
License Number:
25181-L

Date: ***08/21/2025***

Solar Shutdown Device Technical Specifications

—

The Solar Shutdown Device is a Mid-Circuit Interrupter (MCI) and is integral to the rapid shutdown (RSD) function required for rooftop PV systems in accordance with Article 690 of the NEC. When paired with Powerwall 3, solar array shutdown is initiated by an External System Shutdown Switch or the On/Off Enable switch located on Powerwall 3. Systems not subject to rapid shutdown requirements must still install one or more MCIs for functional purposes; see the Powerwall 3 installation manual for details.

Electrical Specifications

Model	MCI-1	MCI-2	MCI-2 High Current
Nominal Input DC Current Rating (I_{MP})	13 A	13 A	15 A
Maximum Input Short Circuit Current (I_{SC})	19 A	17 A	19 A
Maximum System Voltage	600 V DC	1000 V DC[14]	1000 V DC[14]
Maximum Disconnect Voltage[15]	600 V DC	165 V DC	165 V DC

[14] Maximum System Voltage is limited by Powerwall to 600 V DC.

[15] Maximum Disconnect Voltage is the maximum voltage allowed across each MCI in the open position (Rapid Shutdown Initiated). An individual MCI-2 has a voltage rating of 165V but in combination (connected in the same string) their voltage ratings are additive.

RSD Module Performance

Maximum Number of Devices per String	5
Control	Power Line Excitation
Passive State	Normally Open
Maximum Power Consumption	7 W
Warranty	25 years

Environmental Specifications

Operating Temperature	-40°C to 50°C (-40°F to 122°F)	-45°C to 70°C (-49°F to 158°F)
Storage Temperature	–30°C to 70°C (–22°F to 158°F)	–30°C to 70°C (–22°F to 158°F)
Enclosure Rating	NEMA 4X / IP65	

Mechanical Specifications

Electrical Connections	MC4 Connector	
Housing	Plastic	
Dimensions	125 x 150 x 22 mm (5 x 6 x 1 in)	173 x 45 x 22 mm (6.8 x 1.8 x 1 in)
Weight	350 g (0.77 lb)	120 g (0.26 lb)
Mounting Options	ZEP Home Run Clip M4 Screw (#10) M8 Bolt (5/16") Nail / Wood screw	Wire Clip

Compliance Information

Certifications	UL 1741 PVRSE, UL 3741, PVRSA (Photovoltaic Rapid Shutdown Array)
RSD Initiation Method	External System Shutdown Switch or Powerwall 3 Enable Switch

UL 3741 PV Hazard Control (and PVRSA) Compatibility

See UL 3741 Application Addendum

10 MCI DATA SHEET

Project Name:
Joshua Newnam
Property address:
141 Little Br Dr, Lillington, NC 27546

Wiring Solutions Plus LLC
Address:
4724 Hargrove Rd, Raleigh, NC 27616
Phone Number:
984-200-7489
E-Mail.
wiringsolutionsoffice@gmail.com
License Number:
25181-L

Date: *08/21/2025*

Backup Switch

—

The Tesla Backup Switch controls connection to the grid in a Powerwall system, and can be easily installed behind the utility meter or in a standalone meter panel downstream of the utility meter.
The Backup Switch automatically detects grid outages, providing a seamless transition to backup power. It communicates directly with Powerwall, allowing home energy usage monitoring from any mobile device with the Tesla app.

Performance Specifications

Model Number	1624171-xx-y
Continuous Load Rating	200 A, 120/240 V split phase
Maximum Supply Short Circuit Current	22 kA with breaker[17]
Communication	CAN
AC Meter	+/- 0.5%
Expected Service Life	21 years
Warranty	10 years

[17] Breaker maximum supply short circuit current rating must be equal to or greater than the available fault current.

Environmental Specifications

Operating Temperature	–40°C to 50°C (–40°F to 122°F)
Storage Temperature	–40°C to 85°C (–40°F to 185°F)
Enclosure Rating	NEMA 3R
Pollution Rating	PD3

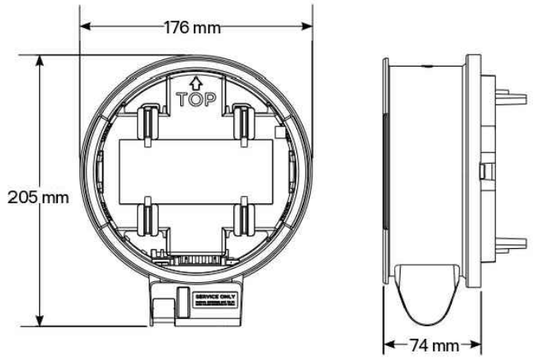
Compliance Information

Safety Standards	USA: UL 414, UL 414 SB, UL 2735, UL 916, CA Prop 65
Emissions	FCC Part 15, Class B, ICES 003

Mechanical Specifications

Dimensions	176 x 205 x 74 mm (6.9 x 8.1 x 2.9 in)
Weight	2.8 lb
Meter and Socket Compatibility	ANSI Type 2S, ringless or ring type
External Service Interface	Contactor manual override[18] Reset button
Conduit Compatibility	1/2-inch NPT

[18] Manually overrides the contactor position during a service event.



11 **BACKUP SWITCH DATA SHEET**

Project Name:
Joshua Newnam
Property address:
141 Little Br Dr, Lillington, NC 27546

Wiring Solutions Plus LLC
Address:
4724 Hargrove Rd, Raleigh, NC 27616
Phone Number:
984-200-7489
E-Mail.
wiringsolutionsoffice@gmail.com
License Number:
25181-L

Date: ***08/21/2025***

Product	Powerwall
Last Revised	November 10, 2023
Revision	1

TESLA

SETTING SITE EXPORT LIMITS FOR POWERWALL SYSTEMS

Power Control Systems (PCS): Site Export Limit

Tesla systems listed to UL 1741 PCS can limit the AC output power (AC kW) through the Site Export Limit setting within the PCS software. This feature is used when there is a utility-imposed limit on how much power a site is allowed to export. It can also be used when there is an existing infrastructure limitation (e.g., small service feeder). A Site Export Limit has been set on the following customer site:

Site Export Limit	12 W
Customer Name	Joyce Robinson
Customer Address	1408 Woodgreen Drive, Greensboro, NC 27405

Tesla Products Listed to UL 1741 PCS

The following products, and their associated model number(s), have been certified to the standards in UL 1741 PCS and have the Site Export Limit function. The unit(s) installed on the customer site listed above are indicated by checked boxes next to the appropriate model number(s).

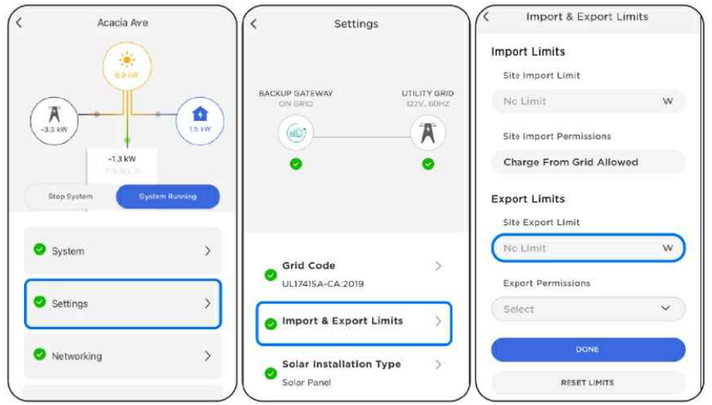
Tesla Product	Model Number(s)	Site Controller Location	Nationally Recognized Testing Laboratory (NRTL) Test Report
Powerwall 2	☐ 1092170-xx-y ☐ 2012170-xx-y ☐ 3012170-xx-y	Gateway 2 or integrated in Powerwall+ solar assembly (when installed in conjunction with Powerwall+)	Intertek: 104267560CRT-001 Intertek: 103879962CRT-003
Powerwall+	☐ 1850000-xx-y	Gateway 2 or integrated in Powerwall+ solar assembly	TÜVRheinland: 32195439.001
Powerwall 3	☑ 1707000-xx-y	Integrated in Powerwall 3	TÜVRheinland: US23U76C.003

Setting the Export Limit and Access Protection

The Site Export Limit is set at the time of installation by qualified personnel. In compliance with Article 750.30(C)(3)(5) of the 2023 National Electric Code, it is password protected. To set a Site Export Limit:

1. Open the Tesla Pros app and launch the **Commissioning** experience from the main menu. Follow the prompts to connect to the system.
2. Select **Settings** from the landing page.
3. Select **Import & Export Limits**.

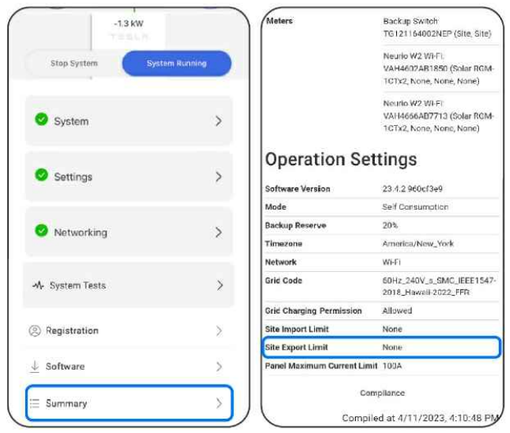
4. Enter the **Site Export Limit** and select **Done**.



Site Export Limit Setting Verification

Settings should be verified by the utility or AHJ after the system has been installed and commissioned. Verification of settings can be accomplished by viewing the site's Setup App *Summary* page, included with the *PCS Settings Application* document. To verify the setting:

1. Follow the steps above to launch Tesla Pros and connect to the system.
2. Select **Summary** from the landing page.
3. View the **Site Export Limit** in the *Operation Settings* section.



Tesla Product Safety Compliance

codecompliance@tesla.com

12 CURTAILMENT LETTER

Project Name:
Joshua Newnam
Property address:
141 Little Br Dr, Lillington, NC 27546

Wiring Solutions Plus LLC
Address:
4724 Hargrove Rd, Raleigh, NC 27616
Phone Number:
984-200-7489
E-Mail.
wiringsolutionsoffice@gmail.com
License Number:
25181-L

Date: ***08/21/2025***