

AERIAL VIEW		PROJECT DESCRIPTION:			GENERAL NOTES		SCOPE:	
		SYSTEM SIZE: DC STC: 6.34 kW AC CEC: 5.78 kW			ALL ELECTRICAL WORK TO BE INSTALLED BY A QUALIFIED AND LICENSED ELECTRICAL CONTRACTOR. ALL SOLAR MODULES SHALL BE UL LISTED 1703 & CEC APPROVED. ALL INVERTERS SHALL BE UL LISTED 1741 CERTIFIED & CEC APPROVED. ALL ELECTRICAL COMPONENTS AND MATERIALS SHALL BE LISTED FOR IT'S PURPOSE AND INSTALLED IN A WORKMAN LIKE MANNER. ALL OUTDOOR EQUIPMENT SHALL MEET APPROPRIATE NEMA STANDARDS. THE ELECTRICAL CONTRACTOR IS ADVISED THAT ALL DRAWINGS AND COMPONENT MANUALS ARE TO BE UNDERSTOOD PRIOR TO INSTALLATION. THE CONTRACTOR IS ADVISED TO HAVE ALL SWITCHES IN THE OFF POSITION AND FUSES REMOVED PRIOR TO INSTALLATION OF FUSE-BEARING COMPONENTS. THIS SYSTEM IS INTENDED TO BE OPERATED IN PARALLEL WITH THE UTILITY SERVICE PROVIDER. ANTI-ISLANDING PROTECTION IS A REQUIREMENT OF UL 1741 AND IS INTENDED TO PREVENT THE OPERATION OF THE PV SYSTEM WHEN THE UTILITY GRID IS NOT OPERATIONAL. PERMISSION TO OPERATE THE SYSTEM IS NOT AUTHORIZED UNTIL FINAL INSPECTIONS AND APPROVALS ARE OBTAINED FROM THE LOCAL AUTHORITY HAVING JURISDICTION AND THE LOCAL UTILITY SERVICE PROVIDER. THE METHOD OF ATTACHMENT CREATES A UNIFIED STRUCTURE TO MEET DEAD LOAD, WIND LOAD, AND SEISMIC REQUIREMENTS. SOLAR MODULES WILL BE SECURED TO THE EXISTING ROOF AS SPECIFIED ON THE STRUCTURAL SHEETS. EXISTING ROOF EQUIPMENT WILL NOT BE EFFECTED BY THE PV SYSTEM. ALL STRUCTURAL DESIGN AND INSTALLATION COMPONENTS ARE THE RESPONSIBILITY OF OTHERS AND OUTSIDE THE SCOPE OF THIS DOCUMENT. ALL FASTENERS SHALL BE CORROSION RESISTANT APPROPRIATE FOR SITE CONDITIONS. CONNECTORS SHALL BE TORQUED PER DEVICE LISTING OR ENGINEERING RECOMMENDATIONS. ALL ROOFING REPAIR MUST MAINTAIN EXISTING CLASS AND TYPE OF ROOF AND ALL WORK SHALL BE IN ACCORDANCE WITH THE ROOF IN MANUFACTURER'S INSTALLATION REQUIREMENTS.		6.34 kW DC Roof Mounted PV Electrical System 6 - Renogy 320W 1 - Canadian Solar 320W 1 - LG Neon-2 320W 12 - Canadian Solar 315W 20 - SMA Sunspec (JMS-F) 1 - 5.0 kW SMA Inverter	
		SOLAR MODULES: (6) Renogy 320W (RNG-320D) (1) Canadian Solar 320W (CS3K-320MS) (1) LG Neon-2 320W (LG320N1C) (12) Canadian Solar 315W (CS3K-315MS)			TOTAL 20 MODULES		VICINITY MAP	
		INVERTERS: (1) SUNNY BOY 5.0kW INVERTER (SB5.0-1TP-US-41)					ELECTRICAL INFORMATION	
		RSD: (20) SMA Sunspec (JMS-F)					EXISTING: 1P, 3W, 120/240V	
		MSP BUS: 200A					MAIN BREAKER: 2x100A	
		PV BREAKER: 30A						

Roof access is not located in areas that require placement of ground ladders over exterior wall openings CRC R331.4.1.

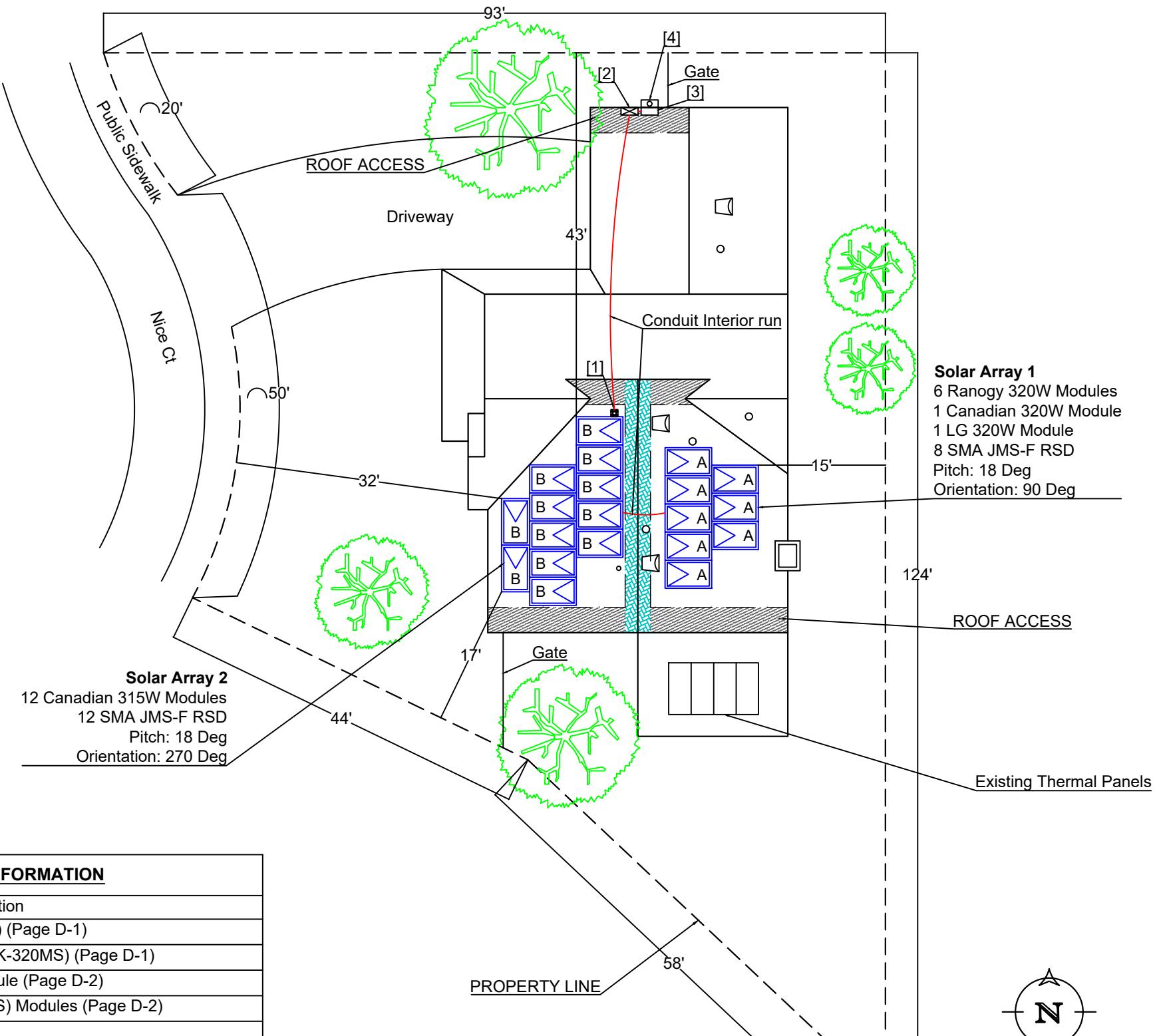
 FIRE SETBACK (18" TYP)

 FIRE SETBACK (36" TYP)

**STRING CONFIGURATION**

A	8 MODULES
B	12 MODULES

Number of modules	20
Module area (sq.ft)	18
Total Module area (sq.ft)	360
Total area of roof (sq.ft)	2295
Total area of array covered in the roof (%)	15.7



**SCOPE:**

6.34 KW DC Roof Mounted PV Electrical System

6 - Renogy 320W

1 - Canadian Solar 320W

1 - LG Neon-2 320W

12 - Canadian Solar 315W

20 - SMA Sunspec (JMS-F)

1 - 5.0 kW SMA Inverter

**BUILDING INFO:**

TWO STORY BUILDING

ROOF TYPE: M CONCRETE TILE

ROOF STRUCTURE:

2"X4" TRUSSES 24" O/C

MOUNTING SYSTEM:

IRONRIDGE RACKING

PARCEL NUMBER: 9839766

LOT AREA: 6,655 SQFT

LIVING AREA: 2,125 SQFT

**Complete Solar**

COMPANY NAME: COMPLETE SOLAR

LICENSE #: 961988

ADDRESS: 3000 EXECUTIVE PKWY

SUITE #504 SAN RAMON, CA 94583

PHONE: (877) 299-4943

SIGNATURE

**CUSTOMER INFORMATION**

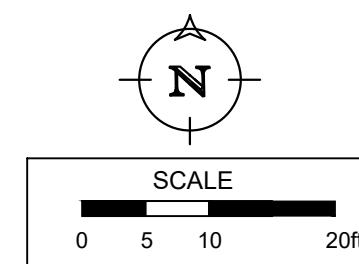
NAME: KEVIN WION

ADDRESS: 1275 NICE CT,  
LIVERMORE, CA 94551

CITY OF LIVERMORE

UTILITY: PG&E

**SITE PLAN**



SCALE: AS NOTED PAPER SIZE: 17" x 11"

DATE: 07/05/2023 PV-1

ELECTRICAL EQUIPMENT INFORMATION		
#	Quantity	Description
1	6	(N) Renogy 320W Modules (RNG-320D) (Page D-1)
2	1	(N) Canadian Solar 320W Module (CS3K-320MS) (Page D-1)
3	1	(N) LG Neon-2 320W (LG320N1C) Module (Page D-2)
4	12	(N) Canadian Solar 315W (CS3K-315MS) Modules (Page D-2)
5	20	(N) SMA Sunspec (JMS-F) (Page D-3)
6	1	(N) Junction-Box
7	1	(N) SMA 5.0 kW Inverter Model (SB5.0-1TP-US-41) (120/240V) (Page D-4)
8	1	(N) 125A Service Sub Panel (120/240V)
9	1	(E) 200A Main Service Panel (120/240V)

MAX DC VOLTAGE FOR INVERTERS:  $12 * 39.9 * 1.12 = 536.3 \text{ V} \leq 600 \text{ V}$

### SCOPE:

6.34 KW DC Roof Mounted PV Electrical System  
6 - Renogy 320W  
1 - Canadian Solar 320W  
1 - LG Neon-2 320W  
12 - Canadian Solar 315W  
20 - SMA Sunspec (JMS-F)  
1 - 5.0 kW SMA Inverter

### BUILDING INFO:

TWO STORY BUILDING  
ROOF TYPE: M CONCRETE TILE  
ROOF STRUCTURE: 2"X4" TRUSSES 24" O/C  
MOUNTING SYSTEM: IRONRIDGE RACKING

PARCEL NUMBER: 9839766  
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LIVING AREA: 2,125 SQFT



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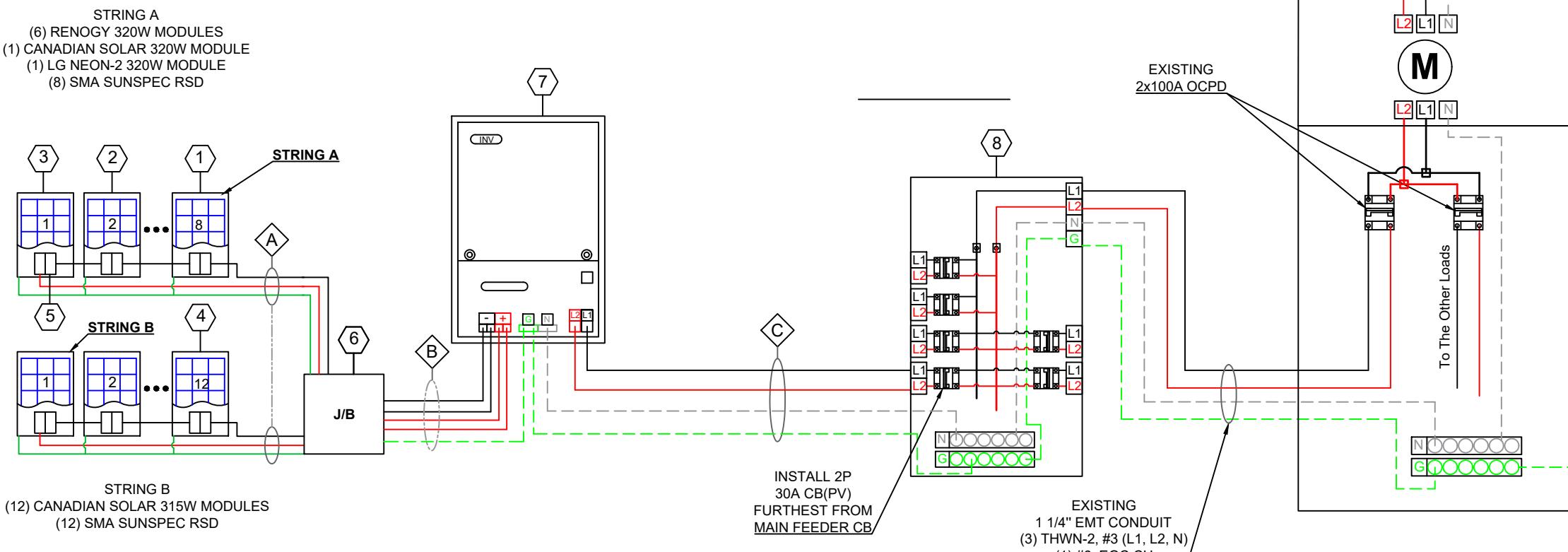
SIGNATURE

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### THREE LINE DIAGRAM

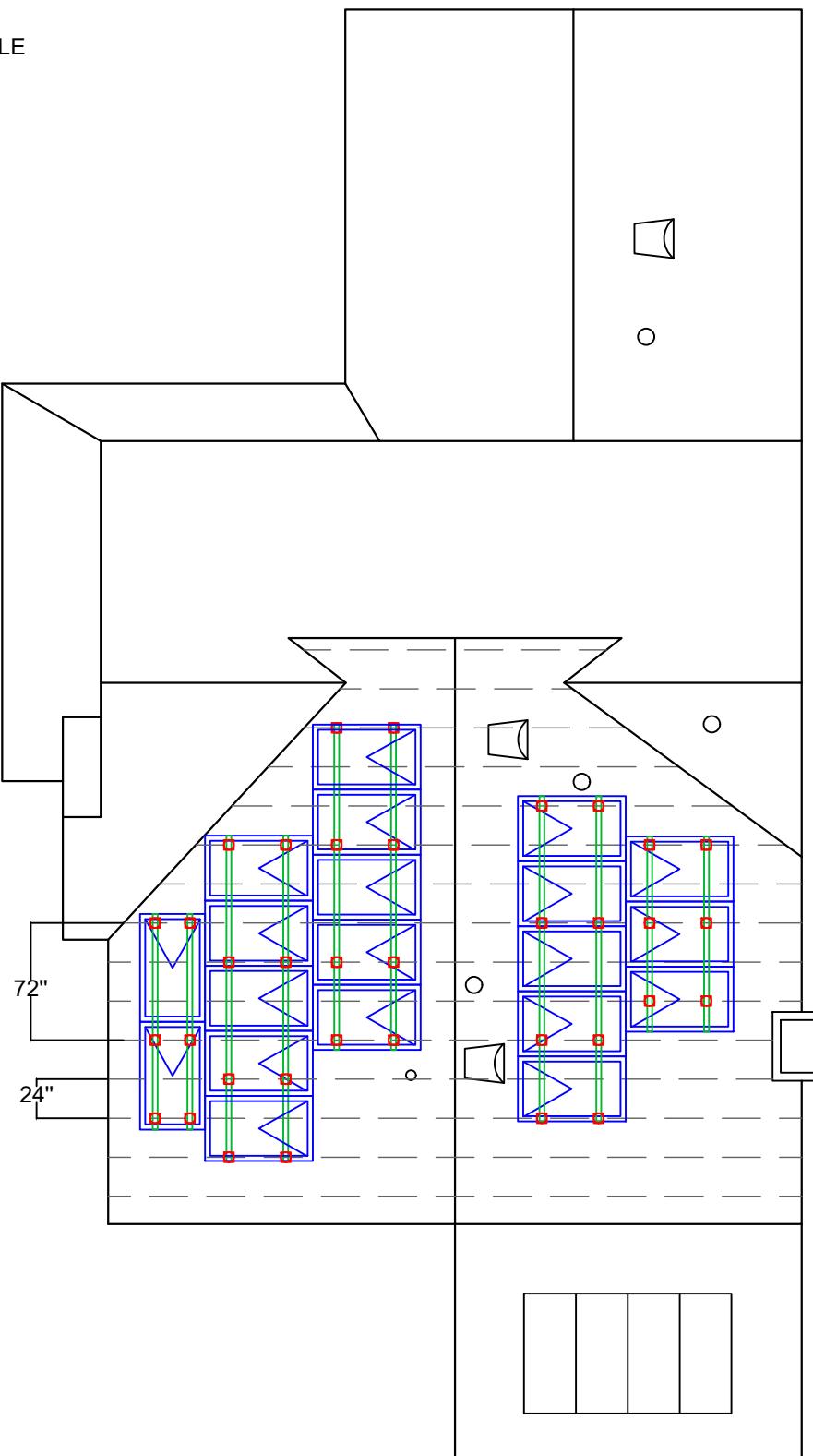
SCALE: AS NOTED PAPER SIZE: 17" x 11"  
DATE: 07/05/2023 PV-2



NOTE: Photovoltaic system is rapid shut down ready

<b>WIRE SIZE CALCULATION</b>												<b>SCOPE:</b>  6.34 KW DC Roof Mounted PV Electrical System 6 - Renogy 320W 1 - Canadian Solar 320W 1 - LG Neon-2 320W 12 - Canadian Solar 315W 20 - SMA Sunspec (JMS-F)  1 - 5.0 kW SMA Inverter	
WIRE TAG#	WIRE TYPE AND SIZE	QUANTITY OF WIRES	GROUNDING SIZE	WIRE AMPACITY	TEMPERATURE	CONDUIT TYPE	ABOVE ROOF	TEMP. DERATE FACTOR	ADJUSTING FACTOR	CORRECTED CONDUCTOR AMP	CURRENT AMP		
A	PV WIRE #10	2	#6, BARE CU	40	A	90°	Free in the air	>3.5 - 12"	0.71	1	N/A		
B	THWN-2 #10 2x(DC+,DC-)	4	#8, EGC CU	40	A	90°	3/4" FMT	ROUGH ATTIC	0.71	0.8	4 Thru 6 Wires		
C	THWN-2 #10 (L1,L2,N)	3	#8, EGC CU	40	A	90°	3/4" EMT	ALONG THE WALL	0.91	1	N/A		
<b>SERVICE SUB PANEL RATING</b>			<b>PV SYSTEM OUTPUT CALCULATION</b>					<b>WIRE AMPACITY DC</b>					
BUSBAR RATING		125	A	1 SMA 5.0 kW Inverter Model (SB5.0-1TP-US-41)		97.6	%	#	RSD AMP	CONSIDER CONTINUOUS COEFFICIENT	CURRENT AMP		
CONTROLLER BREAKER		100	A	6 Renogy 320W (RNG-320D)		320.0	W	A	15	1.25	18.8		
PV BREAKER SIZE		30	A	1 Pmax (PTC Rating)		300.4	W	B	15	1.25	18.8		
120% RULE				1 Canadian Solar 320W (CS3K-320MS)		320.0	W	<b>WIRE AMPACITY AC</b>					
MAX ALLOWED FEED		150	A	1 Pmax (PTC Rating)		298.1	W	#	INVERTER MAX OUTPUT CURRENT	QUANTITY	CONSIDER CONTINUOUS COEFFICIENT		CURRENT AMP
100A "CB" + 30A "SOLAR" =130A ≤ 150A MAX				1 LG Neon-2 320W (LG320N1C)		320.0	W	C	21.0	1	1.25		26.3
				1 Pmax (PTC Rating)		298.7	W						
				12 Canadian Solar 315W (CS3K-315MS)		315.0	W						
				12 Pmax (PTC Rating)		293.3	W						
				Max DC Output		(8 * 320) + (12 * 315)	6.34	KW					
				Max AC Output		((6 * 300.4) + (1 * 298.1) + (1 * 298.7) + (12 * 293.3) * 0.976)	5.78	KW					
<b>BUILDING INFO:</b>													
TWO STORY BUILDING ROOF TYPE: M CONCRETE TILE ROOF STRUCTURE: 2"X4" TRUSSES 24" O/C MOUNTING SYSTEM: IRONRIDGE RACKING													
PARCEL NUMBER: 9839766 LOT AREA: 6,655 SQFT LIVING AREA: 2,125 SQFT													
<b>Complete Solar</b>													
COMPANY NAME: COMPLETE SOLAR LICENSE:# 961988 ADDRESS: 3000 EXECUTIVE PKWY SUITE #504 SAN RAMON, CA 94583 PHONE: (877) 299-4943													
SIGNATURE													
<b>CUSTOMER INFORMATION</b>													
NAME: KEVIN WION ADDRESS: 1275 NICE CT, LIVERMORE, CA 94551 CITY OF LIVERMORE UTILITY: PG&E													
<b>ELECTRICAL CALCULATION</b>													
												SCALE:AS NOTED	PAPER SIZE:17"x11"
												DATE:07/05/2023	PV-3

SOLAR ARRAY MOUNTING RAIL TYPE: IRONRIDGE XR10 RACKING  
 SOLAR ARRAY ATTACHMENT TYPES: ALL TILE HOOK  
 ATTACHMENT SPACING: 72" MAX  
 FRAMING: TRUSSES 2" x 4" @ 24" O.C.  
 FINISHED ROOF SURFACE IS ONE LAYER OF M CONCRETE TILE  
 WIND SPEED: 110 mph FOR EXPOSURE C  
 SNOW LOAD: 0 psf



#### SCOPE:

6.34 KW DC Roof Mounted  
 PV Electrical System  
 6 - Renogy 320W  
 1 - Canadian Solar 320W  
 1 - LG Neon-2 320W  
 12 - Canadian Solar 315W  
 20 - SMA Sunspec (JMS-F)  
 1 - 5.0 kW SMA Inverter

#### BUILDING INFO:

TWO STORY BUILDING  
 ROOF TYPE: M CONCRETE TILE  
 ROOF STRUCTURE:  
 2"X4" TRUSSES 24" O/C  
 MOUNTING SYSTEM:  
 IRONRIDGE RACKING

PARCEL NUMBER: 9839766  
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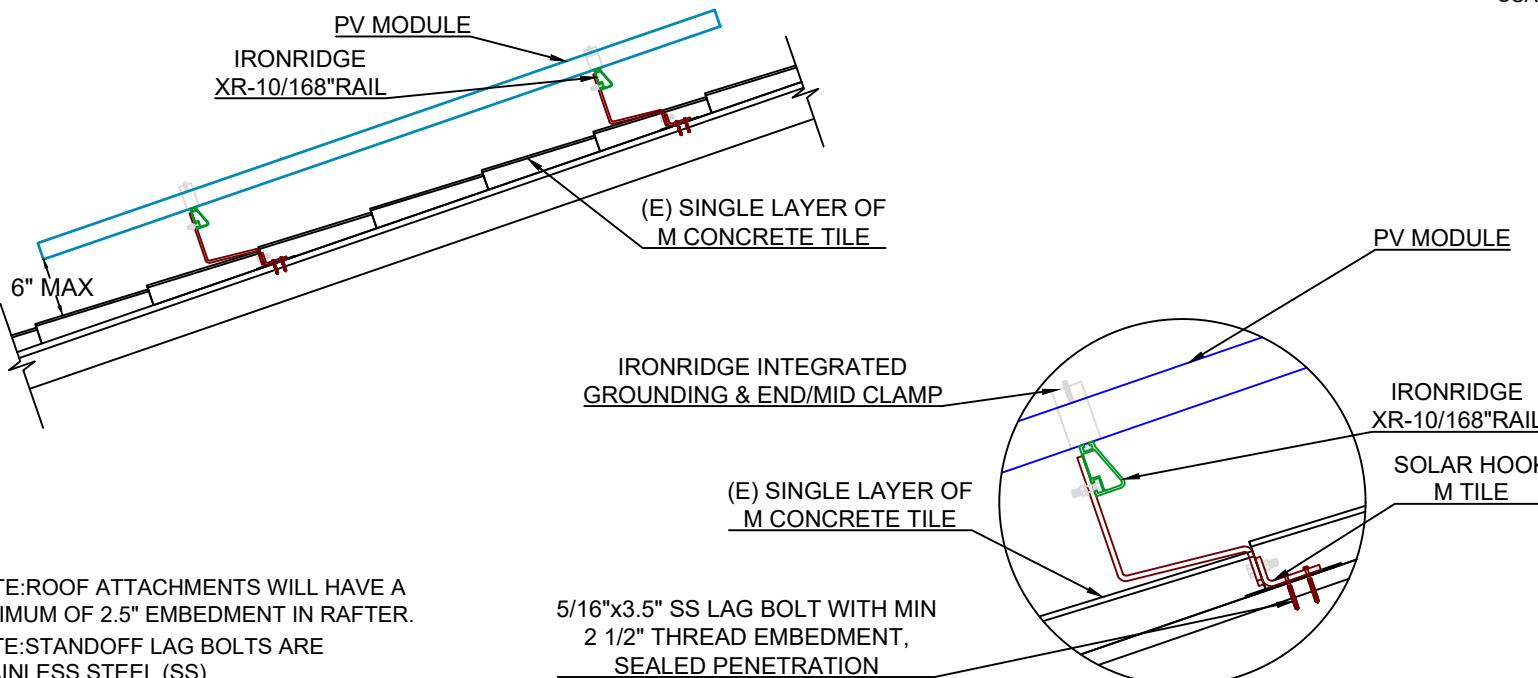
#### ATTACHMENT LAYOUT

SCALE:AS NOTED PAPER SIZE:17"x11"  
 DATE:07/05/2023 PV-4

<b>WEIGHT LOAD CALCULATION</b>	
MODULE WEIGHT(LBS):	39.7 / 37.48 / 40.8
NUMBER OF MODULES:	20
RAPID SHUTDOWN WEIGHT(LBS):	0.95
TOTAL WEIGHT OF MODULES(LBS):	806
SOLAR RACKING WEIGHT(LBS):	161
TOTAL RAPID SHUTDOWN WEIGHT(LBS):	7
TOTAL SYSTEM WEIGHT(LBS):	974
NUMBER OF ATTACHMENTS:	36
LOADING PER ATTACHMENT(LBS):	27.1
SOLAR ARRAY DEAD LOAD(LBS/FT <sup>2</sup> ):	2.71
TOTAL SOLAR AREA(SQFT):	360
TOTAL ROOF AREA(SQFT):	2295
TOTAL AREA OF ARRAY COVERED IN THE ROOF (%)	15.7

### ATTACHMENT DETAIL- IRONRIDGE ALL TILE HOOK

SCALE:NTS



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6.34 KW DC Roof Mounted PV Electrical System  
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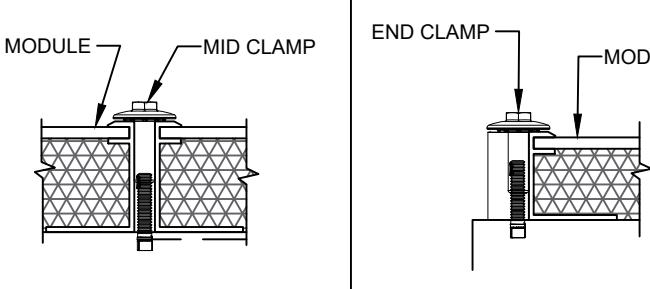
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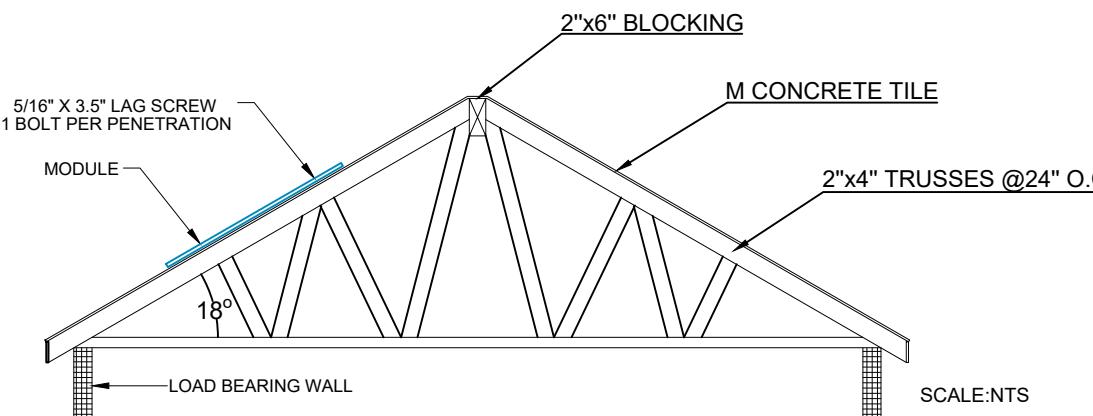
### STRUCTURAL DETAIL

SCALE: AS NOTED PAPER SIZE: 17" x 11"  
DATE: 07/05/2023 PV-5

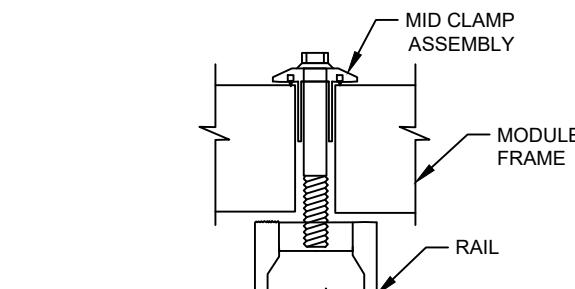
### MID-CLAMP AND END-CLAMP ANATOMY



### ROOF FRAMING DETAILS

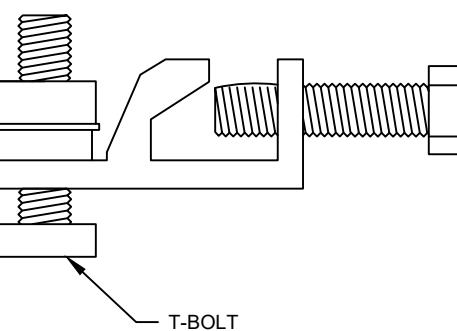


### MODULE TO MODULE & MODULE TO RAIL

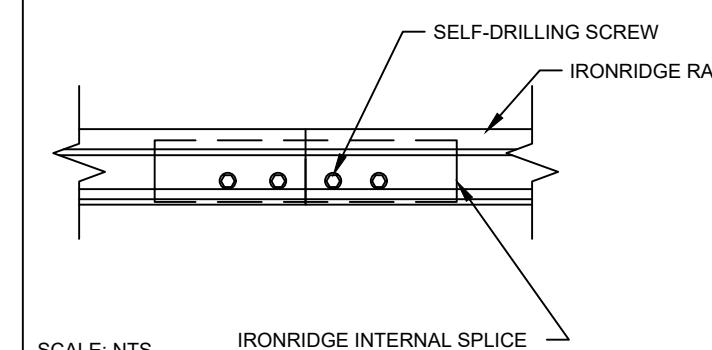


GROUNDING MID-CLAMP  
SCALE: NTS

### GROUNDING LUG

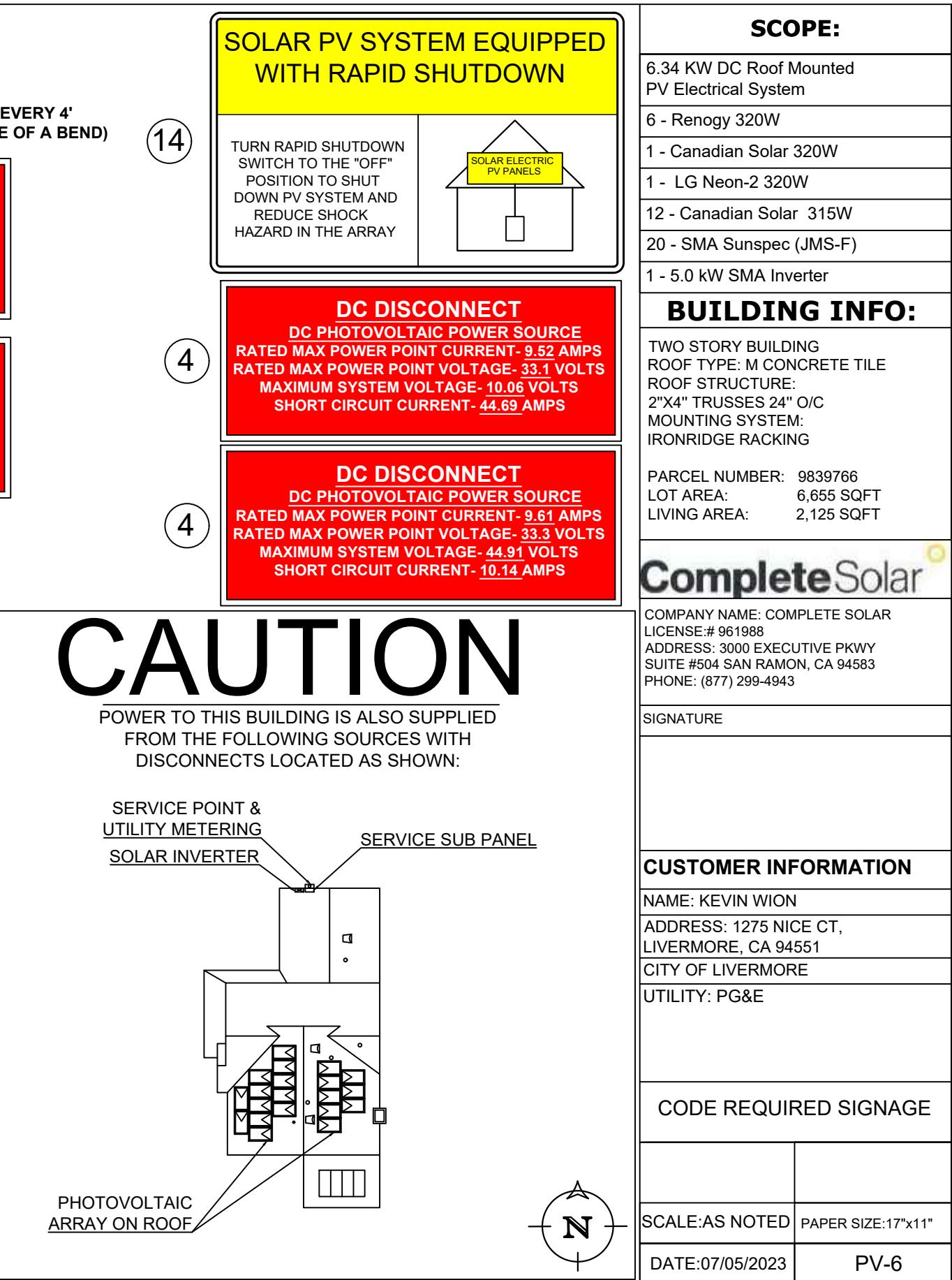
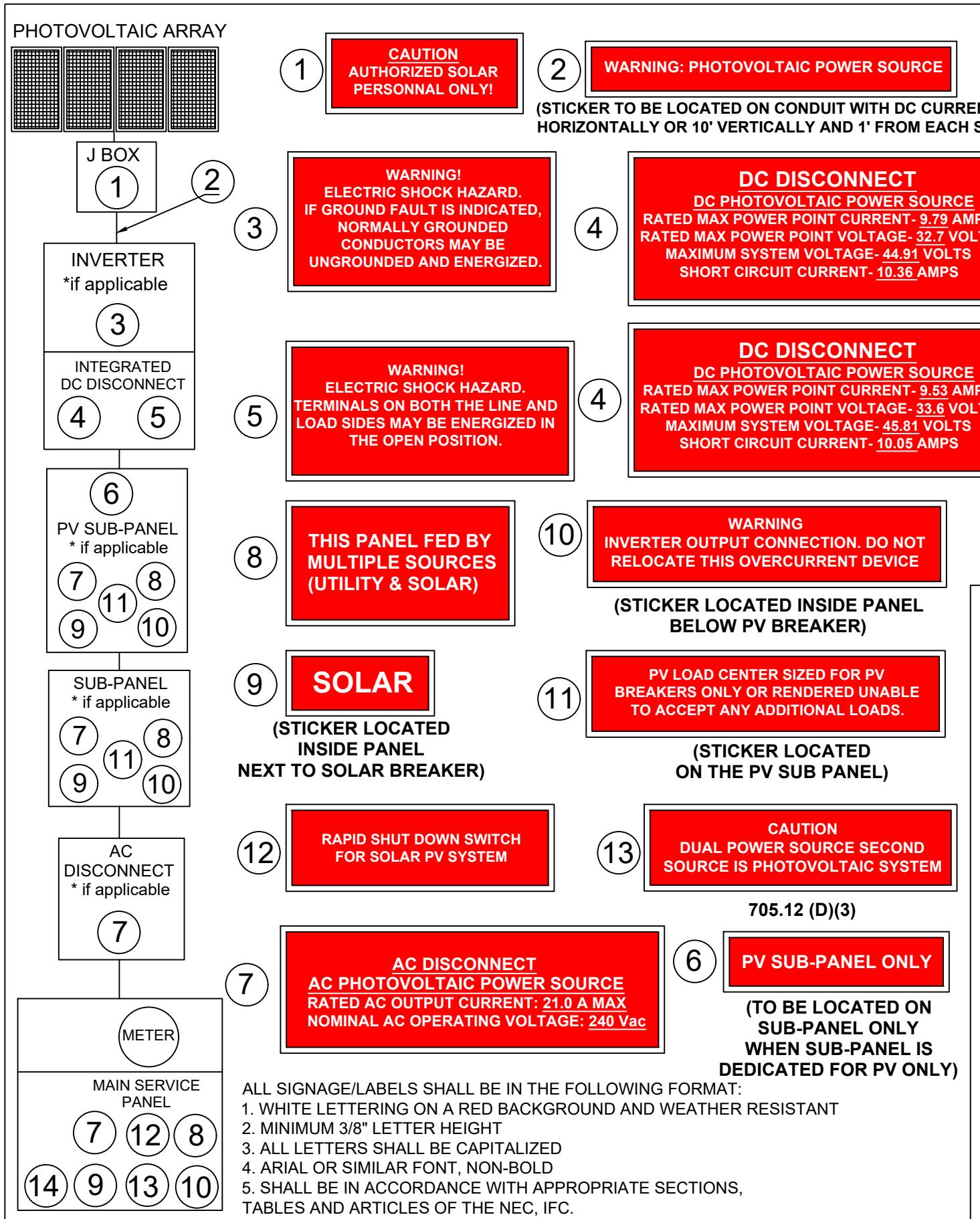


### RAIL TO RAIL



SCALE: NTS

IRONRIDGE INTERNAL SPLICER





## RNG-320D

320W Monocrystalline Solar Panel

### Electrical Data

Maximum Power at STC*	320 W
Open Circuit Voltage ( $V_{oc}$ )	40.10 V
Short Circuit Current ( $I_{sc}$ )	10.36 A
Optimum Operating Voltage ( $V_{opt}$ )	32.7 V
Optimum Operating Current ( $I_{opt}$ )	9.79 A
Module Efficiency	19.2%
Maximum System Voltage	1000 VDC
Maximum Series Fuse Rating	15 A
IP Rating	IP68 (Im. 1h)
Diode Type	THY2550
Number of Diodes	2 Diode(s)
Output Cables	12 AWG (3 ft long)

### Mechanical Data

Solar Cell Type	Monocrystalline (6.25 x 25 in)
Number of Cells	65.6 x 39.4 x 1.4 in (165 x 1002 x 35 mm)
Dimensions	39.7 lb (18 kg)
Weight	Tempered Glass 0.13 in (3.2 mm)
Frame	Black Anodized Aluminum Alloy
Connectors	Solar Connectors
Fire Rating	Type 2

**Solar Connectors**  
Solar Connectors are subject to change without notice.

### Thermal Characteristics

Operating Module Temperature	-40°F to +185°F
Nominal Operating Cell Temperature (NOCT)	47.2°C
Temperature Coefficient of $P_{max}$	-0.43%°C
Temperature Coefficient of $V_{oc}$	-0.30%°C
Temperature Coefficient of $I_{sc}$	0.04%°C

### Junction Box

IP Rating

Diode Type

Number of Diodes

Output Cables

12 AWG (3 ft long)

### Module Diagram

IP68 (Im. 1h)

2 Diode(s)

12 AWG (3 ft long)

### Certifications

IP68 (Im. 1h)

2 Diode(s)

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### Electrical Performance

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### Electrical Performance

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12 AWG (3 ft long)

### Module Diagram

IP68 (Im. 1h)

2 Diode(s)



## KuBlack

### HIGH EFFICIENCY MONO PERC MODULE

#### CS3K-300|305|310|315MS (1000 V / 1500 V)

**MORE POWER**

- Low power loss in cell connection
- Low temperature coefficient (Pmax): -0.36 % / °C
- Heavy snow load up to 6000 Pa\*
- Wind load up to 4000 Pa\*

**MORE RELIABLE**

- Minimizes micro-cracks
- Better shading tolerance
- Lower hot spot temperature
- Heavy snow load up to 6000 Pa\*

**25 years** linear power output warranty\*

**12 years** enhanced product warranty on materials

\*According to the applicable Canadian Solar Limited Warranty Statement.

**MANAGEMENT SYSTEM CERTIFICATES**

- ISO 9001:2017 Quality management system
- ISO 14001:2015 Environmental management system
- OHSAS 18001:2007 Occupational health & safety

**PRODUCT CERTIFICATES**

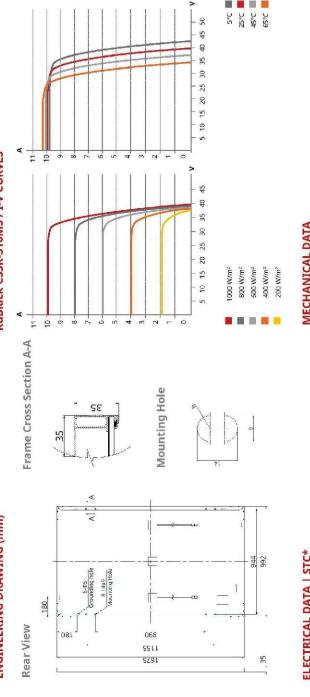
- IEC 61215 / IEC 61730-2/IEC 61730-2/IEC 61730-3 / CE / MCS / IEC 61703-1/IEC 61703-2/IEC 61703-3 / UL 1703 / CSA 2700 / IEC 62710 / VDE Take 3-way
- IEC 61730-2/IEC 61730-3 / CE / MCS / IEC 61703-1/IEC 61703-2/IEC 61703-3 / UL 1703 / CSA 2700 / IEC 62710 / VDE Take 3-way

\* As there are different certification requirements in different markets, please contact your local Canadian Solar representative for the specific requirements applicable to the products in the region in which the module will be used.

**CANADIAN SOLAR INC.** is committed to providing high quality solar products. Canadian Solar offers a wide range of products and services to customers around the world. Canadian Solar is a leading PV Project developer and manufacturer of solar modules with over 36 GW deployed around the world since 2001.

\* For detailed information, please refer to the Installation Manual.

**Engineering Drawing (mm)**



**Electrical Data | STC\***

Series	300MS	305MS	310MS	315MS
Nominal Max. Power (Pmax)	300 W	305 W	310 W	315 W
Opt. Operating Voltage (Vmp)	32.5 V	32.7 V	32.8 V	33.1 V
Opt. Operating Current (Imp)	9.24 A	9.33 A	9.42 A	9.52 A
Open Circuit Voltage (Voc)	39.3 V	39.5 V	39.7 V	39.9 V
Short Circuit Current (Isc)	9.62 A	9.50 A	9.58 A	10.06 A
Module Efficiency	18.05%	18.36%	18.68%	19.6%
Operating Temperature	-40°C ~ +85°C			
Max. System Voltage	1500V (IEC/UL) or 1000V (IEC/UL)			
Module Fire Performance	TYPE I (UL 1703)	or Class C (IEC 61730)		
Max. Series Fuse Rating	30 A			
Application Classification	Class A			
Power Tolerance	0 + 5 W			

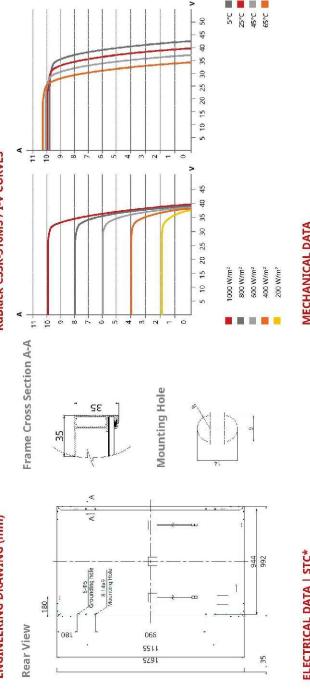
\* Under Standard Test Conditions (STC) of irradiance of 1000 W/m<sup>2</sup>, spectrum AM 1.5 and cell temperature of 25°C.

**Electrical Data | NMOT\***

Series	300MS	305MS	310MS	315MS
Nominal Max. Power (Pmax)	300 W	305 W	310 W	315 W
Opt. Operating Voltage (Vmp)	30.1 V	30.3 V	30.5 V	30.7 V
Opt. Operating Current (Imp)	7.39 A	7.46 A	7.54 A	7.61 A
Open Circuit Voltage (Voc)	36.7 V	36.9 V	37.1 V	37.3 V
Short Circuit Current (Isc)	7.93 A	7.99 A	8.06 A	8.12 A
Module Efficiency	18.05%	18.36%	18.68%	19.6%
Operating Temperature	-40°C ~ +85°C			
Max. System Voltage	1500V (IEC/UL) or 1000V (IEC/UL)			
Module Fire Performance	TYPE I (UL 1703)	or Class C (IEC 61730)		
Max. Series Fuse Rating	30 A			
Application Classification	Class A			
Power Tolerance	0 + 5 W			

\* Under Standard Test Conditions (STC) of irradiance of 1000 W/m<sup>2</sup>, spectrum AM 1.5, ambient temperature 20°C, wind speed of 800 W/m<sup>2</sup>.

**Engineering Drawing (mm)**



**Electrical Data | STC\***

Series	300MS	305MS	310MS	315MS
Nominal Max. Power (Pmax)	300 W	305 W	310 W	315 W
Opt. Operating Voltage (Vmp)	32.5 V	32.7 V	32.8 V	33.1 V
Opt. Operating Current (Imp)	9.24 A	9.33 A	9.42 A	9.52 A
Open Circuit Voltage (Voc)	39.3 V	39.5 V	39.7 V	39.9 V
Short Circuit Current (Isc)	9.62 A	9.50 A	9.58 A	10.06 A
Module Efficiency	18.05%	18.36%	18.68%	19.6%
Operating Temperature	-40°C ~ +85°C			
Max. System Voltage	1500V (IEC/UL) or 1000V (IEC/UL)			
Module Fire Performance	TYPE I (UL 1703)	or Class C (IEC 61730)		
Max. Series Fuse Rating	30 A			
Application Classification	Class A			
Power Tolerance	0 + 5 W			

\* Under Standard Test Conditions (STC) of irradiance of 1000 W/m<sup>2</sup>, spectrum AM 1.5 and cell temperature of 25°C.

**Electrical Data | NMOT\***

Series	300MS	305MS	310MS	315MS
Nominal Max. Power (Pmax)	300 W	305 W	310 W	315 W
Opt. Operating Voltage (Vmp)	30.1 V	30.3 V	30.5 V	30.7 V
Opt. Operating Current (Imp)	7.39 A	7.46 A	7.54 A	7.61 A
Open Circuit Voltage (Voc)	36.7 V	36.9 V	37.1 V	37.3 V
Short Circuit Current (Isc)	7.93 A	7.99 A	8.06 A	8.12 A
Module Efficiency	18.05%	18.36%	18.68%	19.6%
Operating Temperature	-40°C ~ +85°C			
Max. System Voltage	1500V (IEC/UL) or 1000V (IEC/UL)			
Module Fire Performance	TYPE I (UL 1703)	or Class C (IEC 61730)		
Max. Series Fuse Rating	30 A			
Application Classification	Class A			
Power Tolerance	0 + 5 W			

\* Under Standard Test Conditions (STC) of irradiance of 1000 W/m<sup>2</sup>, spectrum AM 1.5, ambient temperature 20°C, wind speed of 800 W/m<sup>2</sup>.



## KuPower

### HIGH EFFICIENCY MONO PERC MODULE

#### CS3K-315|320|325|330|335MS (1000 V / 1500 V)

**MORE POWER**

- Low power loss in cell connection
- Low temperature coefficient (Pmax): -0.36 % / °C
- Heavy snow load up to 6000 Pa\*
- Wind load up to 4000 Pa\*

**MORE RELIABLE**

- Minimizes micro-cracks
- Better shading tolerance
- Lower hot spot temperature
- Heavy snow load up to 6000 Pa\*

**25 years** linear power output warranty\*

**12 years** enhanced product warranty on materials

\*According to the applicable Canadian Solar Limited Warranty Statement.

**MANAGEMENT SYSTEM CERTIFICATES**

- ISO 9001:2017 Quality management system
- ISO 14001:2015 Environmental management system
- OHSAS 18001:2007 International standard for occupational health & safety

**PRODUCT CERTIFICATES**

- IEC 61215 / IEC 61730-2/IEC 61730-3 / CE / MCS / IEC 61703-1/IEC 61703-2/IEC 61703-3 / UL 1703 / CSA 2700 / IEC 62710 / VDE Take 3-way
- IEC 61730-2/IEC 61730-3 / CE / MCS / IEC 61703-1/IEC 61703-2/IEC 61703-3 / UL 1703 / CSA 2700 / IEC 62710 / VDE Take 3-way

\* As there are different certification requirements in different markets, please contact your local Canadian Solar representative for the specific requirements applicable to the products in the region in which the products are to be used.

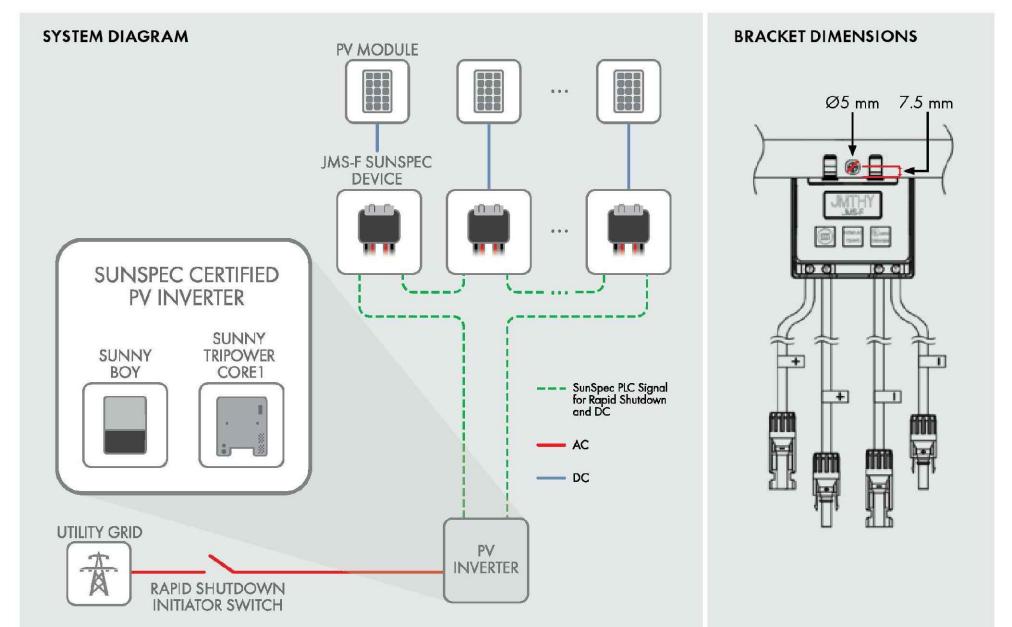
**CANADIAN SOLAR INC.** is committed to providing high quality solar products. Canadian Solar offers a wide range of products and services to customers around the world. Canadian Solar is a leading PV Project developer and manufacturer of solar modules with over 36 GW deployed around the world since 2001.

\* For detailed information, please refer to the Installation Manual.

SCOPE:	
6.34 KW DC Roof Mounted PV Electrical System	
6 - Renogy 320W	
1 - Canadian Solar 320W	
1 - LG Neon-2 320W	
12 - Canadian Solar 315W	
20 - SMA Sunspec (JMS-F)	
1 - 5.0 kW SMA Inverter	
BUILDING INFO:	
TWO STORY BUILDING	
ROOF TYPE: M CONCRETE TILE	
ROOF STRUCTURE:	
2"X4" TRUSSES 24" O/C	
MOUNTING SYSTEM:	
IRONRIDGE RACKING	
PARCEL NUMBER: 9839766	
LOT AREA: 6,655 SQFT	
LIVING AREA: 2,125 SQFT	
<b>Complete Solar</b>	
COMPANY NAME: COMPLETE SOLAR	
LICENSE #: 961988	
ADDRESS: 3000 EXECUTIVE PKWY	
SUITE #504 SAN RAMON, CA 94583	
PHONE: (877) 299-4943	
SIGNATURE	
CUSTOMER INFORMATION	
NAME: KEVIN WION	
ADDRESS: 1275 NICE CT, LIVERMORE, CA 94551	
CITY OF LIVERMORE	
UTILITY: PG&E	
MODULE DATA SHEET	
SCALE: AS NOTED	PAPER SIZE: 17" x 11"
DATE: 07/05/2023	D-2



Technical data		JMS-F
<b>Input (DC)</b>		
Rated DC input power		600 Wp
Maximum PV module open circuit voltage		60 V
Minimum input voltage		10 V
Maximum continuous input current $I_{MAX}$		15 A
Maximum short-circuit input current $I_{SC}$		15 A
<b>Output (DC)</b>		
Output power range		0 W to 600 W
Maximum output voltage		60 V
Standby output voltage		1 V
Maximum system voltage		1500 V
Allowable series string connections		6 to 30 JMS-F devices
<b>Mechanical</b>		
Dimensions L / W / H in mm (in)		89 x 88.5 x 23.1 (3.5 x 3.48 x 0.9)
Weight (including cables)		0.95 lb (435 g)
Input / output connector		MC4
Output wire length		1.2 m
Operating temperature range		-40°C to +75°C (-40°F to +167°F)
Enclosure rating		Type 4X (as per UL 50E)
Relative humidity		0% to 100%
<b>Features and compliance</b>		
Certification		UL 1741 Rapid Shutdown Equipment
Communication mode		Power Line Communication (PLC)
SunSpec Rapid Shutdown Communication Protocol		SunSpec certified
Rapid shutdown time		10 seconds
Warranty (contact SMA Service Line)		25 years
SunSpec certified SMA inverters		Sunny Boy US (SBx-xx1SP-US-41) Sunny Tripower CORE1-US (STP xx-US-41)
Type designation		JMS-F
SMA part number		119814-00.01
Package quantity		40



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## **SCOPE:**

- 6.34 KW DC Roof Mounted PV Electrical System
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  - 1 - Canadian Solar 320W
  - 1 - LG Neon-2 320W
  - 12 - Canadian Solar 315W
  - 20 - SMA Sunspec (JMS-F)
  - 1 - 5.0 kW SMA Inverter

## **BUILDING INFO:**

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ROOF STRUCTURE:  
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MOUNTING SYSTEM:  
IRONRIDGE RACKING

PARCEL NUMBER: 9839766  
LOT AREA: 6,655 SQFT  
LIVING AREA: 2,125 SQFT



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SUITE #504 SAN RAMON, CA 94583  
PHONE: (877) 299-4943

**SIGNATURE**

## **CUSTOMER INFORMATION**

NAME: KEVIN WION

ADDRESS: 1275 NICE CT,  
LIVERMORE, CA 94551

## CITY OF LIVERMORE

## UTILITY: PG&E

## BSD DATA SHEET

SCALE:AS NOTED	PAPER SIZE:17"x11"
DATE:07/05/2023	D-3

## SUNNY BOY 3.0-US / 3.8-US / 5.0-US / 6.0-US / 7.0-US / 7.7-US



SB3.0-1SP-US-41 / SB3.8-1SP-US-41 / SB5.0-1SP-US-41 / SB6.0-1SP-US-41 / SB7.0-1SP-US-41 / SB7.7-1SP-US-41

SB7.0-1SP-US-41 / SB7.7-1SP-US-41 / SB3.0-1TP-US-41 / SB3.8-1TP-US-41 / SB5.0-1TP-US-41 / SB6.0-1TP-US-41 / SB7.0-1TP-US-41 / SB7.7-1TP-US-41

Rapid Shutdown  
CERTIFIED

**SMA ShadeFix**  
STRING LEVEL OPTIMIZATION

<b>Value-Added Improvements</b>	<b>Reduced Labor</b>	<b>Optimized Power Production</b>	<b>Trouble-Free Service</b>
<ul style="list-style-type: none"> <li>SunSpec certified technology for cost-effective module-level shutdown</li> <li>Advanced AFCI compliant to UL 1699B for arc fault protection</li> </ul>	<ul style="list-style-type: none"> <li>New Installation Assistant with direct access via smartphone minimizes time in the field</li> <li>Advanced communication interface with fewer components creates 50% faster setup and commissioning</li> </ul>	<ul style="list-style-type: none"> <li>ShadeFix, SMA's proprietary shade management solution, produces more power than alternatives</li> <li>Reduced component count provides maximum system reliability</li> </ul>	<ul style="list-style-type: none"> <li>SMA Service Mobile App provides simplified, expedited field service</li> <li>Equipped with SMA Smart Connected, a proactive service solution that is integrated into Sunny Portal</li> </ul>

## SUNNY BOY 3.0-US / 3.8-US / 5.0-US / 6.0-US / 7.0-US / 7.7-US

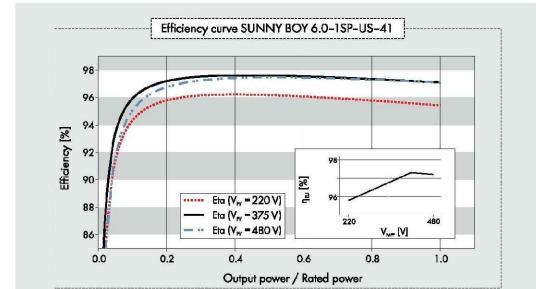
Power with a purpose

The residential PV market is changing rapidly. Your bottom line matters more than ever—so we've designed a superior residential solution to help you decrease costs at every stage of your business operations. The Sunny Boy 3.0-US/3.8-US/5.0-US/6.0-US/7.0-US/7.7-US join the SMA lineup of field-proven solar technology backed by the world's #1 service team. This improved residential solution features ShadeFix, SMA's proprietary technology that optimizes system performance. ShadeFix also provides superior power production with a reduced component count versus competitors, which provides maximum reliability. No other optimized solution generates more power or is as easy as systems featuring SMA ShadeFix and SunSpec certified devices. Finally, SMA Smart Connected will automatically detect errors and initiate the repair and replacement process so that installers can reduce service calls and save time and money.

[www.SMA-America.com](http://www.SMA-America.com)

Technical data	Sunny Boy 3.0-US		Sunny Boy 3.8-US		Sunny Boy 5.0-US		
	208 V	240 V	208 V	240 V	208 V	240 V	
<b>Input [DC]</b>							
Max. PV power	4800 Wp		6144 Wp		8000 Wp		
Max. DC voltage			600 V				
Rated MPPT voltage range	155 - 480 V		195 - 480 V		220 - 480 V		
MPPT operating voltage range			100 - 550 V				
Min. DC voltage / start voltage			100 V / 125 V				
Max. operating input current per MPPT			10 A				
Max. short circuit current per MPPT			18 A				
Number of MPPT tracker / string per MPPT tracker	2/1				3 / 1		
<b>Output [AC]</b>							
AC nominal power	3000 W	3000 W	3330 W	3840 W	5000 W	5000 W	
Max. AC apparent power	3000 VA	3000 VA	3330 VA	3840 VA	5000 VA	5000 VA	
Nominal voltage / adjustable	208 V / ●	240 V / ●	208 V / ●	240 V / ●	208 V / ●	240 V / ●	
AC voltage range	183 - 229 V	211 - 264 V	183 - 229 V	211 - 264 V	183 - 229 V	211 - 264 V	
AC grid frequency			60 Hz / 50 Hz				
Max. output current	14.5 A	12.5 A	16.0 A	16.0 A	24.0 A	21.0 A	
Power factor ( $\cos \phi$ ) / harmonics			1 / < 4 %				
Output phases / line connections			1 / 2				
<b>Efficiency</b>							
Max. efficiency	97.2 %	97.6 %	97.3 %	97.6 %	97.3 %	97.6 %	
CEC efficiency	96.0 %	96.5 %	96.5 %	96.5 %	96.5 %	97.0 %	
<b>Protection devices</b>							
DC disconnect device / DC reverse polarity protection	● / ●						
Ground fault monitoring / Grid monitoring	●						
AC short circuit protection	●						
All-pole sensitive residual current monitoring unit (RCMU)	●						
Arc fault circuit interrupter (AFCI)	●						
Protection class / overvoltage category	1 / IV						
<b>General data</b>							
Dimensions (W / H / D) in mm (in)	535 x 730 x 198 (21.1 x 28.5 x 7.8)						
Packaging dimensions (W / H / D) in mm (in)	600 x 800 x 300 (23.6 x 31.5 x 11.8)						
Weight / packaging weight	26 kg (57 lb) / 30 kg (66 lb)						
Temperature range: operating / non-operating	-25°C ... +60°C / -40°C ... +60°C						
Environmental protection rating	NEMA 3R						
Noise emission (typical)	39 dB(A)						
Internal power consumption at night	< 5 W						
Topology / cooling concept	transformerless / convection						
<b>Features</b>							
Ethernet ports	2						
Secure Power Supply	● *						
Display (2 x 16 characters)	●						
2.4 GHz WLAN / External WLAN antenna	● / ○						
ShadeFix technology for string level optimization	●						
Cellular (4G / 3G) / Revenue Grade Meter	○ / ○ **						
Warranty: 10 / 15 / 20 years ***	● / ○ / ○						
Certificates and approvals							
● Standard features ○ Optional features –Not available							
NOTE: US inverters ship with gray lids. Data at nominal conditions * Not compatible with SunSpec shutdown devices ** Standard in SB3.0-1TP-US-41							
Type designation	SB3.0-1SP-US-41 / SB3.0-1TP-US-41	SB3.8-1SP-US-41 / SB3.8-1TP-US-41	SB5.0-1SP-US-41 / SB5.0-1TP-US-41				
Accessories							
External WLAN antenna EXANTEN-US-40		SunSpec Certified Rapid Shutdown Receivers		Revenue Grade Meter Kit RGM05KIT-US-10		Cellular Modem Kit CELMODKIT-US-10	

\*\*\* Listed warranty terms are applicable in SMA-designated primary support countries, including the U.S., Canada, and Mexico. Reduced terms or restrictions may apply in other Americas regions and territories including the Pacific and Caribbean.



## SCOPE:

6.34 KW DC Roof Mounted  
PV Electrical System

6 - Renogy 320W

1 - Canadian Solar 320W

1 - LG Neon-2 320W

12 - Canadian Solar 315W

20 - SMA Sunspec (JMS-F)

1 - 5.0 kW SMA Inverter

## BUILDING INFO:

TWO STORY BUILDING

ROOF TYPE: M CONCRETE TILE

ROOF STRUCTURE:

2"X4" TRUSSES 24" O/C

MOUNTING SYSTEM:

IRONRIDGE RACKING

PARCEL NUMBER: 9839766

LOT AREA: 6,655 SQFT

LIVING AREA: 2,125 SQFT

**Complete Solar**

COMPANY NAME: COMPLETE SOLAR

LICENSE #: 961988

ADDRESS: 3000 EXECUTIVE PKWY

SUITE #504 SAN RAMON, CA 94583

PHONE: (877) 299-4943

SIGNATURE

## CUSTOMER INFORMATION

NAME: KEVIN WION

ADDRESS: 1275 NICE CT,

LIVERMORE, CA 94551

CITY OF LIVERMORE

UTILITY: PG&E

## INVERTER DATA SHEET

SCALE: AS NOTED

PAPER SIZE: 17" x 11"

DATE: 07/05/2023

D-4

Datasheet
Datasheet


Flush Mount System

**XR Rails**

			
<p>A low-profile mounting rail for regions with light snow.</p> <ul style="list-style-type: none"> <li>• 6' spanning capability</li> <li>• Moderate load capability</li> <li>• Clear and black finish</li> </ul>			
<p>The ultimate residential solar mounting rail.</p> <ul style="list-style-type: none"> <li>• 8' spanning capability</li> <li>• Heavy load capability</li> <li>• Clear and black finish</li> </ul>			
<p>A heavyweight mounting rail for commercial projects.</p> <ul style="list-style-type: none"> <li>• 12' spanning capability</li> <li>• Extreme load capability</li> <li>• Clear anodized finish</li> </ul>			

**Clamps & Grounding**

			
<p>Universal Fastening Objects bond modules to rails.</p> <ul style="list-style-type: none"> <li>• Fully assembled &amp; lubed</li> <li>• Single, universal size</li> <li>• Clear and black finish</li> </ul>			
<p>Snap onto the UFO to turn into a bonded end clamp.</p> <ul style="list-style-type: none"> <li>• Bonds modules to rails</li> <li>• Sized to match modules</li> <li>• Clear and black finish</li> </ul>			
<p>Connect arrays to equipment ground.</p> <ul style="list-style-type: none"> <li>• Low profile</li> <li>• Single tool installation</li> <li>• Mounts in any direction</li> </ul>			
<p>Mount MIs or POs to XR Rails.</p> <ul style="list-style-type: none"> <li>• Bonds devices to rails</li> <li>• Kit comes assembled</li> <li>• Listed to UL 2703</li> </ul>			

**Attachments**

			
<p>Flash and mount XR Rails with superior waterproofing.</p> <ul style="list-style-type: none"> <li>• Twist-on Cap eases install</li> <li>• Wind-driven rain tested</li> <li>• Mill and black finish</li> </ul>			
<p>Drop-in design for rapid rail attachment.</p> <ul style="list-style-type: none"> <li>• Secure rail connections</li> <li>• Slot for vertical adjusting</li> <li>• Clear and black finish</li> </ul>			
<p>Bond and attach XR Rails to roof attachments.</p> <ul style="list-style-type: none"> <li>• T &amp; Square Bolt options</li> <li>• Nut uses 7/16" socket</li> <li>• Assembled and lubricated</li> </ul>			
<p>Raise Flush Mount System to various heights.</p> <ul style="list-style-type: none"> <li>• Works with vent flashing</li> <li>• 4" and 7" lengths</li> <li>• Ships assembled</li> </ul>			

**Resources**

	
<p><b>Design Assistant</b> Go from rough layout to fully engineered system. For free. <a href="http://Go to IronRidge.com/design">Go to IronRidge.com/design</a></p>	
<p><b>NABCEP Certified Training</b> Earn free continuing education credits, while learning more about our systems. <a href="http://Go to IronRidge.com/training">Go to IronRidge.com/training</a></p>	

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SCALE:AS NOTED

PAPER SIZE:17"x11"

DATE:07/05/2023

D-5

**SCOPE:**

6.34 KW DC Roof Mounted PV Electrical System

6 - Renogy 320W

1 - Canadian Solar 320W

1 - LG Neon-2 320W

12 - Canadian Solar 315W

20 - SMA Sunspec (JMS-F)

1 - 5.0 kW SMA Inverter

**BUILDING INFO:**

TWO STORY BUILDING

ROOF TYPE: M CONCRETE TILE

ROOF STRUCTURE: 2"X4" TRUSSES 24" O/C

MOUNTING SYSTEM: IRONRIDGE RACKING

PARCEL NUMBER: 9839766

LOT AREA: 6,655 SQFT

LIVING AREA: 2,125 SQFT

**Complete Solar**

COMPANY NAME: COMPLETE SOLAR

LICENSE #: 961988

ADDRESS: 3000 EXECUTIVE PKWY

SUITE #504 SAN RAMON, CA 94583

PHONE: (877) 299-4943

SIGNATURE

**CUSTOMER INFORMATION**

NAME: KEVIN WION

ADDRESS: 1275 NICE CT, LIVERMORE, CA 94551

CITY OF LIVERMORE

UTILITY: PG&E

RACKING DATA SHEET



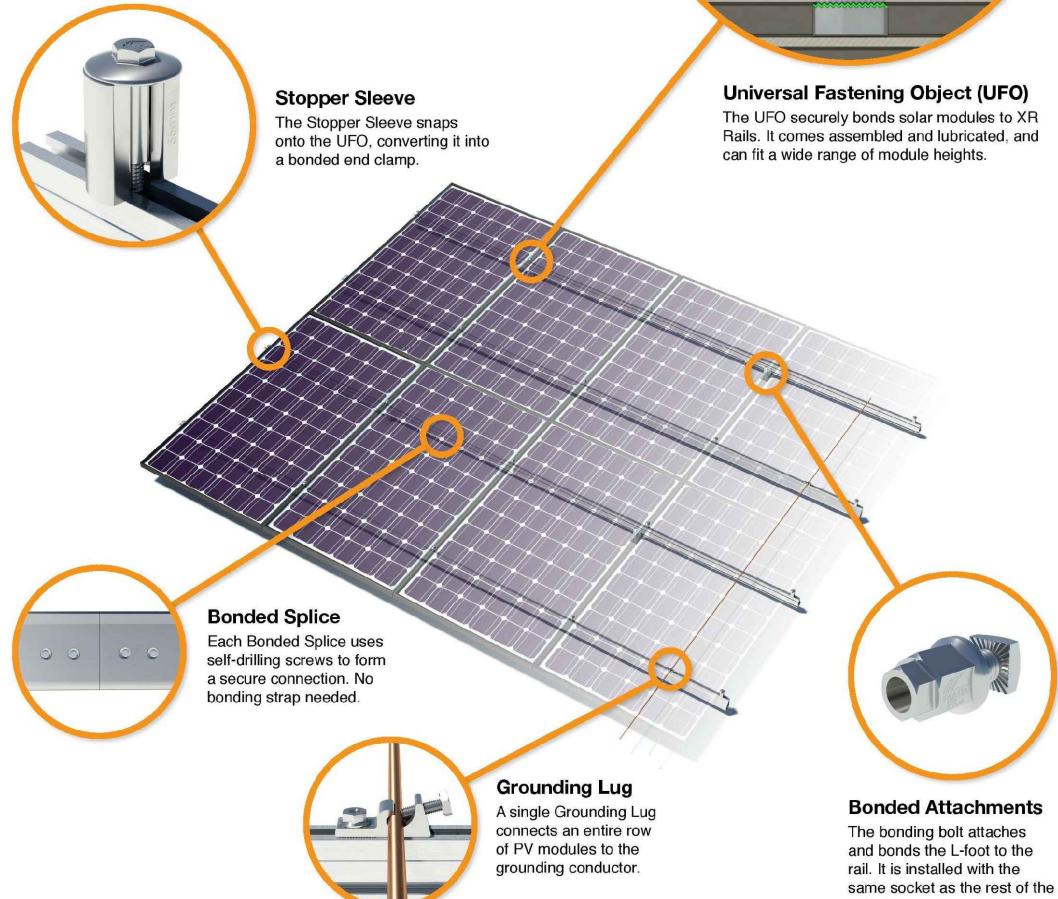
## UFO Family of Components

**Tech Brief**

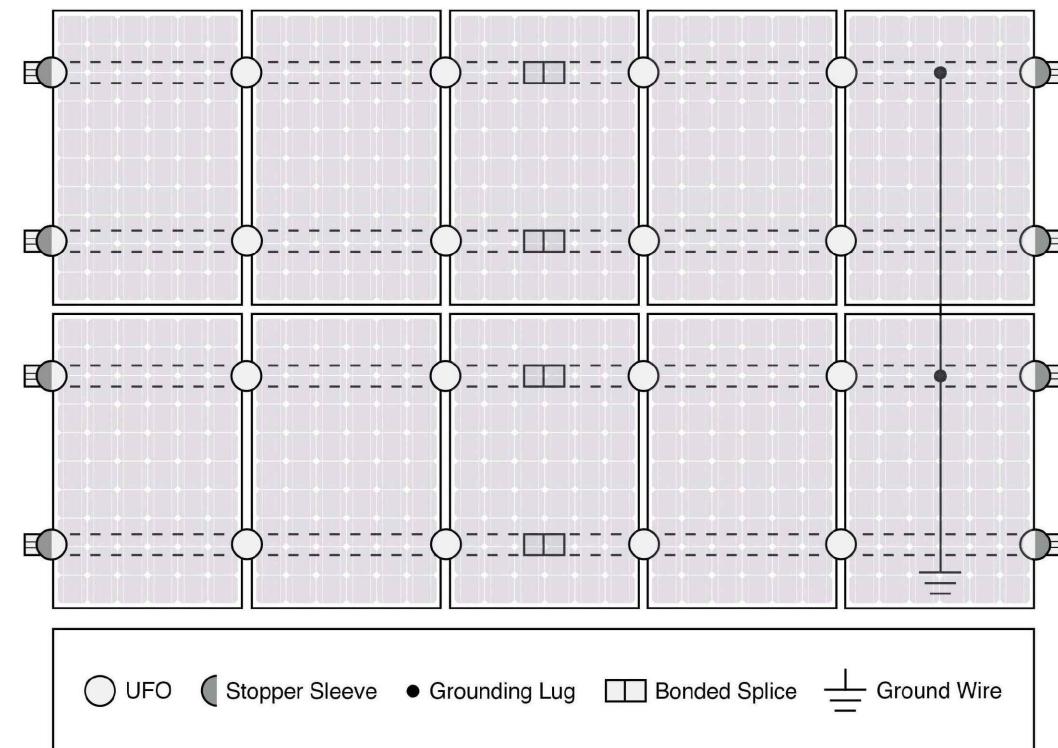
### Simplified Grounding for Every Application

The UFO family of components eliminates the need for separate grounding hardware by bonding solar modules directly to IronRidge XR Rails. All system types that feature the UFO family—Flush Mount, Tilt Mount and Ground Mount—are fully listed to the UL 2703 standard.

UFO hardware forms secure electrical bonds with both the module and the rail, resulting in many parallel grounding paths throughout the system. This leads to safer and more reliable installations.

**Tech Brief**

### System Diagram



Approved Enphase microinverters can provide equipment grounding of IronRidge systems, eliminating the need for grounding lugs and field installed equipment ground conductors (EGC). A minimum of two microinverters mounted to the same rail and connected to the same Engage cable is required. Refer to installation manuals for additional details.

### UL Certification

The IronRidge Flush Mount, Tilt Mount, and Ground Mount Systems have been listed to UL 2703 by Intertek Group plc.

UL 2703 is the standard for evaluating solar mounting systems. It ensures these devices will maintain strong electrical and mechanical connections over an extended period of time in extreme outdoor environments.

[Go to IronRidge.com/UFO](http://Go to IronRidge.com/UFO)

Cross-System Compatibility			
Feature	Flush Mount	Tilt Mount	Ground Mount
XR Rails	✓	✓	XR1000 Only
UFO/Stopper	✓	✓	✓
Bonded Splice	✓	✓	N/A
Grounding Lugs	1 per Row	1 per Row	1 per Array
Microinverters & Power Optimizers	Enphase - M250-72, M250-60, M215-60, C250-72 Darfon - MIG240, MIG300, G320, G640 SolarEdge - P300, P320, P400, P405, P600, P700, P730		
Fire Rating	Class A	Class A	N/A
Modules	Tested or Evaluated with over 400 Framed Modules Refer to installation manuals for a detailed list.		

**SCOPE:**

6.34 KW DC Roof Mounted  
PV Electrical System  
6 - Renogy 320W  
1 - Canadian Solar 320W  
1 - LG Neon-2 320W  
12 - Canadian Solar 315W  
20 - SMA Sunspec (JMS-F)  
1 - 5.0 kW SMA Inverter

**BUILDING INFO:**

TWO STORY BUILDING  
ROOF TYPE: M CONCRETE TILE  
ROOF STRUCTURE:  
2"X4" TRUSSES 24" O/C  
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LIVING AREA: 2,125 SQFT

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CITY OF LIVERMORE

UTILITY: PG&E

**GROUNDING SPECS**

SCALE: AS NOTED PAPER SIZE: 17" x 11"  
DATE: 07/05/2023 D-6

**SCOPE:**

6.34 KW DC Roof Mounted  
PV Electrical System  
6 - Renogy 320W  
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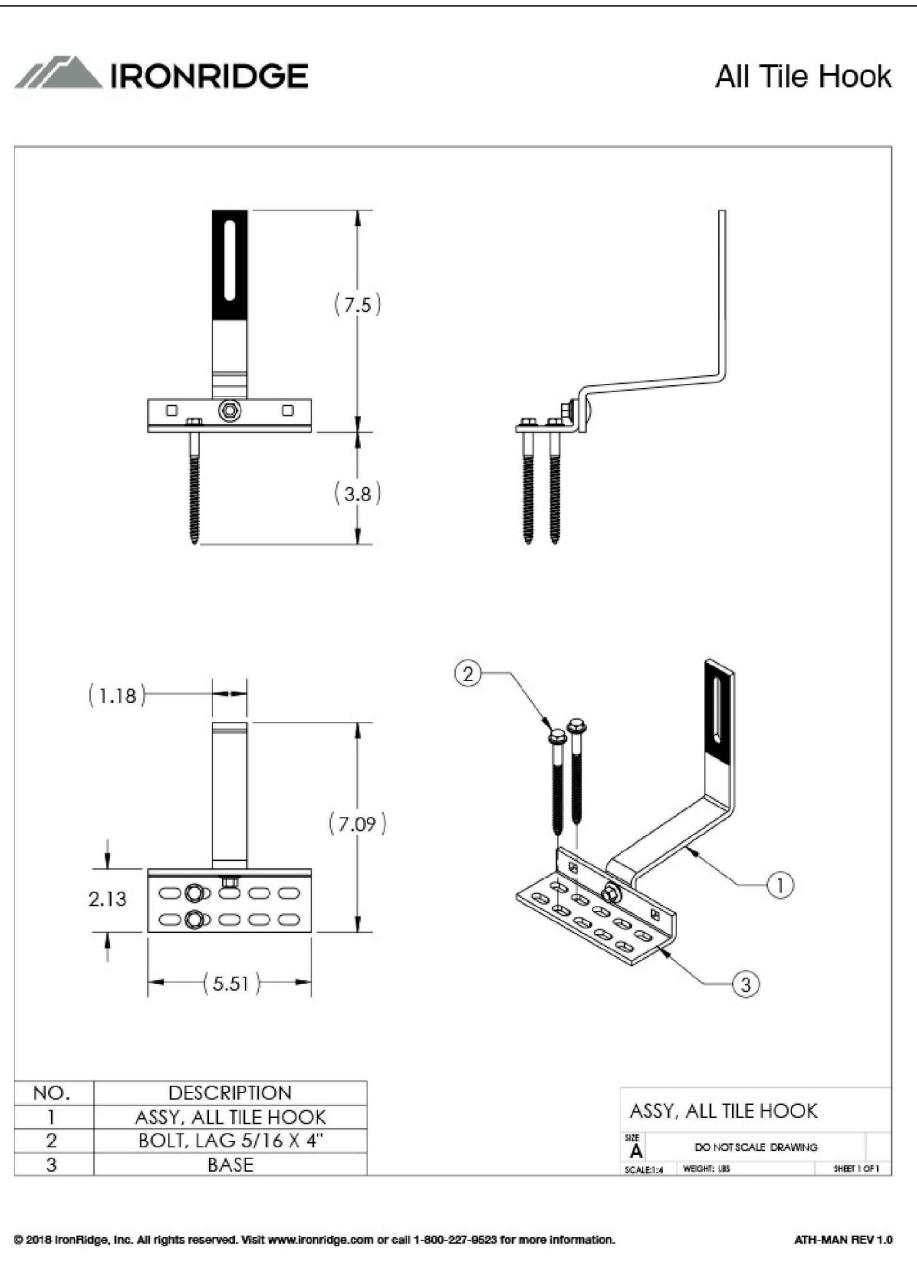
UTILITY: PG&E

**ATTACHMENT DATA SHEET**

SCALE:AS NOTED	PAPER SIZE:17"x11"
DATE:07/05/2023	D-7

12/21/2020

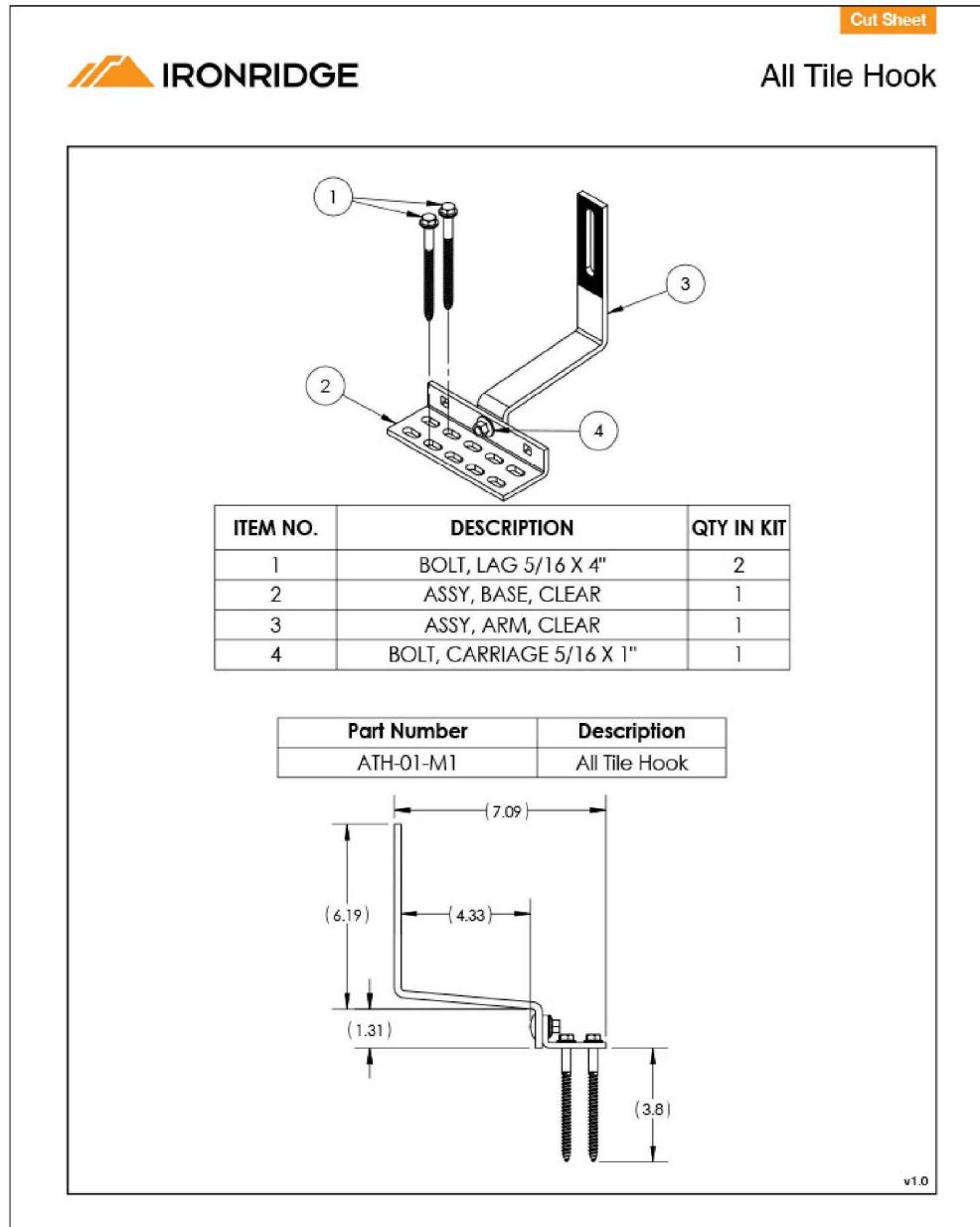
All Tile Hook - IronRidge



ATH Install Manual

12/21/2020

All Tile Hook - IronRidge



Questions?

ATH Cut Sheet

Questions?

		<b>SCOPE:</b>
		6.34 KW DC Roof Mounted PV Electrical System
		6 - Renogy 320W
		1 - Canadian Solar 320W
		1 - LG Neon-2 320W
		12 - Canadian Solar 315W
		20 - SMA Sunspec (JMS-F)
		1 - 5.0 kW SMA Inverter
<b>BUILDING INFO:</b>		
TWO STORY BUILDING ROOF TYPE: M CONCRETE TILE ROOF STRUCTURE: 2"X4" TRUSSES 24" O/C MOUNTING SYSTEM: IRONRIDGE RACKING		
PARCEL NUMBER: 9839766 LOT AREA: 6,655 SQFT LIVING AREA: 2,125 SQFT		
 COMPANY NAME: COMPLETE SOLAR LICENSE #: 961988 ADDRESS: 3000 EXECUTIVE PKWY SUITE #504 SAN RAMON, CA 94583 PHONE: (877) 299-4943		
SIGNATURE		
<b>CUSTOMER INFORMATION</b>		
NAME: KEVIN WION ADDRESS: 1275 NICE CT, LIVERMORE, CA 94551 CITY OF LIVERMORE UTILITY: PG&E		
<b>RACKING CERTIFICATION</b>		
SCALE: AS NOTED PAPER SIZE: 17" x 11"		
DATE: 07/05/2023 D-8		

**Intertek**

8431 Murphy Drive  
Middleton, WI 53562 USA  
Telephone: 608.836.4400  
Facsimile: 608.831.9279  
www.intertek.com

## Test Verification of Conformity

In the basis of the tests undertaken, the sample(s) of the below product have been found to comply with the requirements of the referenced specifications at the time the tests were carried out.

Applicant Name & Address:	IronRidge, Inc. 1495 Zephyr Ave. Hayward, CA 94544 USA				
Product Description:	Flush Mount System with XR Rails.				
Ratings & Principle Characteristics:	Fire Class Resistance Rating: -Flush Mount (Symmetrical). Class A Fire Rated for Low Slope applications when using Type 1, 2 and 3, listed photovoltaic modules. Class A Fire Rated for Steep Slope applications with Type 1, 2 and 3, listed photovoltaic modules. Tested with a 5" gap (distance between the bottom the module frame and the roof covering), per the standard this system can be installed at any gap allowed by the manufacturers installation instructions. No perimeter guarding is required. This rating is applicable with any IronRidge or 3'rd party roof anchor.				
Models:	IronRidge Flush Mount with XR Rails				
Brand Name:	IronRidge Flush Mount				
Relevant Standards:	UL 2703 (Section 15.2 and 15.3) Standard for Safety Mounting Systems, Mounting Devices, Clamping/Retention Devices, and Ground Lugs for Use with Flat-Plate Photovoltaic Modules and Panels, First Edition dated Jan. 28, 2015 <b>Referencing</b> UL1703 Third Edition dated Nov. 18, 2014, (Section 31.2) Standard for Safety for Flat-Plate Photovoltaic Modules and Panels.				
Verification Issuing Office:	Intertek Testing Services NA, Inc. 8431 Murphy Drive Middleton, WI 53562				
Date of Tests:	08/27/2014 to 03/17/2015				
Test Report Number(s):	101769343MID-001r1, 101769343MID-001a, 101915978MID-001 & 101999492MID-001ar1-cr1.				
<p style="text-align: center;">This verification is part of the full test report(s) and should be read in conjunction with them. This report does not automatically imply product certification.</p> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%;">Completed by: Title: Signature: Date:</td> <td style="width: 50%;">Reviewed by: Title: Signature: Date:</td> </tr> <tr> <td>Chris Zimbrich Technician II, Fire Resistance  05/25/2016</td> <td>Chad Naggs Technician I, Fire Resistance  05/25/2016</td> </tr> </table>		Completed by: Title: Signature: Date:	Reviewed by: Title: Signature: Date:	Chris Zimbrich Technician II, Fire Resistance  05/25/2016	Chad Naggs Technician I, Fire Resistance  05/25/2016
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<i>This Verification is for the exclusive use of Intertek's client and is provided pursuant to the agreement between Intertek and its Client. Intertek's responsibility and liability are limited to the terms and conditions of the agreement. Intertek assumes no liability to any party, other than to the Client in accordance with the agreement, for any loss, expense or damage occasioned by the use of this Verification. Only the Client is authorized to permit copying or distribution of this Verification. Any use of the Intertek name or one of its marks for the sale or advertisement of the tested material, product or service must first be approved in writing by Intertek. The observations and test/inspection results referenced in this Verification are relevant only to the sample tested/inspected. This Verification by itself does not imply that the material, product, or service is or has ever been under an Intertek certification program.</i>					
GFT-OP-11a (24-MAR-2014)					

<p><b>IRONRIDGE</b></p> <p><b>Class A Fire Rating</b></p> <p><b>Background</b></p> <p>All roofing products are tested and classified for their ability to resist fire. Recently, these fire resistance standards were expanded to include solar equipment as part of the roof system. Specifically, this requires the modules, mounting hardware and roof covering to be tested together as a system to ensure they achieve the same fire rating as the original roof covering. These new requirements are being adopted throughout the country in 2016.</p> <p><b>IronRidge Certification</b></p> <p>IronRidge was the first company to receive a Class A Fire Rating—the highest possible rating—from Intertek Group plc, a Nationally Recognized Testing Laboratory. IronRidge Flush Mount and Tilt Mount Systems were tested on sloped and flat roofs in accordance with the new UL 1703 &amp; UL 2703 test standards. The testing evaluated the system's ability to resist flame spread, burning material and structural damage to the roof. Refer to the table below to determine the requirements for achieving a Class A Fire Rating on your next project.</p> <table border="1"> <thead> <tr> <th>System</th> <th>Roof Slope</th> <th>Module</th> <th>Fire Rating*</th> </tr> </thead> <tbody> <tr> <td>Flush Mount</td> <td>Any Slope</td> <td>Type 1, 2, &amp; 3</td> <td>Class A</td> </tr> <tr> <td>Tilt Mount</td> <td>≤ 6 Degrees</td> <td>Type 1, 2, &amp; 3</td> <td>Class A</td> </tr> </tbody> </table> <p><small>*Class A rated PV systems can be installed on Class A, B and C roofs.</small></p> <p><b>Fire Testing Process</b></p> <p><b>Test Setup</b></p> <p>Solar Modules are given a Type classification based on their materials and construction. Mounting System is tested as part of a System that includes a protected roof covering. Roof covering products are given a Fire Class Rating A, B or C based on their tested fire resistance.</p> <p><b>Burning Brand Test</b></p> <p>A burning wooden block is placed on module as a fan blows at 12 mph. Flame can be seen on underside of roof within 30 minutes.</p> <p><b>Spread of Flame Test</b></p> <p>Flame at southern edge of roof is aimed up the roof as a fan blows at 12 mph. The flame cannot spread 5 feet or more in 10 minutes.</p> <p><b>More Resources</b></p> <p><b>Engineering Certification Letters</b> We offer complete engineering resources and pre-stamped certification letters. <a href="http://Go to IronRidge.com">Go to IronRidge.com</a></p> <p><b>Installation Manuals</b> Visit our website for manuals that include UL 2703 Listing and Fire Rating Classification. <a href="http://Go to IronRidge.com">Go to IronRidge.com</a></p> <p><small>© 2013 IronRidge, Inc. All rights reserved. Visit <a href="http://www.ironridge.com">www.ironridge.com</a> or call 1-866-227-3623 for more information. Version 1.30</small></p>		System	Roof Slope	Module	Fire Rating*	Flush Mount	Any Slope	Type 1, 2, & 3	Class A	Tilt Mount	≤ 6 Degrees	Type 1, 2, & 3	Class A	<p><b>Tech Brief</b></p> <p><b>Frequently Asked Questions</b></p> <p><b>What is a "module type"?</b></p> <p>The new UL 1703 standard introduces the concept of a PV module type, based on 3 construction parameters and 2 fire performance parameters. The purpose of this classification is to certify mounting systems without needing to test it with every module.</p> <p><b>What roofing materials are covered?</b></p> <p>All fire rated roofing materials are covered within this certification including composition shingle, clay and cement tile, metal, and membrane roofs.</p> <p><b>What if I have a Class C roof, but the jurisdiction now requires Class A or B?</b></p> <p>Generally older roofs will typically be "grandfathered in", and will not require re-roofing. However, if 50% or more of the roofing material is replaced for the solar installation the code requirement will be enforced.</p> <p><b>Where is the new fire rating requirement code listed?</b></p> <p>2012 IBC 1508.7.2 Fire classification. Roof top mounted photovoltaic systems shall have the same fire classification as the roof assembly required by Section 1505.</p> <p><b>Where is a Class A Fire Rating required?</b></p> <p>The general requirement for roofing systems in the IBC refers to a Class C fire rating. Class A or B is required for areas such as Wildland Urban Interface areas (WUI) and for very high fire severity areas. Many of these areas are found throughout the western United States. California has the most Class A and B roof fire rating requirements due to wild fire concerns.</p> <p><b>Are standard mid clamps covered?</b></p> <p>Mid clamps, and end clamps are considered part of the PV "system", and are covered in the certification.</p> <p><b>More Resources</b></p> <p><b>Engineering Certification Letters</b> We offer complete engineering resources and pre-stamped certification letters. <a href="http://Go to IronRidge.com">Go to IronRidge.com</a></p> <p><b>Installation Manuals</b> Visit our website for manuals that include UL 2703 Listing and Fire Rating Classification. <a href="http://Go to IronRidge.com">Go to IronRidge.com</a></p> <p><small>© 2013 IronRidge, Inc. All rights reserved. Visit <a href="http://www.ironridge.com">www.ironridge.com</a> or call 1-866-227-3623 for more information. Version 1.30</small></p>
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<p><b>EXHIBIT: EX-0015 - page 1 of 3</b></p>														

## Technical Information

### SunSpec Certified Rapid Shutdown Devices

#### Overview of approved SMA inverters with SunSpec Certified Rapid Shutdown Receivers



The following SMA inverters can be used together with SunSpec Rapid Shutdown products:

- SB3.0-1SP-US-41
- SB3.8-1SP-US-41
- SB5.0-1SP-US-41
- SB6.0-1SP-US-41
- SB7.0-1SP-US-41
- SB7.7-1SP-US-41
- STP 62-US-41
- STP 50-US-41
- STP 33-US-41

The following overview lists the SunSpec Rapid Shutdown products that are compatible with the SMA inverters listed above:

Device model	Manufacturer	Comment
JMS-F	JMTHY	<ul style="list-style-type: none"> <li>• Rated power of the DC input: 600 W<sub>p</sub></li> <li>• Maximum open-circuit voltage of the PV modules: DC 60 V</li> <li>• Maximum input continuous current (<math>I_{Max}</math>): 15 A</li> <li>• Warranty: 25 years</li> <li>• Developed by SMA, tested for performance and reliability</li> </ul>
RSD-S-PLC	APsmart	<ul style="list-style-type: none"> <li>• SMA inverters are only compatible with certified RSD-S-PLC devices <b>with item number 41500x</b>.</li> </ul>
RSD-D-15	APsmart	<ul style="list-style-type: none"> <li>• SMA inverters are only compatible with RSD-D-15 devices <b>with serial numbers higher than 608000263000</b>.</li> </ul>
RSD-D-20	APsmart	<ul style="list-style-type: none"> <li>• SMA inverters are only compatible with RSD-D-20 devices <b>with serial numbers higher than 608000263000</b>.</li> </ul>

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SunSpec-Kompatibilität-TI-en-18 | Version 1.8

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## SIGNATURE

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## RSD TECHNICAL INFORMATION

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