NEW PHOTOVOLTAIC ROOF MOUNTED SYSTEM - 16.800 KW DC/16.128 KW AC
2321 NE LAKE BREEZE LN, LEE'S SUMMIT, MO 64086

NEW PV SYSTEM SPECIFICATIONS

SYSTEM SIZE:	DC SIZE: 16.800 KW DC-(STC) AC SIZE: 16.128 KW AC
MODULE:	(42) PHONO SOLAR PS400M6-18/VHB
INVERTER:	(21) APSYSTEMS DS3-L (240V)

APPLICABLE CODES

ALL WORK SHALL CONFORM TO THE FOLLOWING CODES:
2018 INTERNATIONAL BUILDING CODE
2018 INTERNATIONAL RESIDENTIAL CODE
2018 INTERNATIONAL EXISTING BUILDING CODE
2018 INTERNATIONAL FIRE CODE
2017 NATIONAL ELECTRICAL CODE
AS ADOPTED BY CITY OF LEE'S SUMMIT

DESIGN CRITERIA

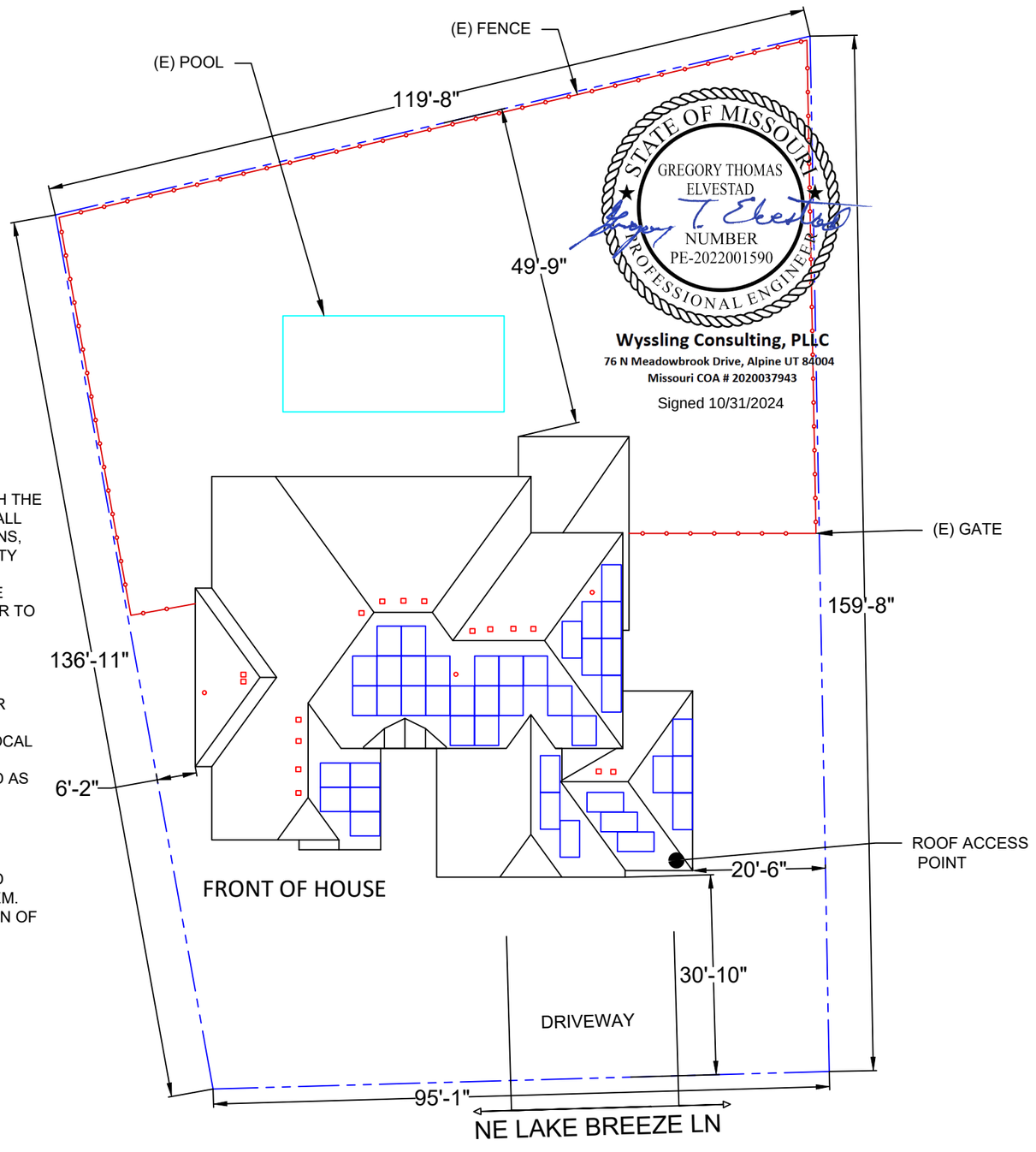
ROOF SURFACE TYPE: COMPOSITE SHINGLE
ROOF FRAMING: 2"X6" RAFTER @ 16" OC
BUILDING STORY: ONE STORY
GROUND SNOW LOAD: 20 PSF
WIND SPEED: 109 MPH
WIND EXPOSURE: B
RISK CATEGORY: II

PROJECT NOTES

1.1.1 THIS PHOTOVOLTAIC (PV) SYSTEM SHALL COMPLY WITH THE RELEVANT YEAR OF THE NATIONAL ELECTRIC CODE (NEC), ALL MANUFACTURER'S LISTING AND INSTALLATION INSTRUCTIONS, AND THE RELEVANT CODES AS SPECIFIED BY THE AUTHORITY HAVING JURISDICTION'S (AHJ) APPLICABLE CODES.
1.1.2 THE UTILITY INTERCONNECTION APPLICATION MUST BE APPROVED AND THE PV SYSTEM MUST BE INSPECTED PRIOR TO OPERATION
1.1.3 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 AND OTHER GOVERNING CODES
1.1.4 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.

SCOPE OF WORK

1.2.1 CONTRACTOR IS RESPONSIBLE FOR THE DESIGN AND SPECIFICATIONS OF THE GRID-TIED PHOTOVOLTAIC SYSTEM. THE CONTRACTOR WILL BE RESPONSIBLE FOR COLLECTION OF EXISTING ONSITE CONDITIONS TO DESIGN, SPECIFY, AND INSTALL THE ROOF-MOUNTED PHOTOVOLTAIC SYSTEM DETAILED IN THIS DOCUMENT



1 PV-01 PROPERTY PLAN
SCALE:1"-20'-0"

STATE OF MISSOURI
GREGORY THOMAS ELVESTAD
NUMBER PE-2022001590
PROFESSIONAL ENGINEER

Wyssling Consulting, PLLC
76 N Meadowbrook Drive, Alpine UT 84004
Missouri COA # 2020037943
Signed 10/31/2024

RELEASE FOR CONSTRUCTION
AS NOTED FOR PLAN REVIEW
DEVELOPMENT SERVICES
LEE'S SUMMIT, MISSOURI
11/12/2024

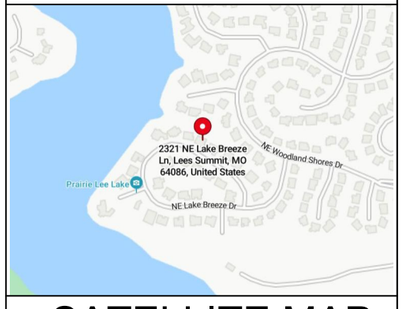
Brandon Kalwei
Digitally signed by Brandon Kalwei
DN: CN=Brandon Kalwei, OU=Development, OU=LS Users, DC=COLS, DC=LOC
Date: 2024.11.12 09:00:47-06'00'

SHEET INDEX

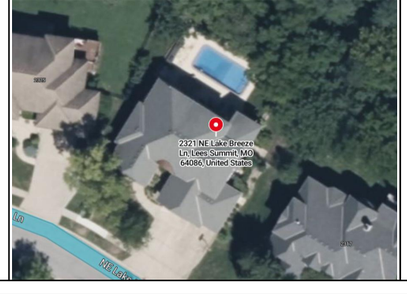
LEGEND

- PROPERTY LINE
- FENCE LINE

VICINITY MAP



SATELLITE MAP



CONTRACTOR

GREEN COMFORT ENERGY SOLUTIONS
235 S CHURCH ST,
OLATHE,KANSAS 66061
PHONE - (913) 286-4155
LIC. NO. - 2024-0011305

PROJECT NAME & ADDRESS

CALEB DENNIS
2321 NE LAKE BREEZE LN,
LEE'S SUMMIT, MO 64086

APN #: 53440042700000000

AHJ: CITY OF LEE'S SUMMIT
UTILITY: EVERGY

SYSTEM DETAILS

DC SIZE: 16.800 KW DC-(STC)
AC SIZE: 16.128 KW AC
(42) PHONO SOLAR PS400M6-18/VHB
(21) APSYSTEMS DS3-L (240V)

REVISIONS

REV	DESCRIPTION	DATE

SHEET TITLE

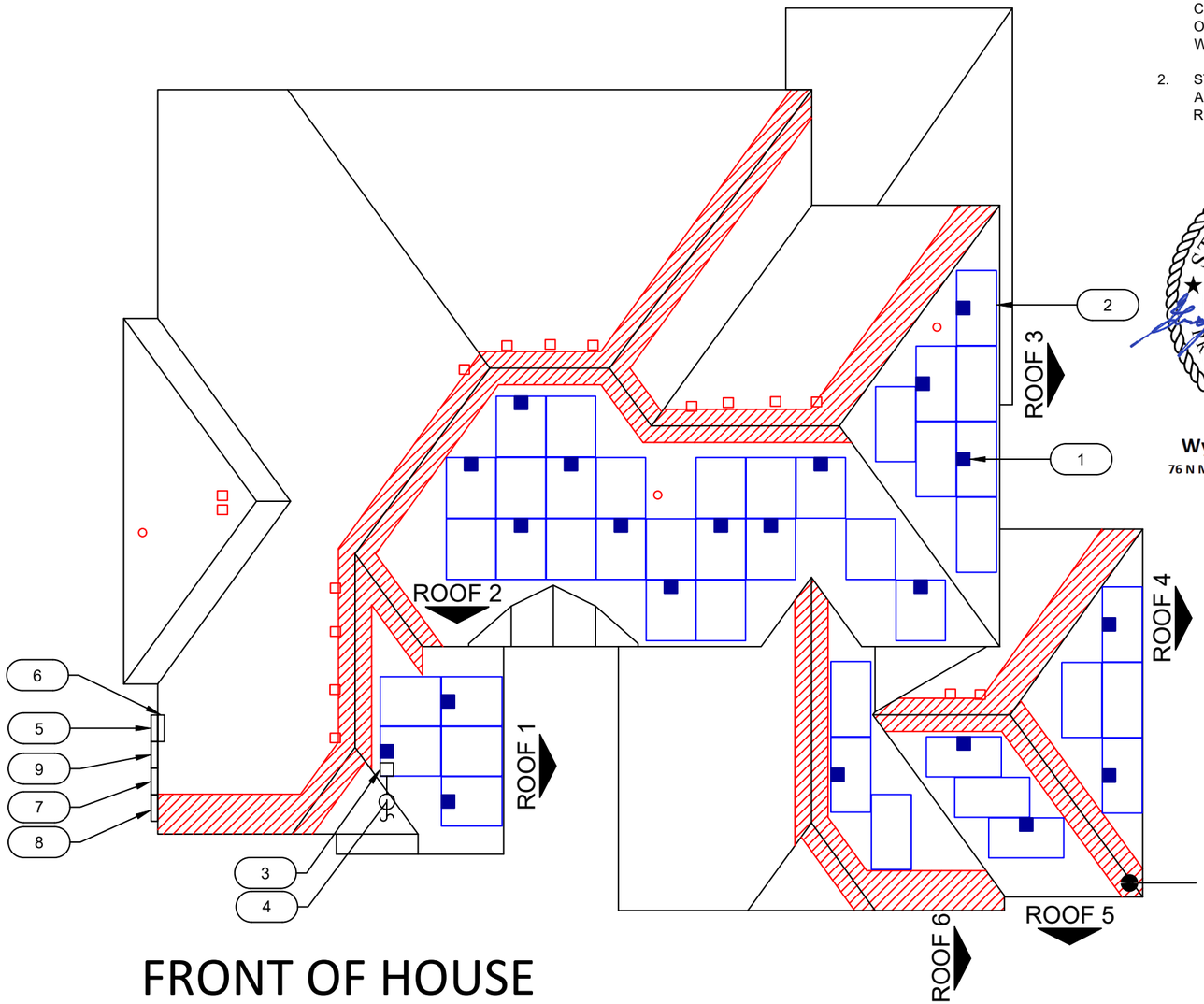
COVER PAGE

DRAWN DATE	10/25/2024
DRAWN BY	RB

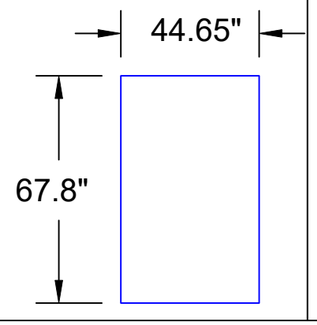
SHEET NUMBER

PV-01

PLAN VIEW TOTAL ROOF AREA:	4113.03 FT²
TOTAL PV ARRAY AREA:	882.95 FT²
TOTAL % OF ROOF COVERED BY PV:	21.47%



FRONT OF HOUSE



1 PV-02 SITE PLAN

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

NOTES:

1. ROOF ACCESS POINT SHALL NOT BE LOCATED IN AREAS THAT 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.
2. STRUCTURES, PATIO COVERS, AND/OR ADDITIONS BUILT WITHOUT PERMITS TO BE RESOLVED BY A SEPARATE PERMIT.

STATE OF MISSOURI
GREGORY THOMAS ELVESTAD
NUMBER PE-2022001590
PROFESSIONAL ENGINEER

Wyssling Consulting, PLLC
76 N Meadowbrook Drive, Alpine UT 84004
Missouri COA # 2020037943

Signed 10/31/2024

LEGEND

36" 18" FIRE SETBACKS

= MECHANICAL VENT

= FLUE / PLUMBING VENT

1 MICROINVERTER (1 PER 2 MODULES)

2 (42) PHONO SOLAR PS400M6-18/VHB MODULES WITH APSYSTEMS DS3-L (240V) UNDER EVERY TWO MODULES

3 (N) JUNCTION BOX (NEMA 3R)

4 CONDUIT RUN; SURFACE MOUNTED (ACTUAL CONDUIT RUNS TO BE DETERMINED IN FIELD)

5 (E) UTILITY METER (UNDERGROUND SERVICE) METER #: 18 099 203

6 (E) MAIN SERVICE PANEL (INSIDE HOUSE)

7 (N) VISIBLE-OPEN, LOCKABLE, LABELED AND FUSED AC DISCONNECT

8 (N) AC COMBINER PANEL

9 PV PRODUCTION METER

ROOF 1	SLOPE	- 36°
	AZIMUTH	- 122°
	MODULE QTY	- 5
	RAFTER	- 2"X6" @ 16" O.C.
	SURFACE TYPE	- COMPOSITE SHINGLE
ROOF 2	SLOPE	- 36°
	AZIMUTH	- 212°
	MODULE QTY	- 20
	RAFTER	- 2"X6" @ 16" O.C.
	SURFACE TYPE	- COMPOSITE SHINGLE
ROOF 3	SLOPE	- 36°
	AZIMUTH	- 122°
	MODULE QTY	- 7
	RAFTER	- 2"X6" @ 16" O.C.
	SURFACE TYPE	- COMPOSITE SHINGLE
ROOF 4	SLOPE	- 36°
	AZIMUTH	- 122°
	MODULE QTY	- 4
	RAFTER	- 2"X6" @ 16" O.C.
	SURFACE TYPE	- COMPOSITE SHINGLE
ROOF 5	SLOPE	- 36°
	AZIMUTH	- 212°
	MODULE QTY	- 3
	RAFTER	- 2"X6" @ 16" O.C.
	SURFACE TYPE	- COMPOSITE SHINGLE
ROOF 6	SLOPE	- 36°
	AZIMUTH	- 122°
	MODULE QTY	- 3
	RAFTER	- 2"X6" @ 16" O.C.
	SURFACE TYPE	- COMPOSITE SHINGLE

CONTRACTOR

GREEN COMFORT ENERGY SOLUTIONS
235 S CHURCH ST,
OLATHE,KANSAS 66061

PHONE - (913) 286-4155
LIC. NO. - 2024-0011305

PROJECT NAME & ADDRESS

CALEB DENNIS
2321 NE LAKE BREEZE LN,
LEE'S SUMMIT, MO 64086

APN #: 53440042700000000

AHJ: CITY OF LEE'S SUMMIT
UTILITY: EVERGY

SYSTEM DETAILS

DC SIZE: 16.800 KW DC-(STC)
AC SIZE: 16.128 KW AC
(42) PHONO SOLAR PS400M6-18/VHB
(21) APSYSTEMS DS3-L (240V)

REVISIONS

REV	DESCRIPTION	DATE

SHEET TITLE

SITE PLAN

DRAWN DATE	10/25/2024
DRAWN BY	RB

SHEET NUMBER

PV-02

RELEASE FOR CONSTRUCTION
AS NOTED FOR PLAN REVIEW
DEVELOPMENT SERVICES
LEE'S SUMMIT, MISSOURI
11/12/2024

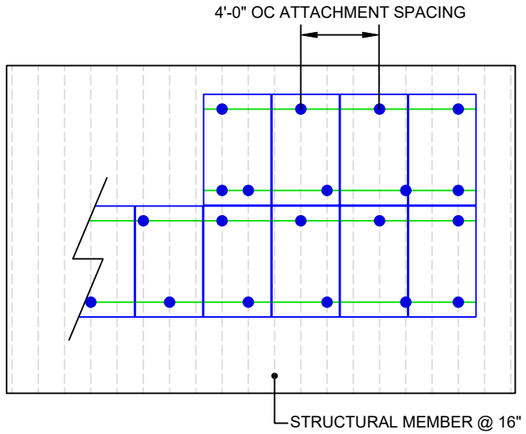
DISTRIBUTED LOAD CALCULATIONS	
MODULE	PHONO SOLAR PS400M6-18/VHB
MODULE WEIGHT	45.8 LBS
MODULE DIMENSIONS (L" x W")	67.8" x 44.65"
TOTAL QTY. OF MODULES	42
TOTAL WEIGHT OF MODULES	1923.60 LBS
TYPE OF RACKING	IRONRIDGE XR-100 RAIL (XR-100-168M)
TYPE OF ATTACHMENT	IRONRIDGE QUICKMOUNT HALO ULTRAGRIP (QM-HUG-01-M1)
DISTRIBUTED WEIGHT OF RACKING	0.5 PSF
TOTAL WEIGHT OF ARRAY	2365.08 LBS
AREA OF MODULE	21.02 SQFT.
TOTAL ARRAY AREA	882.95 SQFT.
DISTRIBUTED LOAD	2.68 PSF

NOTE:

1. CONTRACTOR/INSTALLER TO VERIFY COMPATIBILITY OF ANY BRANDS OR PRODUCTS SUBSTITUTED OR USED AS ALTERNATES WITHIN ANY BRAND-SPECIFIC SYSTEMS. CONTRACTOR SHALL SUPPLY AND PRESENT CERTIFICATES OF COMPATIBILITY TO THE BUILDING OFFICIAL UPON INSPECTION AS NEEDED.
2. REFER TO PV MODULE MANUFACTURER'S INSTALLATION INSTRUCTIONS FOR RAIL SPACING SPECIFICATIONS

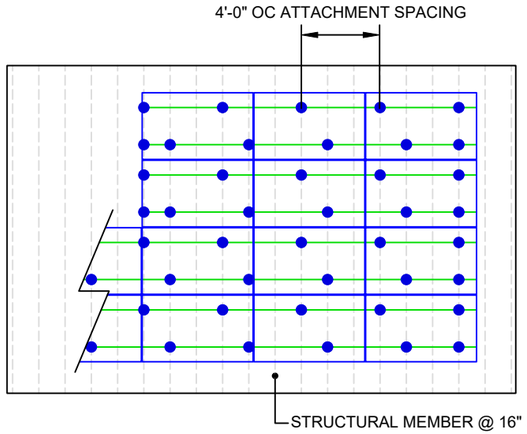
LEGEND

- ATTACHMENT POINTS
- RAIL
- STRUCTURAL MEMBER



1.0 PV-03 TYPICAL ATTACHMENT PLAN (PORTRAIT)

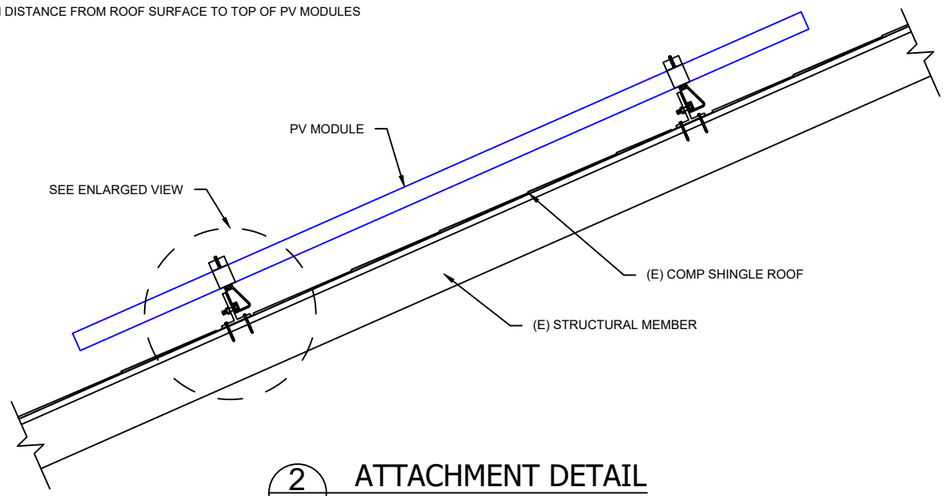
SCALE: NTS



1.1 PV-03 TYPICAL ATTACHMENT PLAN (LANDSCAPE)

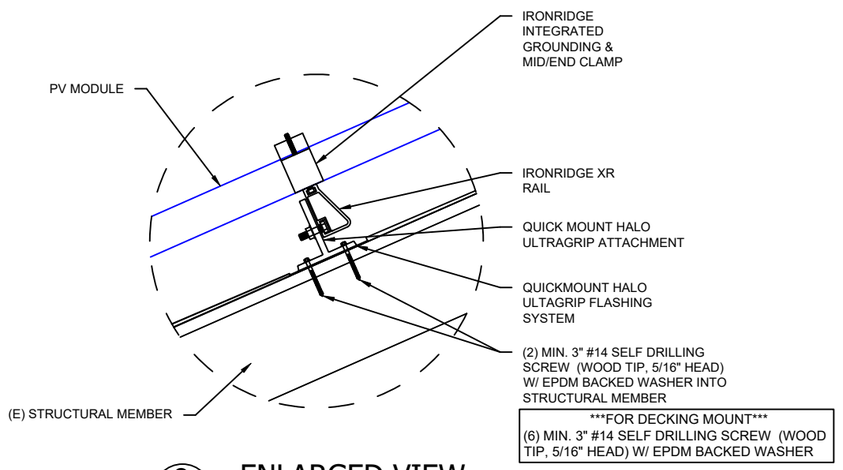
SCALE: NTS

NOTE: 6" MAXIMUM DISTANCE FROM ROOF SURFACE TO TOP OF PV MODULES



2 PV-03 ATTACHMENT DETAIL

Scale: NTS



3 PV-03 ENLARGED VIEW

Scale: NTS

CONTRACTOR

GREEN COMFORT ENERGY SOLUTIONS

235 S CHURCH ST,
OLATHE,KANSAS 66061

PHONE - (913) 286-4155
LIC. NO. - 2024-0011305

PROJECT NAME & ADDRESS

CALEB DENNIS
2321 NE LAKE BREEZE LN,
LEE'S SUMMIT, MO 64086

APN #: 53440042700000000

AHJ: CITY OF LEE'S SUMMIT
UTILITY: EVERGY

SYSTEM DETAILS

DC SIZE: 16.800 KW DC-(STC)
AC SIZE: 16.128 KW AC
(42) PHONO SOLAR PS400M6-18/VHB
(21) APSYSTEMS DS3-L (240V)

REVISIONS

REV	DESCRIPTION	DATE

SHEET TITLE

ATTACHMENT PLAN & DETAILS

DRAWN DATE	10/25/2024
DRAWN BY	RB

SHEET NUMBER

PV-03

RELEASE FOR CONSTRUCTION
AS NOTED FOR PLAN REVIEW
DEVELOPMENT SERVICES
LEE'S SUMMIT, MISSOURI
11/12/2024

MICROINVERTER SPECIFICATIONS	
MANUFACTURER / MODEL #	APSYSTEMS DS3-L (240V)
INPUT POWER RANGE	265W-570W
MIN/MAX START VOLTAGE	26V/60V
NOMINAL AC VOLTAGE	240V
MAX CONT. OUTPUT CURRENT	3.2A
MAX CONT. OUTPUT POWER	768W
MAX MODULES PER STRING	14 (7 MICROINVERTERS)

SOLAR MODULE SPECIFICATIONS	
MANUFACTURER / MODEL #	PHONO SOLAR PS400M6-18/VHB
VMP	30.85 V
IMP	12.97 A
VOC	36.87 V
ISC	13.52 A
TEMP. COEFF. VOC	-0.28 %/°C

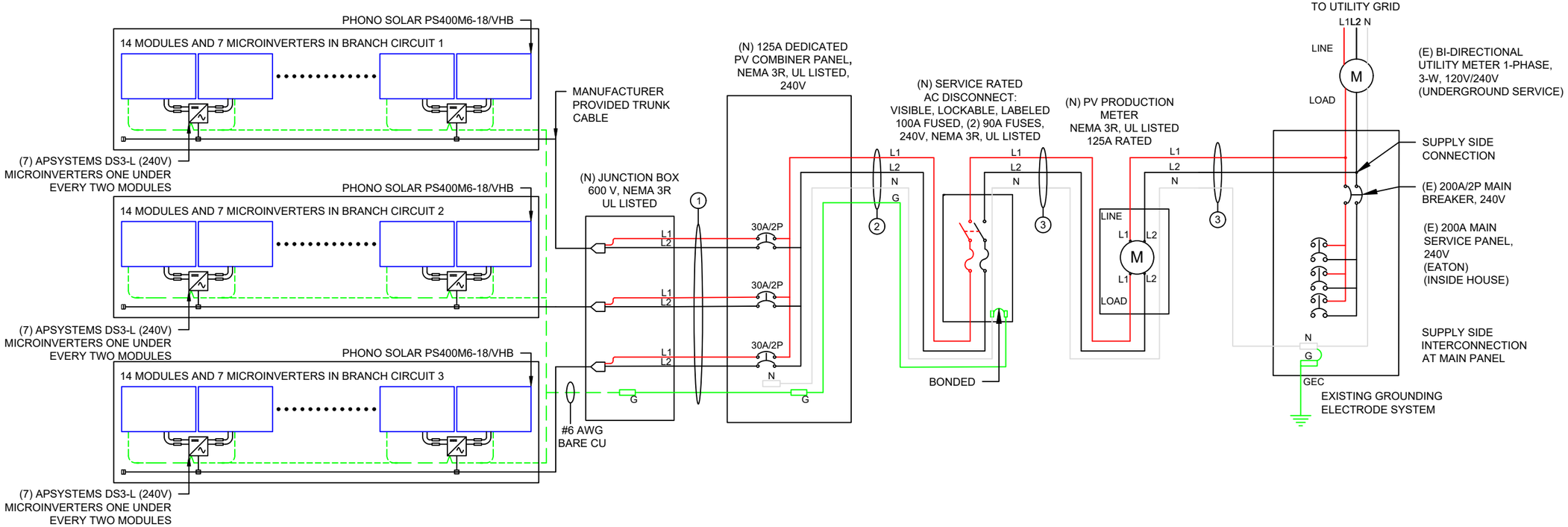
AMBIENT TEMPERATURE SPECIFICATIONS	
RECORD LOW TEMP	-20°C
AMBIENT TEMP (HIGH TEMP 2% AVG.)	35°C
MINIMUM CONDUIT HEIGHT ABOVE ROOF SURFACE	7/8"

STATE OF MISSOURI
GREGORY THOMAS ELVESTAD
NUMBER PE-2022001590
PROFESSIONAL ENGINEER

Wyssling Consulting, PLLC
76 N Meadowbrook Drive, Alpine UT 84004
Missouri COA # 2020037943

Signed 10/31/2024

ROMEX CAN BE USED IN LIEU OF CONDUIT FOR INTERIOR BUILDING AND ATTIC RUNS ONLY. DO NOT USE ROMEX IN CONDUIT OR OUTDOOR ENVIRONMENTS.



DESCRIPTION	FORMULA	RESULT
PV OVERCURRENT PROTECTION NEC 690.9(B)	TOTAL INVERTER OUTPUT CURRENT x 1.25 = (21 x 3.2)A x 1.25	84.00A (SELECTED OCPD = 90A)

WIRE ID	EXPECTED WIRE TEMP (°C)	TEMP DERATE (90 °C)	QTY OF CURRENT CARRYING CONDUCTORS	CONDUIT FILL DERATE	MINIMUM CONDUIT SIZE (TBD ON SITE)	WIRE GAUGE & TYPE	CONDUCTOR AMPACITY @ 90°C (A)	CONDUCTOR AMPACITY @ 75°C (A)	REQUIRED CIRCUIT CONDUCTOR AMPACITY (A)	ADJUSTED CONDUCTOR AMPACITY @ 90 °C (A)	NEUTRAL CONDUCTOR SIZE & TYPE	GROUND WIRE SIZE & TYPE
1	35	0.96	6	0.8	3/4" METAL	#10 THWN-2	40	35	28.00	30.72	NONE	#10 THWN-2
2	35	0.96	2	1	1" METAL	#4 THWN-2	95	85	84.00	91.20	#4 THWN-2	#8 THWN-2
3	35	0.96	2	1	1" METAL	#4 THWN-2	95	85	84.00	91.20	#4 THWN-2	NONE

CONTRACTOR

GREEN COMFORT ENERGY SOLUTIONS
235 S CHURCH ST,
OLATHE,KANSAS 66061

PHONE - (913) 286-4155
LIC. NO. - 2024-0011305

PROJECT NAME & ADDRESS

CALEB DENNIS
2321 NE LAKE BREEZE LN,
LEE'S SUMMIT, MO 64086

APN #: 53440042700000000

AHJ: CITY OF LEE'S SUMMIT
UTILITY: EVERGY

SYSTEM DETAILS

DC SIZE: 16.800 KW DC-(STC)
AC SIZE: 16.128 KW AC
(42) PHONO SOLAR PS400M6-18/VHB
(21) APSYSTEMS DS3-L (240V)

REVISIONS

REV	DESCRIPTION	DATE

SHEET TITLE

ELECTRICAL DIAGRAM

DRAWN DATE	10/25/2024
DRAWN BY	RB

SHEET NUMBER

PV-04

RELEASED FOR CONSTRUCTION
AS NOTED FOR PLAN REVIEW
DEVELOPMENT SERVICES
LEE'S SUMMIT, MISSOURI
11/12/2024

GENERAL NOTES

SITE NOTES

2.1.1 A LADDER WILL BE IN PLACE FOR INSPECTION IN ACCORDANCE WITH OSHA REGULATIONS.
2.1.2 THE PV MODULES ARE CONSIDERED NON-COMBUSTIBLE AND THIS SYSTEM IS A UTILITY INTERACTIVE SYSTEM WITH NO STORAGE BATTERIES.
2.1.3 THE SOLAR PV INSTALLATION WILL NOT OBSTRUCT ANY PLUMBING, MECHANICAL, OR BUILDING ROOF VENTS.
2.1.4 PROPER ACCESS AND WORKING CLEARANCE AROUND EXISTING AND PROPOSED ELECTRICAL EQUIPMENT WILL BE PROVIDED IN ACCORDANCE WITH SECTION NEC 110.26.
2.1.5 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.

EQUIPMENT LOCATIONS

2.2.1 ALL EQUIPMENT SHALL MEET MINIMUM SETBACKS IN ACCORDANCE WITH NEC 110.26.
2.2.2 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).
2.2.3 JUNCTION AND PULL BOXES PERMITTED INSTALLED UNDER PV MODULES IN ACCORDANCE WITH NEC 690.34.
2.2.4 ADDITIONAL AC DISCONNECT(S) SHALL BE PROVIDED WHERE THE INVERTER IS NOT WITHIN SIGHT OF THE AC SERVICING DISCONNECT.
2.2.5 ALL EQUIPMENT SHALL BE INSTALLED ACCESSIBLE TO QUALIFIED PERSONNEL IN ACCORDANCE WITH NEC APPLICABLE CODES.
2.2.6 ALL COMPONENTS ARE LISTED FOR THEIR PURPOSE AND RATED FOR OUTDOOR USAGE WHEN APPROPRIATE.

STRUCTURAL NOTES

2.3.1 RACKING SYSTEM & PV ARRAY WILL BE INSTALLED IN ACCORDANCE WITH THE 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, IN ACCORDANCE WITH RAIL MANUFACTURER'S INSTALLATION PRACTICES.
2.3.2 JUNCTION BOX WILL BE INSTALLED PER MANUFACTURER'S SPECIFICATIONS. IF ROOF-PENETRATING TYPE, IT SHALL BE FLASHED & SEALED PER LOCAL REQUIREMENTS.
2.3.3 ROOFTOP PENETRATIONS FOR PV RACEWAY WILL BE COMPLETED AND SEALED W/ APPROVED CHEMICAL SEALANT PER CODE BY A LICENSED CONTRACTOR.
2.3.4 ALL PV RELATED ROOF ATTACHMENTS TO BE SPACED NO GREATER THAN THE SPAN DISTANCE SPECIFIED BY THE RACKING MANUFACTURER OR PROFESSIONAL ENGINEERING GUIDANCE.
2.3.5 WHEN POSSIBLE, ALL PV RELATED RACKING ATTACHMENTS WILL BE STAGGERED AMONGST THE ROOF FRAMING MEMBERS.

WIRING & CONDUIT NOTES

2.4.1 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.
2.4.2 CONDUCTORS SIZED IN ACCORDANCE WITH THE NEC
2.4.3 AC CONDUCTORS TO BE COLORED OR MARKED PER NEC
2.4.4 LISTED OR LABELED EQUIPMENT SHALL BE INSTALLED AND USED IN ACCORDANCE WITH ANY INSTRUCTIONS INCLUDED IN THE LISTING OR LABELING PER NEC

GROUNDING NOTES

2.5.1 GROUNDING SYSTEM COMPONENTS SHALL BE LISTED FOR THEIR PURPOSE, AND GROUNDING DEVICES EXPOSED TO THE ELEMENTS SHALL BE RATED FOR SUCH USE.
2.5.2 PV EQUIPMENT SHALL BE GROUNDED IN ACCORDANCE WITH NEC 690.43 AND NEC TABLE 250.122.
2.5.3 METAL PARTS OF MODULE FRAMES, MODULE RACKING, AND ENCLOSURES CONSIDERED GROUNDED IN ACCORDANCE WITH NEC 250.134 AND 250.136(A).
2.5.4 EQUIPMENT GROUNDING CONDUCTORS SHALL BE SIZED IN ACCORDANCE WITH NEC 690.45 AND INVERTER MANUFACTURER'S INSTALLATION PRACTICES
2.5.5 EACH MODULE WILL BE GROUNDED AS SHOWN IN MANUFACTURER DOCUMENTATION AND APPROVED BY THE AHJ.
2.5.6 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.
2.5.7 GROUNDING AND BONDING CONDUCTORS, IF INSULATED, SHALL BE COLORED GREEN OR MARKED GREEN IF #4 AWG OR LARGER PER NEC 250.119
2.5.8 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 IN ACCORDANCE WITH NEC 250, NEC 690.47 AND THE AHJ.
2.5.9 GROUND-FAULT DETECTION SHALL COMPLY WITH NEC 690.41(B)(1) AND (2) TO REDUCE FIRE HAZARDS

DISCONNECTION AND OVERCURRENT PROTECTION NOTES

2.6.1 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).
2.6.2 DISCONNECTS TO BE ACCESSIBLE TO QUALIFIED UTILITY PERSONNEL, BE LOCKABLE, AND BE A VISIBLE-BREAK SWITCH
2.6.3 PV SYSTEM CIRCUITS INSTALLED ON OR IN HABITABLE BUILDINGS SHALL INCLUDE A RAPID SHUTDOWN FUNCTION TO REDUCE SHOCK HAZARD FOR EMERGENCY RESPONDERS IN ACCORDANCE WITH 690.12
2.6.4 ALL OCPD RATINGS AND TYPES SPECIFIED ACCORDING TO NEC 690.8, 690.9, AND 240.
2.6.5 INVERTER ON-GRID BRANCHES SHALL BE CONNECTED TO A SINGLE BREAKER OR GROUPED FUSE DISCONNECT(S) IN ACCORDANCE WITH NEC 110.3(B).
2.6.6 IF REQUIRED BY THE AHJ, SYSTEM WILL INCLUDE ARC-FAULT CIRCUIT PROTECTION IN ACCORDANCE WITH NEC 690.11 AND UL1699B.

INTERCONNECTION NOTES

2.7.1 LOAD SIDE INTERCONNECTION SHALL BE IN ACCORDANCE WITH NEC 705.12.
2.7.2 THE SUM OF THE UTILITY OCPD AND INVERTER CONTINUOUS OUTPUT MAY NOT EXCEED 120 PERCENT OF BUSBAR RATING PER NEC 705.12.
2.7.3 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 IN ACCORDANCE WITH NEC 705.12.
2.7.4 AT MULTIPLE ELECTRIC POWER SOURCES OUTPUT COMBINER PANEL, TOTAL RATING OF ALL OVERCURRENT PROTECTION DEVICES SHALL NOT EXCEED AMPACITY OF BUSBAR. HOWEVER, THE MAIN OVERCURRENT PROTECTION DEVICE MAY BE EXCLUDED IN ACCORDANCE WITH NEC 705.12.
2.7.5 FEEDER TAP INTERCONNECTION (LOAD SIDE) IN ACCORDANCE WITH NEC 705.12.
2.7.6 SUPPLY SIDE TAP INTERCONNECTION IN ACCORDANCE WITH TO NEC 705.12 WITH SERVICE ENTRANCE CONDUCTORS IN ACCORDANCE WITH NEC 230.42.
2.7.7 BACKFEEDING BREAKER FOR ELECTRIC POWER SOURCES OUTPUT IS EXEMPT FROM ADDITIONAL FASTENING PER NEC 705.12.

CONTRACTOR

GREEN COMFORT ENERGY SOLUTIONS
235 S CHURCH ST,
OLATHE,KANSAS 66061
PHONE - (913) 286-4155
LIC. NO. - 2024-0011305

PROJECT NAME & ADDRESS

CALEB DENNIS
2321 NE LAKE BREEZE LN,
LEE'S SUMMIT, MO 64086

APN #: 53440042700000000

AHJ: CITY OF LEE'S SUMMIT
UTILITY: EVERGY

SYSTEM DETAILS

DC SIZE: 16.800 KW DC-(STC)
AC SIZE: 16.128 KW AC
(42) PHONO SOLAR PS400M6-18/VHB
(21) APSYSTEMS DS3-L (240V)

REVISIONS

REV	DESCRIPTION	DATE

SHEET TITLE

NOTES

DRAWN DATE	10/25/2024
DRAWN BY	RB

SHEET NUMBER

PV-05

⚠WARNING

ELECTRICAL SHOCK HAZARD

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

LABEL LOCATION: COMBINER PANEL, AC DISCONNECT, POINT OF INTERCONNECTION
PER CODE: NEC 690.13(B)

⚠WARNING

TURN OFF PHOTOVOLTAIC AC DISCONNECT PRIOR TO WORKING INSIDE PANEL

LABEL LOCATION: COMBINER PANEL(S), MAIN SERVICE DISCONNECT
PER CODE: NEC 110.27(C), OSHA 1910.145(f)(7)

WARNING: PHOTOVOLTAIC POWER SOURCE

LABEL LOCATION: DC CONDUIT/RACEWAY/CABLE TRAY
PER CODE: NEC 690.31(G)(3-4)

PHOTOVOLTAIC SYSTEM AC DISCONNECT

RATED AC OUTPUT CURRENT: 67.20 A
NOMINAL OPERATING AC VOLTAGE: 240 V

LABEL LOCATION: POINT OF INTERCONNECTION
PER CODE: NEC 690.54

PV SYSTEM

DISCONNECT

LABEL LOCATION: AC DISCONNECT
PER CODE: NEC 690.13(B)

DO NOT DISCONNECT UNDER LOAD

LABEL LOCATION: MAIN SERVICE DISCONNECT
PER CODE: NEC 690.15(C) & NEC 690.33(E)(2)

⚠WARNING DUAL POWER SOURCE
SECOND SOURCE IS PHOTOVOLTAIC SYSTEM

LABEL LOCATION: MAIN SERVICE DISCONNECT
PER CODE: NEC 705.12(B)(3-4), NEC 690.59

⚠WARNING

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

LABEL LOCATION: POINT OF INTERCONNECTION, COMBINER PANEL
PER CODE: NEC 705.12(B)(2)(3)(c)

⚠WARNING

POWER SOURCE OUTPUT CONNECTION. DO NOT RELOCATE THIS OVERCURRENT DEVICE.

LABEL LOCATION: MAIN SERVICE DISCONNECT, POINT OF INTERCONNECTION
PER CODE: 705.12(B)(2)(3)(b)

MAIN PHOTOVOLTAIC SYSTEM DISCONNECT

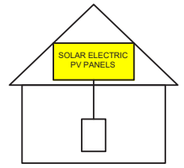
LABEL LOCATION: MAIN SERVICE DISCONNECT, UTILITY METER
PER CODE: NEC 690.13(B)

RAPID SHUTDOWN SWITCH FOR SOLAR PV SYSTEM

LABEL LOCATION: RSD INITIATION DEVICE, AC DISCONNECT
PER CODE: NEC 690.56(C)(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



LABEL LOCATION: MAIN SERVICE DISCONNECT
PER CODE: NEC 690.56(C)(1)(a)

⚠ CAUTION

PHOTOVOLTAIC SYSTEM CIRCUIT IS BACKFED

LABEL LOCATION: MAIN SERVICE DISCONNECT
PER CODE: NEC 690.13(F), NEC 705.12(B)(3-4), NEC 690.59

PV METER

LABEL LOCATION: PV METER

STATE OF MISSOURI
GREGORY THOMAS ELVESTAD
NUMBER PE-2022001590
PROFESSIONAL ENGINEER

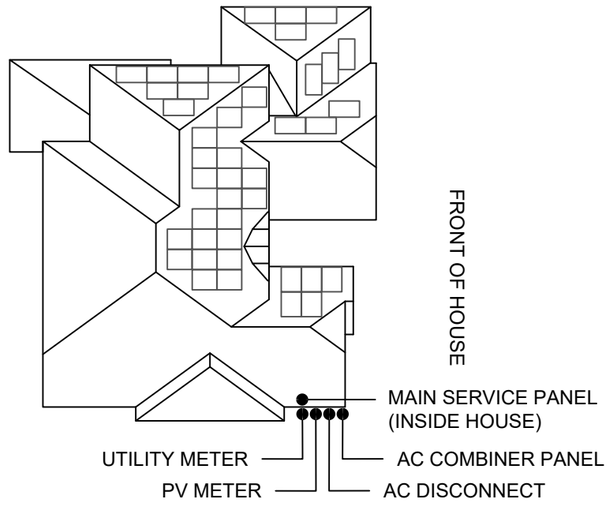
Wyssling Consulting, PLLC
76 N Meadowbrook Drive, Alpine UT 84004
Missouri COA # 2020037943

Signed 10/31/2024

CAUTION

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

ADDRESS: 2321 NE LAKE BREEZE LN, LEE'S SUMMIT, MO 64086



CONTRACTOR

GREEN COMFORT ENERGY SOLUTIONS
235 S CHURCH ST,
OLATHE,KANSAS 66061
PHONE - (913) 286-4155
LIC. NO. - 2024-0011305

PROJECT NAME & ADDRESS

CALEB DENNIS
2321 NE LAKE BREEZE LN,
LEE'S SUMMIT, MO 64086

APN #: 53440042700000000

AHJ: CITY OF LEE'S SUMMIT
UTILITY: EVERGY

SYSTEM DETAILS

DC SIZE: 16.800 KW DC-(STC)
AC SIZE: 16.128 KW AC
(42) PHONO SOLAR PS400M6-18/VHB
(21) APSYSTEMS DS3-L (240V)

REVISIONS

REV	DESCRIPTION	DATE

SHEET TITLE

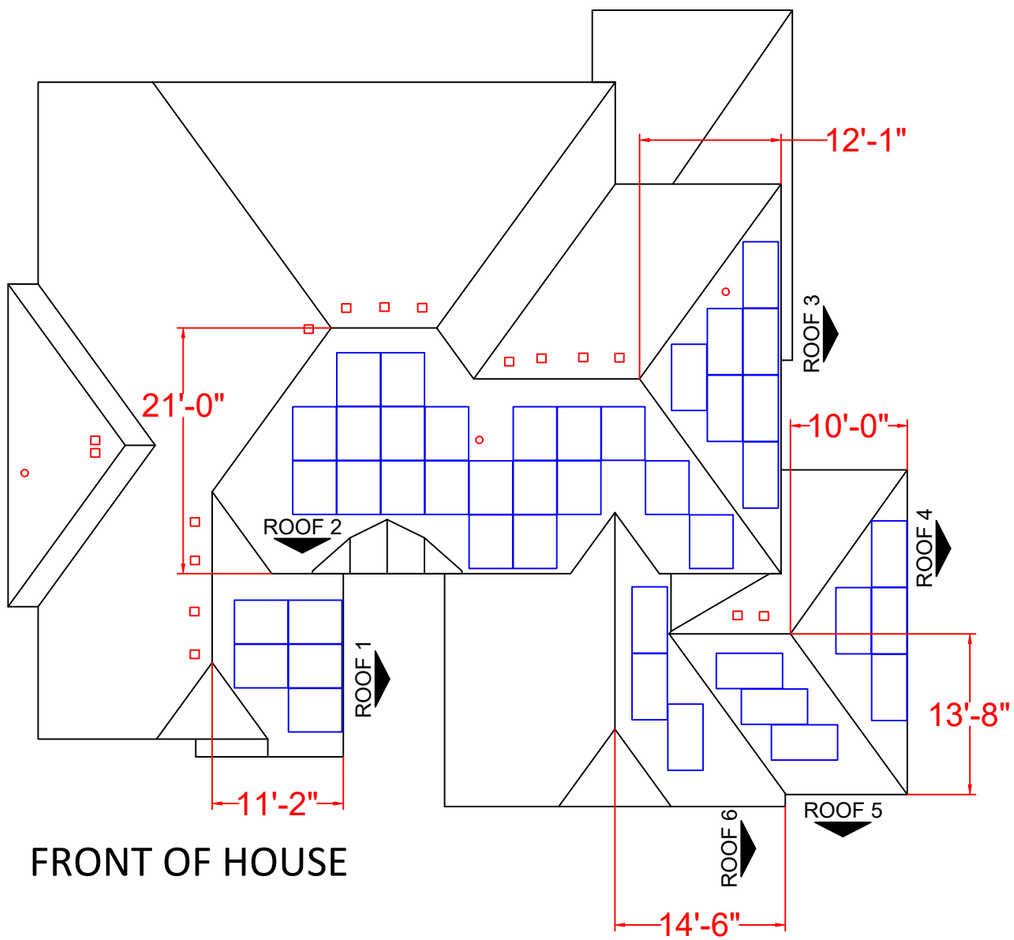
WARNING LABELS

DRAWN DATE	10/25/2024
DRAWN BY	RB

SHEET NUMBER

PV-06

RELEASE FOR CONSTRUCTION
AS NOTED FOR PLAN REVIEW
DEVELOPMENT SERVICES
LEE'S SUMMIT, MISSOURI
11/12/2024



FRONT OF HOUSE

**DIMENSIONS ARE 2D (FLAT)

CONTRACTOR

GREEN COMFORT ENERGY SOLUTIONS
235 S CHURCH ST,
OLATHE,KANSAS 66061
PHONE - (913) 286-4155
LIC. NO. - 2024-0011305

PROJECT NAME & ADDRESS

CALEB DENNIS
2321 NE LAKE BREEZE LN,
LEE'S SUMMIT, MO 64086

APN #: 53440042700000000

AHJ: CITY OF LEE'S SUMMIT
UTILITY: EVERGY

SYSTEM DETAILS

DC SIZE: 16.800 KW DC-(STC)
AC SIZE: 16.128 KW AC
(42) PHONO SOLAR PS400M6-18/VHB
(21) APSYSTEMS DS3-L (240V)

REVISIONS

REV	DESCRIPTION	DATE

SHEET TITLE

INSTALLATION RESOURCE

DRAWN DATE	10/25/2024
DRAWN BY	RB

SHEET NUMBER

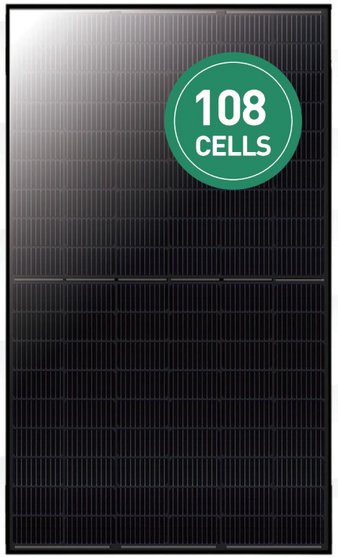
PV-07

Phono® Solar

TWINPLUS MODULE SERIES

HIGH EFFICIENCY MONO-PERC M6-10B-B

390-410W



OUTSTANDING PRODUCT PERFORMANCE

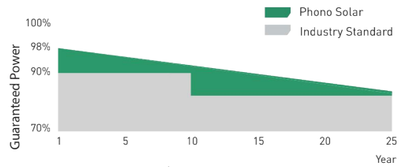
- Competitive high-temperature performance with ameliorated temperature coefficient
- Minimized power loss in cell connection
- Better performance under shading effect
- Decreased nominal operating cell temperature to 45 ± 2°C
- Higher power generation with multi-busbar and half-cut technology

TRUSTWORTHY QUALITY AND RELIABILITY

- Guaranteed 0~+5W positive tolerance secures reliable power output
- 5400Pa maximum snow load, 2400Pa maximum wind load
- Optimized electrical design lowers hot spot risk and operating current

PID RESISTANT

- Industry-leading cell processing technology and electrical design ensure solid PID resistance



12-year Product Warranty | 25-year Linear Performance Warranty

MANAGEMENT SYSTEM CERTIFICATES

IEC 61215, IEC 61730, UL 61730

ISO 9001:2015 / Quality management system

ISO 14001:2015 / Standards for environmental management system

ISO 45001:2018 / International standards for occupational health & safety

Bloomberg NEW ENERGY FINANCE Tier1

TOP PERFORMER 2022 PVEL PV MODULE RELIABILITY SCORECARD

www.phonosolar.com info@phonosolar.com

ELECTRICAL TYPICAL VALUES

Model	1000V	PS390M6-18/VHB		PS395M6-18/VHB		PS400M6-18/VHB		PS405M6-18/VHB		PS410M6-18/VHB	
	1500V	PS390M6H-18/VHB		PS395M6H-18/VHB		PS400M6H-18/VHB		PS405M6H-18/VHB		PS410M6H-18/VHB	
Testing Condition		STC	NOCT	STC	NOCT	STC	NOCT	STC	NOCT	STC	NOCT
Rated Power (Pmpp)		390	290	395	294	400	298	405	301	410	305
Rated Current (Impp)		12.79	10.33	12.88	10.41	12.97	10.48	13.06	10.55	13.15	10.63
Rated Voltage (Vmpp)		30.50	28.08	30.67	28.24	30.85	28.40	31.02	28.55	31.18	28.71
Short Circuit Current (Isc)		13.32	10.76	13.42	10.84	13.52	10.92	13.62	11.00	13.72	11.09
Open Circuit Voltage (Voc)		36.48	34.44	36.67	34.62	36.87	34.81	37.05	34.98	37.23	35.15
Module Efficiency (%)		19.97		20.23		20.48		20.74		21.00	

STC(Standard Testing Conditions):Irradiance 1000W/m², AM 1.5, Cell Temperature 25°C

NOCT (Nominal Operation Cell Temperature): Irradiance 800W/m², Ambient Temperature 20°C, Spectra at AM1.5, Wind at 1m/S

MECHANICAL CHARACTERISTICS

Cell Type	Monocrystalline 182mm x 91mm
Dimension (L× W × H)	Length: 1722mm (67.80 inch) Width: 1134mm (44.65 inch) Height: 30mm (1.18 inch)
Weight	22.0kg (45.80 lbs)
Front Glass	3.2mm Toughened Glass
Frame	Anodized Aluminium Alloy
Cable (Including Connector)	4mm² (IEC), (+):450mm,(-):250mm or Customized Length
Junction Box	IP 68 Rated

TEMPERATURE RATINGS

Voltage Temperature Coefficient	-0.28%/°C
Current Temperature Coefficient	+0.05%/°C
Power Temperature Coefficient	-0.35%/°C
Tolerance	0~+5w
NOCT	45±2°C

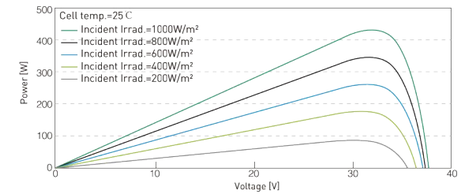
ABSOLUTE MAXIMUM RATING

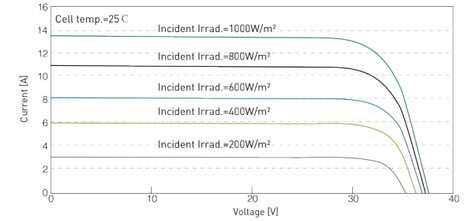
Operating Temperature	From -40 to +85°C
Hail Diameter @ 80km/h	Up to 25mm
Front Side Maximum Static Loading	5400Pa
Rear Side Maximum Static Loading	2400Pa
Maximum Series Fuse Rating	25A
PV Module Classification	II
Module Fire Performance (UL 61730)	Type 1
Maximum System Voltage	DC 1000V/1500V

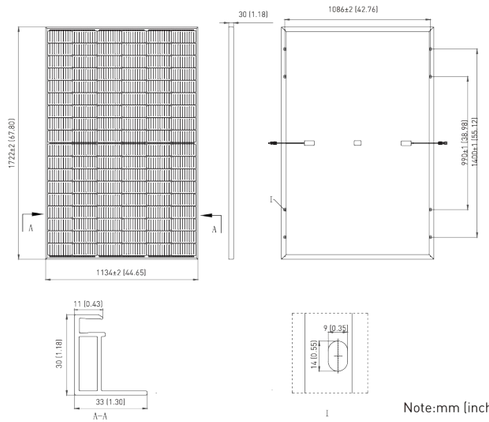
PACKING CONFIGURATION

Container	20' GP	40' HQ
Pieces/Container	216	936

ELECTRICAL CHARACTERISTICS





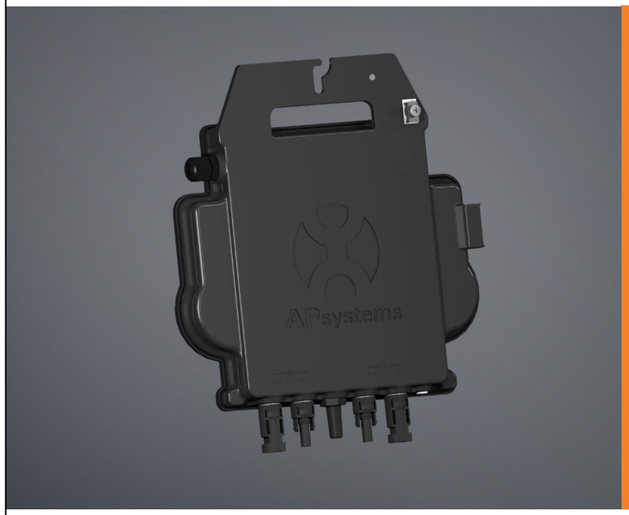


Note:mm (inch)

Phono® Solar

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

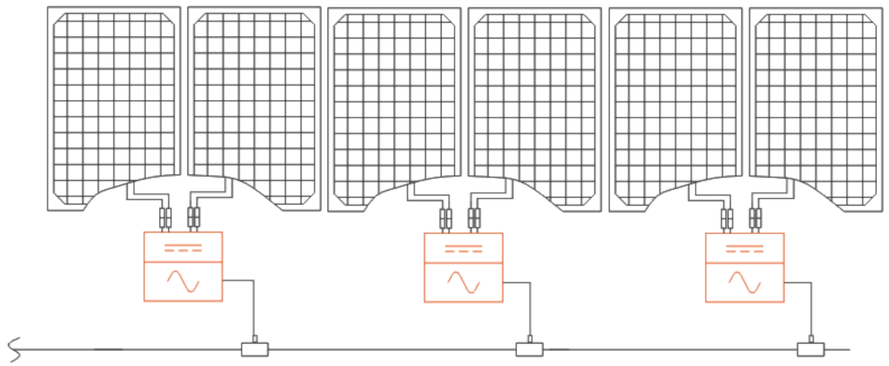
PRODUCT FEATURES

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



2023/04/06 Rev1.8

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.

APsystems
8701 N. Mopac Expy, Ste 160, Austin, TX 78759
apsystems.com

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

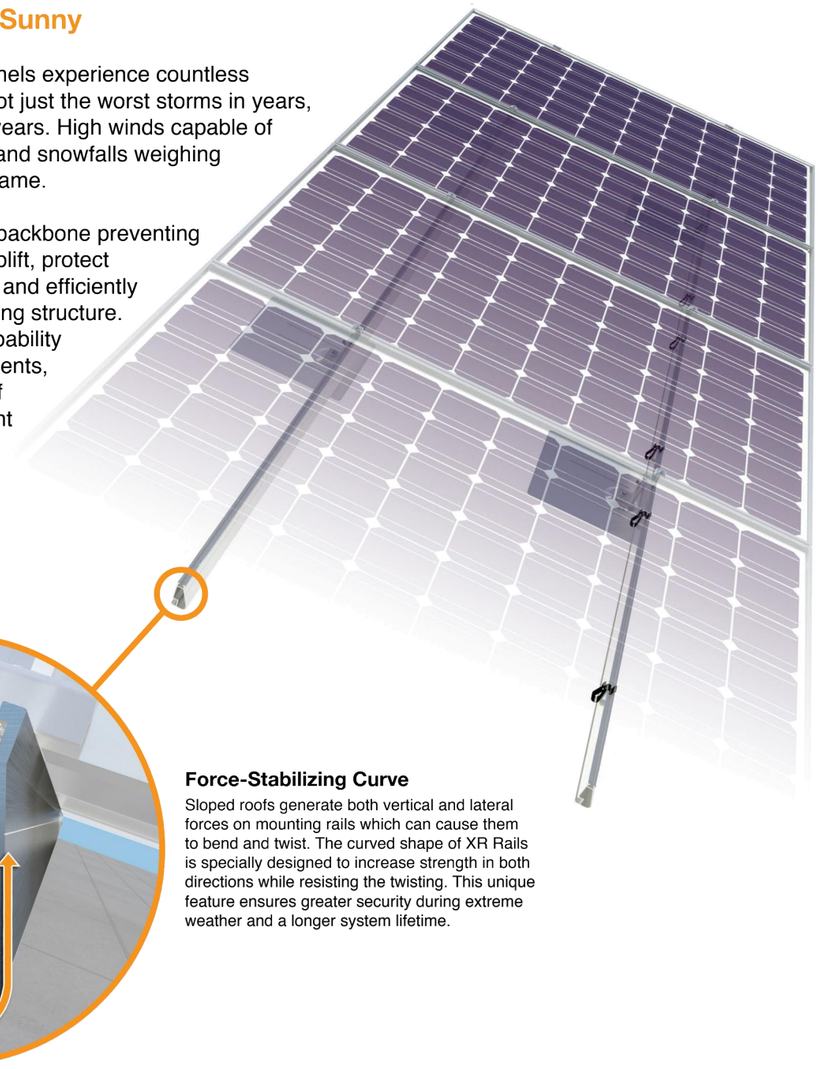
Tech Brief

XR Rail Family

Solar Is Not Always Sunny

Over their lifetime, solar panels experience countless extreme weather events. Not just the worst storms in years, but the worst storms in 40 years. High winds capable of ripping panels from a roof, and snowfalls weighing enough to buckle a panel frame.

XR Rails are the structural backbone preventing these results. They resist uplift, protect against buckling and safely and efficiently transfer loads into the building structure. Their superior spanning capability requires fewer roof attachments, reducing the number of roof penetrations and the amount of installation time.



Force-Stabilizing Curve

Sloped roofs generate both vertical and lateral forces on mounting rails which can cause them to bend and twist. The curved shape of XR Rails is specially designed to increase strength in both directions while resisting the twisting. This unique feature ensures greater security during extreme weather and a longer system lifetime.

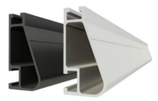
Compatible with Flat & Pitched Roofs

XR Rails are compatible with FlashFoot and other pitched roof attachments.

IronRidge offers a range of tilt leg options for flat roof mounting applications.

Corrosion-Resistant Materials

All XR Rails are made of marine-grade aluminum alloy, then protected with an anodized finish. Anodizing prevents surface and structural corrosion, while also providing a more attractive appearance.



Tech Brief

XR Rail Family

The XR Rail Family offers the strength of a curved rail in three targeted sizes. Each size supports specific design loads, while minimizing material costs. Depending on your location, there is an XR Rail to match.

XR10

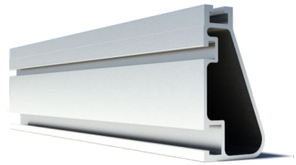
XR10 is a sleek, low-profile mounting rail, designed for regions with light or no snow. It achieves 6 foot spans, while remaining light and economical.

- 6' spanning capability
- Moderate load capability
- Clear & black anodized finish
- Internal splices available

XR100

XR100 is the ultimate residential mounting rail. It supports a range of wind and snow conditions, while also maximizing spans up to 8 feet.

- 8' spanning capability
- Heavy load capability
- Clear & black anodized finish
- Internal splices available



XR1000

XR1000 is a heavyweight among solar mounting rails. It's built to handle extreme climates and spans 12 feet or more for commercial applications.

- 12' spanning capability
- Extreme load capability
- Clear anodized finish
- Internal splices available

Rail Selection

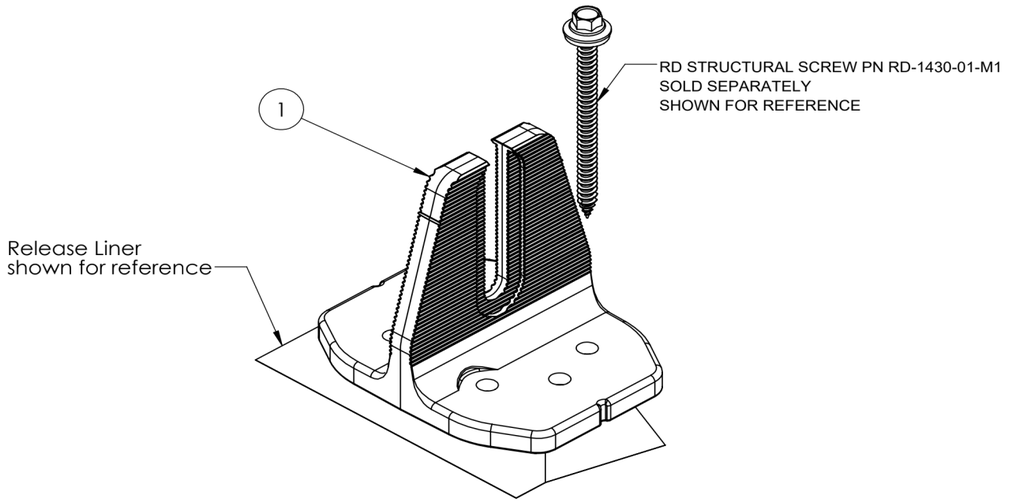
The following table was prepared in compliance with applicable engineering codes and standards. Values are based on the following criteria: ASCE 7-10, Roof Zone 1, Exposure B, Roof Slope of 7 to 27 degrees and Mean Building Height of 30 ft. Visit IronRidge.com for detailed span tables and certifications.

Load		Rail Span					
Snow (PSF)	Wind (MPH)	4'	5' 4"	6'	8'	10'	12'
None	100	XR10		XR100		XR1000	
	120						
	140						
	160						
10-20	100						
	120						
	140						
	160						
30	100						
	160						
40	100						
	160						
50-70	160						
80-90	160						

Cut Sheet

IRONRIDGE

QuickMount® Halo UltraGrip

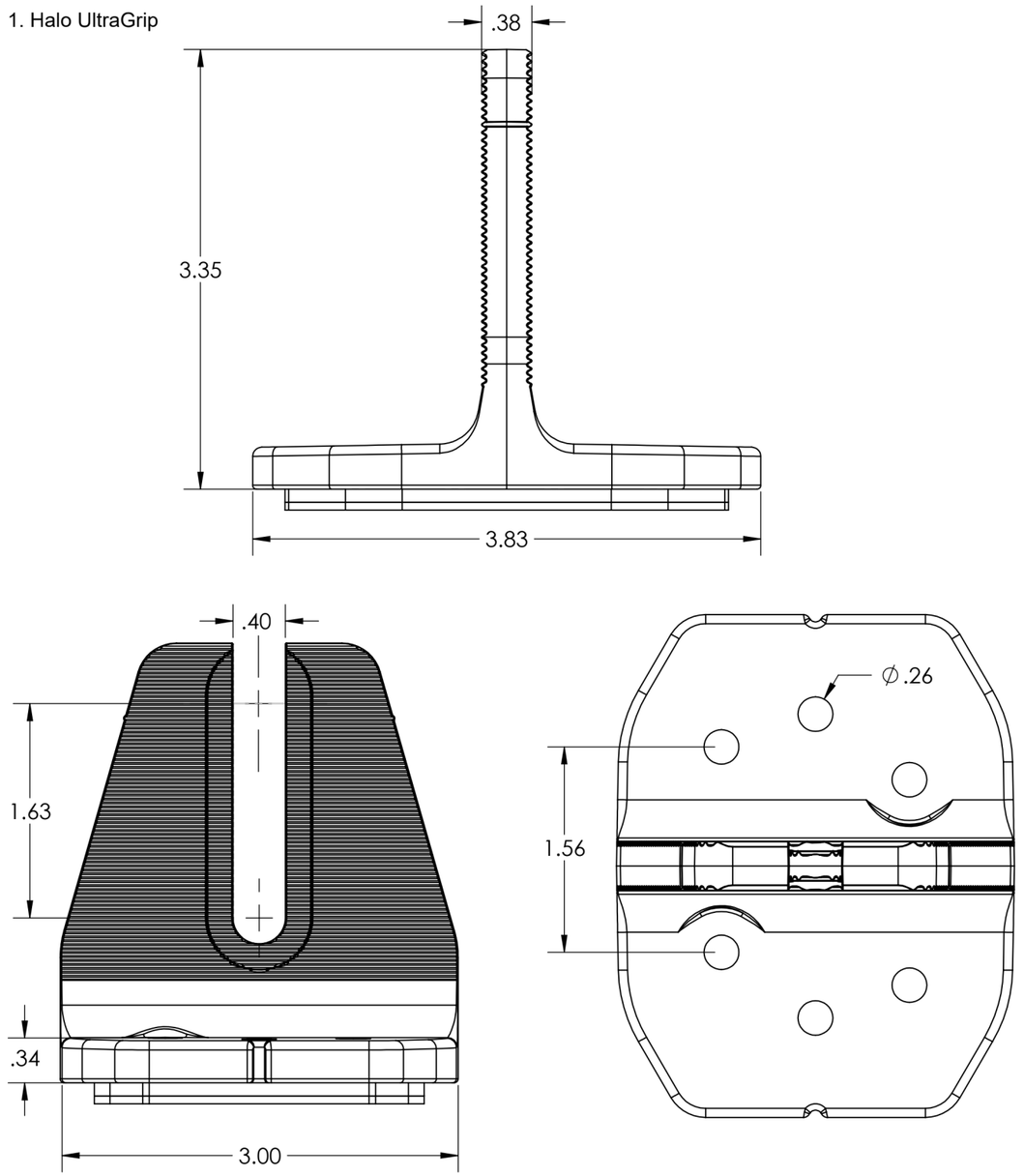


ITEM NO	DESCRIPTION	QTY IN KIT
1	QM Halo UltraGrip(Mill or Black)	1

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

Cut Sheet

1. Halo UltraGrip



Property	Value
Material	300 Series Aluminium
Finish	Mill or Black