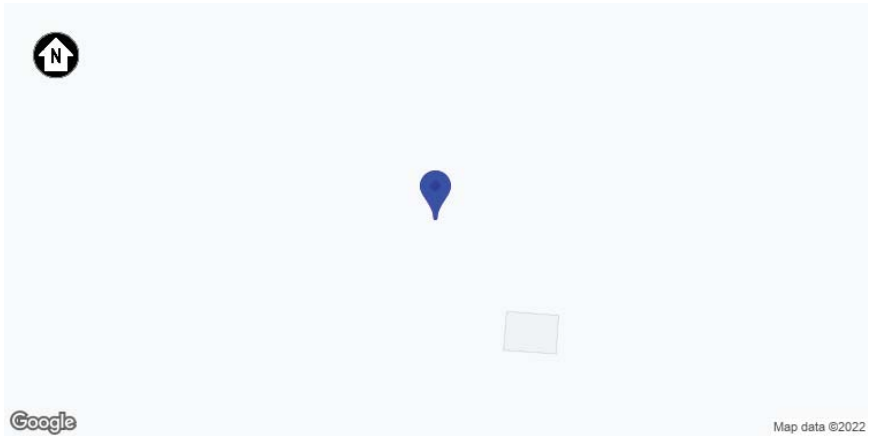
DIRECTORY OF PAGES

PROJECT DETAILS

PROPERTY OWNER	PINE FLAT LLC.
PROPERTY ADDRESS	6600 PINE FLAT RD, GEYSERVILLE, CA 95441 US
APN	131-120-016
ZONING	RESIDENTIAL
USE AND OCCUPANCY CLASSIFICATION	ONE- OR TWO-FAMILY DWELLING GROUP (GROUP R3)
AHJ	COUNTY OF SONOMA
UTILITY COMPANY	PACIFIC GAS & ELECTRIC CO
ELECTRICAL CODE	2019 CEC
FIRE CODE	2019 CFC
OTHER BUILDING CODES	2019 CA BUILDING CODE 2019 CA RES. BUILDING CODE 2019 CA PLUMBING CODE 2019 CA MECHANICAL CODE 2019 CA FUEL GAS CODE 2019 CA ENERGY CODE

CONTRACTOR INFORMATION

COMPANY	PURE POWER SOLUTIONS
LICENSE NUMBER	808734 (C10)
ADDRESS	1083 VINE STREET #279, HEALDSBURG, CA 95448
CONTRACTOR SIGNATURE	



1 PV-1 PLOT SCALE: NTS

2 PV-1 LOCALE SCALE: NTS

SCOPE OF WORK

13KW ROOF MOUNT SOLAR ARRAY WITH ENERGY STORAGE SYSTEM

THIS DOCUMENT HAS BEEN PREPARED FOR THE PURPOSE OF DESCRIBING THE DESIGN OF A PROPOSED PV SYSTEM WITH ENOUGH DETAIL TO DEMONSTRATE COMPLIANCE WITH APPLICABLE CODES AND REGULATIONS. THE DOCUMENT SHALL NOT BE RELIED UPON AS A SUBSTITUTE FOR FOLLOWING MANUFACTURER INSTALLATION INSTRUCTIONS. THE SYSTEM SHALL COMPLY WITH ALL MANUFACTURERS LISTING AND INSTALLATION INSTRUCTIONS, AS WELL AS ALL APPLICABLE CODES. NOTHING IN THIS DOCUMENT SHALL BE INTERPRETED IN A WAY THAT OVERRIDES THEM. CONTRACTOR IS RESPONSIBLE FOR VERIFICATION OF ALL CONDITIONS, DIMENSIONS, AND DETAILS IN THIS DOCUMENT.

SYSTEM DETAILS

DESCRIPTION	NEW GRID-INTERACTIVE PV SYSTEM WITH ``` ENERGY STORAGE
DC RATING OF SYSTEM	13.32KW
AC RATING OF SYSTEM	13.18KW
AC OUTPUT CURRENT	52.2A
INVERTER(S)	36 X ENPHASE IQ7A-72-2-US
MODULE	LG LG370N1K-A6
ARRAY WIRING	(4) BRANCH OF 9 IQ7A-72-2-US MICROINVERTERS

INTERCONNECTION DETAILS

POINT OF CONNECTION	NEW LOAD-SIDE AC CONNECTION PER CEC 705.12(B)(2)(3)(A) AT MSP
UTILITY SERVICE	120/240V 1Φ
LOCATION	MAIN SERVICE PANEL W/400A BUSBAR 200A MCB

SITE DETAILS

ASHRAE EXTREME LOW	-3°C (27°F)
ASHRAE 2% HIGH	37°C (99°F)
CLIMATE DATA SOURCE	UKIAH MUNICIPAL AIRPORT (KUKI)
RISK CATEGORY	II
WIND EXPOSURE CATEGORY	C

P-171367

PURE POWER SOLUTIONS

GRID-TIED SOLAR POWER SYSTEM

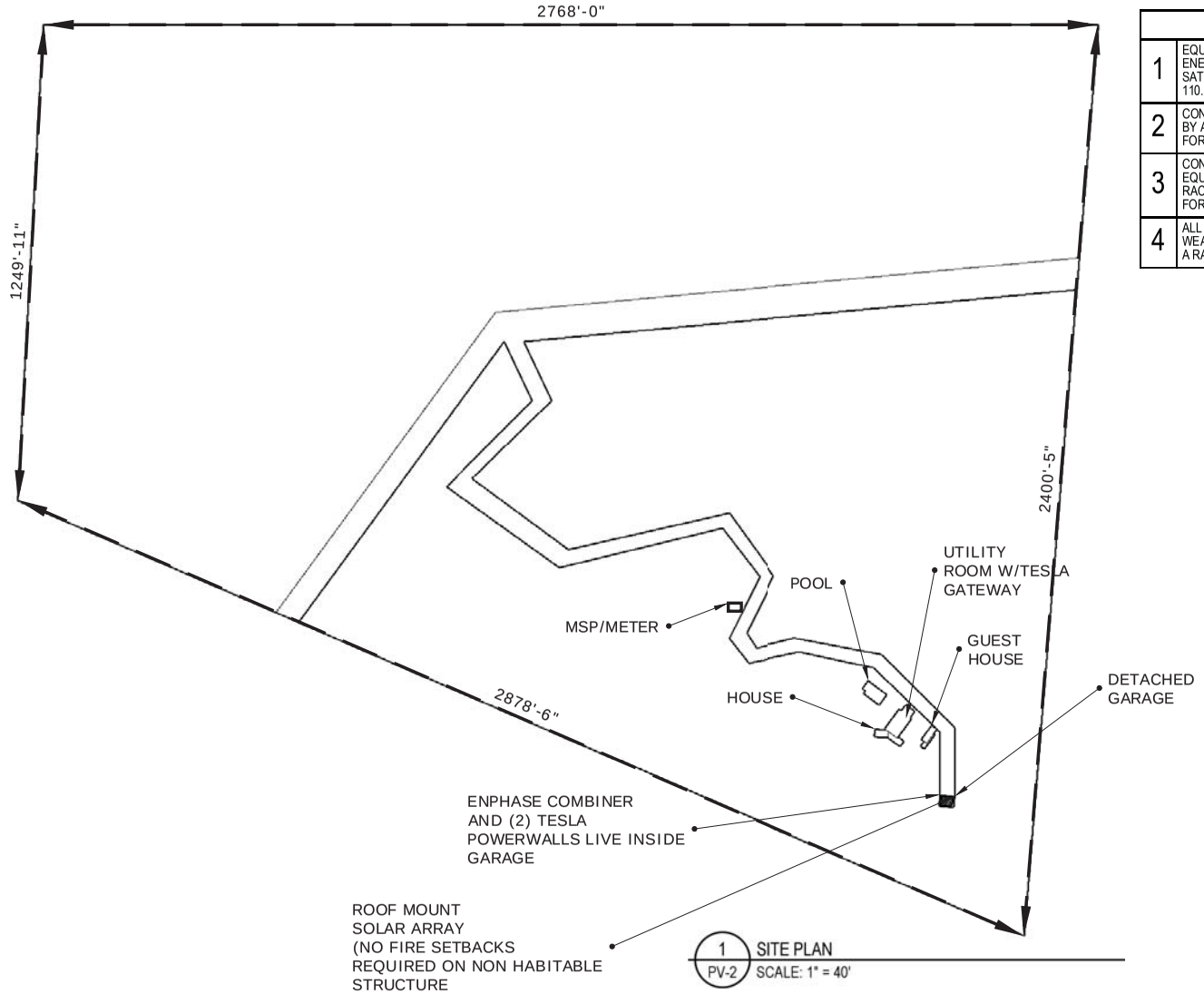
PINE-FLAT-LLC. RESIDENCE
6600 PINE FLAT RD
GEYSERVILLE, CA 95441

PROJECT SUMMARY

DOC ID: 171367-241256-1
DATE: 1/7/22
CREATOR: M.M.
REVIEWER:

REVISIONS

PV-1



GENERAL NOTES	
1	EQUIPMENT LIKELY TO BE WORKED UPON WHILE ENERGIZED SHALL BE INSTALLED IN LOCATIONS THAT SATISFY MINIMUM WORKING CLEARANCES PER CEC 110.26.
2	CONTRACTOR SHALL USE ONLY COMPONENTS LISTED BY A NATIONALLY RECOGNIZED TESTING LABORATORY FOR THE INTENDED USE.
3	CONTRACTOR IS RESPONSIBLE FOR FURNISHING ALL EQUIPMENT, CABLES, ADDITIONAL CONDUITS, RACEWAYS, AND OTHER ACCESSORIES NECESSARY FOR A COMPLETE AND OPERATIONAL PV SYSTEM.
4	ALL EMT CONDUIT FITTINGS SHALL BE LISTED AS WEATHERPROOF FITTINGS AND INSTALLED TO ENSURE A RAINTIGHT FIT, PER CEC 358.42.

P-171367

GRID-TIED SOLAR POWER SYSTEM

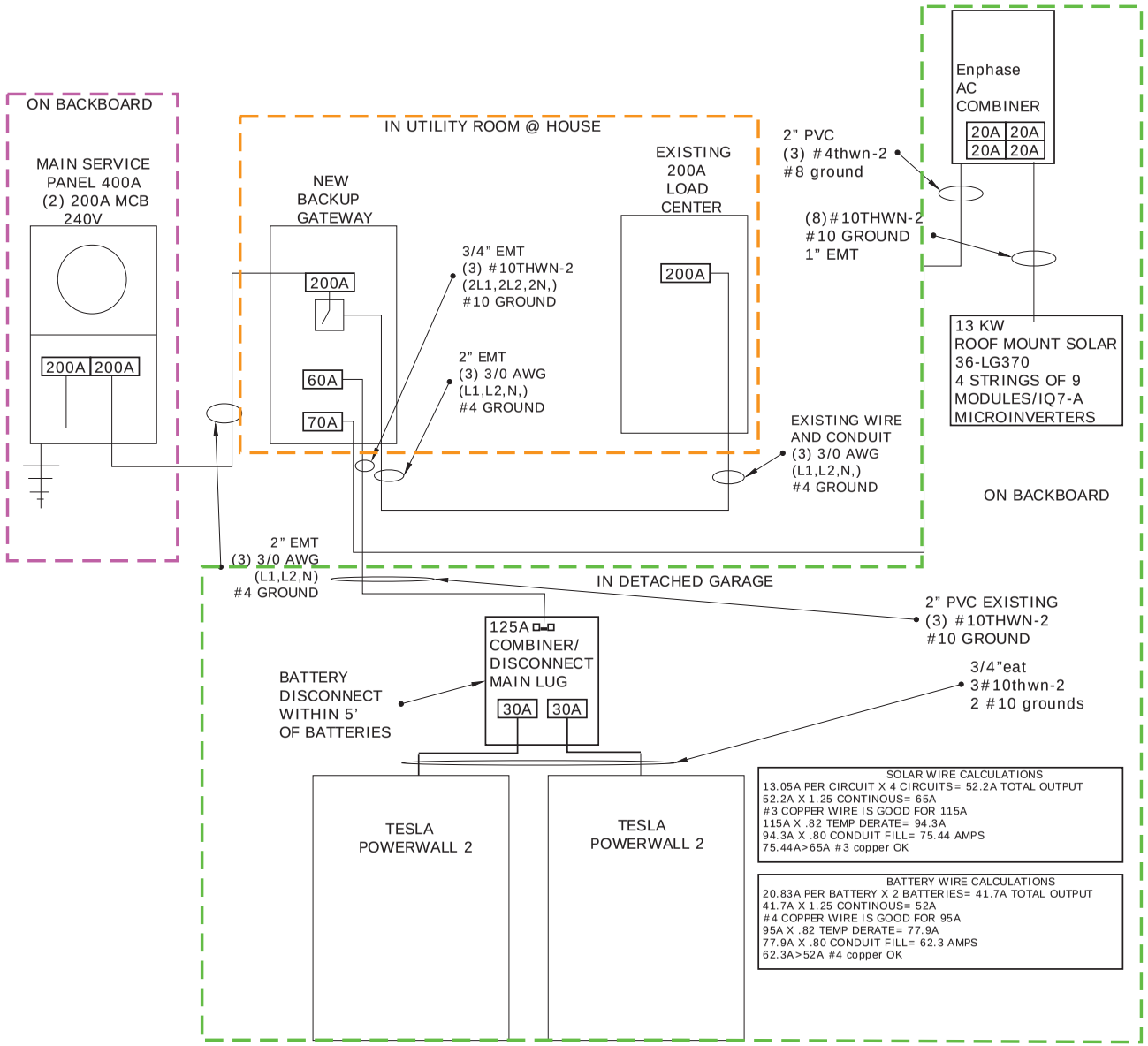
PINE-FLAT-LLC. RESIDENCE
6600 PINE FLAT RD
GEYSERVILLE, CA 95441

SITE PLAN

DOC ID: 171367-211256-1
DATE: 1/7/22
CREATOR: M.M.
REVIEWER:

REVISIONS

PV-2



SOLAR WIRE CALCULATIONS
13.05A PER CIRCUIT X 4 CIRCUITS= 52.2A TOTAL OUTPUT
52.2A X 1.25 CONTINOUS= 65A
#3 COPPER WIRE IS GOOD FOR 115A
115A X .82 TEMP DERATE= 94.3A
94.3A X .80 CONDUIT FILL= 75.44 AMPS
75.44A>65A #3 copper OK

BATTERY WIRE CALCULATIONS
20.83A PER BATTERY X 2 BATTERIES= 41.7A TOTAL OUTPUT
41.7A X 1.25 CONTINOUS= 52A
#4 COPPER WIRE IS GOOD FOR 95A
95A X .82 TEMP DERATE= 77.9A
77.9A X .80 CONDUIT FILL= 62.3 AMPS
62.3A>52A #4 copper OK

GENERAL ELECTRICAL NOTES

1	UTILITY HAS 24-HR UNRESTRICTED ACCESS TO ALL PHOTOVOLTAIC SYSTEM COMPONENTS LOCATED AT THE SERVICE ENTRANCE.
2	CONDUCTORS EXPOSED TO SUNLIGHT SHALL BE LISTED AS SUNLIGHT RESISTANT PER NEC ARTICLE 300.6 (C) (1) AND ARTICLE 310.10 (D).
3	CONDUCTORS EXPOSED TO WET LOCATIONS SHALL BE SUITABLE FOR USE IN WET LOCATIONS PER NEC ARTICLE 310.10 (C).

GROUNDING NOTES

1	ALL EQUIPMENT SHALL BE PROPERLY GROUNDED PER THE REQUIREMENTS OF NEC ARTICLES 250 & 690
2	PV MODULES SHALL BE GROUNDED TO MOUNTING RAILS USING MODULE LUGS OR RACKING INTEGRATED GROUNDING CLAMPS AS ALLOWED BY LOCAL JURISDICTION. ALL OTHER EXPOSED METAL PARTS SHALL BE GROUNDED USING UL-LISTED LAY-IN LUGS.
3	INSTALLER SHALL CONFIRM THAT MOUNTING SYSTEM HAS BEEN EVALUATED FOR COMPLIANCE WITH UL 2703 "GROUNDING AND BONDING" WHEN USED WITH PROPOSED PV MODULE.
4	IF THE EXISTING MAIN SERVICE PANEL DOES NOT HAVE A VERIFIABLE GROUNDING ELECTRODE, IT IS THE CONTRACTOR'S RESPONSIBILITY TO INSTALL A SUPPLEMENTAL GROUNDING ELECTRODE.
5	AC SYSTEM GROUNDING ELECTRODE CONDUCTOR (GEC) SHALL BE A MINIMUM SIZE #8AWG WHEN INSULATED, #6AWG IF BARE WIRE.
6	EQUIPMENT GROUNDING CONDUCTORS SHALL BE SIZED ACCORDING TO NEC ARTICLE 690.45, AND BE A MINIMUM OF #10AWG WHEN NOT EXPOSED TO DAMAGE, AND #6AWG SHALL BE USED WHEN EXPOSED TO DAMAGE
7	GROUNDING AND BONDING CONDUCTORS, IF INSULATED, SHALL BE COLOR CODED GREEN, OR MARKED GREEN IF #4AWG OR LARGER

1 PV-3 SINGLE-LINE DIAGRAM
SCALE: NTS

P-171367

GRID-TIED SOLAR POWER SYSTEM

PINE-FLAT-LLC. RESIDENCE
6600 PINE FLAT RD
GEYSERVILLE, CA 95441

SINGLE-LINE DIAGRAM

PROJECT ID: 171367
DATE: 01/07/22
CREATED BY: M.M.
CHECKED BY:

REVISIONS

PV-3

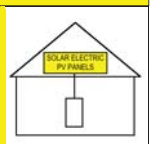
C1 - AC COMBINER
(ENPHASE IQ COMBINER 3-ES)
3

MSP - MAIN SERVICE PANEL
1 2 4 5 6

1 SEE NOTE NO. 4 (MSP)

PHOTOVOLTAIC 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.



CEC690.56(C)(1) AND CFC1204.5.1,1204.5.1

3 AC COMBINER PANEL (C1)

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

CEC705.12(B)(2)(3)(C)

2 POINT-OF-INTERCONNECTION OR AT MAIN SERVICE DISCONNECT (MSP)

! CAUTION !
POWER TO THIS BUILDING IS ALSO FROM ROOF ARRAY WITH DISCONNECTS AS SHOWN

INSTALLED BY PURE POWER SOLUTIONS

CEC690.56(B),705.10

4 AC DISCONNECT (CB5 IN MSP)

MAXIMUM AC OPERATING CURRENT: 52.2A
MAXIMUM AC OPERATING VOLTAGE: 240V

CEC690.54

5 ANY AC ELECTRICAL PANEL THAT IS FED BY BOTH THE UTILITY AND THE PHOTOVOLTAIC SYSTEM (MSP)

! WARNING !
DUAL POWER SOURCE. SECOND SOURCE IS PHOTOVOLTAIC SYSTEM.

CEC705.12(B)(3)

6 SOLAR BACKFEED BREAKER AS MAIN AC SOLAR DISCONNECT (CB5 IN MSP)

PV SYSTEM DISCONNECT

CEC690.13(B)

LABELING NOTES	
1	ALL PLAQUES AND SIGNAGE REQUIRED BY 2019 CEC AND 2019 CFC WILL BE INSTALLED AS REQUIRED.
2	LABELS, WARNING(S) AND MARKING SHALL COMPLY WITH ANSI Z535.4, WHICH REQUIRES THAT DANGER, WARNING, AND CAUTION SIGNS USED THE STANDARD HEADER COLORS, HEADER TEXT, AND SAFETY ALERT SYMBOL ON EACH LABEL. THE ANSI STANDARD REQUIRES A HEADING THAT IS AT LEAST 50% TALLER THAN THE BODY TEXT, IN ACCORDANCE WITH CEC 110.21(B).
3	A PERMANENT PLAQUE OR DIRECTORY SHALL BE INSTALLED PROVIDING THE LOCATION OF THE SERVICE DISCONNECTING MEANS AND THE PHOTOVOLTAIC SYSTEM DISCONNECTING MEANS IF NOT IN THE SAME LOCATION IN ACCORDANCE WITH CEC 690.56(B).
4	LABEL(S) WITH MARKING, "TURN RAPID SHUTDOWN SWITCH TO THE 'OFF' POSITION TO SHUT DOWN PV SYSTEM AND REDUCE SHOCK HAZARD IN THE ARRAY," SHALL BE LOCATED WITHIN 3 FT OF SERVICE DISCONNECTING MEANS THE TITLE SHALL UTILIZE CAPITALIZED LETTERS WITH A MINIMUM HEIGHT OF 3/8" IN BLACK ON A YELLOW BACKGROUND, AND REMAINING TEXT SHALL BE CAPITALIZED WITH A MINIMUM HEIGHT OF 3/16" IN BLACK ON WHITE BACKGROUND

P-171367

GRID-TIED SOLAR POWER SYSTEM

PINE-FLAT-LLC. RESIDENCE
6600 PINE FLAT RD
GEYSERVILLE, CA 95441

SAFETY LABELS

DOC ID: 171367-211256-1
DATE: 1/7/22
CREATOR: M.M.
REVIEWER:

REVISIONS

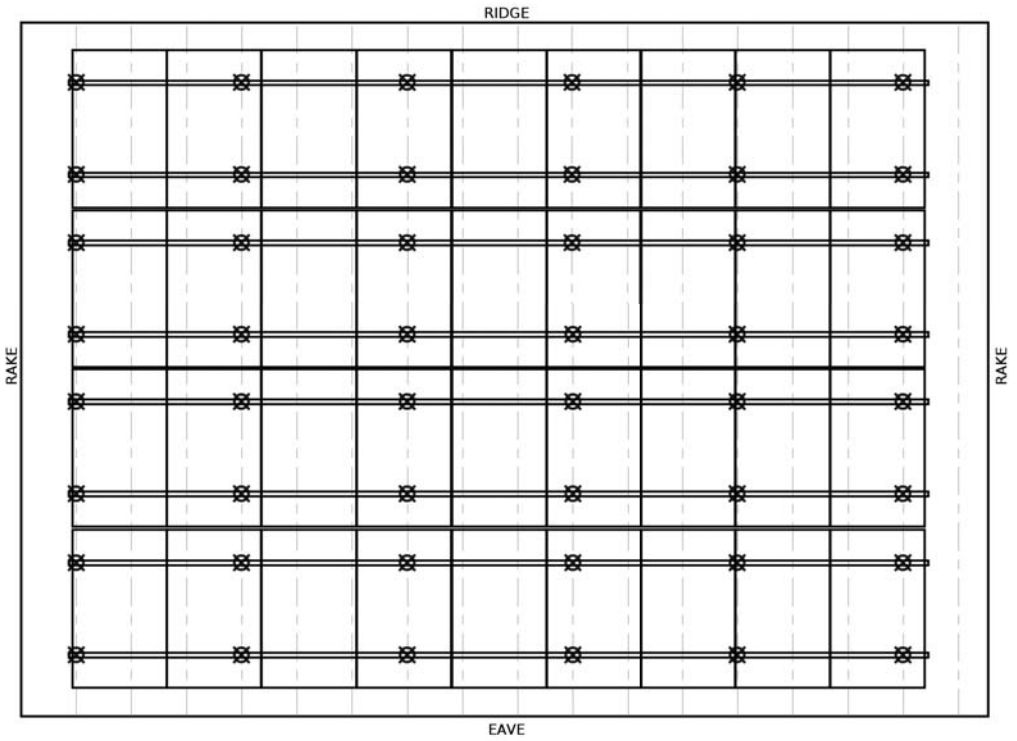
PV-4

ROOF PROPERTIES	
ROOF MATERIAL	SINGLE-PLY MEMBRANE (1 LAYER)
SLOPE	1/12 (4.8°)
MEAN ROOF HEIGHT	21FT
DECK SHEATHING	15/32" OSB
CONSTRUCTION	RAFTERS (2X6'S), 24IN OC

MODULE MECHANICAL PROPERTIES	
MODEL	LG LG370N1K-A6
DIMENSIONS (AREA)	68.5IN X 41.0IN X 1.6IN (19.5 SQ FT)
WEIGHT	41LB

MOUNTING SYSTEM PROPERTIES	
RAIL MODEL	IRONRIDGE XR100
ANCHOR MODEL	U-ANCHORS
FASTENING METHOD	3.0 INCH EMBEDMENT INTO RAFTERS WITH (2) 5/16IN DIA. FASTENERS
MAX. ALLOW. RAIL SPAN	108.0IN (ZONES 1, 2, AND 3)
MAX. MOUNT SPACING	72.0IN (ZONES 1, 2, AND 3)
MAX. ALLOW. CANTILEVER	43.2IN (ZONES 1, 2, AND 3)
GROUNDING AND BONDING	INTEGRAL GROUNDING CERTIFIED TO UL 2703 REQUIREMENTS

NOTES	
1	RAFTER LOCATIONS ARE APPROXIMATE. ACTUAL LOCATIONS MAY DIFFER AND CONTRACTOR MAY NEED TO ADJUST MOUNT LOCATIONS. IN NO CASE SHALL THE MOUNT SPACING EXCEED "MAX. MOUNT SPACING"



1 PV-5 ATTACHMENT PLAN (ORTHOGONAL PROJECTION)
SCALE: 3/16" = 1'

P-171367

PURE POWER SOLUTIONS

GRID-TIED SOLAR POWER SYSTEM

PINE-FLAT-LLC. RESIDENCE
6600 PINE FLAT RD
GEYSERVILLE, CA 95441

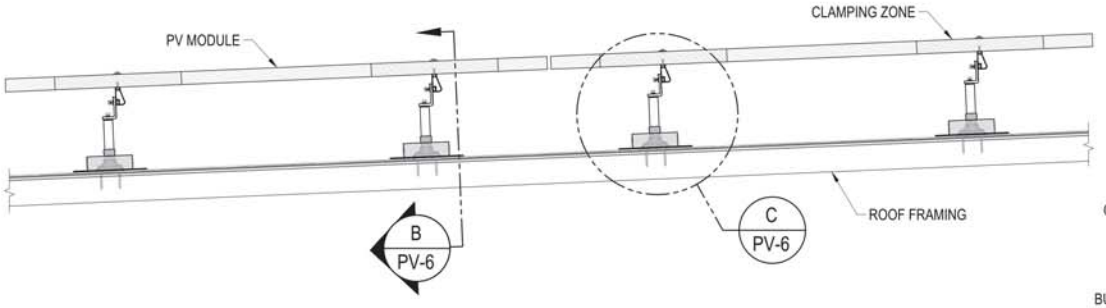
ATTACHMENT PLAN

DOC ID: 171367-211256-1
DATE: 1/7/22
CREATOR: M.M
REVIEWER:

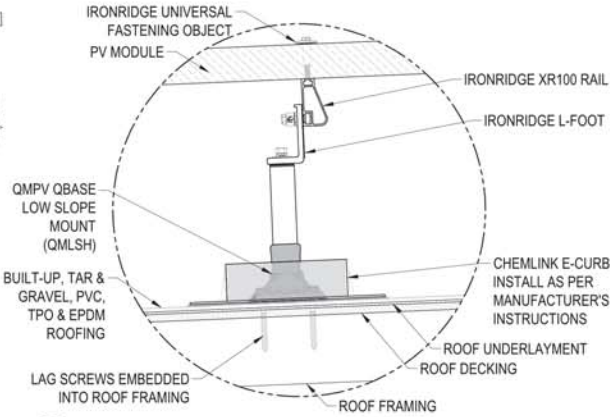
REVISIONS

PV-5

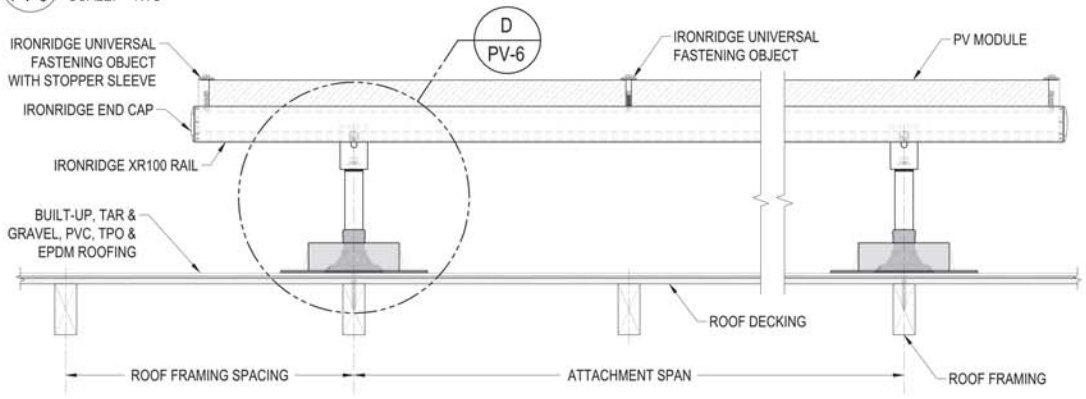
MOUNTING SYSTEM NOTES	
1	FLASHING SHALL BE APPLIED IN ACCORDANCE WITH MANUFACTURERS' INSTRUCTIONS.
2	IF THERE IS ANY CONFLICT BETWEEN WHAT IS DEPICTED HERE AND INSTRUCTIONS PROVIDED BY A MANUFACTURER, THE MANUFACTURER'S INSTRUCTIONS SHALL SUPERCEDE.



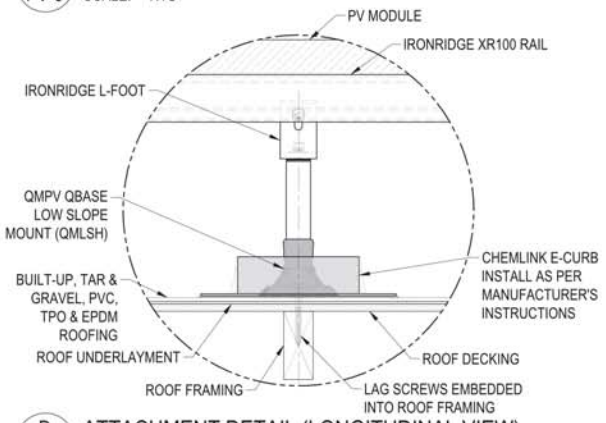
A PV-6 RACKING ELEVATION (TRANSVERSE VIEW)
SCALE: NTS



C PV-6 ATTACHMENT DETAIL (TRANSVERSE VIEW)
SCALE: NTS



B PV-6 RACKING ELEVATION (LONGITUDINAL VIEW)
SCALE: NTS



D PV-6 ATTACHMENT DETAIL (LONGITUDINAL VIEW)
SCALE: NTS

P-171367

GRID-TIED SOLAR POWER SYSTEM

PINE-FLAT-LLC. RESIDENCE
6600 PINE FLAT RD
GEYSERVILLE, CA 95441

ATTACHMENT DETAILS

DOC ID: 171367-211256-1
DATE: 1/7/22
CREATOR: M.M.
REVIEWER:

REVISIONS

PV-6

Conductor, Conduit, and OCPD Sizing Validation

1. Maximum System Voltage Test

1.1. Enphase inverter w/36 LG LG370N1K-A6 (370W)s

Array Properties

Array Type	Microinverter Array
System Description	Enphase inverter w/36 LG LG370N1K-A6 (370W)s
Module	LG370N1K-A6 (370W)
Highest number of modules in series in a PV Source Circuit	1
Design Low Temp.	-3°C
Module Voc	41.9V
Temp. Coefficient Voc	-0.109V/C

CEC Code Validation Tests

1.	PV Source Circuit maximum Voc must not exceed 600V 44.95V < 600V = true	PASS

CEC Code Calculations

A. Maximum Voltage of PV Source Circuit 44.95V
see 690.7(A)

CEC 690.7(A) requires that if the PV module manufacturer provides a temperature coefficient of open-circuit voltage, it must be used to calculate the PV array's maximum system voltage. It includes an information note recommending the use of the ASHRAE 'Extreme Annual Mean Minimum Design Dry Bulb Temperature' as the design low temperature. Using these values, the module Voc (41.9V) will increase to 44.95V at the design low temperature (-3°C).

(-3°C - 25°C) X -0.109V/C + 41.9V = 44.95V
The module Voc at the design low temperature is 44.95V.

44.95V X 1 = 44.95V

2. Wire, Conduit, and OCPD Code Compliance Validation

2.1. #1: AC Branch Output: Transition Box to AC Combiner

Circuit Section Properties

Conductor	10 AWG THWN-2, Copper
Equipment Ground Conductor (EGC)	10 AWG THWN-2, Copper
OCPD(s)	20A
Raceway/Cable	1" dia. EMT
Lowest Terminal Temperature Rating	90°C
Maximum Wire Temperature	57°C
Power Source Description	Branch of 9 IQ7A-72-2-US microinverters
Power Source Current	13.05A
Voltage	240V

CEC Code Calculations

A. Continuous Current 13.05A
see Article 100

Equipment maximum rated output current is 9 X 1.45A = 13.05A

B. Ampacity of Conductor 40A
see Table 310.15(B)(16)

Ampacity (30°C) for a copper conductor with 90°C insulation in conduit/cable is 40A.

C. Derated Ampacity of Conductor 19.88A
see Table 310.15(B)(3)(c), Table 310.15(B)(3)(a), and Article 100

The temperature factor for 90°C insulation at 57°C is 0.71.
The fill factor for a conduit/cable that has 8 wires is 0.7.
The ampacity derated for Conditions of Use is the product of the conductor ampacity (40A) multiplied by the temperature factor (0.71) and by the fill factor (0.7).

40A X 0.71 X 0.7 = 19.88A

D. Max Current for Terminal Temp. Rating 40A
see 110.14(C)

The lowest temperature rating for this conductor at any termination is 90°C.
Using the method specified in 110.14(C), the maximum current permitted to ensure that the device terminal temperature does not exceed its 90°C rating would be the amount referenced in the 90°C column in Table 310.15(B)(16), which is 40A.

E. Minimum Allowed OCPD Rating 16A
see 240.4

CEC 690.9(B) requires that the OCPD be rated for no less than 1.25 times the Continuous Current of the circuit.

13.05A X 1.25 = 16.31A rounded down to 16A

F. Maximum Allowed OCPD Rating 30A
see 240.4(D)

CEC 240.4(D) requires that OCPD rating not exceed 30A when protecting a Copper 10 AWG conductor.

G. Minimum Required EGC Size 12 AWG
see Table 250.122

The smallest EGC size allowed is 12 AWG for OCPD rating 20A according to Table 250.122.

H. Minimum Recommended Conduit Size 1" dia.
see 300.17

The total area of all conductors is 0.2532in². With a maximum fill rate of 0.4, the recommended conduit diameter is 1.

Qty	Description	Size	Type	Area	Total Area
8	Conductor	10 AWG	THWN-2	0.0211in²	0.1688in²
4	Equipment Ground	10 AWG	THWN-2	0.0211in²	0.0844in²
12					0.2532in²

0.2532in² / 0.4 = 0.633in² (Corresponding to a diameter of 1")

CEC Code Validation Tests

1.	OCPD rating must be at least 125% of Continuous Current (240.4) 20A >= 13.05A X 1.25 = true	PASS
2.	Derated ampacity must exceed OCPD rating, or rating of next smaller OCPD (240.4(B) and 240.4) 19.88A >= 15A (Next Smaller OCPD Rating) = true	PASS
3.	OCPD rating must not exceed max OCPD rating for conductor (240.4) 20A (OCPD Rating) <= 30A = true	PASS
4.	Derated Ampacity must be greater than or equal to the Continuous Current (Article 100) 19.88A >= 13.05A = true	PASS
5.	Conductor Ampacity must be at least 125% of Continuous Current (215.2(A)(1)) 40A > 13.05A x 1.25 = true	PASS
6.	Max current for terminal must be at least 125% of the Continuous Current. (110.14(C)) 40A >= 13.05A X 1.25 = true	PASS
7.	EGC must meet code requirements for minimum size (Table 250.122) 10 AWG >= 12 AWG = true	PASS
8.	Conduit must meet code recommendation for minimum size (300.17) 1in. >= 1in. = true	PASS

2.2. #2: AC Branch Output: Transition Box to AC Combiner

Circuit Section Properties

Conductor	10 AWG THWN-2, Copper
Equipment Ground Conductor (EGC)	10 AWG THWN-2, Copper
OCPD(s)	20A
Raceway/Cable	1" dia. EMT
Lowest Terminal Temperature Rating	90°C
Maximum Wire Temperature	57°C
Power Source Description	Branch of 9 IQ7A-72-2-US microinverters
Power Source Current	13.05A
Voltage	240V

CEC Code Calculations

A. Continuous Current 13.05A
see Article 100

Equipment maximum rated output current is 9 X 1.45A = 13.05A

B. Ampacity of Conductor 40A
see Table 310.15(B)(16)

Ampacity (30°C) for a copper conductor with 90°C insulation in conduit/cable is 40A.

C. Derated Ampacity of Conductor 19.88A
see Table 310.15(B)(3)(c), Table 310.15(B)(3)(a), and Article 100

The temperature factor for 90°C insulation at 57°C is 0.71.
The fill factor for a conduit/cable that has 8 wires is 0.7.
The ampacity derated for Conditions of Use is the product of the conductor ampacity (40A) multiplied by the temperature factor (0.71) and by the fill factor (0.7).

40A X 0.71 X 0.7 = 19.88A

D. Max Current for Terminal Temp. Rating 40A
see 110.14(C)

The lowest temperature rating for this conductor at any termination is 90°C.
Using the method specified in 110.14(C), the maximum current permitted to ensure that the device terminal temperature does not exceed its 90°C rating would be the amount referenced in the 90°C column in Table 310.15(B)(16), which is 40A.

E. Minimum Allowed OCPD Rating 16A
see 240.4

CEC 690.9(B) requires that the OCPD be rated for no less than 1.25 times the Continuous Current of the circuit.

13.05A X 1.25 = 16.31A rounded down to 16A

F. Maximum Allowed OCPD Rating 30A
see 240.4(D)

CEC 240.4(D) requires that OCPD rating not exceed 30A when protecting a Copper 10 AWG conductor.

G. Minimum Required EGC Size 12 AWG
see Table 250.122

The smallest EGC size allowed is 12 AWG for OCPD rating 20A according to Table 250.122.

H. Minimum Recommended Conduit Size 1" dia.
see 300.17

The total area of all conductors is 0.2532in². With a maximum fill rate of 0.4, the recommended conduit diameter is 1.

Qty	Description	Size	Type	Area	Total Area
8	Conductor	10 AWG	THWN-2	0.0211in²	0.1688in²
4	Equipment Ground	10 AWG	THWN-2	0.0211in²	0.0844in²
12					0.2532in²

0.2532in² / 0.4 = 0.633in² (Corresponding to a diameter of 1")

CEC Code Validation Tests

1.	OCPD rating must be at least 125% of Continuous Current (240.4) 20A >= 13.05A X 1.25 = true	PASS
2.	Derated ampacity must exceed OCPD rating, or rating of next smaller OCPD (240.4(B) and 240.4) 19.88A >= 15A (Next Smaller OCPD Rating) = true	PASS
3.	OCPD rating must not exceed max OCPD rating for conductor (240.4) 20A (OCPD Rating) <= 30A = true	PASS
4.	Derated Ampacity must be greater than or equal to the Continuous Current (Article 100) 19.88A >= 13.05A = true	PASS
5.	Conductor Ampacity must be at least 125% of Continuous Current (215.2(A)(1)) 40A > 13.05A x 1.25 = true	PASS
6.	Max current for terminal must be at least 125% of the Continuous Current. (110.14(C)) 40A >= 13.05A X 1.25 = true	PASS
7.	EGC must meet code requirements for minimum size (Table 250.122) 10 AWG >= 12 AWG = true	PASS
8.	Conduit must meet code recommendation for minimum size (300.17) 1in. >= 1in. = true	PASS

2.3. #3: AC Branch Output: Transition Box to AC Combiner

Circuit Section Properties

Conductor	10 AWG THWN-2, Copper
Equipment Ground Conductor (EGC)	10 AWG THWN-2, Copper
OCPD(s)	20A
Raceway/Cable	1" dia. EMT
Lowest Terminal Temperature Rating	90°C
Maximum Wire Temperature	57°C
Power Source Description	Branch of 9 IQ7A-72-2-US microinverters
Power Source Current	13.05A
Voltage	240V

CEC Code Calculations

A. Continuous Current 13.05A
see Article 100

Equipment maximum rated output current is 9 X 1.45A = 13.05A

B. Ampacity of Conductor 40A
see Table 310.15(B)(16)

Ampacity (30°C) for a copper conductor with 90°C insulation in conduit/cable is 40A.

C. Derated Ampacity of Conductor 19.88A
see Table 310.15(B)(3)(c), Table 310.15(B)(3)(a), and Article 100

The temperature factor for 90°C insulation at 57°C is 0.71.
The fill factor for a conduit/cable that has 8 wires is 0.7.
The ampacity derated for Conditions of Use is the product of the conductor ampacity (40A) multiplied by the temperature factor (0.71) and by the fill factor (0.7).

40A X 0.71 X 0.7 = 19.88A

D. Max Current for Terminal Temp. Rating 40A
see 110.14(C)

The lowest temperature rating for this conductor at any termination is 90°C.
Using the method specified in 110.14(C), the maximum current permitted to ensure that the device terminal temperature does not exceed its 90°C rating would be the amount referenced in the 90°C column in Table 310.15(B)(16), which is 40A.

E. Minimum Allowed OCPD Rating 16A
see 240.4

CEC 690.9(B) requires that the OCPD be rated for no less than 1.25 times the Continuous Current of the circuit.

13.05A X 1.25 = 16.31A rounded down to 16A

F. Maximum Allowed OCPD Rating 30A
see 240.4(D)

CEC 240.4(D) requires that OCPD rating not exceed 30A when protecting a Copper 10 AWG conductor.

G. Minimum Required EGC Size 12 AWG
see Table 250.122

The smallest EGC size allowed is 12 AWG for OCPD rating 20A according to Table 250.122.

H. Minimum Recommended Conduit Size 1" dia.
see 300.17

The total area of all conductors is 0.2532in². With a maximum fill rate of 0.4, the recommended conduit diameter is 1.

Qty	Description	Size	Type	Area	Total Area
8	Conductor	10 AWG	THWN-2	0.0211in²	0.1688in²
4	Equipment Ground	10 AWG	THWN-2	0.0211in²	0.0844in²
12					0.2532in²

0.2532in² / 0.4 = 0.633in² (Corresponding to a diameter of 1")

CEC Code Validation Tests

1.	OCPD rating must be at least 125% of Continuous Current (240.4) 20A >= 13.05A X 1.25 = true	PASS
2.	Derated ampacity must exceed OCPD rating, or rating of next smaller OCPD (240.4(B) and 240.4) 19.88A >= 15A (Next Smaller OCPD Rating) = true	PASS
3.	OCPD rating must not exceed max OCPD rating for conductor (240.4) 20A (OCPD Rating) <= 30A = true	PASS
4.	Derated Ampacity must be greater than or equal to the Continuous Current (Article 100) 19.88A >= 13.05A = true	PASS
5.	Conductor Ampacity must be at least 125% of Continuous Current (215.2(A)(1)) 40A > 13.05A x 1.25 = true	PASS
6.	Max current for terminal must be at least 125% of the Continuous Current. (110.14(C)) 40A >= 13.05A X 1.25 = true	PASS
7.	EGC must meet code requirements for minimum size (Table 250.122) 10 AWG >= 12 AWG = true	PASS
8.	Conduit must meet code recommendation for minimum size (300.17) 1in. >= 1in. = true	PASS

2.4. #4: AC Branch Output: Transition Box to AC Combiner

Circuit Section Properties

Conductor	10 AWG THWN-2, Copper
Equipment Ground Conductor (EGC)	10 AWG THWN-2, Copper
OCPD(s)	20A
Raceway/Cable	1" dia. EMT
Lowest Terminal Temperature Rating	90°C
Maximum Wire Temperature	57°C
Power Source Description	Branch of 9 IQ7A-72-2-US microinverters
Power Source Current	13.05A
Voltage	240V

CEC Code Calculations

A. Continuous Current 13.05A
see Article 100

Equipment maximum rated output current is 9 X 1.45A = 13.05A

B. Ampacity of Conductor 40A
see Table 310.15(B)(16)

Ampacity (30°C) for a copper conductor with 90°C insulation in conduit/cable is 40A.

C. Derated Ampacity of Conductor 19.88A
see Table 310.15(B)(3)(c), Table 310.15(B)(3)(a), and Article 100

The temperature factor for 90°C insulation at 57°C is 0.71.
The fill factor for a conduit/cable that has 8 wires is 0.7.
The ampacity derated for Conditions of Use is the product of the conductor ampacity (40A) multiplied by the temperature factor (0.71) and by the fill factor (0.7).
40A X 0.71 X 0.7 = 19.88A

D. Max Current for Terminal Temp. Rating 40A
see 110.14(C)

The lowest temperature rating for this conductor at any termination is 90°C.
Using the method specified in 110.14(C), the maximum current permitted to ensure that the device terminal temperature does not exceed its 90°C rating would be the amount referenced in the 90°C column in Table 310.15(B)(16), which is 40A.

E. Minimum Allowed OCPD Rating 16A
see 240.4

CEC 690.9(B) requires that the OCPD be rated for no less than 1.25 times the Continuous Current of the circuit.
13.05A X 1.25 = 16.31A rounded down to 16A

F. Maximum Allowed OCPD Rating 30A
see 240.4(D)

CEC 240.4(D) requires that OCPD rating not exceed 30A when protecting a Copper 10 AWG conductor.

G. Minimum Required EGC Size 12 AWG
see Table 250.122

The smallest EGC size allowed is 12 AWG for OCPD rating 20A according to Table 250.122.

H. Minimum Recommended Conduit Size 1" dia.
see 300.17

The total area of all conductors is 0.2532in². With a maximum fill rate of 0.4, the recommended conduit diameter is 1.

Qty	Description	Size	Type	Area	Total Area
8	Conductor	10 AWG	THWN-2	0.0211in²	0.1688in²
4	Equipment Ground	10 AWG	THWN-2	0.0211in²	0.0844in²
12					0.2532in²

0.2532in² / 0.4 = 0.633in² (Corresponding to a diameter of 1")

CEC Code Validation Tests

1.	OCPD rating must be at least 125% of Continuous Current (240.4) 20A >= 13.05A X 1.25 = true	PASS
2.	Derated ampacity must exceed OCPD rating, or rating of next smaller OCPD (240.4(B) and 240.4) 19.88A >= 15A (Next Smaller OCPD Rating) = true	PASS
3.	OCPD rating must not exceed max OCPD rating for conductor (240.4) 20A (OCPD Rating) <= 30A = true	PASS
4.	Derated Ampacity must be greater than or equal to the Continuous Current (Article 100) 19.88A >= 13.05A = true	PASS
5.	Conductor Ampacity must be at least 125% of Continuous Current (215.2(A)(1)) 40A > 13.05A x 1.25 = true	PASS
6.	Max current for terminal must be at least 125% of the Continuous Current. (110.14(C)) 40A >= 13.05A X 1.25 = true	PASS
7.	EGC must meet code requirements for minimum size (Table 250.122) 10 AWG >= 12 AWG = true	PASS
8.	Conduit must meet code recommendation for minimum size (300.17) 1in. >= 1in. = true	PASS

2.5. #5: AC Combiner Output: AC Combiner to Main Service Panel

Circuit Section Properties

Conductor	4 AWG THWN-2, Copper
Equipment Ground Conductor (EGC)	8 AWG THWN-2, Copper
OCPD(s)	70A
Raceway/Cable	1" dia. PVC-40
Lowest Terminal Temperature Rating	75°C
Maximum Wire Temperature	37°C
Power Source Description	Enphase inverter w/36 LG LG370N1K-A6 (370W)s
Power Source Current	52.2A
Voltage	240V

CEC Code Calculations

A. Continuous Current 52.2A
see Article 100

Equipment maximum rated output current is 52.2A

B. Ampacity of Conductor 95A
see Table 310.15(B)(16)

Ampacity (30°C) for a copper conductor with 90°C insulation in conduit/cable is 95A.

C. Derated Ampacity of Conductor 86.45A
see Table 310.15(B)(3)(c), Table 310.15(B)(3)(a), and Article 100

The temperature factor for 90°C insulation at 37°C is 0.91.
The fill factor for a conduit/cable that has 2 wires is 1.
The ampacity derated for Conditions of Use is the product of the conductor ampacity (95A) multiplied by the temperature factor (0.91) and by the fill factor (1).
95A X 0.91 X 1 = 86.45A

D. Max Current for Terminal Temp. Rating 85A
see 110.14(C)

The lowest temperature rating for this conductor at any termination is 75°C.
Using the method specified in 110.14(C), the maximum current permitted to ensure that the device terminal temperature does not exceed its 75°C rating would be the amount referenced in the 75°C column in Table 310.15(B)(16), which is 85A.

E. Minimum Allowed OCPD Rating 65A
see 240.4

CEC 690.9(B) requires that the OCPD be rated for no less than 1.25 times the Continuous Current of the circuit.
52.2A X 1.25 = 65.25A rounded down to 65A

F. Minimum Required EGC Size 8 AWG
see Table 250.122

The smallest EGC size allowed is 8 AWG for OCPD rating 70A according to Table 250.122.

G. Minimum Recommended Conduit Size 1" dia.
see 300.17

The total area of all conductors is 0.2838in². With a maximum fill rate of 0.4, the recommended conduit diameter is 1.

Qty	Description	Size	Type	Area	Total Area
2	Conductor	4 AWG	THWN-2	0.0824in²	0.1648in²
1	Neutral	4 AWG	THWN-2	0.0824in²	0.0824in²
1	Equipment Ground	8 AWG	THWN-2	0.0366in²	0.0366in²
4					0.2838in²

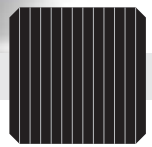
0.2838in² / 0.4 = 0.7095in² (Corresponding to a diameter of 1")

CEC Code Validation Tests

1.	OCPD rating must be at least 125% of Continuous Current (240.4) 70A >= 52.2A X 1.25 = true	PASS
2.	Derated ampacity must exceed OCPD rating, or rating of next smaller OCPD (240.4) 86.45A >= 70A (OCPD Rating) = true	PASS
3.	Derated Ampacity must be greater than or equal to the Continuous Current (Article 100) 86.45A >= 52.2A = true	PASS
4.	Conductor Ampacity must be at least 125% of Continuous Current (215.2(A)(1)) 95A > 52.2A x 1.25 = true	PASS
5.	Max current for terminal must be at least 125% of the Continuous Current. (110.14(C)) 85A >= 52.2A X 1.25 = true	PASS
6.	EGC must meet code requirements for minimum size (Table 250.122) 8 AWG >= 8 AWG = true	PASS
7.	Conduit must meet code recommendation for minimum size (300.17) 1in. >= 1in. = true	PASS

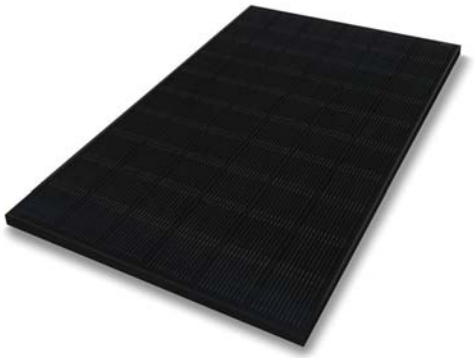
LG NeON®2 Black

LG370N1K-A6



370W

The LG NeON® 2 is LG's best selling solar module and one of the most powerful and versatile modules on the market today. The cells are designed to appear all-black at a distance, and the performance warranty guarantees 90.6% of labeled power output at 25 years.



25 YEAR PRODUCT • PERFORMANCE • LABOR WARRANTY

c UL us

Features

Enhanced Performance Warranty

LG NeON® 2 Black has an enhanced performance warranty. After 25 years, LG NeON® 2 Black is guaranteed at least 90.6% of initial performance.

25-Year Limited Product Warranty

The NeON® 2 Black is covered by a 25-year limited product warranty. In addition, up to $450 of labor costs will be covered in the rare case that a module needs to be repaired or replaced.

Solid Performance on Hot Days

LG NeON® 2 Black performs well on hot days due to its low temperature coefficient.

Roof Aesthetics

LG NeON® 2 Black has been designed with aesthetics in mind using thinner wires that appear all black at a distance.

When you go solar, ask for the brand you can trust: LG Solar

About LG Electronics USA, Inc.

LG Electronics is a global leader in electronic products in the clean energy markets by offering solar PV panels and energy storage systems. The company first embarked on a solar energy source research program in 1985, supported by LG Group's vast experience in the semi-conductor, LCD, chemistry and materials industries. In 2010, LG Solar successfully released its first MonoX® series to the market, which is now available in 32 countries. The NeON® (previous MonoX® NeON), NeON®2, NeON®2 BiFacial won the "Intersolar AWARD" in 2013, 2015 and 2016, which demonstrates LG's leadership and innovation in the solar industry.

LG Life's Good

LG NeON®2 Black

LG370N1K-A6

General Data

Cell Properties (Material/Type)	Monocrystalline/N-type
Cell Maker	LG
Cell Configuration	60 Cells (6 x 10)
Number of Busbars	12EA
Module Dimensions (L x W x H)	1,740mm x 1,042mm x 40 mm
Weight	18.6 kg
Glass (Material)	Tempered Glass with AR coating
Backsheet (Color)	Black
Frame (Material)	Anodized Aluminium
Junction Box (Protection Degree)	IP 68 with 3 Bypass Diodes
Cables (Length)	1,100mm x 2EA
Connector (Type/Maker)	MC 4/MC

Certifications and Warranty

Certifications*	IEC 61215-1/-1-1/2 : 2016, IEC 61730-1/2 : 2016, UL 61730-1 : 2017, UL 61730-2 : 2017
	ISO 9001, ISO 14001, ISO 50001
	OHSAS 18001
Salt Mist Corrosion Test	IEC 61701:2012 Severity 6
Ammonia Corrosion Test	IEC 62716:2013
Module Fire Performance	Type 2 (UL 61730)
Fire Rating	Class C (UL 790, ULC/ORD C 1703)
Solar Module Product Warranty	25 Year Limited
Solar Module Output Warranty	Linear Warranty*

*Improved: 1st year 98.5%, from 2-24th year: -0.33%/year down, 90.6% at year 25

Temperature Characteristics

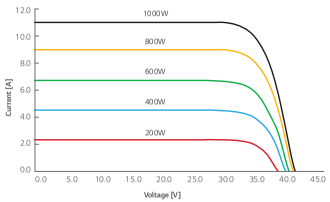
NMOT*	[°C]	42 ± 3
Pmax	[%/°C]	-0.35
Voc	[%/°C]	-0.26
Isc	[%/°C]	0.03

*NMOT (Nominal Module Operating Temperature): Irradiance 800 W/m², Ambient temperature 20°C, Wind speed 1 m/s, Spectrum AM 1.5

Electrical Properties (NMOT)

Model		LG370N1K-A6
Maximum Power (Pmax)	[W]	277
MPP Voltage (Vmpp)	[V]	33.3
MPP Current (Impp)	[A]	8.32
Open Circuit Voltage (Voc)	[V]	39.4
Short Circuit Current (Isc)	[A]	8.81

I-V Curves



Electrical Properties (STC*)

Model		LG370N1K-A6
Maximum Power (Pmax)	[W]	370
MPP Voltage (Vmpp)	[V]	35.5
MPP Current (Impp)	[A]	10.43
Open Circuit Voltage (Voc ± 5%)	[V]	41.9
Short Circuit Current (Isc ± 5%)	[A]	10.96
Module Efficiency	[%]	20.4
Power Tolerance	[%]	0 ~ +3

*STC (Standard Test Condition): Irradiance 1000 W/m², cell temperature 25°C, AM 1.5
Measurement Tolerence of Pmax: ± 3%

Operating Conditions

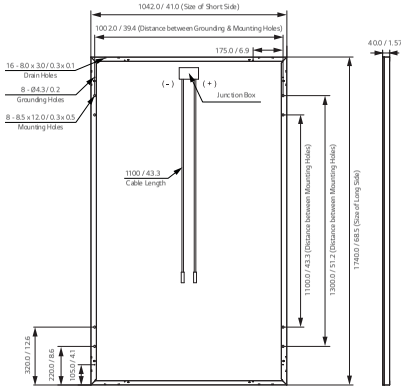
Operating Temperature	[°C]	-40 ~ +85
Maximum System Voltage	[V]	1,000 (UL/IEC)
Maximum Series Fuse Rating	[A]	20
Mechanical Test Load* (Front)	[Pa/psf]	5,400
Mechanical Test Load* (Rear)	[Pa/psf]	4,000

*Based on IEC 61215-2 : 2016 (Test Load = Design Load x Safety Factor (1.5))
Mechanical Test Loads 6,000Pa/5,400Pa based on IEC 61215:2005

Packaging Configuration

Number of Modules per Pallet	[EA]	25
Number of Modules per 40' Container	[EA]	650
Number of Modules per 53' Container	[EA]	850
Packaging Box Dimensions (L x W x H)	[mm]	1,790 x 1,120 x 1,213
Packaging Box Dimensions (L x W x H)	[in]	70.5 x 44.1 x 47.8
Packaging Box Gross Weight	[kg]	500
Packaging Box Gross Weight	[lb]	1,102

Dimensions (mm/inch)



LG Life's Good

LG Electronics USA, Inc.
Solar Business Division
2000 Millbrook Drive
Lincolnshire, IL 60069

www.lg-solar.com

Product specifications are subject to change without notice.
LG370N1K-A6.pdf
020221

Data Sheet
Enphase Networking

Enphase IQ Combiner 3-ES/3C-ES

X-IQ-AM1-240-3-ES
X-IQ-AM1-240-3C-ES

The **Enphase IQ Combiner 3-ES/3C-ES**™ with Enphase IQ Envoy™ and integrated LTE-M1 cell modem (included only with IQ Combiner 3C-ES) consolidates interconnection equipment into a single enclosure and streamlines PV and storage installations by providing a consistent, pre-wired solution for residential applications. It offers up to four 2-pole input circuits and Eaton BR series busbar assembly.

X-IQ-AM1-240-3C-ES

X-IQ-AM1-240-3-ES

Smart

- Includes IQ Envoy for communication and control
- Includes LTE-M1 cell modem (included only with IQ Combiner 3C-ES)
- Includes solar shield to match Ensemble esthetics and deflect heat
- Flexible networking supports Wi-Fi, Ethernet, or cellular
- Optional AC receptacle available for PLC bridge
- Provides production metering and consumption monitoring

Simple

- Reduced size from IQ Combiner+ (X-IQ-AM1-240-2)
- Centered mounting brackets support single stud mounting
- Supports back and side conduit entry
- Up to four 2-pole branch circuits for 240 VAC plug-in breakers (not included)
- 80 A total PV or storage branch circuits

Reliable

- Durable NRTL-certified NEMA type 3R enclosure
- Five-year limited warranty
- Two years labor reimbursement program coverage included for both the Combiner SKU's
- UL listed

UL LISTED

To learn more about Enphase offerings, visit **enphase.com**

ENPHASE

Enphase IQ Combiner 3-ES / 3C-ES

MODEL NUMBER	
IQ Combiner 3-ES (X-IQ-AM1-240-3-ES)	IQ Combiner 3-ES with Enphase IQ Envoy printed circuit board for integrated revenue grade PV production metering (ANSI C12.20 +/- 0.5%) and consumption monitoring (+/- 2.5%). Includes a silver solar shield to match the Encharge storage system and Enpower smart switch and to deflect heat.
IQ Combiner 3C-ES (X-IQ-AM1-240-3C-ES)	IQ Combiner 3C-ES with Enphase IQ Envoy printed circuit board for integrated revenue grade PV production metering (ANSI C12.20 +/- 0.5%) and consumption monitoring (+/- 2.5%). Includes Enphase Mobile Connect LTE-M1 (CELLMODEM-M1), a plug-and-play industrial-grade cell modem for systems up to 60 microinverters. (Available in the US, Canada, Mexico, Puerto Rico, and the US Virgin Islands, where there is adequate cellular service in the installation area.) Includes a silver solar shield to match the Encharge storage system and Enpower smart switch and to deflect heat.
ACCESSORIES and **REPLACEMENT PARTS**	(not included, order separately)
Ensemble Communications Kit (COMMS-CELLMODEM-M1)	Includes COMMS-KIT-01 and CELLMODEM-M1 with 5-year data plan for Ensemble sites
Circuit Breakers BRK-10A-2-240 BRK-15A-2-240 BRK-20A-2P-240	Supports Eaton BR210, BR215, BR220, BR230, BR240, BR250, and BR260 circuit breakers. Circuit breaker, 2 pole, 10A, Eaton BR210 Circuit breaker, 2 pole, 15A, Eaton BR215 Circuit breaker, 2 pole, 20A, Eaton BR220
EPLC-01	Power line carrier (communication bridge pair), quantity - one pair
XA-SOLARSHIELD-ES	Replacement solar shield for Combiner 3-ES / 3C-ES
XA-PLUG-120-3	Accessory receptacle for Power Line Carrier in IQ Combiner 3-ES / 3C-ES (required for EPLC-01)
XA-ENV-PCBA-3	Replacement IQ Envoy printed circuit board (PCB) for Combiner 3-ES / 3C-ES
ELECTRICAL SPECIFICATIONS	
Rating	Continuous duty
System voltage	120/240 VAC, 60 Hz
Eaton BR series busbar rating	125 A
Max. continuous current rating	65 A
Max. continuous current rating (input from PV/storage)	64 A
Max. fuse/circuit rating (output)	90 A
Branch circuits (solar and/or storage)	Up to four 2-pole Eaton BR series Distributed Generation (DG) breakers only (not included)
Max. total branch circuit breaker rating (input)	80A of distributed generation / 95A with IQ Envoy breaker included
Envoy breaker	10A or 15A rating GE/Siemens/Eaton included
Production metering CT	200 A solid core pre-installed and wired to IQ Envoy
Consumption monitoring CT (CT-200-SPLIT)	A pair of 200 A split core current transformers
MECHANICAL DATA	
Dimensions (WxHxD)	37.5 x 49.5 x 16.8 cm (14.75" x 19.5" x 6.63"). Height is 21.06" (53.5 cm) with mounting brackets.
Weight	7.5 kg (16.5 lbs)
Ambient temperature range	-40° C to +46° C (-40° to 115° F)
Cooling	Natural convection, plus heat shield
Enclosure environmental rating	Outdoor, NRTL-certified, NEMA type 3R, polycarbonate construction
Wire sizes	• 20 A to 50 A breaker inputs: 14 to 4 AWG copper conductors • 60 A breaker branch input: 4 to 1/0 AWG copper conductors • Main lug combined output: 10 to 2/0 AWG copper conductors • Neutral and ground: 14 to 1/0 copper conductors Always follow local code requirements for conductor sizing.
Altitude	To 2000 meters (6,560 feet)
INTERNET CONNECTION OPTIONS	
Integrated Wi-Fi	802.11b/g/n
Cellular	CELLMODEM-M1-06 4G based LTE-M1 cellular modem (included only with IQ Combiner 3C-ES). Note that an Enphase Mobile Connect cellular modem is required for all Ensemble installations.
Ethernet	Optional, 802.3, Cat5E (or Cat 6) UTP Ethernet cable (not included)
COMPLIANCE	
Compliance, Combiner	UL 1741, CAN/CSA C22.2 No. 107.1, 47 CFR, Part 15, Class B, ICES 003 Production metering: ANSI C12.20 accuracy class 0.5 (PV production) Consumption metering: accuracy class 2.5
Compliance, IQ Envoy	UL 60601-1/CANCSA 22.2 No. 61010-1

To learn more about Enphase offerings, visit **enphase.com**

ENPHASE

Data Sheet
Enphase Microinverters
Region: AMERICAS

Enphase IQ 7A Microinverter

The high-powered smart grid-ready **Enphase IQ 7A Micro™** dramatically simplifies the installation process while achieving the highest system efficiency for systems with 60-cell and 72-cell modules.

Part of the Enphase IQ System, the IQ 7A Micro integrates with the Enphase IQ Envoy™, Enphase IQ Battery™, and the Enphase Enlighten™ monitoring and analysis software.

The IQ Series Microinverters extend the reliability standards set forth by previous generations and undergo over a million hours of power-on testing, enabling Enphase to provide an industry-leading warranty of up to 25 years.

High Power
- Peak output power 366 VA @ 240 VAC and 295 VA @ 208 VAC

Easy to Install
- Lightweight and simple
- Faster installation with improved, lighter two-wire cabling
- Built-in rapid shutdown compliant (NEC 2014 & 2017)

Efficient and Reliable
- Optimized for high powered 60-cell and 72-cell modules
- Highest CEC efficiency of 97%
- More than a million hours of testing
- Class II double-insulated enclosure
- UL listed

Smart Grid Ready
- Complies with advanced grid support, voltage and frequency ride-through requirements
- Envoy and Internet connection required
- Configurable for varying grid profiles
- Meets CA Rule 21 (UL 1741-SA)

To learn more about Enphase offerings, visit **enphase.com**

ENPHASE

Enphase IQ 7A Microinverter

INPUT (DC)	IQ7A-72-2-US	
Commonly used module pairings[1]	295 W–460 W +	
Module compatibility	60-cell, 66-cell, and 72-cell PV modules	
Maximum input DC voltage	58 V	
Power point tracking voltage range[2]	18 V–58 V	
Min/Max start voltage	30 V / 58 V	
Max DC short circuit current (module Isc)[3]	15 A	
Overvoltage class DC port	II	
DC port backfeed current	0 A	
PV array configuration	1 x 1 ungrounded array; No additional DC side protection required; AC side protection requires max 20A per branch circuit	
OUTPUT (AC)	**@ 240 VAC**	**@ 208 VAC**
Peak output power	366 VA	295 VA
Maximum continuous output power	349 VA	290 VA
Nominal (L-L) voltage/range[4]	240 V / 211–264 V	208 V / 183–229 V
Maximum continuous output current	1.45 A (240 VAC)	1.39 A (208 VAC)
Nominal frequency	60 Hz	
Extended frequency range	47–68 Hz	
AC short circuit fault current over 3 cycles	5.8 Arms	
Maximum units per 20 A (L-L) branch circuit[5]	11 (240 VAC)	11 (208 VAC)
Overvoltage class AC port	III	
AC port backfeed current	18 mA	
Power factor setting	1.0	
Power factor (adjustable)	0.85 leading ... 0.85 lagging	
EFFICIENCY	**@240 VAC**	**@208 VAC**
CEC weighted efficiency	97.0 %	96.5%
MECHANICAL		
Ambient temperature range	-40°C to +60°C	
Relative humidity range	4% to 100% (condensing)	
Connector type: DC (IQ7A-72-2-US)	MC4	
Dimensions (WxHxD)	212 mm x 175 mm x 30.2 mm (without bracket)	
Weight	1.08 kg (2.38 lbs)	
Cooling	Natural convection — No fans	
Approved for wet locations	Yes	
Pollution degree	PD3	
Enclosure	Class II double-insulated, corrosion resistant polymeric enclosure	
Environmental category / UV exposure rating	NEMA Type 6 / outdoor	
FEATURES		
Communication	Power Line Communication (PLC)	
Monitoring	Enlighten Manager and MyEnlighten monitoring options Compatible with Enphase IQ Envoy	
Disconnecting means	The AC and DC connectors have been evaluated and approved by UL for use as the load-break disconnect required by NEC 690.	
Compliance	CA Rule 21 (UL 1741-SA) UL 62109-1, UL1741/IEEE1547, FCC Part 15 Class B, ICES-0003 Class B, CAN/CSA-C22.2 NO. 107.1-01 This product is UL Listed as PV Rapid Shut Down Equipment and conforms with NEC-2014 and NEC-2017 section 690.12 and C22.1-2015 Rule 64-218 Rapid Shutdown of PV Systems, for AC and DC conductors, when installed according manufacturer's instructions.	

1. No enforced DC/AC ratio. See the compatibility calculator at https://enphase.com/en-us/support/module-compatibility.
2. CEC peak power tracking voltage range is 38 V to 43 V.
3. Maximum continuous input DC current is 10.2A.
4. Voltage range can be extended beyond nominal if required by the utility.
5. Limits may vary. Refer to local requirements to define the number of microinverters per branch in your area.

To learn more about Enphase offerings, visit **enphase.com**

2019-11-07

ENPHASE

POWERWALL

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

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

PERFORMANCE SPECIFICATIONS

AC Voltage (Nominal)	120/240 V
Feed-In Type	Split Phase
Grid Frequency	60 Hz
Total Energy	14 kWh
Usable Energy	13.5 kWh
Real Power, max continuous	5 kW (charge and discharge)
Real Power, peak (10 s, off-grid/backup)	7 kW (charge and discharge)
Apparent Power, max continuous	5.8 kVA (charge and discharge)
Apparent Power, peak (10 s, off-grid/backup)	7.2 kVA (charge and discharge)
Maximum Supply Fault Current	10 kA
Maximum Output Fault Current	32 A
Overcurrent Protection Device	30 A
Imbalance for Split-Phase Loads	100%
Power Factor Output Range	+/– 1.0 adjustable
Power Factor Range (full-rated power)	+/– 0.85
Internal Battery DC Voltage	50 V
Round Trip Efficiency[1,3]	90%
Warranty	10 years

[1]Values provided for 25°C (77°F), 3.3 kW charge/discharge power.
[2]In Backup mode, grid charge power is limited to 3.3 kW.
[3]AC to battery to AC, at beginning of life.

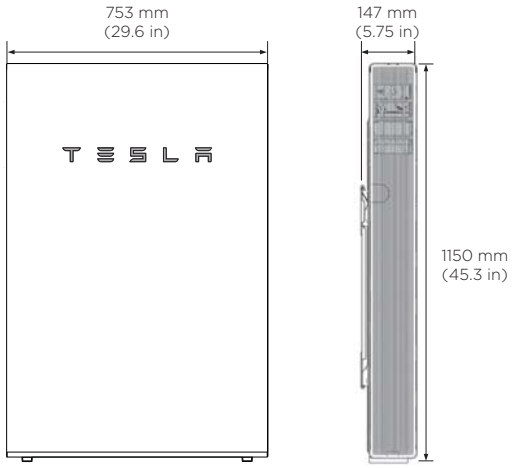
COMPLIANCE INFORMATION

Certifications	UL 1642, UL 1741, UL 1973, UL 9540, IEEE 1547, UN 38.3
Grid Connection	Worldwide Compatibility
Emissions	FCC Part 15 Class B, ICES 003
Environmental	RoHS Directive 2011/65/EU
Seismic	AC156, IEEE 693-2005 (high)

MECHANICAL SPECIFICATIONS

Dimensions[1]	1150 mm x 755 mm x 147 mm (45.3 in x 29.6 in x 5.75 in)
Weight[1]	114 kg (251.3 lbs)
Mounting options	Floor or wall mount

[1]Dimensions and weight differ slightly if manufactured before March 2019. Contact Tesla for additional information.

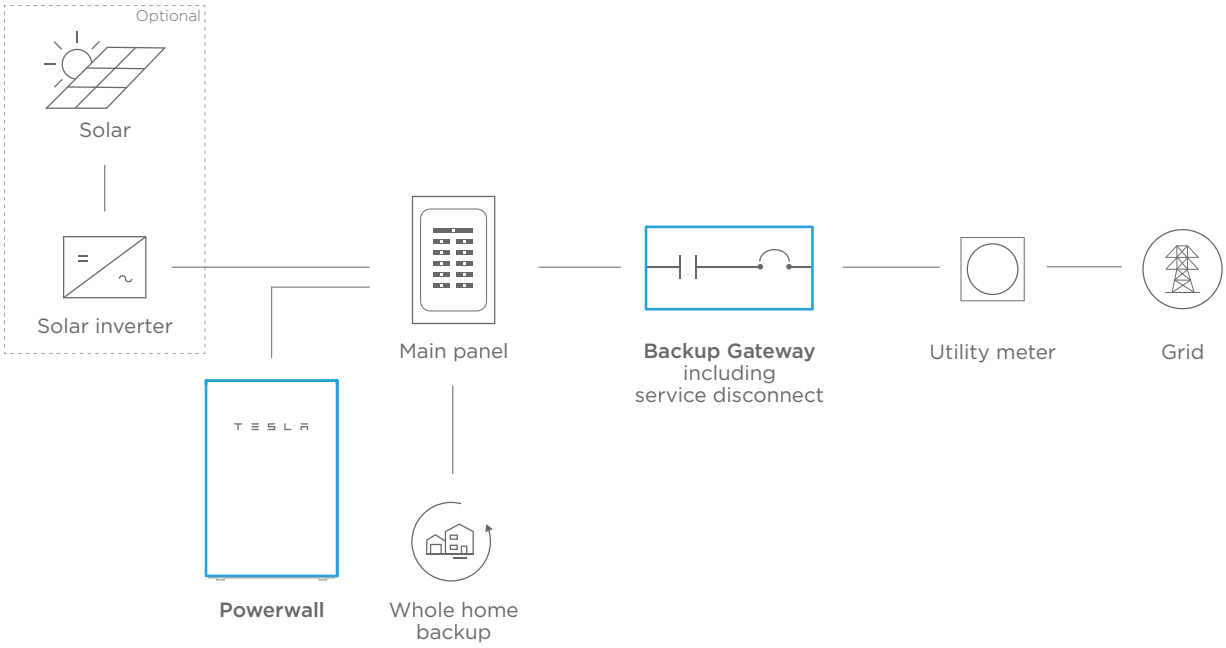


ENVIRONMENTAL SPECIFICATIONS

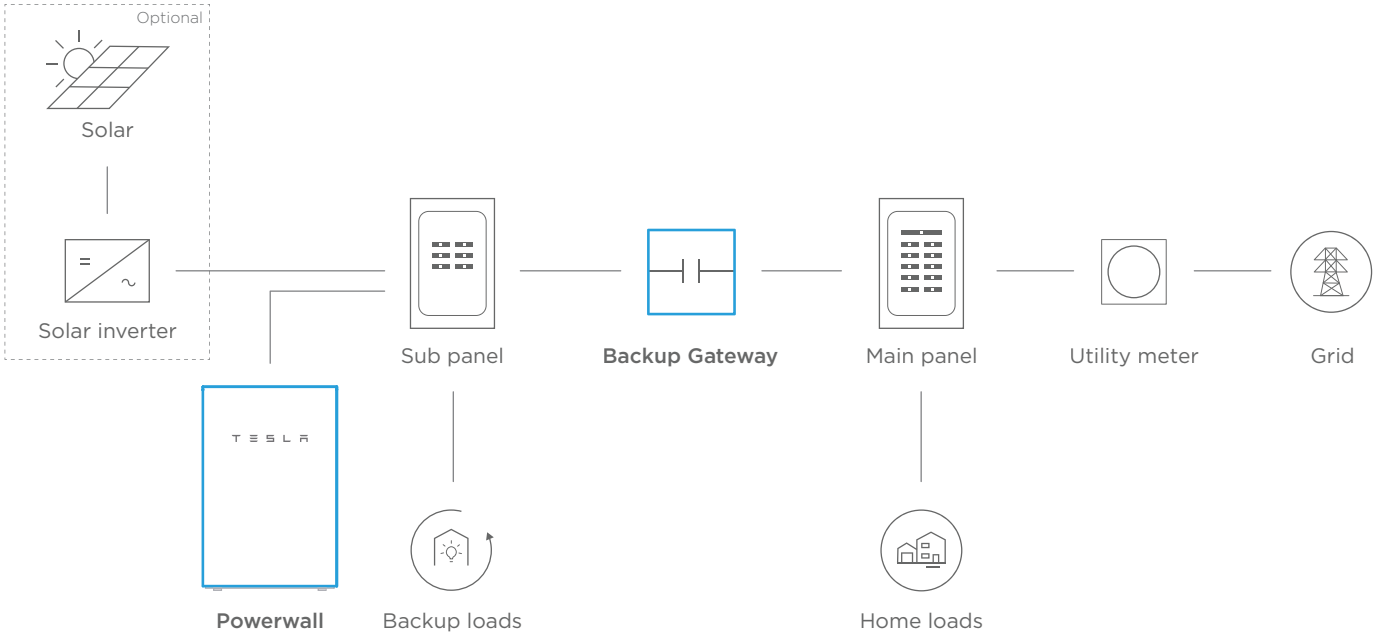
Operating Temperature	–20°C to 50°C (–4°F to 122°F)
Recommended Temperature	0°C to 30°C (32°F to 86°F)
Operating Humidity (RH)	Up to 100%, condensing
Storage Conditions	–20°C to 30°C (–4°F to 86°F) Up to 95% RH, non-condensing State of Energy (SoE): 25% initial
Maximum Elevation	3000 m (9843 ft)
Environment	Indoor and outdoor rated
Enclosure Type	NEMA 3R
Ingress Rating	IP67 (Battery & Power Electronics) IP56 (Wiring Compartment)
Wet Location Rating	Yes
Noise Level @ 1m	< 40 dBA at 30°C (86°F)

TYPICAL SYSTEM LAYOUTS

WHOLE HOME BACKUP



PARTIAL HOME BACKUP

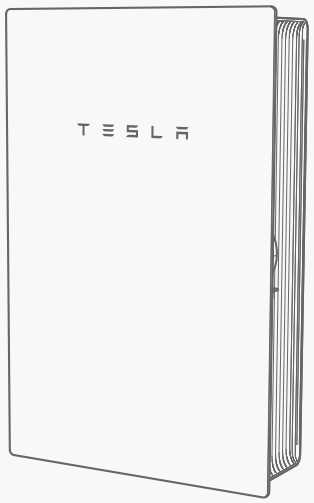


POWERWALL
Backup Gateway 2

Backup Gateway 2 for Tesla Powerwall provides energy management and monitoring for solar self-consumption, time-based control, and backup operation.

When the Powerwall system is in Backup mode, Backup Gateway 2 controls connection to the grid, automatically detecting outages and providing seamless transition to backup power.

Communicating directly with Powerwall, Backup Gateway 2 allows you to monitor energy use and manage backup energy reserves from any mobile device with the Tesla app.



PERFORMANCE SPECIFICATIONS

AC Voltage (Nominal)	240 V (Line-to-Neutral) 440 V (Line-to-Line)
Feed-In Type	Single Phase, Three Phase
Grid Frequency	50/60 Hz
Nominal Current	100 A per phase (Single Phase) 80 A per phase (Three Phase)
Maximum Input Short Circuit Current	16 kA[1]
Overvoltage Category	Category III
AC Meter	Revenue accurate (+/– 0.2 %)
Connectivity	Ethernet, Wi-Fi, Cellular (LTE/4G)[2]
User Interface	Tesla App or Local Network Monitoring
Operating Modes	Support for solar self-consumption, time-based control, and backup
Backup Operation	Backup of selected single phase; Automatic disconnect of all phases
Modularity	Supports up to 10 AC-coupled Powerwalls
Warranty	10 years

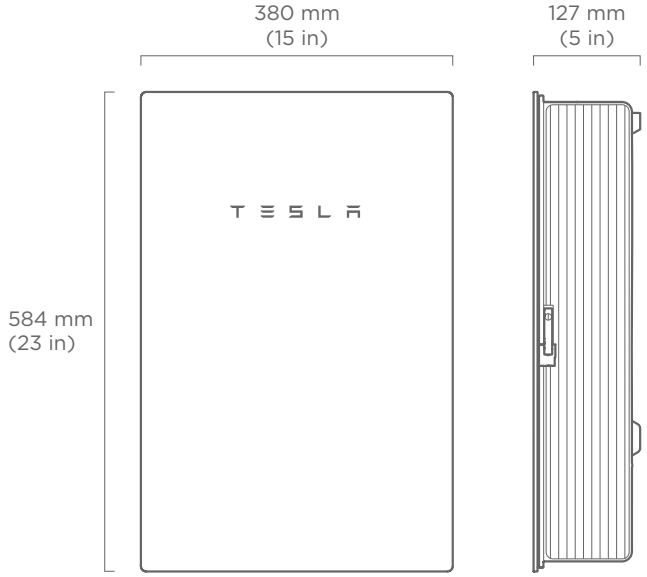
[1]16 kA rating when installed with DIN-mount fuse; 10 kA rating without fuse. 2Cellular connectivity subject to network operator service coverage and signal strength (2G/3G supported where LTE/4G unavailable).

COMPLIANCE INFORMATION

Safety	IEC-62109-1, IEC 62053-22, IEC 61439-1, IEC 61439-3
EMC and Radio Equipment	EMC Directive 2014/30/EU, Radio Equipment Directive 2014/53/EU, IEC 61000-6-1, IEC 61000-6-3, EN 55024, EN 300 328, EN 300 440, EN 301 489-1, EN 301 489-17, EN 301 489-52, EN 301 511, EN 301 893, EN 301 908-1
Environmental	RoHS Directive 2011/65/EU, WEEE Directive 2012/19/EU, Battery Directive 2006/66/EC REACH Regulation EC 1907/2006
Seismic	AC156, IEEE 693-2005 (high)

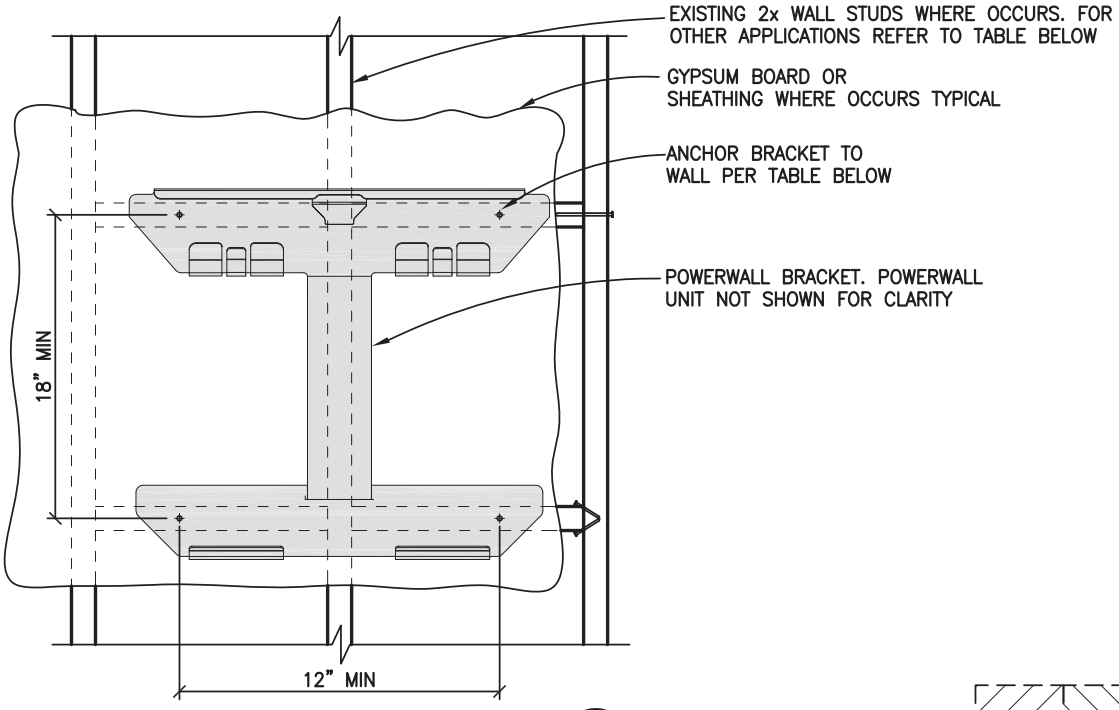
MECHANICAL SPECIFICATIONS

Dimensions	584 mm x 380 mm x 127 mm (23 in x 15 in x 5 in)
Weight	11.4 kg (25.1 lb)
Breaker space (DIN rail)	Main breaker: 1-, 2- or 3-pole Generation/Load breakers: 6 spaces
Mounting options	Wall mount



ENVIRONMENTAL SPECIFICATIONS

Operating Temperature	–20°C to 50°C (–4°F to 122°F)
Operating Humidity (RH)	Up to 100%, condensing
Maximum Elevation	3000 m (9843 ft)
Environment	Indoor and outdoor rated
Ingress Rating	IP55

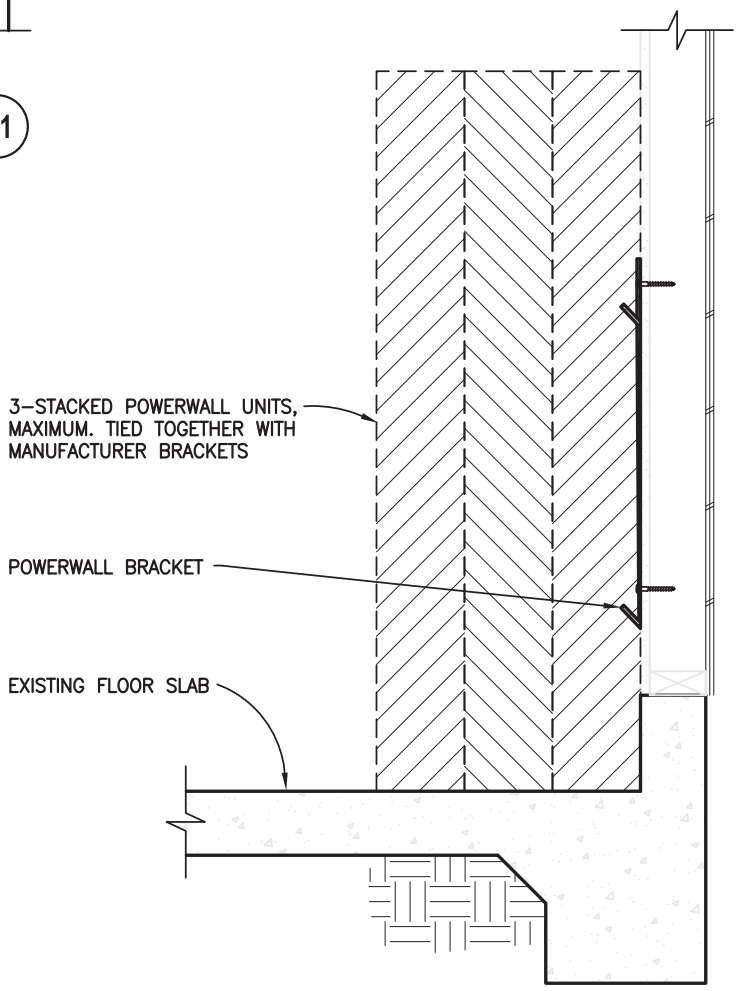


FRONT VIEW G1

NOTE: SEE GENERAL NOTES ON SHEET 2.

ANCHORAGE TABLE

WALL CONSTRUCTION TYPE	DETAIL REFERENCE
WOOD	W1/4, W3/4
METAL STUD	MS5/6
PLYWOOD	P1/10
CONCRETE/CMU	C3/10
UNISTRUT ATTACHMENT	U1/8, U3/9



WOOD STUD, W/ BLOCKING: SIDE VIEW G2

NOTE: DETAIL APPLICABLE ONLY AT GROUND-MOUNTED, INTERIOR CONDITIONS

3-STACKED, GROUND-MOUNTED CONFIGURATION

DATE: 05/25/2017

SCALE: 1"=1'-0"

TESLA POWERWALL

DWG. NO.

SHEET 11 OF 11

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

28375 Industrial Blvd.
Hayward, CA 94545
1-800-227-9523
IronRidge.com

Attn: Corey Geiger, COO, IronRidge Inc.
Date: May 18th, 2020

Re: Structural Certification and Span Tables for IronRidge Flush Mount System

This letter addresses the structural performance and code compliance of IronRidge's Flush Mount System. The contents of the letter shall be read in its entirety before being applied to any project design. The Flush Mount System is a proprietary rooftop mounting system used to support photovoltaic (PV) modules installed in portrait or landscape orientation and set parallel to the underlying roof surface. PV modules are supported by extruded aluminum XR Rails and secured to the rails with IronRidge mounting clamps. The XR Rails are side mounted to a selected roof attachment with 3/8" stainless steel bonding hardware and then attached directly to the roof structure or to a stanchion that is fastened to the underlying roof structure. Assembly details of a typical Flush Mount installation and its core components are shown in Exhibit EX-0015.

The IronRidge Flush Mount System is designed and certified to the structural requirements of the reference standards listed below, for the load conditions and configurations tabulated in the attached span tables.

- ASCE/SEI 7-10 Minimum Design Loads for Buildings and Other Structures (ASCE 7-10)
- 2015 International Building Code (IBC-2015)
- 2016 California Building Code (CBC-2016)
- 2015 Aluminum Design Manual (ADM-2015)

The tables included in this letter provide the maximum allowable spans of XR Rails in the Flush Mount System for the respective loads and configurations listed, covering wind exposure categories B, C, & D, roof zones 1, 2 & 3, and roof slopes from 8º to 45º. The span tables are applicable provided that the following conditions are met:

1. *Span* is the distance between two adjacent roof attachment points (measured at the center of the attachment fastener)

2. The underlying roof pitch, measured between roof surface and horizontal plane, is 45º or less.

3. The *mean roof height*, defined as the average of the roof eave height and the roof ridge height measured from grade, does not exceed 30 feet.

4. Module length shall not exceed the listed maximum dimension provided for the respective span table and module width shall not exceed 42".

5. All Flush Mount components shall be installed in a professional workmanlike manner per IronRidge's *Flush Mount installation manual* and other applicable standards for general roof construction practice.

28375 Industrial Blvd.
Hayward, CA 94545
1-800-227-9523
IronRidge.com

The span tables provided in this letter are certified based on the structural performance of IronRidge XR Rails only with no consideration of the structural adequacy of the chosen roof attachments, PV modules, or the underlying roof supporting members. It is the responsibility of the installer or system designer to verify the structural capacity and adequacy of the aforementioned system components in regards to the applied or resultant loads of any chosen array configuration.

Sincerely,

REGISTERED PROFESSIONAL ENGINEER
GANG XUAN
NO. 6504
STRUCTURAL
STATE OF CALIFORNIA

Date: 2020.05.22 12:25:32 -07'00'

Gang Xuan, SE
Senior Structural Engineer

28357 Industrial Blvd.
Hayward, CA 94545
1-800-227-9523
IronRidge.com

Attn: Corey Geiger, COO, IronRidge Inc.
Date: July 1st, 2021

Re: Structural Certification and Span Tables for the IronRidge Flush Mount System

This letter addresses the structural performance and code compliance of IronRidge's Flush Mount System. The contents of the letter shall be read in its entirety before applying to any project design. The Flush Mount System is a proprietary rooftop mounting system used to support photovoltaic (PV) modules installed in portrait or landscape orientation and set parallel to the underlying roof surface. PV modules are supported by extruded aluminum XR Rails and secured to the rails with IronRidge mounting clamps. The XR Rails are side mounted to a selected roof attachment with 3/8" stainless steel bonding hardware and then attached directly to the roof structure or to a stanchion that is fastened to the underlying roof structure. Assembly details of a typical Flush Mount installation and its core components are shown in Exhibit EX-0015.

The IronRidge Flush Mount System is designed and certified to the structural requirements of the reference standards listed below, for the load conditions and configurations tabulated in the attached span tables.

- ASCE/SEI 7-16 Minimum Design Loads for Buildings and Other Structures (ASCE 7-16)
- 2018 International Building Code (IBC-2018)
- 2019 California Building Code (CBC-2019)
- 2015 Aluminum Design Manual (ADM-2015)
- Report SEAOC (Structural Engineer Association of California) PV2-2017 Wind Design for Solar Arrays

The tables included in this letter provide the maximum allowable spans of XR Rails in the Flush Mount System for the respective loads and configurations listed, covering wind exposure categories B, C, & D, roof zones provided in ASCE 7-16 for gable & hip roof profiles, and roof slopes of 8° to 45°. The tabulated spans are applicable when the following conditions are met:

1. *Span* is the distance between two adjacent roof attachment points (measured at the center of the attachment fastener).

2. Each module shall be supported by 2 rails (2 rail system) or 3 rails (3 rail system). Spans are calculated based on 2 rail systems, and conservatively deemed acceptable for 3 rail systems.

3. The underlying roof slope, measured between the roof surface and horizontal plane, is 8º to 45º.

4. The *mean roof height*, defined as the average of the roof eave height and the roof ridge height measured from grade, does not exceed 30 feet.

5. A clearance from the underside of the array to the roof surface of 2" minimum shall be provided and the height of the array, the distance from the module top surface to the roof surface (defined as h_2), shall not exceed 10".

6. Module length and area shall not exceed the maximum values listed on the respective span tables.

7. All Flush Mount components shall be installed in a professional workmanlike manner per IronRidge's *Flush Mount Installation Manual* and other applicable standards for the general roof construction practice.

28357 Industrial Blvd.
Hayward, CA 94545
1-800-227-9523
IronRidge.com

The span tables provided in this letter are certified based on the structural performance of IronRidge XR Rails only with no consideration of the structural adequacy of the chosen roof attachments, PV modules, or the underlying roof supporting members. It is the responsibility of the installer or system designer to verify the structural capacity and adequacy of the aforementioned system components in regards to the applied or resultant loads of any chosen array configuration.

Sincerely,

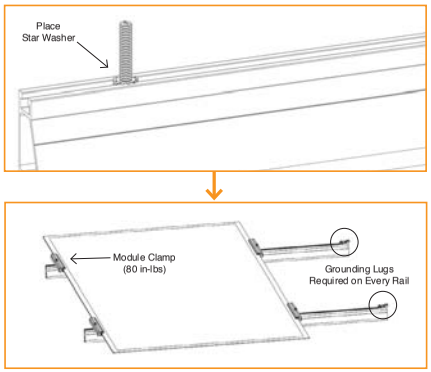
REGISTERED PROFESSIONAL ENGINEER
GANG XUAN
NO. 6504
STRUCTURAL
STATE OF CALIFORNIA

2021.07.14 17:00:22 -07'00'

Gang Xuan, SE
Senior Structural Engineer

FRAMELESS MODULE KITS

Insert Frameless Kit T-bolt in top rail slot. Place star washer over T-bolt, allowing it to rest on top of rail. Secure module clamps with a hex nut and torque to **80 in-lbs**.



- **Tested or evaluated module clamps:**
  - **Sunforson silver or black SFS-UTMC-200(B) mid and SFS-UTEC-200(B) end clamps.**
  - **Sunpreme silver or black mid and end clamps with part numbers 7500105X where "X" is 1, 5, 6 or 7.**
  - **IronRidge silver or black mid and end clamps with part numbers FMLS-XC-001-Y where "X" is E or M and "Y" is B or blank.**
- **Follow module manufacturer's installation instructions to install the module clamps.**
- **Frameless modules require using a Grounding Lug on every rail.**
- **For Sunpreme Modules Only: If required to use slide prevention hardware, see Module Slide Prevention Addendum (Version 1.10).**

MODULE COMPATIBILITY

The Flush Mount System may be used to ground and/or mount a PV module complying with UL 1703 only when the specific module has been evaluated for grounding and/or mounting in compliance with the included instructions. Unless otherwise noted, “xxx” refers to the module power rating and both black and silver frames are included in the certification.

MAKE	MODELS
Amerisolar	Amerisolar modules with 35, 40 and 50 mm frames AS-bYxxxZ Where "b" can be 5 or 6; "Y" can be M, P, M27, P27, M30, or P30; "xxx" is the module power rating; and "Z" can be blank, W or WB
Astronergy Solar	Astronergy modules with 30, 35, 40 and 45 mm frames aaSMbbyyC/zz-xxx Where “aa” can be CH or A; "bb" can be 60, 66, or 72; “yy” can be blank, 10 or 12; "C" can M, P, M(BL), M-HC, M(BL)-HC, P-HC, (DG), or (DGT); “zz” can be blank, HV, F-B, or F-BH ; and “xxx” is the module power rating Astronergy frameless modules CHSM6610P(DG)-xxx Where “xxx” is the module power rating
Auxin	Auxin modules with 40 mm frames AXN6y6zAxxx Where "y" can be M or P; "z" can be 08, 09, 10, 11, or 12; "A" can be F or T; and "xxx" is the module power rating
Axitec	Axitec Modules with 35 and 40 mm frames AC-xxxY/aaZZb Where "xxx" is the module power rating; "Y" can be M, P or MH; "aa" can be blank, 125- or 156-; "ZZ" can be 54, 60, 72, 120, or 144; "b" can be S or SB
Boviet	Boviet modules with 40mm frames BVM66aaYY-xxx Where "aa" can be 9, 10 or 12; "YY" is M or P; and "xxx" is the module power rating
BYD	Where "xxx" is the module power rating; "Y" can be M, P or MH; "aa" can be blank, 125- or 156-; "ZZ" can be 54, 60, 72, 120, or 144; "b" can be S or SB
Canadian Solar	Canadian Solar modules with 30, 35 and 40 mm frames CSbY-xxxZ Where "b" can be 1, 3 or 6; "Y" can be H, K, P, U, V, W, or X; "xxx" refers to the module power rating; and "Z" can be M, P, MS, PX , M-SD, P-AG, P-SD, MB-AG, PB-AG, MS-AG, or MS-SD Canadian Solar frameless modules CSbY-xxx-Z Where "b" can be 3 or 6; "Y" is K, P, U, or X; "xxx" is the module power rating, and "Z" can be M-FG, MS-FG, P-FG, MB-FG, or PB-FG
CertainTeed	CertainTeed modules with 35 and 40 frames CTxxxYZZ-AA Where "xxx" is the module power rating; "Y" can be M, P or HC; "ZZ" can be 00,01, 10, or 11; and "AA" can be 01, 02, 03 or 04
CSUN	Csun modules with 35 and 40 mm frames YYxxx-zzAbb Where "YY" is CSUN or SST; xxx is the module power rating; "zz" is blank, 60, or 72; and "A" is blank, P or M; "bb" is blank, BB, BW, or ROOF
Ecosolargy	Ecosolargy modules with 35, 40 and 50 mm frames ECOxxxYzzA-bbD Where "xxx" is the module power rating; "Y" can be A, H, S, or T; "zz" can be 125 or 156; "A" can be M or P; "bb" can be 60 or 72; and "D" can be blank or B

MODULE COMPATIBILITY

ET Solar	ET Solar modules with 35, 40 and 50 mm frames ET-Y6ZZxxxAA Where “Y” can be P, L, or M; “ZZ” can be 60 or 72; “xxx” refers to the module power rating; and “AA” can be WB, WW, BB, WBG, WWG, WBAC, WBCO, WWCO, WWBCO or BBAC
Flex	Flex modules with 35, 40 and 50 mm frames and model identifier FXS-xxxYY-ZZ; where "xxx" is the module power rating; "YY" can be BB or BC; and "ZZ" can be MAA1B, MAA1W, MAB1W, SAA1B, SAA1W, SAC1B, SAC1W, SAD1W, SBA1B, SBA1W, SBC1B, or SBC1W
GCL	GCL modules with 35 mm and 40 mm frames GCL-a6/YY xxx Where "a" can be M or P; "YY" can be 60, 72, or 72H; and xxx is the module power rating
GigaWatt Solar	Gigawatt modules with 40 mm frames GWxxxYY Where “xxx” refers to the module power rating; and “YY” can be either PB or MB
Hansol	Hansol modules with 35 and 40 frames HSxxxYY-zz Where "xxx" is the module power rating; "YY" can be PB, PD, PE, TB, TD, UB, UD, or UE; and "zz" can be AN1, AN3, AN4, HV1, or JH2
Hanwha Solar	Hanwha Solar modules with 40, 45 and 50 mm frames HSLaaP6-YY-1-xxxZ Where "aa" can be either 60 or 72; "YY" can be PA or PB; "xxx" refers to the module power rating; and "Z" can be blank or B
Hanwha Q CELLS	Hanwha Q CELLS Modules with 32, 35, 40 and 42mm frames and model identifier aaYY-ZZ-xxx where "aa" can be Q. or B.; "YY" can be PLUS, PRO, PEAK, LINE PRO, LINE PLUS, or PEAK DUO; and "ZZ" can be G3, G3.1, G4, G4.1, L-G2, L-G2.3, L-G3, L-G3.1, L-G3y, L-G4, L-G4.2, L-G4y, LG4.2/TAA, BFR-G3, BLK-G3, BFR-G3.1, BLK-G3.1, BFR-G4, BFR-G4.1, BFR G4.3, BLK-G4.1, G4/SC, G4.1/SC, G4.1/TAA, G4.1/MAX, BFR G4.1/TAA, BFR G4.1/MAX, BLK G4.1/TAA, BLK G4.1/SC, EC-G4.4, G5, BLK-G5, L-G5, L-G5.1, L-G5.2, L-G5.2/H, L-G5.3, G6, G6+, BLK-G6, L-G6, L-G6.1, L-G6.2, L-G6.3, G7, BLK-G6+, BLK-G7, G7.2, G8, BLK-G8, G8+, BLK-G8+ L-G7, L-G7.1, L-G7.2, L-G7.3, L-G8, L-G8.1, L-G8.2, or L-G8.3; and "xxx" is the module power rating
Heliene	Heliene modules with 40 mm frames YYZZxxx Where "YY" can be 36, 60, 72, or 96; "ZZ" can be M, P, or MBLK; and "xxx" is the module power rating
HT-SAAE	HT-SAAE modules with 40 mm frames HT72-156Z-xxx Where "Z" can be M, P, M-C, P-C, M(S), M(VS), M(V), P(V), M(V)-C, P(V)-C; and "xxx" is the module power rating
Hyundai	Hyundai modules with 33, 35, 40 and 50 mm frames HiY-SxxxZZ Where "Y" can be A, M or S; "xxx" refers to the module power rating; and "ZZ" can be HG, HI, KI, MI, MF, MG, RI, RG(BF), RG(BK), SG, TI, or TG
Itek	Itek Modules with 40 and 50 mm frames IT-xxx-YY Where "xxx" is the module power rating; and "YY" can be blank, HE, or SE, or SE72
JA Solar	JA Solar modules with 35, 40 and 45 mm frames JAyyzz-bbww-xxx/aa Where “yy” can be M, P, M6 or P6; “zz” can be blank, (K), (L), (R), (V), (BK), (FA), (TG), (FA)(R), (L)(BK), (L)(TG), (R)(BK), (R)(TG), (V)(BK), (BK)(TG), or (L)(BK)(TG); “bb” can be 48, 60, or 72; "ww" can be S01, S02, S03, S09, or S10; “xxx” is the module power rating; and “aa” can be MP, SI, SC, PR, 3BB, 4BB, 4BB/RE, 5BB
Jinko	Jinko modules with 35 and 40 mm frames JKMYxxxZZ-aa Where "Y" can either be blank or S; "xxx" is the module power rating; "ZZ" can be P, PP, M; and "aa" can be blank, 60, 60B, 60H, 60L, 60BL, 60HL, 60HBL, 60-J4, 60B-J4, 60B-EP, 60(Plus), 60-V, 60-MX, 72, 72-V, 72H-V, 72L-V, 72HL-V or 72-MX Jinko frameless modules JKMxxxPP-DV Where "xxx" is the module power rating
Kyocera	Kyocera Modules with 46mm frames KYxxxZZ-AA Where "Y" can be D or U; "xxx" is the module power rating; "ZZ" can be blank, GX, or SX; and "AA" can be LPU, LFU, UPU, LPS, LPB, LFB, LFBS, LFB2, LPB2, 3AC, 3BC, 3FC, 4AC, 4BC, 4FC, 4UC, 5AC, 5BC, 5FC, 5UC, 6BC, 6FC, 8BC, 6MCA, or 6MPA
LG	LG modules with 35, 40 and 46 mm frames LGxxxYaZ-bb Where "xxx" is the module power rating; "Y" can be A, E, N, Q, S; "a" can be 1 or 2; "Z" can be C, K, T, or W; and "bb" can be A3, A5, B3, G3, G4, K4, or V5
Longi	Longi modules with 30, 35 and 40 mm frames LRa-YYZZ-xxxM Where "a" can be 4 or 6; "YY" can be blank, 60 or 72; "ZZ" can be blank, BK, BP, HV, PB, PE, PH, HBD, HPB, or HPH; "xxx" is the module power rating
Mission Solar	Mission Solar modules with 40 mm frames MSEbbxxxZZaa Where "bb" can be blank or 60A; "xxx" is the module power rating; "ZZ" can be blank, MM, SE, SO or SQ, and "aa" can be blank, 1J, 4J, 4S, 5K, 5T, 6J, 6S, 6W, 8K, 8T, or 9S
Mitsubishi	Mitsubishi modules with 46 mm frames PV-MYYxxxZZ Where "YY" can be LE or JE; xxx is the module power rating; and "ZZ" can be either HD, HD2, or FB

MODULE COMPATIBILITY

Motech	IM and XS series modules with 40, 45 and 50 mm frames
Neo Solar Power	Neo Solar Power modules with 35 mm frames D6YxxxZZaa Where "Y" can be M or P; xxx is the module power rating; "ZZ" can be B3A, B4A, E3A, E4A, H3A, H4A; and "aa" can be blank, (TF), ME or ME (TF)
Panasonic	Panasonic modules with 35 and 40 mm frames BHNxxxYYzzA Where "xxx" refers to the module power rating; "YY" can be either KA, SA or ZA; "zz" can be either 01, 02, 03, 04, 06, 06B, 11, 11B, 15, 15B, 16, 16B, 17, or 18; and "A" can be blank, E or G
Peimar	Peimar modules with 40 mm frames SGxxxYzz Where “xxx” is the module power rating; “Y” can be M or P; and “zz” can be blank, (BF), or (FB)
Phono Solar	Phono Solar modules with 35, 40 and 45 mm frames PSxxxY-ZZ/A Where xxx refers to the module power rating; "Y" can be M or P; "ZZ" can be 20 or 24; and "A" can be F, T or U
Prism Solar	Prism Solar frameless modules BiYY-xxxBSTC Where "YY" can be 48, 60, 60S, 72 or 72S; and "xxx" is the module power rating
REC Solar	REC modules with 30, 38 and 45 mm frames RECxxxYYZZ Where “xxx” is the module power rating; “YY” can be AA, M, NP, PE, PE72, TP, TP2, TP2M, TP2SM, or TP2S; and “ZZ” can be blank, Black, BLK, BLK2, SLV, or 72
Renesola	ReneSola modules with 35, 40 and 50 mm frames JCxxxY-ZZ Where "xxx" refers to the module power rating; "Y" can be F, M or S; and "ZZ" can be Ab, Ab-b, Abh, Abh-b, Abv, Abv-b, Bb, Bb-b, Bbh, Bbh-b, Bbv, Bbv-b, Db, or Db-b
Renogy	Renogy Modules with 40 and 50 mm frames RNG-xxxY Where "xxx" is the module power rating; and "Y" can be D or P
Risen	Risen Modules with 35 and 40 mm frames RSMyy-6-xxxZZ Where "yy" can be 60 or 72; "xxx" is the module power rating; and "ZZ" can be M or P Frameless modules RSMyy-6-xxxZZ Where "yy" can be 60 or 72; "xxx" is the module power rating; and "ZZ" can be MDG or PDG
S-Energy	S-Energy modules with 40 frames SNxxxY-ZZ Where "xxx" is the module power rating; "Y" can be M or P; and "ZZ" can be 10, or 15
Seraphim Energy Group	Seraphim modules with 35 and 40 mm frames SEG-6YY-xxxZZ Where "YY" can be MA, MB, PA, or PB; "xxx" is the module power rating; and "ZZ" can be BB, BW, WB or WW
Seraphim USA	Seraphim modules with 40 and 50 mm frames SRP-xxx-6YY Where "xxx" is the module power rating; and "YY" can be MA, MB, PA, PB, QA-XX-XX, and QB-XX-XX
Sharp	Sharp modules with 35 and 40 mm frames NUYYxxx Where “YY” can be SA or SC; and "xxx" is the module power rating
Silfab	Silfab Modules with 38 mm frames SYY-Z-xxx Where "YY" can be SA or LA; SG or LG; "Z" can be M, P, or X; and "xxx" is the module power rating
Solaria	Solaria modules with 40 mm frames PowerXT xxxY-ZZ Where "xxx" is the module power rating; "Y" can be R or C; and "ZZ" can be AC, BD, BX, BY, PD, PX, PZ, WX or WZ
Solarcity	Solarcity modules with 40 mm frames SCxxxYY Where "xxx" is the module power rating; and "YY" can be blank, B1 or B2
SolarTech	SolarTech modules with 42 mm frames STU-xxxYY Where "xxx" is the module power rating; and "YY" can be PERC or HJT
SolarWorld AG / Industries GmbH	SolarWorld Sunmodule Plus, Protect, Bisun, XL, Bisun XL, may be followed by mono, poly, duo, black, bk, or clear; modules with 31, 33 or 46 mm frames SW-xxx Where "xxx" is the module power rating
SolarWorld Americas Inc.	SolarWorld Sunmodule Plus, Protect, Bisun, XL, Bisun XL, may be followed by mono, poly, duo, black, bk, or clear; modules with 33 mm frames SWA-xxx Where "xxx" is the module power rating
Stion	Stion Thin film modules with 35 mm frames STO-xxx or STO-xxxA Thin film frameless modules STL-xxx or STL-xxxA Where "xxx" is the module power rating
SunEdison	SunEdison Modules with 35, 40 and 50 mm frames SE-YxxxZABCDE Where "Y" can be B, F, H, P, R, or Z; "xxx" refers to the module power rating; "Z" can be 0 or 4; "A" can be B,C,D,E,H,I,J,K,L,M, or N ; "B" can be B or W; "C" can be A or C; "D" can be 3, 7, 8, or 9; and "E" can be 0, 1 or 2

MODULE COMPATIBILITY

Suniva	Suniva modules with 35, 38, 40, 46 and 50 mm frames OPTxxx-AA-B-YYY-Z MVXxxx-AA-B-YYY-Z Where "xxx" is the module power rating; "AA" is either 60 or 72; "B" is either 4 or 5; "YYY" is either 100,101,700,1B0, or 1B1; and "Z" is blank or B
Sunpower	Sunpower standard (G3 or G4) or InvisiMount (G5) 40 and 46 mm frames SPR-Zb-xxx-YY Where "Z" is either A, E, P or X; “b” can be blank, 17, 18, 19, 20, 21, or 22; “xxx” is the module power rating and “YY” can be blank, BLK, COM, C-AC, D-AC, E-AC, G-AC, BLK-C-AC, or BLK-D-AC
Sunpreme	Sunpreme frameless modules GXB-xxxYY Where "xxx" is the module power rating; and "YY" can be blank or SL
Sunspark	Sunspark modules with 40 mm frames SYY-xxZ Where “YY” can be MX or ST; “xxx” is the module power rating; and “Z” can be P or W
Suntech	Vd, Vem, Wdb, Wde, and Wd series modules with 35, 40 and 50 mm frames
Talesun	Talesun modules with 35 and 40 frames TP6yyZxxx-A Where "yy" can be 60, 72, H60 or H72; "Z" can be M, or P; "xxx" is the module power rating; and "A" can be blank, B, or T
Trina	Trina Modules with 30, 35, 40 and 46mm frames TSM-xxxYYZZ Where "xxx" is the module power rating; "YY" can be DD05, DD06, DE14, DE15, DEG15, PA05, PC05, PD05, PD06, PA14, PC14, PD14, PE14, or PE15 ; and "ZZ" can be blank, .05, .08, .10, .18, .08D, .18D, 0.82, .002, .00S, 05S, 08S, A, A.05, A.08, A.10, A.18, A(II), A.05(II), A.08(II), A.082(II), A.10(II), A.18(II), H, H(II), H.05(II), H.08(II), HC.20(II), HC.20(II), or M Frameless modules TSM-xxxYY Where "YY" can be either DEG5(II), DEG5.07(II), DEG5.40(II), DEG5.47(II), DEG14(II), DEG14C(II), DEG14C.07(II), DEG14.40(II), PEG5, PEG5.07, PEG5.40, PEG5.47, PEG14, or PEG14.40
Vikram	Vikram solar modules with 40 mm frames Syy.ZZ.AAA.bb Where "yy" can be M, P, MBB, MH, MS, MHBB, or PBB; "ZZ" can be 60 or 72; "AAA" is the module power rating; and "bb" can be 03.04 or 05
Winaico	Winaico modules with 35 and 40 mm frames Wsy-xxxz6 Where "y" can be either P or T; "xxx" is the module power rating; and "z" can be either M or P
Yingli	Panda, YGE and YGE-U series modules with 35, 40 and 50 mm frames

U-ANCHOR™ | U2400-TPO

Mechanically Attached Solution For Single-Ply Roofing System

ANCHOR PRODUCTS™

Front *Back*

Description

The U2400-TPO is a lightweight rooftop attachment system consisting of an U-Anchor 2000 Series plate and cover membrane. The cover membrane and separator disk are factory sealed to the top of the plate. The U2400-TPO provides a fastened, watertight, warranted attachment for TPO single-ply membranes.

Advantages

- Extremely strong and lightweight.
- Fast installation, approximate rate of 12 per man hour.
- Installs on any surface from flat to vertical.

U-Anchor Attachment

The U2400-TPO is attached by lifting the flashing to expose the fastening hole on the plate. Then, fastening through the roofing assembly and into the structural decking with 2-8 approved fasteners, as directed by project specific engineering. The membrane cover is then hot air welded around the perimeter to the roof membrane. After verifying the seam integrity with a probe, seam sealer maybe required per roofing manufacturer's specifications.

Project-specific data is required to determine the correct type of fastener and number needed to secure each U-Anchor. An ANSI/SPRI FX-1 Pull Test is recommended to measure the pull-out resistance of fasteners included in the load path, (for example, substrate -> fasteners -> the U-Anchor -> other components.)

Equipment Attachment

To securely mount your rooftop equipment to the U-Anchor, after its installed, the connection nut must be tightened to approximately 20-25 ft.-lbs.

Use a calibrated torque wrench during install to ensure appropriate results are achieved.

Refer to product documentation for detailed installation and component requirements.

Testing

Results are based on plate performance only.

- Ultimate Load - Shear: 4,339 lbs
- Ultimate Load - Tension: 2,713 lbs

Tested in accordance with ICC AC467

Individual roof deck assembly tests available upon request as application specific results may vary.

Listings

- ICC-ES Evaluation Report ESR-4152

Warranty

- 20 Year Limited Material Only Warranty.
  Subject to terms and conditions.

Product Specifications

Bolts

- 3/8"-16 x 1.5" Bolt*
- Material Type: 304 Stainless Steel

Plate

- Outer Diameter: 5.5"
- Fastener Hole Diameter: 0.265" (8 holes)
- Fastener Hole Pattern: 4.125" Diameter
- Steel Thickness: 0.047" (1.194mm)
- Material Type: Galvanized Steel G90

Cover Membrane

- Manufacturer: Brand or Non-Brand Specific*
- Color: Default White*
- Length: 11.75"
- Width: 11.75"
- Thickness: Default 60 mil*

Patents

- Visit www.anchorp.com/patents

Packaging Specifications

- Sold Individually OR Full Box Quantity
- Individual Weight: Approx. 0.75 lbs
- Full Box Quantity: 10 units
- Box Weight: Approx. 10 lbs
- Box Dimensions: 13" x 11" x 13"
- Full Pallet Quantity: 50 boxes
- Pallet Dimensions: 48" x 40" x 66"

* Specified option is standard. Custom options may be available for additional charge. Lead times may apply depending on roofing manufacturer and product availability.

All representations herein are premised on proper installation and use of approved components. Failure to properly install or use of unapproved components voids all Anchor Products representations.

Anchor Products systems are included in many roofing manufacturers' guarantees! Please contact us for more information.

ROOFING MANUFACTURER ACCEPTED

MADE IN U. S. A.

Anchor Products LLC.
PO Box 1551
Colleyville, TX 76034

Secured Mounting Solutions™

888-575-2131
www.anchorp.com
info@anchorp.com