Residential Solar PV System Application Packet

A building permit, an electrical permit, and plan review are required for all solar photovoltaic (PV) system installations. An additional permit may be needed if structural reinforcement is required to be added to the building for mounting a solar photovoltaic (PV) system to it, or if a separate contractor is constructing the footing and piers for ground mounted solar.

Rooftop-Mounted PV Installations - *Submit the following:*

- ☐ **Fully completed application for a building permit** *(included in this packet)*
- ☐ **Site Plan**
  - All buildings shown & dimensioned to each other & property lines
- ☐ **PV Placement Plan**
  - Roof plan with PV placement shown with roof access pathways and setbacks at ridgeline shown
- ☐ **Manufacturer's Instructions**
  - Fasteners – Data Sheet – Line Diagram – Labeling Information – Specification Sheet
- ☐ **Roof Analysis**
  - An engineer's report and plans are NOT required if roof structure meets one of the following criteria:
    - Existing rafter structure meets the design criteria in Minnesota Residential Code
    - Trusses were designed, permitted and inspected to comply with 2007 Minnesota Residential Code or subsequent versions.
  - Other roof structures require analysis by a Minnesota licensed structural engineer and submittal of:
    - Construction plans showing the roof structure and any modifications required and installation of the solar equipment on the structure, **or**
    - A letter from the engineer describing the roof and the modifications required.
    - Cross section drawing that identifies rafter size, spacing and span dimension and approximate roof slope and panel angle, unless flush-mounted.
    - Specification of style, diameter, length of embedment of bolts (i.e., Simpson ¼" dia. SDS wood screws or equiv., 3" embedment into framing, blocking, or bracing).
- ☐ **Fully completed application for an electrical permit and the following information:** form-electrical-permit-application-73.pdf (duluthmn.gov)
  - Line diagram (see sample attached)
  - Manufacturer's install/data sheet
  - Site plan/diagram (see sample attached)

Ground-Mounted PV Installations- *Submit the following:*

- ☐ **Fully completed application for a building permit** *(included in this packet)*
- ☐ **Site Plan**
  All buildings & PV arrays shown & dimensioned to each other & property lines. This must meet UDC setbacks
- ☐ **Foundations & connection details for PV arrays – stamped & signed by a Minnesota Structural Engineer**
  Depth and size of foundation with connection detail between the PV array racking system and the foundation
- ☐ **Manufacturer's Instructions**
  Fasteners – Data Sheet – Line Diagram – Labeling Information – Specification Sheet - Racking
- ☐ **Fully completed application for an electrical permit and the following information:**
  form-electrical-permit-application-73.pdf (duluthmn.gov)
  - Line diagram (see sample attached)
  - Manufacturer's install/data sheet
  - Site plan/diagram (see sample attached)

Fees

Building permit fee for 1 or 2 Family Residential Solar PV Install when no other structural construction work is needed is a flat fee $65.38. If structural construction work is required fees will be based on the valuation of work, including materials and labor. The fee schedule for the city of Duluth is available at: handout-fee-schedule-for-permits-139.pdf (duluthmn.gov).

The electrical permit fees are based on the number of watts. An electrical permit fee for 1 or 2 Family Residential Solar PV **up to 10,000 watts** is $65.38. An electrical permit fee for 1 or 2 Family Residential Solar PV **over 10,000 watts** is $129.75.

Plan review fees will be waived for PV installations for existing 1 and 2 family and townhouse residential buildings under the scope of the Minnesota Residential Code.

Submitting Permit Applications and Plans

Contractors registered with Construction Services & Inspections can submit electrical permit applications online via eTRAKiT: Apply on Paper or Online
Required documents must be provided via the upload function to make a complete application for review. Contact Construction Services & Inspections at 218-730-5250 or permittingservices@duluthmn.gov to register to use eTRAKiT.

Building permit application for alterations related to PV installations are not currently available online. Contact Construction Services & Inspections at 218-730-5250 or permittingservices@duluthmn.gov.

Contractor licensing regulations information is available at Minnesota Department of Labor and Industries website:
https://secure.doli.state.mn.us/lookup/licensing.aspx

Doc 333-vA052021-0221

Residential (One and Two Family and Townhome) Plan Review & Building Permit Application

Complete All Items and the Checklist

Project Name			Application Date
Site Address	Room or Unit Number		Floor
Parcel ID Number(s) (match site plan and survey)			
Legal Description: Subdivision, Lot & Block or other description (must match site plan and survey)			
Applicant Name	Applicant is: ☐ Owner ☐ Contractor ☐ Owner's Agent	Contractor license #:	
Applicant Address	City	State	Zip
Applicant Email (REQUIRED)	Applicant Phone (REQUIRED)		
Owner Name			
Owner Address	City	State	Zip
Owner Email (REQUIRED)	Owner Phone (REQUIRED)		

☐ *By checking this box I affirm that I am the owner of the property referenced above and that the applicant for this permit is authorized to do the work described in the permit application and accompanying documents.*

Description of proposed work: ☐ Single Family ☐ Two Family (Duplex) ☐ Townhome

Check Applicable:
☐ Interior Remodel w/ Change of Use ☐ Interior Remodel No Change of Use ☐ Demolition
☐ New Building ☐ Addition ☐ Sitework/Foundation Only ☐ Other

Project Valuation. **Include materials and labor for all work:**

Permit Fee:	Plan Review Fee:	State Surcharge:	Total Enclosed:

Design Professional (Architect or Engineer) or Plan Preparer Name			
Design Professional or Plan Preparer Address	City	State	Zip
Design Professional or Plan Preparer Email (REQUIRED)			Phone (REQUIRED)

Sprinklered? ☐ No ☐ Yes

Does the project site or any area to be disturbed by construction contain wetlands? ☐ **No** ☐ **Yes**

I do hereby make application for a building permit. The application and accompanying documents are complete and accurate. Work shall be consistent with the plans and information provided with the permit application and shall comply with applicable codes, ordinances and laws and conditions of approval. Work shalll not begin until a building permit has been issued.

Applicant's Signature (REQUIRED)

Office Use

Zone District: Stormwater Zone: Special Approvals:

LUTech:

duluthmn.gov/csi | 218-730-5240 | permittingservices@duluthmn.gov

CS&I City of Duluth Construction Services & Inspections

Data Sheet - Line Diagram - Site Plan – Array Layout - Labeling Information - Specification Sheet

Sample Manufacturer's Installation/Data Sheet

APS YC500A-K Microinverter Datasheet

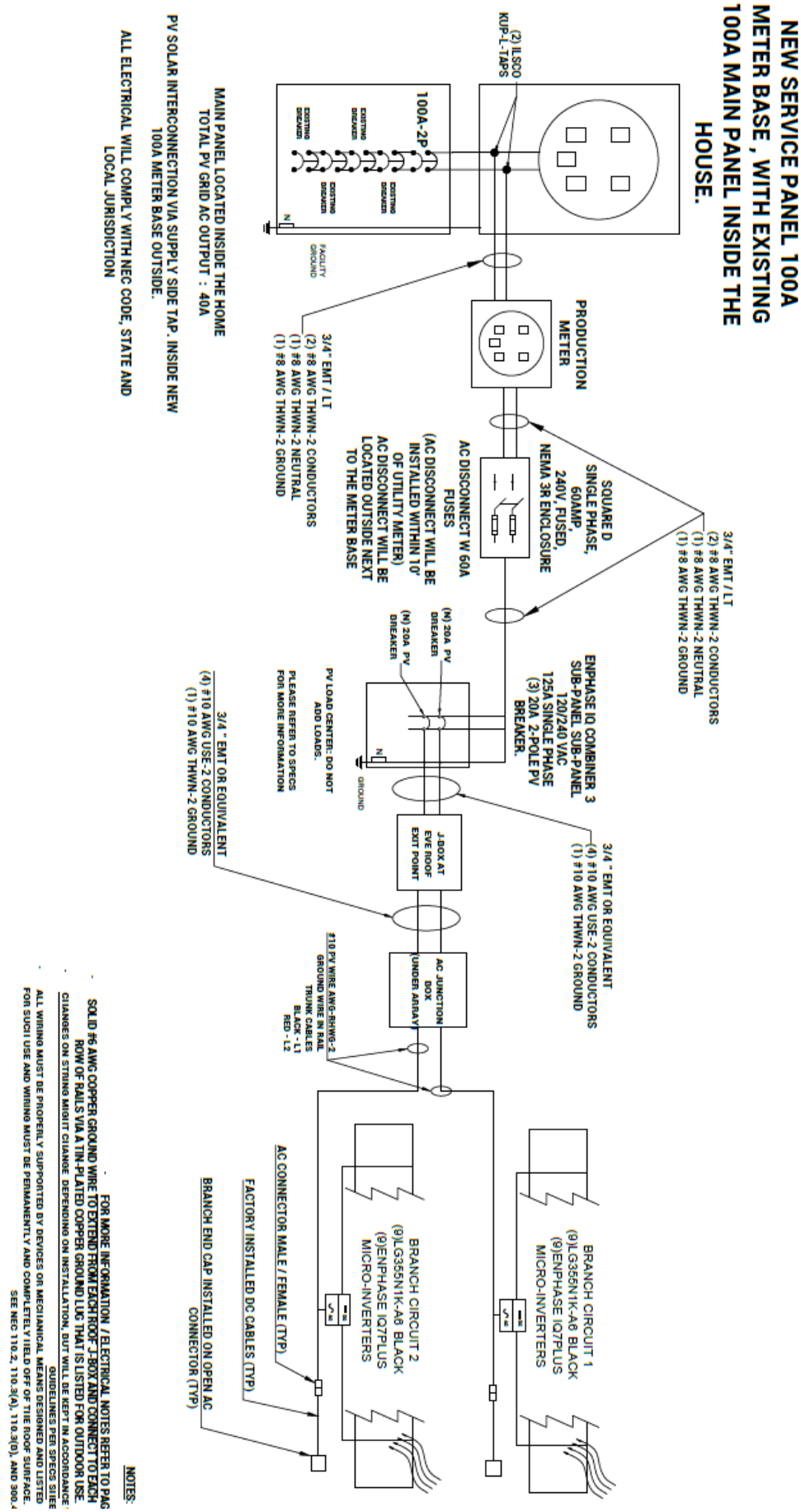
INPUT DATA (DC)	
Maximum Input Voltage	55V
Maximum Input Current	24A
OUTPUT DATA (AC)	
Rated Output Power	500W
Maximum Output Current - 240V	2.08A
Maximum Output Current - 208V	2.4A
Nominal Output Voltage/Range - 240V	211-264V*
Nominal Output Voltage/Range - 208V	183-233V*
Nominal Output Frequency/Range	60Hz / 59.3-60.5Hz*
Power Factor	>0.99
Total Harmonic Distortion	<3%
Maximum Units Per Branch	7 per 20A / 9 per 25A breaker
EFFICIENCY	
Peak Efficiency	95.5%
CEC Weighted Efficiency	94.5%
Nominal MPP Tracking Efficiency	99.0%
MECHANICAL DATA	
Storage Temperature Range	-40ºF to +185ºF (-40ºC to +85ºC)
Operating Temperature Range (Ambient)	-40ºF to +149ºF (-40ºC to +65ºC)
Operating Temperature Range (Internal)	-40ºF to +185ºF (-40ºC to +85ºC)
Dimensions (WxHxD) inches	7.9" x 6.3" x 1.1"
Dimensions (WxHxD) mm	200mm x 160mm x 29mm
Weight	5.5 lbs (2.5kg)
Enclosure Rating	NEMA 3R
Cooling	Natural Convection
FEATURES & COMPLIANCE	
Communication	Power line
Design Lifetime	25 years
Emissions & Immunity (EMC) Compliance	FCC PART 15, ANSI C63.4 2003, ICES-003
Safety Class Compliance	UL 1741 , CSA C22.2, No. 107.1-01 Text
Grid Connection Compliance	IEEE 1547

* Programmable per customer and utility requirements
All settings UL approved

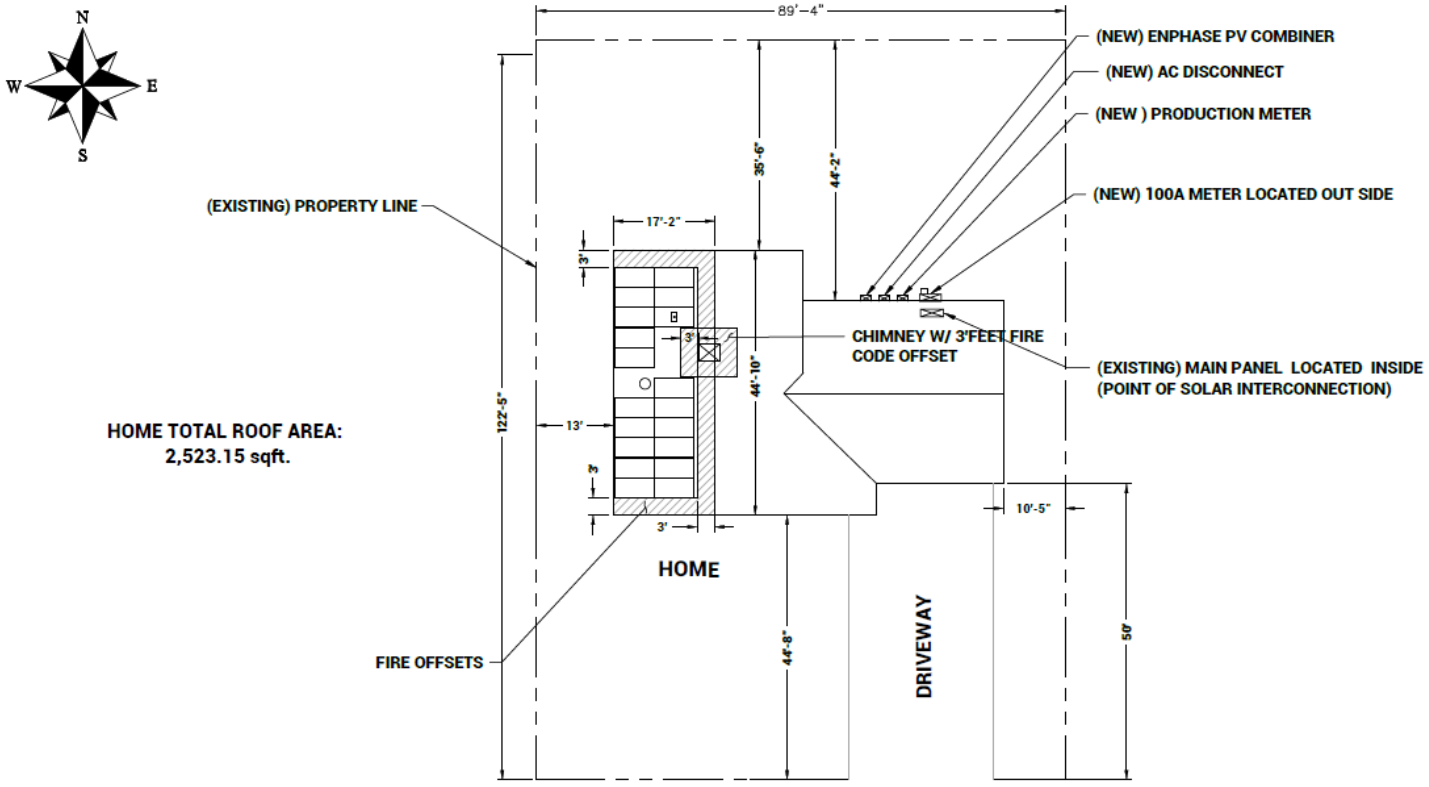
1015 Hostmark St., Suite 104, Poulsbo, WA 98370 | 206.855.5100 | APSamerica.com

APS AMERICA

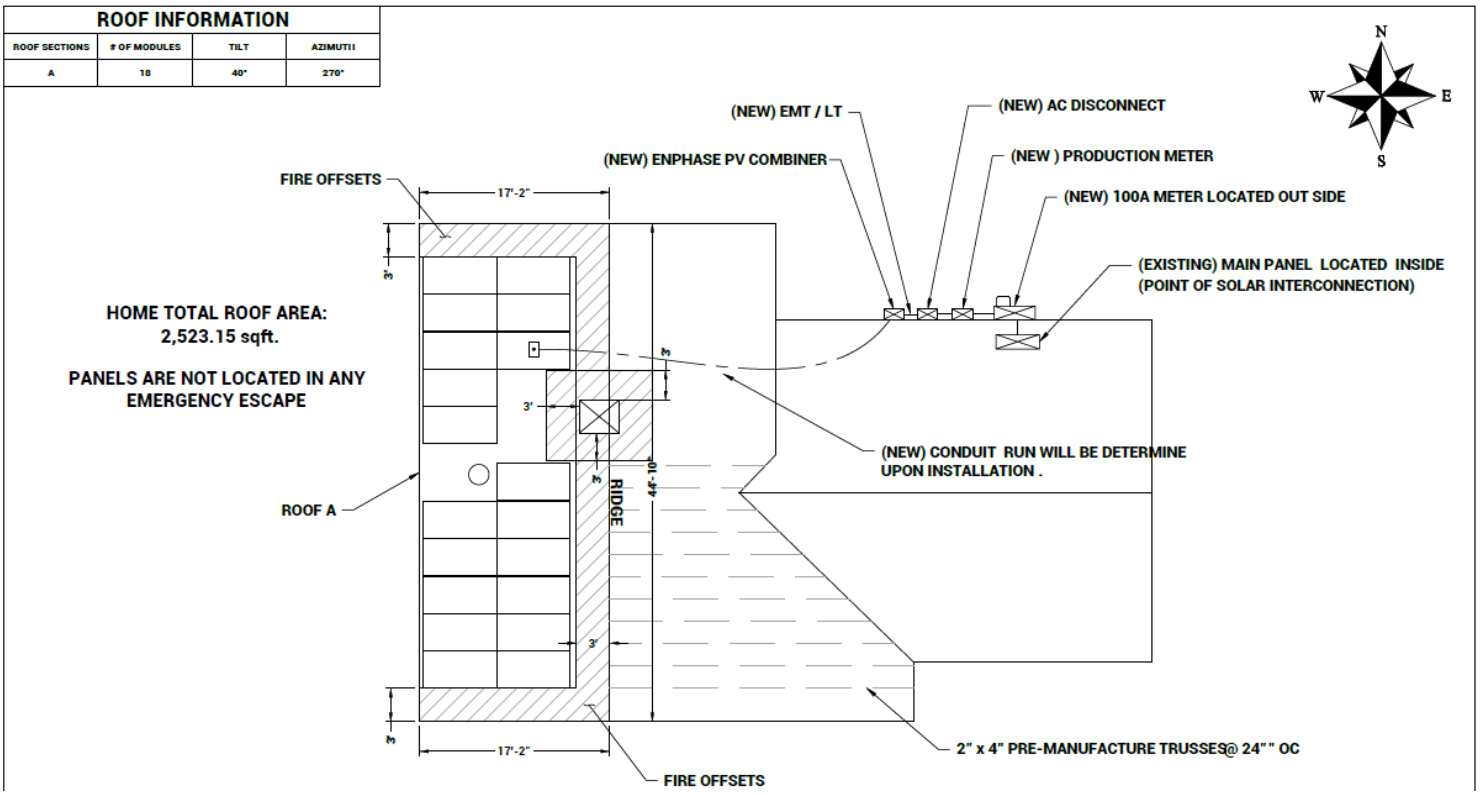
Sample Line Diagram



Sample Site Plan



Sample Array Layout



2020 NEC Labeling Requirements

Section	Location of Label	Label Text and Appearance
690.54	All interactive system(s) points of interconnection with other sources shall be marked at an accessible location at the disconnecting means as a power source and with the rated ac output current and the nominal operating ac voltage.	PHOTOVOLTAIC AC DISCONNECT MAXIMUM AC OPERATING CURRENT: NOMINAL OPERATING AC VOLTAGE:
690.56(B) 690.4(D) 705.10 705.12	A permanent plaque or directory, denoting all electric power sources on or in the premises, shall be installed at each service equipment location and at locations of all electric power production sources capable of being interconnected.	⚠ WARNING DUAL POWER SOURCE SECOND SOURCE IS PHOTOVOLTAIC SYSTEM
690.13(B)	Each PV system disconnecting means shall plainly indicate whether in the open (off) or closed (on) position and be permanently marked: "PV SYSTEM DISCONNECT" Or equivalent.	MAIN PHOTOVOLTAIC SYSTEM DISCONNECT PHOTOVOLTAIC DC DISCONNECT PHOTOVOLTAIC AC DISCONNECT
690.53	A permanent label for the direct-current PV power source indicating the information specified in (1) through (3 shall be provided by the installer at the PV disconnecting means.	MAXIMUM VOLTAGE MAXIMUM CIRCUIT CURRENT MAX RATED OUTPUT CURRENT OF THE CHARGE CONTROLLER OR DC TO DC CONVERTER (IF INSTALLED)
690.31 (D)(2)	The following wiring methods and enclosures that contain PV power source conductors shall be marked: (1) Exposed raceways, cable trays, and other wiring methods (2) Covers or enclosures of pull boxes and junction boxes (3) Conduit bodies in which any of the available conduit openings are unused	WARNING: PHOTOVOLTAIC POWER SOURCE
690.13(B) 690.15	Where all terminals of the disconnecting means may be energized in the open position, a warning sign shall be mounted on or adjacent to the disconnecting means.	⚠ WARNING ELECTRICAL SHOCK HAZARD TERMINALS ON BOTH LINE AND LOAD SIDES MAY BE ENERGIZED IN THE OPEN POSITION

Section	Location of Label	Label Text and Appearance
705.12	Permanent warning labels shall be applied to distribution equipment	⚠ WARNING THIS EQUIPMENT FED BY MULTIPLE SOURCES. TOTAL RATING OF ALL OVERCURRENT DEVICES, EXCLUDING MAIN SUPPLY OVERCURRENT DEVICE, SHALL NOT EXCEED AMPACITY OF BUSBAR.
705.12	A permanent warning label shall be applied to the distribution equipment adjacent to the back-fed breaker from the inverter.	⚠ WARNING INVERTER OUTPUT CONNECTION. DO NOT RELOCATE THIS OVERCURRENT DEVICE.
690.56 (C) Buildings with Rapid Shutdown PV systems shall have permanent labels as described in 690.56(C)(1) through (C)(2)	(1)(a) For PV systems that shut down the array and conductors leaving the array: The title "SOLAR PV SYSTEM IS EQUIPPED WITH RAPID SHUTDOWN" shall utilize capitalized characters with a minimum height of 3/8 in. in black on yellow background, and the remaining characters shall be capitalized with a minimum height of 3/16 in. in black on white background.	SOLAR PV SYSTEM EQUIPPED WITH RAPID SHUTDOWN TURN RAPID SHUTDOWN SWITCH TO THE "OFF" POSITION TO SHUTDOWN PV SYSTEM AND REDUCE SHOCK HAZARD IN ARRAY
	(2) A rapid shutdown switch shall have a label located on or no more than 3 ft from the switch that includes this wording. The label shall be reflective, with all letters capitalized and having a minimum height of 3/8 in., in white on red background.	RAPID SHUTDOWN SWITCH FOR SOLAR PV

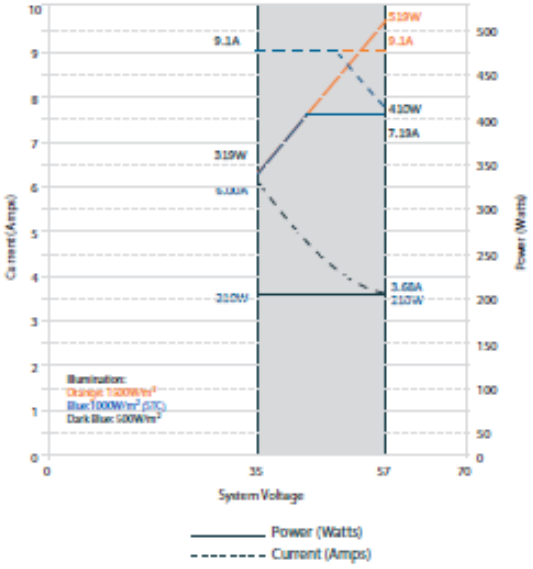
The labels in 690.56(C) shall include a simple diagram of a building with a roof. Buildings with PV systems shall have a permanent label located at each service equipment location to which the PV systems are connected or at an approved readily visible location and shall indicate the location of rapid shutdown initiation devices.

(1) Buildings with More Than One Rapid Shutdown Type. For buildings that have PV systems with more than one rapid shutdown type or PV systems with no rapid shutdown, a detailed plan view diagram of the roof shall be provided showing each different PV system with a dotted line around areas that remain energized after rapid shutdown is initiated.

Sample Specifications Sheet

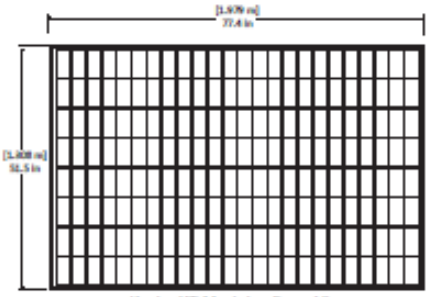
RAIS® XT-A PV Module 410W$_p$

Typical IV Curve: RAIS® XT-A 410W$_p$ PV Module

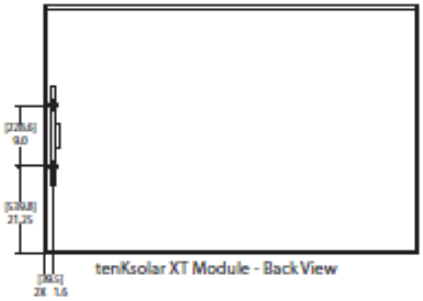


Power (Watts)
Current (Amps)

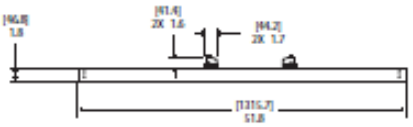
Module Dimensions



tenKsolar XT Module - Front View



tenKsolar XT Module - Back View



tenKsolar XT Module - Side View

Application Options
Direct Grid Connect Inverters
Battery Only Systems
Hybrid Inverters

Specifications	
Power Output at STC (Pmax)	410W$_p$
Power Tolerance	+/- 3%
Cell Type	Polycrystalline Silicon
Number of Cells	192 Half Cells
Glass	3.2mm Tempered Glass
Maximum Current Output	9.1A
Maximum Series Fuse Rating	80A
DC Voltage Output	35V Minimum / 57V Maximum
Ground Fault Detect	Integrated (Compatible w/ Inverter GFDI)
Internal Ground Fault Limit	500 mA
Frame Size (not including optional extensions)	77.4" x 51" (1979mm x 1295mm)
Frame / Background	Silver / White
Backsheet Material	PET Covered Aluminum
Bypass Diodes	None
Ambient Operating Temperature Range	-40°F to 185°F (-40°C to 85°C)
Module NOCT (Nominal Operating Cell Temperature)	109°F (43°C)
Temperature Coefficient	-0.46% / °C
Static Load Capacity	50 psf / 2400 Pa
Hail Resistance	Direct 1" impact at 52mph (84kph)
Weight	71 lbs (32.2 kgs)
Certifications	UL 1703/UL 1741 IEC 61215 EN 61730
Warranty	**12 Year Limited Product Warranty, 25 Year Linear Power Warranty: 3% Power Degradation First Year, 0.2% Linear Degradation per year after First Year**

Shipping Information	
Max Quantity per Pallet	23
Pallet Dimensions	82 W x 55" D (1.4m x 2.1m)
Fully Loaded Pallet Weight	1735 lbs (787 kg)

Specifications and design are subject to change without notice.
Read operating instructions carefully before using this product.