WYSSLING CONSULTING
CORPORATE EXPERIENCE WITH SMALL BUSINESS VALUE

Scott E. Wyssling, PE
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May 28, 2024

EnergyOne Renewables
1333 North-West Vivion Road, Suite 101
Kansas City, MO, 64118

Re: Engineering Services
Smith Residence
413 SE Mill Creek Circle, Lee's Summit, MO
11.070 kW System

To Whom It May Concern:

We have received information regarding solar panel installation on the roof of the above referenced structure. Our evaluation of the structure is to verify the existing capacity of the roof system and its ability to support the additional loads imposed by the proposed solar system.

A. Site Assessment Information

1. Site visit documentation identifying attic information including size and spacing of framing for the existing roof structure.
2. Design drawings of the proposed system including a site plan, roof plan and connection details for the solar panels. This information will be utilized for approval and construction of the proposed system.

B. Description of Structure:

Roof Framing:	Prefabricated wood trusses at 24" on center. All truss members are constructed of 2x4 dimensional lumber.
Roof Material:	Composite Asphalt Shingles
Roof Slope:	34 degrees
Attic Access:	Accessible
Foundation:	Permanent

C. Loading Criteria Used

- **Dead Load**
  - Existing Roofing and framing = 7 psf
  - New Solar Panels and Racking = 3 psf
  - TOTAL = 10 PSF
- **Live Load** = 20 psf (reducible) – 0 psf at locations of solar panels
- **Ground Snow Load** = 20 psf
- **Wind Load** based on ASCE 7-16
  - Ultimate Wind Speed = 109 mph (based on Risk Category II)
  - Exposure Category C

Analysis performed of the existing roof structure utilizing the above loading criteria is in accordance with the 2018 International Residential Code, including provisions allowing existing structures to not require strengthening if the new loads do not exceed existing design loads by 105% for gravity elements and 110% for seismic elements. This analysis indicates that the existing framing will support the additional panel loading without damage, if installed correctly.

D. Solar Panel Anchorage

1. The solar panels shall be mounted in accordance with the most recent Sunmodo installation manual. If during solar panel installation, the roof framing members appear unstable or deflect non-uniformly, our office should be notified before proceeding with the installation.
2. The maximum allowable withdrawal for a ¼" wood screw in ½" plywood is 55 lbs per screw (per APA technical note E830d). Connection on the roof is utilizing four (4) ¼" wood screws into the existing decking to resist uplift forces. Contractor to verify installation to be performed in accordance with the manufacturer's recommendations. Based on four (4) ¼" wood screws into ½" plywood, 220 lbs of uplift resistance is provided per attachment.
3. Considering the wind speed, roof slopes, size and spacing of framing members, and condition of the roof, the panel supports shall be placed no greater than 48" on center.

Based on the above evaluation, this office certifies that with the racking and mounting specified, the existing roof system will adequately support the additional loading imposed by the solar system. This evaluation is in conformance with the 2018 IRC, current industry standards, and is based on information supplied to us at the time of this report.

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

Very truly yours,

Scott E. Wyssling, PE
Missouri License No. 2019011786
Missouri COA 2020037943

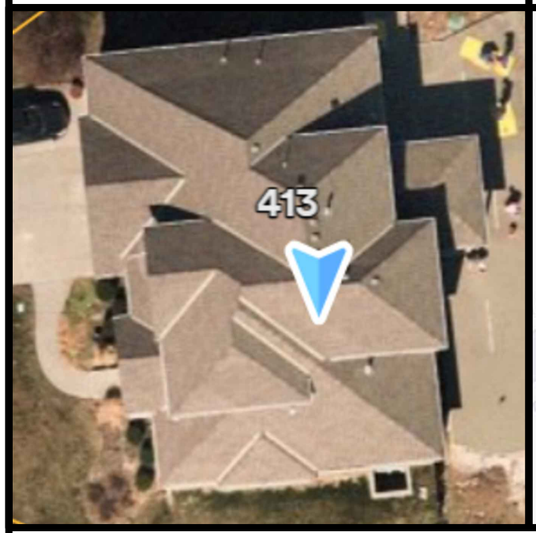
Signed 5/28/2024

NEW PV ROOFTOP SYSTEM DESIGN

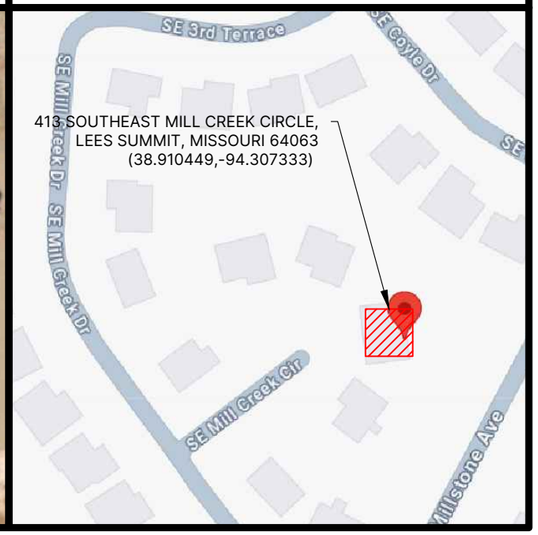
27 MODULES - 11.070 KW DC & 9.600 KW AC SYSTEM SIZE

DEREK AND ASHLEY SMITH RESIDENCE - 413 SOUTHEAST MILL CREEK CIRCLE, LEES SUMMIT, MISSOURI 64063

AERIAL MAP



VICINITY MAP



SHEET INDEX

REVISIONS		
NO.	DATE	COMMENTS
1		
2		

SCOPE OF WORK

INSTALL 11.070 KW DC ROOF MOUNTED
PV SYSTEM UTILIZING
(27) MSOLAR TXI10-410108BB
(15) AP SYSTEMS DS3-S
(1) AC COMBINER PANEL
(1) 60A FUSED UTILITY AC DISCONNECT
SUNMODO SMRAIL100 RACKING WITH
(104) SUNMODO NANOMOUNT MOUNTS
EXISTING 200 A BUSBAR WITH 200 A MAIN BREAKER
INTERCONNECTION METHOD: SUPPLY SIDE TAP
ROOF TYPE: COMP SHINGLE
NUMBER OF STORIES: 2

CONTRACTOR

ENERGYONE RENEWABLES
1333 NW VIVION ROAD SUITE 101
KANSAS CITY, MO 64118

CODE REFERENCE

AHJ: LEES SUMMIT

2017 NATIONAL ELECTRIC CODE (NEC)
2018 INTERNATIONAL BUILDING CODE
2018 INTERNATIONAL RESIDENTIAL CODE

Andrea Sessler
Digitally signed by Andrea Sessler
DN: CN=Andrea Sessler, OU=Development, OU=LS Users, DC=COLS, DC=LOC
Date: 2024.06.06 16:26:05-05'00'

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DESIGN CRITERIA

ASCE 7-16 WIND SPEED: 109 MPH
EXPOSURE CATEGORY C
GROUND SNOW LOAD: 20 PSF

GENERAL NOTES

1. CONTRACTOR SHALL FIELD VERIFY ALL DIMENSIONS AND REVIEW ALL MANUFACTURER INSTALLATION DOCUMENTS PRIOR TO INITIATING CONSTRUCTION.
2. ALL COMPONENTS SHALL BE NEW AND LISTED BY A RECOGNIZED ELECTRICAL TESTING LABORATORY AND LISTED FOR THEIR SPECIFIC APPLICATION.
3. OUTDOOR EQUIPMENT SHALL BE NEMA 3R RATED OR BETTER.
4. ACCESS TO ELECTRICAL COMPONENTS OVER 150 VOLTS TO GROUND SHALL BE RESTRICTED TO QUALIFIED PERSONNEL.
5. 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.
6. EACH MODULE TO BE GROUNDED USING THE SUPPLIED CONNECTION POINT PER THE MANUFACTURER'S REQUIREMENTS. ALL PV MODULES, EQUIPMENT, AND METALLIC COMPONENTS ARE TO BE BONDED. IF THE EXISTING GROUNDING ELECTRODE SYSTEM CANNOT BE VERIFIED OR IS ONLY METALLIC WATER PIPING, IT IS THE CONTRACTOR'S RESPONSIBILITY TO INSTALL A SUPPLEMENTAL GROUNDING ELECTRODE.
7. DC CONDUCTORS SHALL BE RUN IN EMT AND/OR MC (METAL CLAD CABLE) AND SHALL BE LABELED. ALL DC CONDUCTORS RUN INSIDE OF THE STRUCTURE SHALL BE INSTALLED A MINIMUM OF 18" BELOW THE ROOF DECK.
8. EXPOSED NON-CURRENT CARRYING METAL PARTS OF ELECTRICAL EQUIPMENT SHALL BE GROUNDED IN ACCORDANCE WITH APPLICABLE NEC.
9. CONFIRM LINE SIDE VOLTAGE AT THE ELECTRIC UTILITY SERVICE PRIOR TO CONNECTING INVERTER. VERIFY SERVICE VOLTAGE IS WITHIN INVERTER VOLTAGE OPERATIONAL RANGE.
10. ELECTRICAL CONTRACTOR TO PROVIDE CONDUIT EXPANSION JOINTS AND ANCHOR CONDUIT RUNS AS REQUIRED PER CODE.
11. ALL WIRING MUST BE PROPERLY SUPPORTED BY DEVICES OR MECHANICAL MEANS DESIGNED AND LISTED FOR SUCH USE, AND FOR ROOF-MOUNTED SYSTEMS, WIRING MUST BE PERMANENTLY AND COMPLETELY HELD OFF OF THE ROOF SURFACE.
12. ALL ROOF PENETRATIONS MUST BE SEALED OR FLASHED.
13. EQUIPMENT MAY BE SUBSTITUTED FOR SIMILAR EQUIPMENT BASED ON AVAILABILITY. SUBSTITUTED EQUIPMENT SHALL COMPLY WITH DESIGN CRITERIA.
14. 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.
15. WHENEVER A DISCREPANCY IN THE 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 ENGINEERS.

ENGINEERED PLANS COMPLETED BY ENGINEERS IN THE USA

DESIGN ENGINEER
WYSSLING CONSULTING
CORPORATE EXPERIENCE WITH SMALL BUSINESS VALUE
76 N. MEADOWBROOK DRIVE
ALPINE, UTAH 84004
swyssling@wysslingconsulting.com
(201) 874-3483
MISSOURI COA NO. 2020037943

SOLAR COMPANY/CLIENT
EnergyONE Renewables

ENERGYONE RENEWABLES
1333 NW VIVION ROAD SUITE 101
KANSAS CITY, MO 64118

SMITH, DEREK AND ASHLEY
413 SOUTHEAST MILL CREEK CIRCLE
LEES SUMMIT, MO 64063

COVER SHEET

STATE OF MISSOURI
SCOTT E WYSSLING
NUMBER PE-2019011786
PROFESSIONAL ENGINEER

Signed 5/28/2024

SCOTT E. WYSSLING, P.E.
MISSOURI LICENSE NO. 2019011786

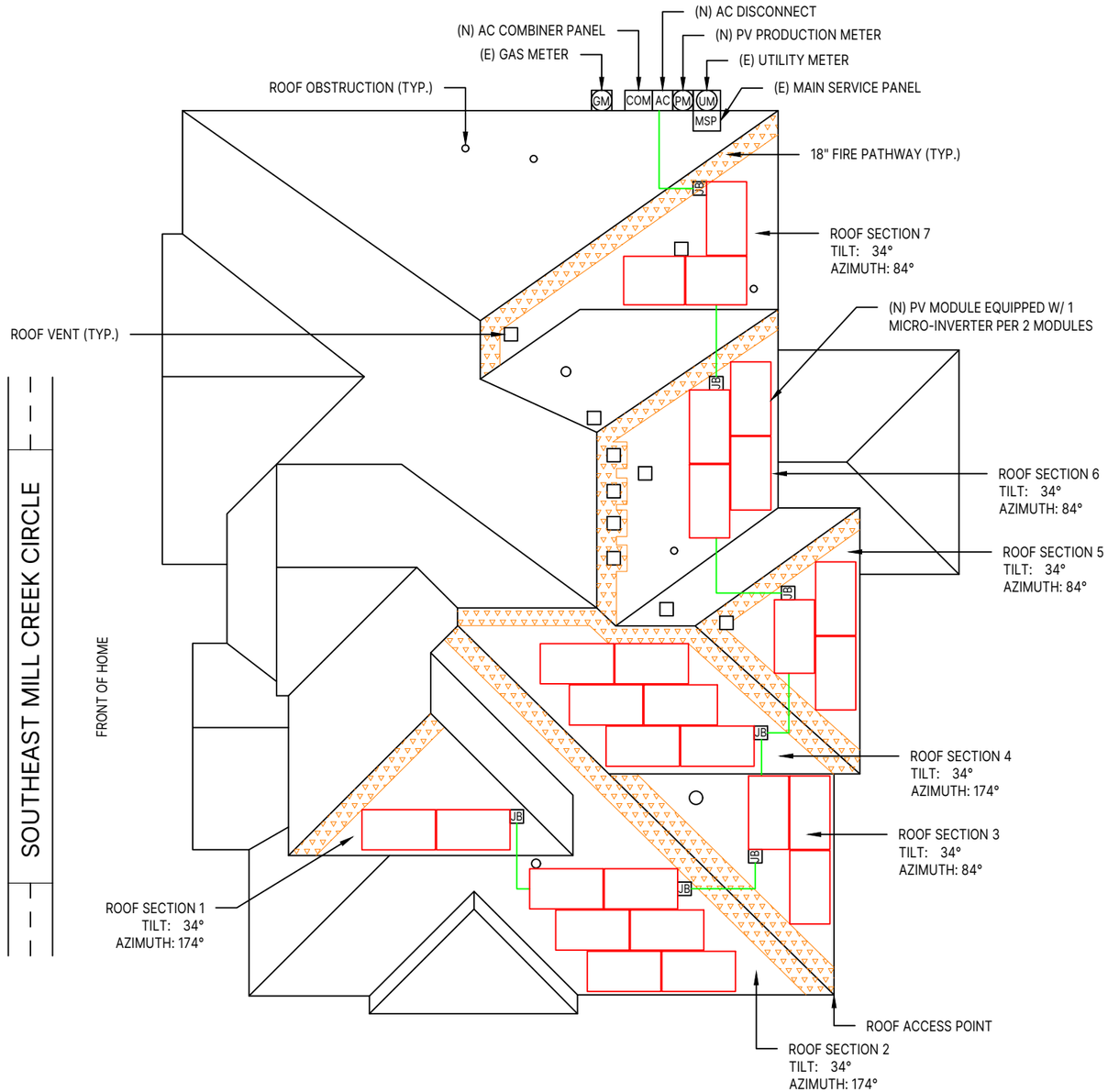
DATE:	5/28/2024
DRAWN BY:	BSR
REVIEWED BY:	EJD

PV-1

SITE PLAN LEGEND

UTILITY METER	UM
MAIN SERVICE PANEL	MSP
GAS METER	GM
AC DISCONNECT	AC
DC DISCONNECT	DC
AC COMBINER PANEL	COM
INVERTER	INV
LOAD CENTER	LC
IQ SYSTEM CONTROLLER	IQ
BACKUP INTERFACE	BI
BATTERY	B
PRODUCTION METER	PM
SUBPANEL	SUB
JUNCTION BOX	JB
FIRE PATHWAY	
SATELLITE DISH	
PROPERTY LINE	
ATTIC RUN CONDUIT	
EXTERNAL CONDUIT	
CHIMNEY	
ROOF OBSTRUCTION (TYP.)	
ROOF VENT (TYP.)	

UTILITY: KCPL



MODULE SPEC AND ROOF INFO:

PV MODULE TYPE - MSOLAR TXI10-410108BB (410W)
SOLAR AREA - 567.52 SQ FT
ROOF AREA - 3482.54 SQ FT

ROOF COVERAGE - 16.30%

SITE PLAN NOTES:

1. VERIFY ALL OBSTRUCTIONS AND DIMENSIONS IN THE FIELD.
2. PROVIDE RAIL SPLICES AS REQUIRED BY MANUFACTURER'S GUIDELINES.
3. NO SIGNIFICANT SHADING WILL RESULT FROM EXISTING ROOF OBSTRUCTIONS.
4. PV MODULES CANNOT BE INSTALLED OVER OR BLOCK ATTIC, PLUMBING, FURNACE OR WATER HEATER VENTS
5. AC DISCONNECT SHALL BE VISIBLE-OPEN TYPE, LOCKABLE AND READILY ACCESSIBLE. TO BE WITHIN 10' OF THE UTILITY METER
6. 3/4" OR GREATER CONDUIT RUN (7/8" ABOVE ROOF SURFACE)
7. ROOF ACCESS POINTS SHALL BE LOCATED IN AREAS THAT DO NOT REQUIRE THE PLACEMENT OF GROUND LADDERS OVER OPENINGS SUCH AS WINDOWS OR DOORS, AND LOCATED AT STRONG POINTS OF BUILDING CONSTRUCTION IN LOCATIONS WHERE THE ACCESS POINT DOES NOT CONFLICT WITH OVERHEAD OBSTRUCTIONS SUCH AS TREE LIMBS, WIRES OR SIGNS.

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

ENGINEERED PLANS COMPLETED BY ENGINEERS IN THE USA

DESIGN ENGINEER

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CORPORATE EXPERIENCE WITH SMALL BUSINESS VALUE

76 N. MEADOWBROOK DRIVE
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(201) 874-3483

MISSOURI COA NO. 2020037943

SOLAR COMPANY/CLIENT

EnergyONE Renewables

ENERGYONE RENEWABLES
1333 NW VIVION ROAD SUITE 101
KANSAS CITY, MO 64118

SMITH, DEREK AND ASHLEY
413 SOUTHEAST MILL CREEK CIRCLE
LEES SUMMIT, MO 64063

SITE PLAN

STATE OF MISSOURI
SCOTT E WYSSLING
NUMBER PE-2019011786
PROFESSIONAL ENGINEER

Signed 5/28/2024

SCOTT E. WYSSLING, P.E.
MISSOURI LICENSE NO. 2019011786

DATE: 5/28/2024

PV-2

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MOUNTING PLAN LEGEND

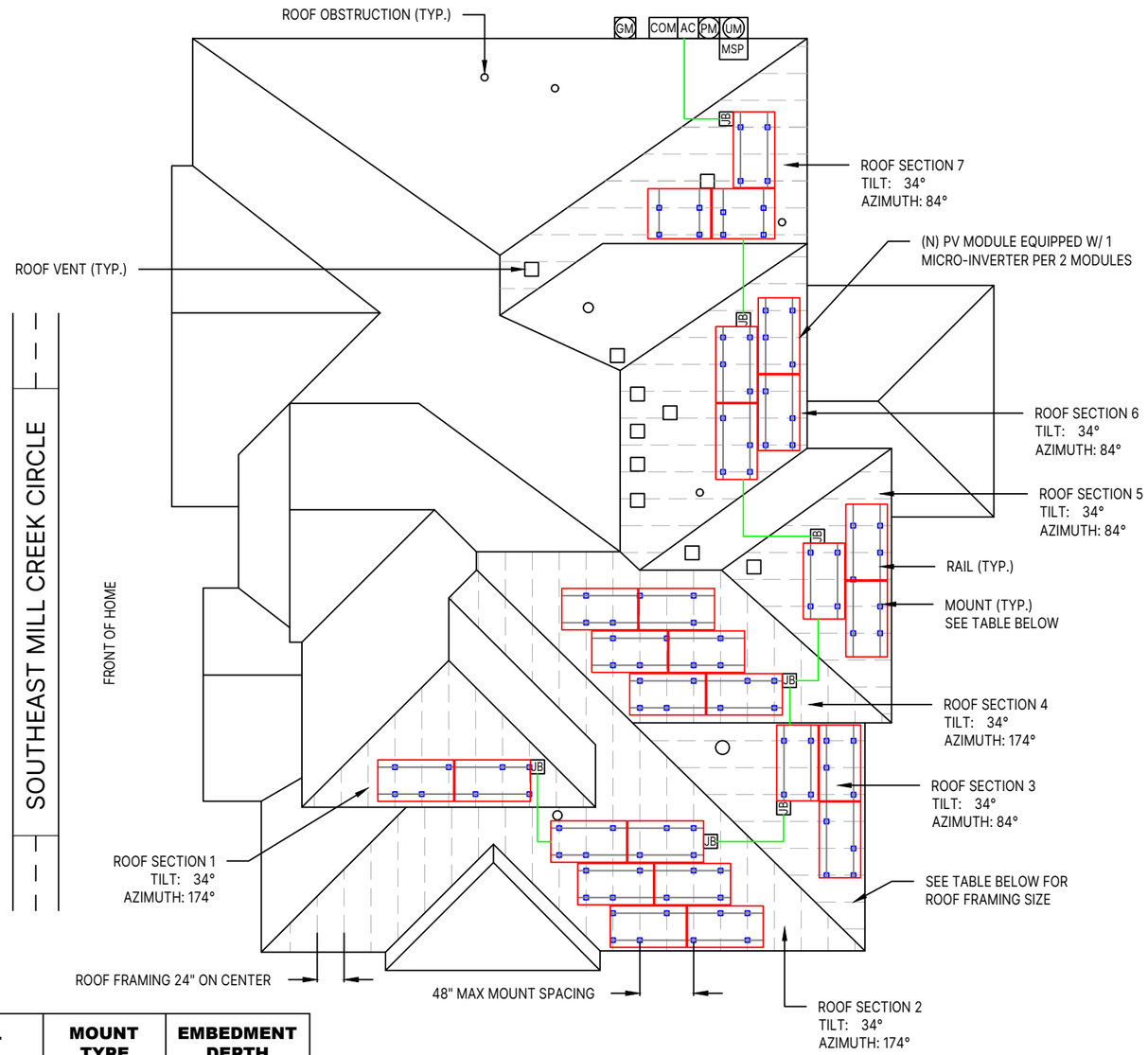
UTILITY METER	UM
MAIN SERVICE PANEL	MSP
GAS METER	GM
AC DISCONNECT	AC
DC DISCONNECT	DC
AC COMBINER PANEL	COM
INVERTER	INV
LOAD CENTER	LC
IQ SYSTEM CONTROLLER	IQ
BACKUP INTERFACE	BI
BATTERY	B
PRODUCTION METER	PM
SUBPANEL	SUB
JUNCTION BOX	JB
SATELLITE DISH	
PROPERTY LINE	
ATTIC RUN CONDUIT	
EXTERNAL CONDUIT	
RAIL	
MOUNT	
ROOF FRAMING	
METAL SEAMS	
CHIMNEY	
ROOF OBSTRUCTION (TYP.)	
ROOF VENT (TYP.)	

CANTILEVER NOTES:

1. CANTILEVER (OVERHANG) LENGTHS CAN BE UP TO 33% OF THE SPAN LENGTH.
2. THE CANTILEVER IS DEFINED AS THE DISTANCE FROM THE CENTER OF THE MOUNT TO THE EDGE OF THE RAIL

MOUNTING PLAN NOTES:

1. VERIFY ALL OBSTRUCTIONS AND DIMENSIONS IN THE FIELD.
2. PROVIDE RAIL SPLICES AS REQUIRED BY MANUFACTURER'S GUIDELINES.
3. NO SIGNIFICANT SHADING WILL RESULT FROM EXISTING ROOF OBSTRUCTIONS.
4. PV MODULES CANNOT BE INSTALLED OVER OR BLOCK ATTIC, PLUMBING, FURNACE OR WATER HEATER VENTS
5. ACTUAL ROOF CONDITIONS AND ROOF FRAMING (OR SEAM)LOCATIONS MAY VARY. INSTALL PER MANUFACTURER(S)INSTALLATION GUIDELINES AND ENGINEERED SPANS FOR ATTACHMENTS



	ROOF FRAMING	FRAMING SPACING	ROOF TYPE	MAX MOUNT SPACING	MOUNT	MOUNT TYPE	EMBEDMENT DEPTH
ROOF SECTION 1	2X4 - TRUSSES	24"	COMP SHINGLE	48"	SUNMODO NANOMOUNT	DECK MOUNT	1/2"
ROOF SECTION 2	2X4 - TRUSSES	24"	COMP SHINGLE	48"	SUNMODO NANOMOUNT	DECK MOUNT	1/2"
ROOF SECTION 3	2X4 - TRUSSES	24"	COMP SHINGLE	48"	SUNMODO NANOMOUNT	DECK MOUNT	1/2"
ROOF SECTION 4	2X4 - TRUSSES	24"	COMP SHINGLE	48"	SUNMODO NANOMOUNT	DECK MOUNT	1/2"
ROOF SECTION 5	2X4 - TRUSSES	24"	COMP SHINGLE	48"	SUNMODO NANOMOUNT	DECK MOUNT	1/2"
ROOF SECTION 6	2X4 - TRUSSES	24"	COMP SHINGLE	48"	SUNMODO NANOMOUNT	DECK MOUNT	1/2"
ROOF SECTION 7	2X4 - TRUSSES	24"	COMP SHINGLE	48"	SUNMODO NANOMOUNT	DECK MOUNT	1/2"

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

ENGINEERED PLANS COMPLETED BY ENGINEERS IN THE USA

DESIGN ENGINEER

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MISSOURI COA NO. 2020037943

SOLAR COMPANY/CLIENT

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KANSAS CITY, MO 64118

SMITH, DEREK AND ASHLEY
413 SOUTHEAST MILL CREEK CIRCLE
LEES SUMMIT, MO 64063

MOUNTING PLAN

STATE OF MISSOURI
SCOTT E. WYSSLING
NUMBER PE-2019011786
PROFESSIONAL ENGINEER

Signed 5/28/2024

SCOTT E. WYSSLING, P.E.
MISSOURI LICENSE NO. 2019011786

DATE: 5/28/2024

PV-3

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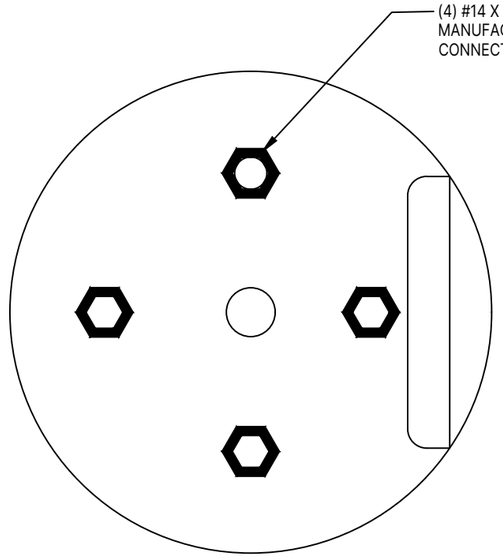
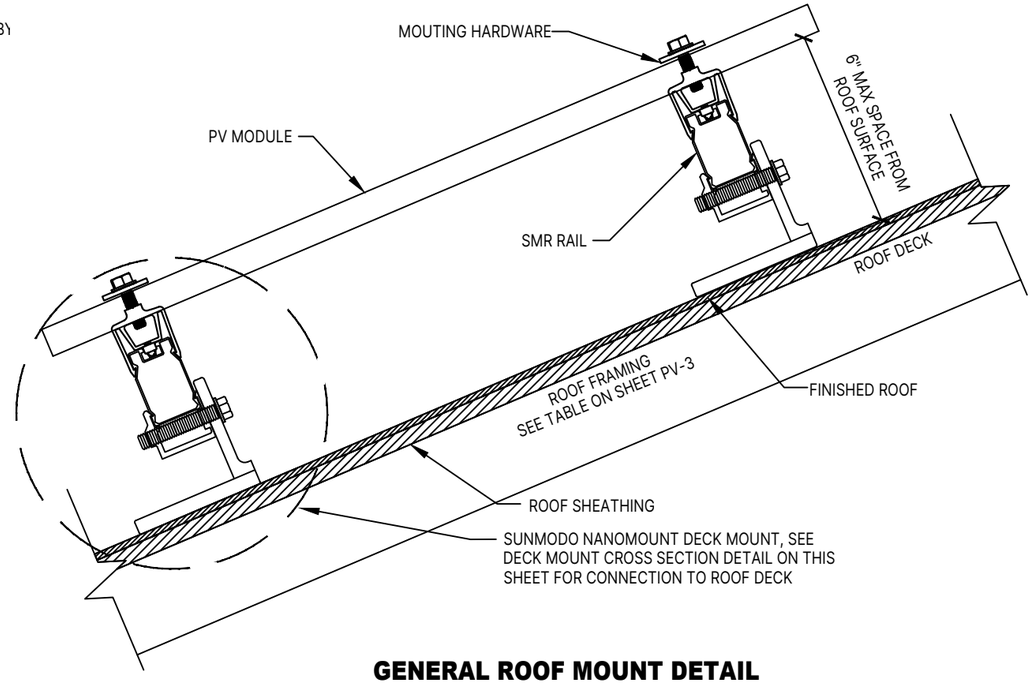


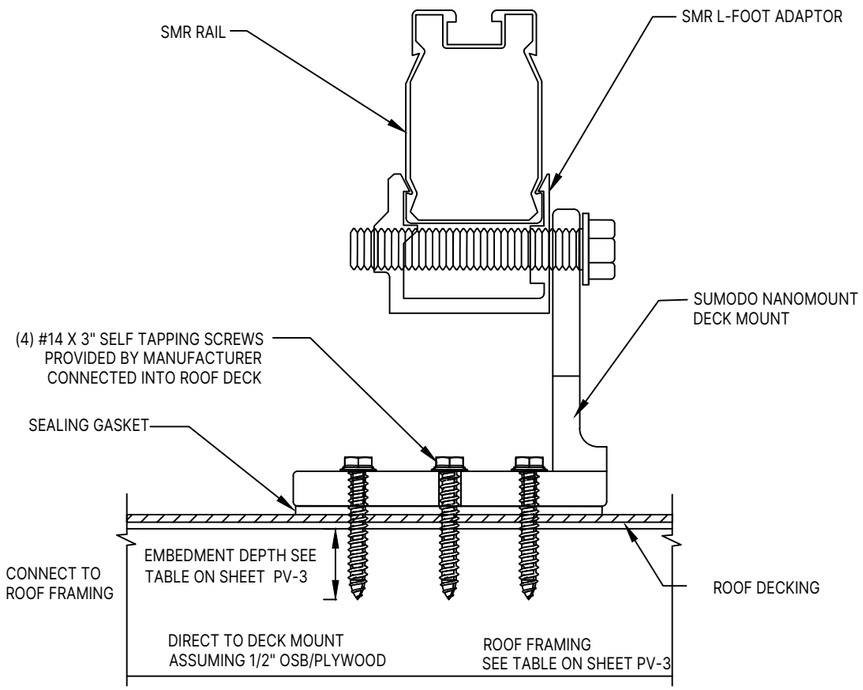
DECK MOUNT PLAN VIEW DETAIL

NTS



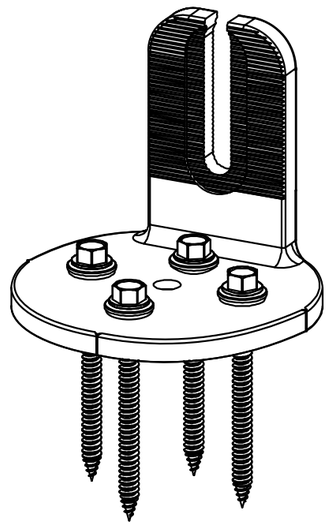
GENERAL ROOF MOUNT DETAIL

NTS



DECK MOUNT CROSS SECTION DETAIL

NTS



DECK MOUNT

NTS

MOUNT INSTALLATION NOTES

1. CONTRACTOR IS TO FOLLOW THE PLAN FOR INSTALLING ROOF MOUNTS.
2. IF THE CONTRACTOR IDENTIFIES THE ROOF FRAMING IS DIFFERENT FROM WHAT IS IDENTIFIED ON THIS PLAN, CONTRACTOR SHALL NOTIFY THE ENGINEER BEFORE PROCEEDING WITH INSTALLATION.
3. CONTRACTOR TO FOLLOW MANUFACTURERS SPECIFICATIONS FOR INSTALLATION AND REQUIRED SCREWS.

ENGINEERED PLANS COMPLETED BY ENGINEERS IN THE USA

DESIGN ENGINEER

WYSSLING CONSULTING
CORPORATE EXPERIENCE WITH SMALL BUSINESS VALUE

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SMITH, DEREK AND ASHLEY
413 SOUTHEAST MILL CREEK CIRCLE
LEES SUMMIT, MO 64063

STRUCTURAL DETAILS

STATE OF MISSOURI
SCOTT E WYSSLING
NUMBER PE-2019011786
PROFESSIONAL ENGINEER

Signed 5/28/2024

SCOTT E. WYSSLING, P.E.

MISSOURI LICENSE NO. 2019011786

DATE: 5/28/2024

S-1

RELEASE FOR CONSTRUCTION
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CONDUCTOR SCHEDULE

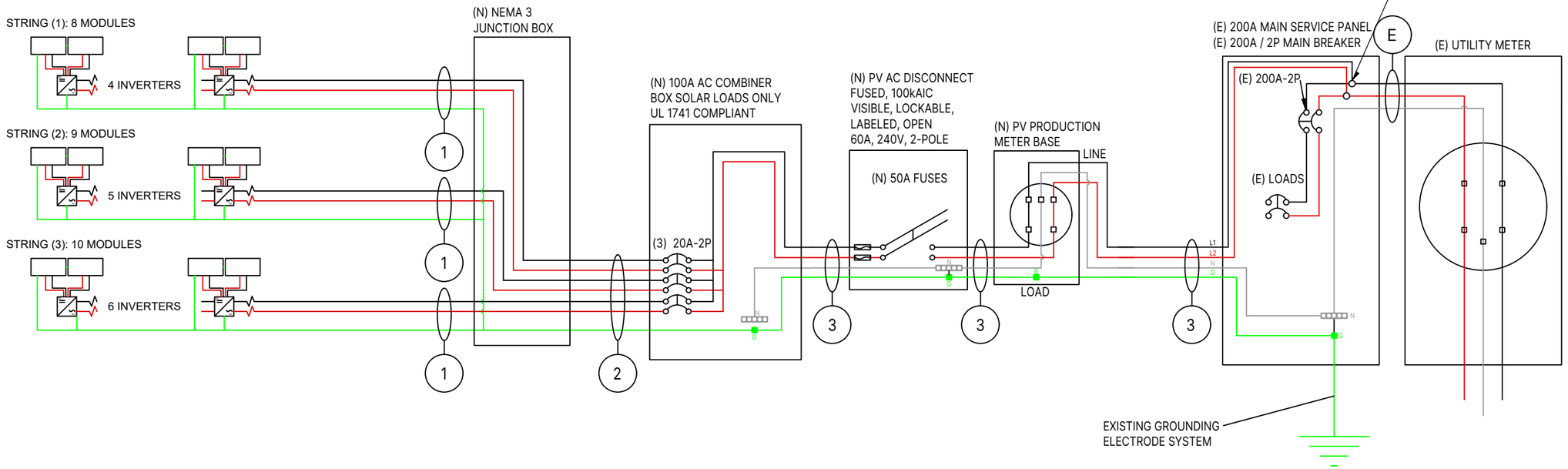
	CONDUCTORS				GROUND		CONDUIT
TAG ID	WIRES IN CONDUIT	WIRE AWG	TYPE, MATERIAL	AMPACITY	SIZE	TYPE, MATERIAL	
1	3	#12 AWG	Q CABLE	20	#6 AWG	BARE, CU	
2	7	#10 AWG	THWN-2, CU	30	#8 AWG	THHW, CU	3/4" CONDUIT
3	4	#6 AWG	THWN-2, CU	65	#8 AWG	THHW, CU	3/4" CONDUIT

CONDUCTOR NOTES

1. ALL TERMINATIONS AND CONDUCTORS RATED FOR 75°C MINIMUM. 110.14(C)(1)(a)(3).

INTERCONNECTION CALCULATIONS

ITEM	UNIT	PANEL
BUS RATING	AMPS	200A
MAIN OCPD	AMPS	200A
ALLOWED PV PER NEC	AMPS	40A



GENERAL NOTES

1. AC DISCONNECT SHALL BE VISIBLE-OPEN TYPE, LOCKABLE AND READILY ACCESSIBLE. TO BE WITHIN 10' OF THE UTILITY METER
2. GROUNDING WIRE SIZED PER 250.66. RAN TO EXISTING GROUNDING ROD AND CONNECTED VIA GROUNDING ELECTRODE CONDUCTOR TAP
3. SUPPLEMENTAL ELECTRODE AND #6 CU GEC TO BE IRREVERSIBLY CRIMPED TO EXISTING GEC

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SMITH, DEREK AND ASHLEY
413 SOUTHEAST MILL CREEK CIRCLE
LEES SUMMIT, MO 64063

ELECTRICAL DIAGRAM

DATE: 5/28/2024

E-1

CONDUCTOR CALCULATIONS

TAG 1 (SEE E-1)	TAG 2 (SEE E-1)	TAG 3 (SEE E-1)
UNDER MODULES, NOT IN CONDUIT	#10 AWG MAX CURRENT = 30A	#6 AWG MAX CURRENT = 65A
#12 AWG MAX CURRENT = 20A		
		39.9* 1.25 (SAFETY FACTOR) = 49.87A
10.64 A FOR CIRCUIT 1	10.64 A FOR CIRCUIT 1	RECOMMENDED OCPD = 50
13.3 A FOR CIRCUIT 2	13.3 A FOR CIRCUIT 2	
15.96 A FOR CIRCUIT 3	15.96 A FOR CIRCUIT 3	

EQUIPMENT INFORMATION

MODULE	
MANUFACTURER/ MODEL	MSOLAR TXI10-410108BB
PMAX	410 W
VOC	37.32 V
VMP	31.45 V
IMP	13.04 A
ISC	13.95 A
TEMPERATURE COOEFFICIENT OF PMAX	-0.35 %/°C
TEMPERATURE COEFFICIENT OF VOC	-0.275 %/°C

INVERTER	
MANUFACTURER/ MODEL	AP SYSTEMS DS3-S
MAX AC OUTPUT	2.66 A
AC OUTPUT VOLTAGE	240 V
MAX DC INPUT VOLTAGE	60 V
MAX INPUT CURRENT	16 A
WEIGHTED CEC EFFICIENCY	97.00%
INVERTER WATTAGE	640 W

ENGINEERED PLANS COMPLETED BY ENGINEERS IN THE USA 🇺🇸

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EQUIPMENT INFORMATION

DATE: 5/28/2024

E-2

⚠ WARNING

ELECTRIC SHOCK HAZARD

THE DC CONDUCTORS OF THIS PHOTOVOLTAIC SYSTEM ARE UNGROUNDED AND MAY BE ENERGIZED

AT EACH JUNCTION BOX, COMBINER BOX, DISCONNECT AND DEVICE WHERE ENERGIZED UNGROUNDED CONDUCTORS MAY BE EXPOSED DURING SERVICE [NEC. 690.35(F)]

⚠ WARNING

ELECTRIC SHOCK HAZARD

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

FOR PV DISCONNECTING MEANS WHERE ALL TERMINALS OF THE DISCONNECTING MEANS MAY BE ENERGIZED IN THE OPEN POSITION.
NEC 690.17(E), NEC 705.22

PHOTOVOLTAIC SYSTEM ⚠ AC DISCONNECT ⚠

RATED AC OUTPUT CURRENT	39.9 A
NOMINAL OPERATING AC VOLTAGE	240 V

AT POINT OF INTERCONNECTION, MARKED AT AC DISCONNECT MEANS NEC 690.54, NEC 690.13(B)

⚠ WARNING

DUAL POWER SUPPLY

SOURCES: UTILITY GRID AND PV SOLAR ELECTRIC SYSTEM

AT POINT OF INTERCONNECTION FOR EQUIPMENT CONTAINING OVERCURRENT DEVICES IN CIRCUTS SUPPLYING POWER TO A BUSBAR OR CONDUCTOR SUPPLIED FROM MULTIPLE SOURCES, EACH SERVICE EQUIPMENT AND ALL ELECTRIC POWER PRODUCTION SOURCE LOCATIONS. NEC 705.12(B)(2)(3)

WARNING: PHOTOVOLTAIC POWER SOURCE

AT DIRECT-CURRENT EXPOSED RACEWAYS, CABLE TRAYS, COVERS AND ENCLOSURES OF JUNCTION BOXES, AND OTHER WIRING METHODS; SPACED AT MAXIMUM 10FT SECTION OR WHERE SEPARATED BY ENCLOSURES, WALLS, PARTITIONS, CEILINGS, OR FLOORS.NEC 690.31(G)(3&4)

⚠ WARNING

PHOTOVOLTAIC SYSTEM COMBINER PANEL

DO NOT ADD LOADS

AT AC COMBINER PANEL. NEC 690.13(B)

PHOTOVOLTAIC SYSTEM EQUIPPED WITH RAPID SHUTDOWN

SIGN LOCATED AT UTILITY SERVICE EQUIPMENT.
NEC 690.56(C)

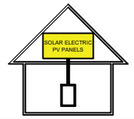
⚠ WARNING

THIS EQUIPMENT FED BY MULTIPLE SOURCES. TOTAL RATING OF ALL OVERCURRENT DEVICES, EXCLUDING MAIN SUPPLY OVERCURRENT DEVICE, SHALL NOT EXCEED AMPACITY OF BUSBAR

SIGN LOCATED AT LOAD CENTER IF CONTAINING 3 OR MORE POWER SOURCES.
NEC 705.12(B)(2)(3)(C)

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



FOR PV SYSTEMS THAT SHUT DOWN THE ARRAY AND CONDUCTORS LEAVING THE ARRAY: THE TITLE "SOLAR PV SYSTEM IS EQUIPPED WITH RAPID SHUTDOWN" SHALL UTILIZE CAPITALIZED CHARACTERS WITH A MINIMUM HEIGHT OF 3/8 INCHES IN BLACK ON YELLOW BACKGROUND, AND THE REMAINING CHARACTERS SHALL BE CAPITALIZED WITH A MINIMUM HEIGHT OF 3/16" INCHES IN BLACK ON WHITE BACKGROUND

RAPID SHUTDOWN SWITCH FOR SOLAR PV SYSTEM

NEXT TO RAPID SHUTDOWN DISCONNECT FOR SYSTEM. NEC 690.56(C)(3)

PHOTOVOLTAIC AC DISCONNECT

MAXIMUM AC OPERATING CURRENT:	39.9
NOMINAL OPERATING AC VOLTAGE:	240

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

⚠ WARNING

INVERTER OUTPUT CONNECTION: DO NOT RELOCATE THIS OVERCURRENT DEVICE

PLACED ADJACENT TO THE BACK-FED BREAKER FROM THE INVERTER IF TIE IN CONSISTS OF LOAD SIDE CONNECTION TO BUSBAR.
NEC 705.12(B)(2)(3)(b)

CAUTION: DO NOT INSTALL ADDITIONAL LOADS IN THIS PANEL

PLACE LABEL AT MAIN SERVICE PANEL

⚠ WARNING

THIS EQUIPMENT FED BY MULTIPLE SOURCES. TOTAL RATING OF ALL OVERCURRENT DEVICES, EXCLUDING MAIN SUPPLY OVERCURRENT DEVICE, SHALL NOT EXCEED AMPACITY OF BUSBAR.

PLACE LABEL AT MAIN SERVICE PANEL

LABELING NOTES:

1. LABELS CALLED OUT ACCORDING TO ALL COMMON CONFIGURATIONS. ELECTRICIAN TO DETERMINE EXACT REQUIREMENTS IN THE FIELD PER CURRENT NEC AND LOCAL CODES AND MAKE APPROPRIATE ADJUSTMENTS.
3. LABELING REQUIREMENTS BASED ON THE 2017 NATIONAL ELECTRIC CODE, OSHA STANDARD 19010.145, ANSI Z535.
4. LABELS SHALL NOT BE HAND-WRITTEN (NEC 110.21(B))
5. MATERIAL BASED ON THE REQUIREMENTS OF THE AUTHORITY HAVING JURISDICTION.
6. LABELS TO BE OF SUFFICIENT DURABILITY TO WITHSTAND THE ENVIRONMENT INVOLVED [NEC 110.21]
7. LABELS TO BE A MINIMUM LETTER HEIGHT OF 3/8", WHITE ON RED BACKGROUND; REFLECTIVE, AND PERMANENTLY AFFIXED [IFC 605.11.1.1]

ENGINEERED PLANS COMPLETED BY ENGINEERS IN THE USA

DESIGN ENGINEER

WYSSLING CONSULTING
CORPORATE EXPERIENCE WITH SMALL BUSINESS VALUE

76 N. MEADOWBROOK DRIVE
ALPINE, UTAH 84004
swyssling@wysslingconsulting.com
(201) 874-3483

MISSOURI COA NO. 2020037943

SOLAR COMPANY/CLIENT

EnergyONE Renewables

ENERGYONE RENEWABLES
1333 NW VIVION ROAD SUITE 101
KANSAS CITY, MO 64118

SMITH, DEREK AND ASHLEY
413 SOUTHEAST MILL CREEK CIRCLE
LEES SUMMIT, MO 64063

PV LABELS

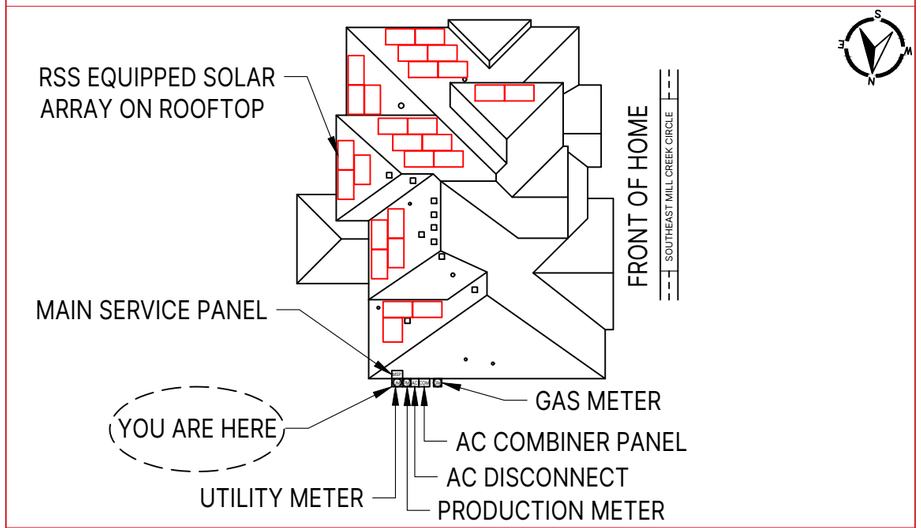
DATE: 5/28/2024

E-3

RELEASE FOR CONSTRUCTION
AS NOTED ON PLANS REVIEW
DEVELOPMENT SERVICES
LEE'S SUMMIT, MISSOURI
06/06/2024 4:22:41

CAUTION:

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



413 SOUTHEAST MILL CREEK CIRCLE, LEES SUMMIT, MISSOURI 64063

LABEL LOCATION: MSP CODE REF: NEC 2017 - 705.10

ENGINEERED PLANS COMPLETED BY ENGINEERS IN THE USA

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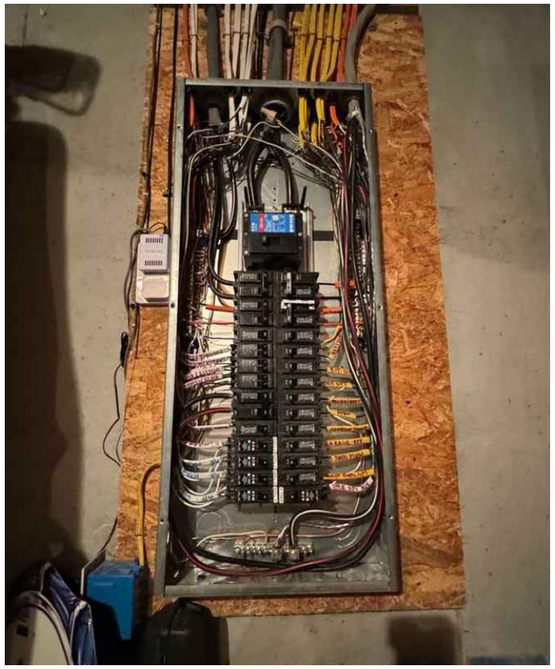
413 SOUTHEAST MILL CREEK CIRCLE
LEES SUMMIT, MO 64063

PLACARD

DATE: 5/28/2024

E-4



ENGINEERED PLANS COMPLETED BY ENGINEERS IN THE USA

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LEES SUMMIT, MO 64063

SITE PHOTOS

DATE: 5/28/2024

PV-4

msolar

108BB 410W HC Series

mSolar 10BB Half-Cell Black
Monocrystalline PERC PV Module

Excellent efficiency
10 busbar technology increases power by decreasing the distance between busbars and the finger grid line

Improved weak illumination response
More power output even in lower light conditions such as overcast days or off-peak sunlight hours

Anti PID
Panels rigorously tested to limit power degradation caused by 'stray' currents

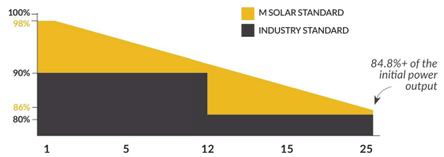
High wind and snow resistance
5,400Pa Snow Load
2,400Pa Wind Load

25-year warranty
M Solar modules are guaranteed to retain at least 84.3% of the initial power output

Appealing Aesthetics
Fully black module creates a sleek, uniform array

25-year product warranty, 25-year output warranty

0.5% annual degradation over 25 years



CEC

UL 61730 | IEC 61215 | IEC 61730
ISO9001, ISO14001, ISO45001

www.msolarenergy.us

108BB 410W HC Series | msolar 10BB Half-Cell, All-Black Monocrystalline PERC PV Module

Electrical Characteristics | STC*

Module Type	TXI10-400108BB	TXI10-405108BB	TXI10-410108BB
Nominal Power Watt Pmax (W)*	400	405	410
Power Output Tolerance Pmax (W)	0~+5	0~+5	0~+5
Maximum Power Voltage Vmp (V)	31.01	31.21	31.45
Maximum Power Current Imp (A)	12.90	12.98	13.04
Open Circuit Voltage (V)	37.07	37.23	37.32
Short Circuit Current Isc (A)	13.97	13.87	13.95
Module Efficiency (%)	20.48	20.74	21.00

*STC (Standard Test Condition): Irradiance 1000W/m², Module Temperature 25°C, AM 1.5
*Measuring tolerance: ±

Electrical Characteristics | NMOT*

Maximum Power Watt Pmax (Wp)	270	274	278
Maximum Power Voltage Vmpp (V)	29.26	29.47	29.72
Maximum Power Current Impp (A)	10.32	10.38	10.43
Open Circuit Voltage Voc (V)	34.88	35.12	35.23
Short Circuit Current Isc (A)	11.03	11.10	11.16

*NMOT(Nominal module operating temperature): Irradiance 800W/m², Ambient Temperature 20°C, AM 1.5, Wind Speed 1m/s

Mechanical Data

Solar Cells	Mono PERC, 182mm half cells
Cells orientation	108 (6x9+6x9)
Module dimension	67.80x44.65x1.38 in. (1,722x1,134x35 mm)
Weight	46.30 lb (21.00 kg)
Glass	3.2mm, High Transmission, Low Iron & Semi-Tempered Glass
Junction Box	IP 68, 3 Diodes
Cables	1,200mm
Connectors	MC4 EVO2

Temperature Ratings

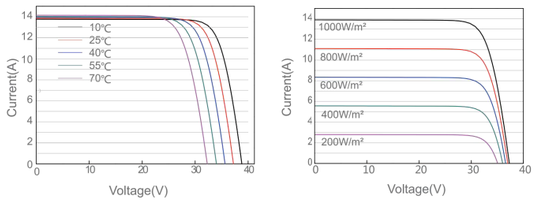
NOCT	42°C±2°C
Temperature coefficient of Pmax	-0.350%/°C
Temperature coefficient of Voc	-0.275%/°C
Temperature coefficient of Isc	+0.045%/°C

Working Conditions

Maximum System Voltage	1500VDC
Operating Temperature	-40°C ~+85°C
Maximum Series Fuse	25A
Maximum Load (Snow/Wind)	5,400Pa / 2,400Pa
Fire Rating	UL type 1**

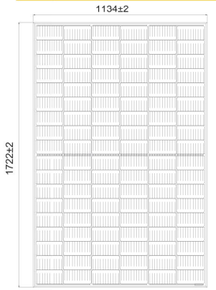
*Do not connect Fuse in Combiner Box with two or more strings in parallel connection
*Remark: Electrical data in this catalog do not refer to a single module and they are not part of the offer. They only serve for comparison among different module types.
**Please note, the 'Fire Class' Rating is designated for the full installed PV system, which includes, but is not limited to, the module, the type of mounting used, pitch and roof composition.

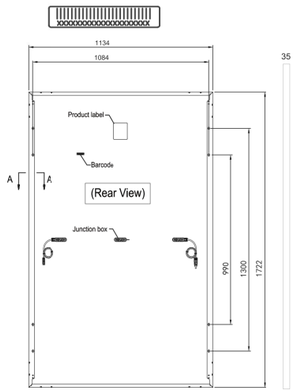
I-V Curves of PV Module (405W)



Note: please read safety and installation instructions before using this product. Subject to change without prior notice.

Dimensions (MM)





Tolerance:
Length: ±2mm
Width: ±2mm
Height: ±1mm
Pitch-row: ±1mm

Packaging Details

31 Panels per pallet	Pallet Stack Weight 2,934 lbs. (1341.98 kg)	Truck Weight 38,461.2 lbs. (17,445.7 kg)
26 Pallets per truck		

msolar

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MODULE SPEC SHEET

DATE: 5/28/2024

SPEC S-1

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06/06/2024 4:22:41

APsystems
ALTENERGY POWER

Leading the Industry in
Solar Microinverter Technology

DS3 Series

The most powerful Dual Microinverter

- One microinverter connects to two solar modules
- Max output power reaching 640VA, 768VA or 880VA
- Two independent input channels (MPPT)
- CA Rule 21 (UL 1741 SB) compliant
- NEC 2020 690.12 Rapid Shutdown Compliant
- Encrypted Wireless ZigBee Communication
- Phase Monitored and Phase Balanced

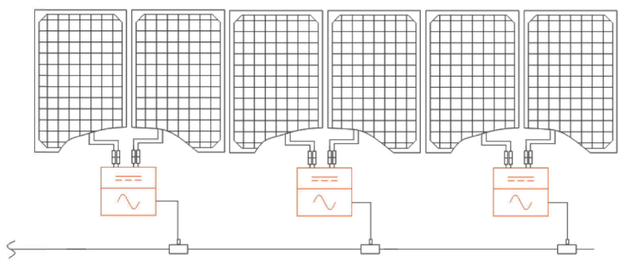
PRODUCT FEATURES

APsystems' 3rd generation of dual-module microinverters, the DS3 product family represents the culmination of years of power conversion expertise and innovation in high-efficiency, high-density power conversion to maximize the peak performance of today's high-capacity PV modules.

The DS3 series reaches unprecedented levels of power output. It features 2 input channels, each with independent MPPT, and encrypted wireless ZigBee communication. An innovative and compact design makes the product lighter while maximizing power production, and silicone-encapsulated components reduce stress on electronics, facilitate thermal dissipation, and enhance weatherproofing. Reliability is significantly increased thanks to 20% fewer components than previous generations. A 24/7 energy access through apps or web based portal facilitate remote diagnosis and maintenance.

The DS3 series is grid-interactive and fully compliant with CA Rule 21 requirements. With its unparalleled performance, efficiency of 97.3%, and increased reliability, the APsystems DS3 series is a gamechanger for residential and commercial solar.

WIRING SCHEMATIC



2023/06/25 Rev1.9

Datasheet | DS3 Microinverter Series

Model	DS3-S	DS3-L	DS3
Region		USA / Canada	
Input Data (DC)			
Recommended PV Module Power (STC) Range	250Wp-480Wp+	265Wp-570Wp+	300Wp-660Wp+
Peak Power Tracking Voltage(1)		28V-45V	
Operating Voltage Range		26V-60V	
Maximum Input Voltage		60V	
Maximum Input Current	16A x 2	18A x 2	20A x 2
Maximum input short circuit current	20A per input	22.5A per input	25A per input
Output Data (AC)			
Maximum Continuous Output Power	640VA	768VA	880VA
Nominal Output Voltage/Range(2)		240V / 211V-264V	
Nominal Output Current	2.66A	3.2A	3.7A
Maximum Output Fault Current (ac) And Duration		5.691Apk, 26.75ms of duration; 3.307Arms	
Nominal Output Frequency/ Range(2)		60Hz/58.8Hz-61.2Hz(HECO:57Hz-63Hz)	
Power Factor (Default/Adjustable)		0.99/0.8 leading..0.8 lagging	
Maximum Units per 30A Branch(3)	9	7	6
Maximum Units per 20A Branch(3)	6	5	4
AC Bus Cable		10AWG / 12AWG	
Efficiency			
Peak Efficiency		97.3%	
CEC Efficiency		97%	
Nominal MPPT Efficiency		99.5%	
Night Power Consumption		20mW	
Mechanical Data			
Operating Ambient Temperature Range(4)		-40°F to +149°F (-40°C to +65°C)	
Storage Temperature Range		-40°F to +185°F (-40°C to+85°C)	
Dimensions (W x H x D)	10.3" × 8.6" × 1.6" (263mm x 218mm x 41.2mm)		10.3" × 8.6" × 1.7" (263mm x 218mm x 42.5mm)
Weight	5.7lbs(2.7kg)		6.8lbs(3.1kg)
DC Connector Type		Stäubli MC4 PV-ADBP4-S2&ADSP4-S2	
Cooling		Natural Convection - No Fans	
Enclosure Environmental Rating		Type 6	
Features			
Communication (Inverter To ECU) (5)		Encrypted ZigBee	
Isolation Design		High Frequency Transformers, Galvanically Isolated	
Energy Management		Energy Management Analysis (EMA) system	
Warranty(6)		10 Years Standard ; 25 Years Optional	
Compliance			
Safety and EMC Compliance		UL1741; CSA C22.2 No. 107.1-16; UL1741SA; UL1741SB; IEEE1547; Rule 21; SRD-V2.0; FCC Part15; ICES-003; NEC2014&NEC2017&NEC2020 Section 690.11 DC Arc-Fault circuit Protection; NEC2014&NEC2017&NEC2020 Section 690.12 Rapid Shutdown of PV systems on Buildings	

(1) VMP values may be different on previous DS3 models with a 34-45V range for microinverters not connected to an ECU and 30-45V range for devices upgraded with an ECU.
(2) Nominal voltage/frequency range can be extended beyond nominal if required by the utility.
(3) Limits may vary. Refer to local requirements to define the number of microinverters per branch in your area.
(4) The inverter may enter to power de-grade mode under poor ventilation and heat dissipation installation environment.
(5) Recommend no more than 80 inverters register to one ECU for stable communication.
(6) To be eligible for the warranty, APsystems microinverters need to be monitored via the EMA portal. Please refer to our warranty T&Cs available on usa.APsystems.com.

Specifications subject to change without notice please ensure you are using the most recent update fourd at web : usa.APsystems.com

Meets the standard requirements for Distributed Energy Resources (UL 1741) and identified with the CSA Listed Mark

APsystems
8627 N. Mopac Expy, Suite 150, Austin, TX 78759
apsystems.com

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INVERTER SPEC SHEET

DATE: 5/28/2024

SPECS-2

MILBANK
ENERGY AT WORK

Search

U4216-RXL

4 Terminal Ringless Large Hub Open Adapt To Small Closing Plate Lever Bypass External Hex

SPECIFICATIONS

Brand Name	Milbank
Type	Ringless Meter Socket
Application	Meter Socket
Standard	UL Listed;Type 3R
Voltage Rating	600 Volts Alternating Current
Amperage Rating	200 Continuous Ampere
Phase	1 Phase
Frequency Rating	60 Hertz
Size	4.844L x 13W x 19H
Number of Main Breakers	0
Main Breaker Size	No Main Breaker
Cable Entry	Overhead or Underground
Terminal	Lay in
Insulation	Glass Polyester
Mounting	Surface Mount
Material	G90 Galvanized Steel with Powder Coat Finish
Number of Jaws	4 Terminal
Bypass Provision	Lever Bypass
Number of Meter Positions	1 Position
Equipment Ground	Triplex Ground
Hub/Closing Plate	Large Hub Opening Adapted to Small Closing Plate
Line Side Wire Range	6 AWG - 350 kcmil
Load Side Wire Range	6 AWG - 350 kcmil
Number Of Receptacles	0
Height	19 IN
Length	4.844 IN
Width	13 IN

Appears In:

Kentucky, South
Indiana Area

Please consult serving utility for their requirements prior to ordering or installing, as specifications and approvals vary by utility and may require local electrical inspector approval. All installations must be installed by a licensed electrician and must comply with all national and local codes, laws and regulations. Milbank reserves the right to make changes in specifications and features shown without notice or obligation.

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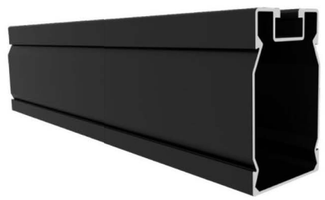
PV METER SPEC SHEET

DATE: 5/28/2024

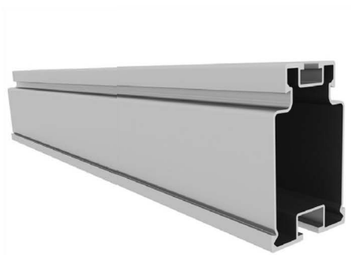
SPECS-3

SUNMODO
LEADING by DESIGN

SMR100 Rail



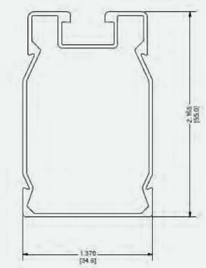
SMR300 Rail



Part Number	Description
A20422-168-BK	SMR100 Rail, 168", Black Anodized
A20422-168-ML	SMR100 Rail, 168", Mill Finish
A20444-174-ML	SMR300 Rail, 174", Mill Finish
A20444-212-ML	SMR300 Rail, 212", Mill Finish

Cut Sheet

SMR100 Rail



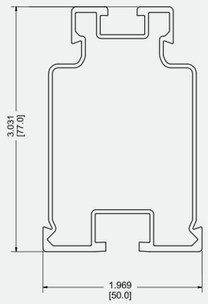
Mechanical Properties

Material: 6005-T5 Aluminum
Weight: 0.4126 lbs/ft (0.614 kg/m)
Ultimate Tensile Strength: 37.7 ksi (260 MPa)
Yield Strength: 34.8 ksi (240 MPa)

Section Properties

Sx: 0.196 in^3 (3.21 cm^3)
Sy: 0.146 in^3 (2.39 cm^3)
Area (X-section): 0.352 in^2 (2.27 cm^2)

SMR300 Rail



Mechanical Properties

Material: 6005-T5 Aluminum
Weight: 0.783 lbs/ft (1.167 kg/m)
Ultimate Tensile Strength: 37.7 ksi (260 MPa)
Yield Strength: 34.8 ksi (240 MPa)

Section Properties

Sx: 0.527 in^3 (8.64 cm^3)
Sy: 0.303 in^3 (4.97 cm^3)
Area (X-section): 0.669 in^2 (4.32 cm^2)

Dimensions shown are inches (and millimeters)

Details are subject to change without notice

SUNMODO
LEADING by DESIGN

Mid Clamp

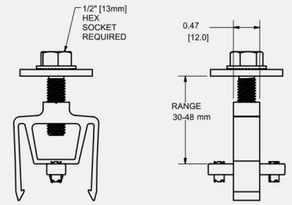
End Clamp

Bottom End Clamp

Part Number	Description
K10417-004	Mid Clamp, SMR Pop-On, Silver
K10417-BK4	Mid Clamp, SMR Pop-On, Black
K10418-004	End Clamp, SMR Pop-On, Silver
K10418-BK4	End Clamp, SMR Pop-On, Black
K10505-001	Bottom End Clamp, SMR100, Silver
K10505-BK1	Bottom End Clamp, SMR100, Black

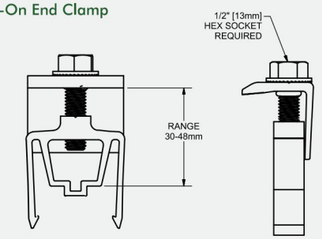
Cut Sheet

Pop-On Bonding Mid Clamp



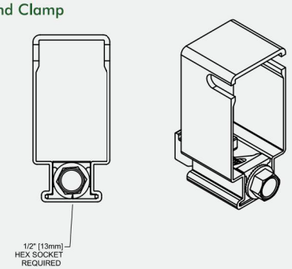
Material: Aluminum and Stainless Steel hardware

Pop-On End Clamp



Materials: Aluminum and Stainless Steel hardware

Bottom End Clamp



Materials: Aluminum and Stainless Steel hardware

D10225-V005

Dimensions shown are inches (and millimeters)

Details are subject to change without notice

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LEES SUMMIT, MO 64063

RAIL SPEC SHEET

DATE: 5/28/2024

SPECS-4

SUNMODO
LEADING by DESIGN

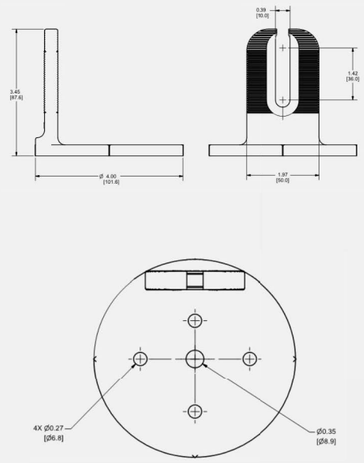
NanoMount®

Part Number	Description
K50063-BK1	NanoMount® • NanoMount • Sealing Gasket

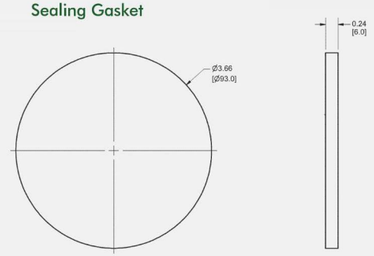
See Published data for allowable loads. Care should be taken to avoid concentrated loads during installation.

Cut Sheet

NanoMount®



Sealing Gasket



Material: Aluminum and Neoprene

Dimensions shown are inches (and millimeters)

Details are subject to change without notice

SUNMODO
LEADING by DESIGN

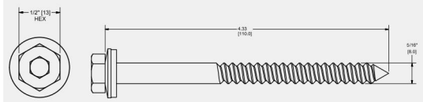
Lag Bolt Assembly

Decking Screw Assembly

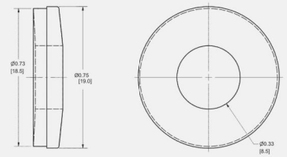
Item No.	Part Number	Description
1	K50049-BK1	Lag Bolt Assembly • M8X110 Hex Head Lag Bolt • Sealing Washer
2	K50055-BK2	Decking Screw Assembly • #14 X 3" Self-Tapping Screw • Sealing Washer

Cut Sheet

1. M8X110 Hex Head Lag Bolt

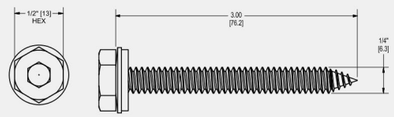


Sealing Washer

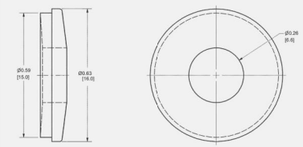


Material: Stainless Steel and EPDM

2. #14 X 3" Self-Tapping Screw



Sealing Washer



Material: Stainless Steel and EPDM

Dimensions shown are inches (and millimeters)

Details are subject to change without notice

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MOUNTING SPEC SHEET

DATE: 5/28/2024

SPEC SHEET