



## EXPEDITED PERMIT PROCESS FOR PV SYSTEMS AC MODULE

The Solar America Board for Codes and Standards (Solar ABCs) Expedited Permit Process provides a means to differentiate systems that can be permitted quickly and easily due to their similarity with the majority of small-scale PV systems. Those systems with unique characteristics may be handled with small additions to this Expedited Permit Process or may require much more information, depending on the uniqueness of the installation.

The following pages contain forms for the AC Module to use with the Expedited Permit Process. The Standard String, Micro-Inverter, and Supply-Side Connection forms are also available as interactive PDF files at [www.solarabcs.org/permitting](http://www.solarabcs.org/permitting). In jurisdictions that have adopted the Expedited Permit Process for PV Systems, these forms can be filled out electronically and submitted in either printed form and via email. An electronic format is used so that the supplied information is standardized and legible for the local jurisdiction.

# EXPEDITED PERMIT PROCESS FOR SMALL-SCALE PV SYSTEMS AC MODULE

The information in this guideline is intended to help local jurisdictions and contractors identify when PV system installations are simple, needing only a basic review, and when an installation is more complex. It is likely that 50%-75% of all residential systems will comply with these simple criteria. For projects that fail to meet the simple criteria, resolution steps have been suggested to provide as a path to permit approval.

## **Required Information for Permit:**

1. Site plan showing location of major components on the property. This drawing need not be exactly to scale, but it should represent relative location of components at site (see supplied example site plan). PV arrays on dwellings with a 3' perimeter space at ridge and sides may not need separate fire service review.
2. Electrical diagram showing PV array configuration, wiring system, overcurrent protection, inverter, disconnects, required signs, and ac connection to building (see supplied standard electrical diagram).
3. Specification sheets and installation manuals (if available) for all manufactured components including, but not limited to, PV modules, inverter(s), combiner box, disconnects, and mounting system.

## **Step 1: Structural Review of PV Array Mounting System**

**Is the array to be mounted on a defined, permitted roof structure?**  Yes  No

*If No due to non-compliant roof or a ground mount, submit completed worksheet for the structure WKS1.*

### **Roof Information:**

1. Is the roofing type lightweight (Yes = composition, lightweight masonry, metal, etc...)\_\_\_\_\_

*If No, submit completed worksheet for roof structure WKS1 (No = heavy masonry, slate, etc...).*

2. Does the roof have a single roof covering?  Yes  No

*If No, submit completed worksheet for roof structure WKS1.*

3. Provide method and type of weatherproofing roof penetrations (e.g. flashing, caulk).\_\_\_\_\_

### **Mounting System Information:**

1. Is the mounting structure an engineered product designed to mount PV modules with no more than an 18" gap beneath the module frames?  Yes  No

*If No, provide details of structural attachment certified by a design professional.*

2. For manufactured mounting systems, fill out information on the mounting system below:
  - a. Mounting System Manufacturer \_\_\_\_\_ Product Name and Model# \_\_\_\_\_
  - b. Total Weight of PV Modules and Rails \_\_\_\_\_lbs
  - c. Total Number of Attachment Points \_\_\_\_\_
  - d. Weight per Attachment Point (b ÷ c) \_\_\_\_\_lbs (if greater than 45 lbs, see WKS1)
  - e. Maximum Spacing Between Attachment Points on a Rail \_\_\_\_\_inches (see product manual for maximum spacing allowed based on maximum design wind speed)
  - f. Total Surface Area of PV Modules (square feet) \_\_\_\_\_ ft<sup>2</sup>
  - g. Distributed Weight of PV Module on Roof (b ÷ f) \_\_\_\_\_ lbs/ft<sup>2</sup>

*If distributed weight of the PV system is greater than 5 lbs/ft<sup>2</sup>, see WKS1.*

## **Step 2: Electrical Review of PV System (Calculations for Electrical Diagram)**

**In order for a PV system to be considered for an expedited permit process, the following must apply:**

1. PV modules, utility-interactive inverters, and combiner boxes are identified for use in PV systems.
2. The PV array is composed of 4 series strings or less per inverter.
3. The total inverter capacity has a continuous ac power output 13,440 Watts or less
4. The ac interconnection point is on the load side of service disconnecting means (690.64(B)).
5. One of the standard electrical diagrams (E1.1, E1.1a, E1.1b, or E1.1c) can be used to accurately represent the PV system. Interactive PDF diagrams are available at [www.solarabcs.org/permitting](http://www.solarabcs.org/permitting).

*Fill out the standard electrical diagram completely. A guide to the electrical diagram is provided to help the applicant understand each blank to fill in. If the electrical system is more complex than the standard electrical diagram can effectively communicate, provide an alternative diagram with appropriate detail.*

# AC MODULE SITE PLAN

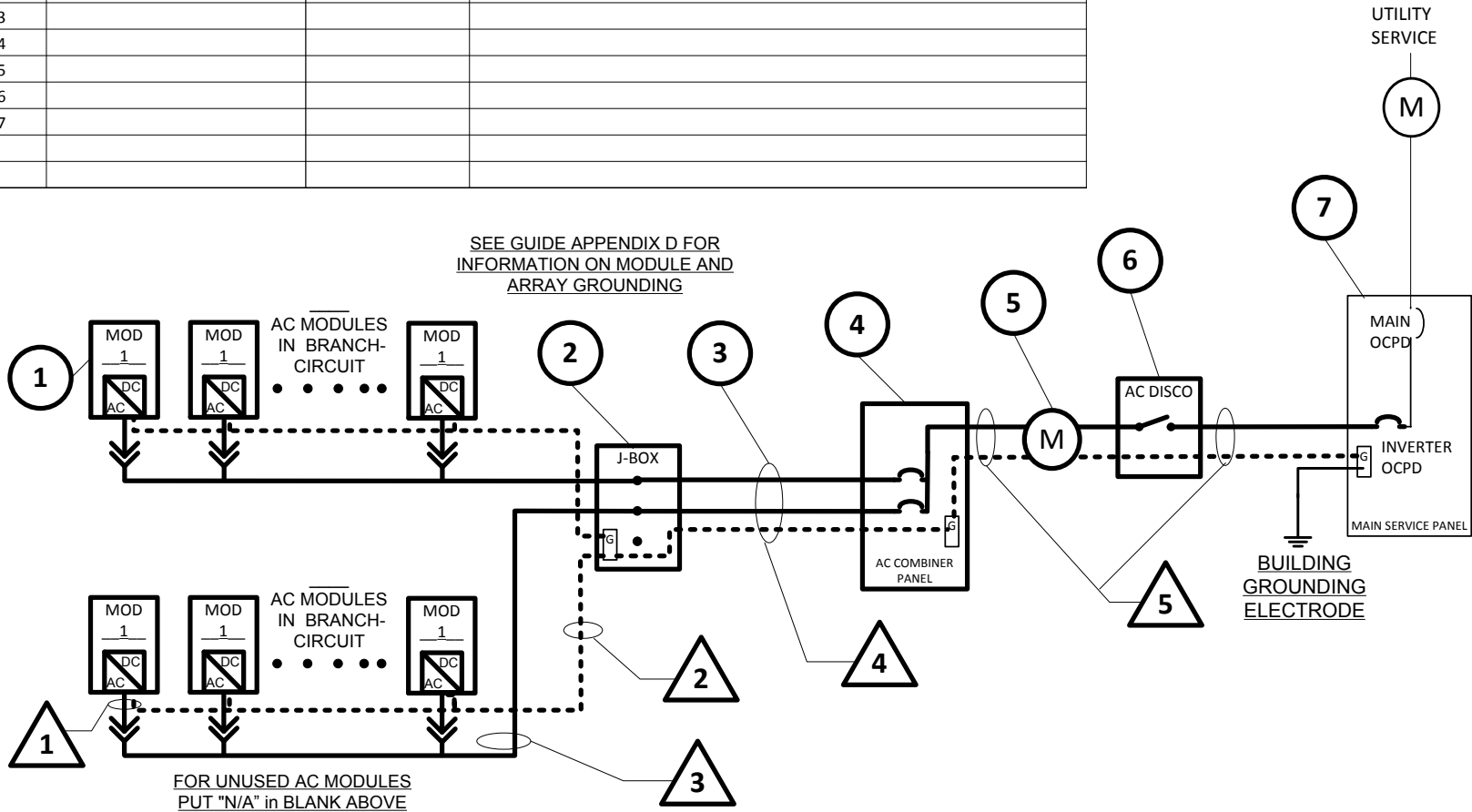


Contractor Name, Address and Phone:	<b>Site Plan</b> <b>for Small-Scale, Single-Phase PV Systems</b>			
	Site Name: Site Address System AC Size			
Drawn By:	SIZE	FSCM NO	DWG NO	REV
Checked By:	SCALE	NTS	Date:	SHEET

# AC MODULE ELECTRICAL DIAGRAM

EQUIPMENT SCHEDULE			
TAG	DESCRIPTION	PART NUMBER	NOTES
1			
2			
3			
4			
5			
6			
7			

SEE GUIDE APPENDIX D FOR  
INFORMATION ON MODULE AND  
ARRAY GROUNDING



CONDUIT AND CONDUCTOR SCHEDULE					
TAG	DESCRIPTION OR CONDUCTOR TYPE	COND. GAUGE	NUMBER OF CONDUCTORS	CONDUIT TYPE	CONDUIT SIZE
1	USE-2 <input type="checkbox"/> or PV WIRE <input type="checkbox"/>	MFG	MFG Cable	N/A	N/A
2	GEC <input type="checkbox"/> EGC <input type="checkbox"/> X ALL THAT APPLY			N/A	N/A
3	EXTERIOR CABLE LISTED W/ INV.	MFG	MFG Cable	N/A	N/A
4	THWN-2 <input type="checkbox"/> or XHHW-2 <input type="checkbox"/> or RHW-2 <input type="checkbox"/>				
	GEC <input type="checkbox"/> EGC <input type="checkbox"/> X ALL THAT APPLY				
	NO DC GEC IF 690.35 SYSTEM				
5	THWN-2 <input type="checkbox"/> or XHHW-2 <input type="checkbox"/> or RHW-2 <input type="checkbox"/>				
	GEC <input type="checkbox"/> EGC <input type="checkbox"/> X ALL THAT APPLY				

Contractor Name, Address and Phone:	<b>One-Line Standard Electrical Diagram for AC Module PV Systems</b>			
	Site Name:			
	Site Address:			
	System AC Size:			
Drawn By:	SIZE	FSCM NO	DWG NO	REV
Checked By:	SCALE	NTS	Date:	SHEET

# NOTES FOR AC MODULE ELECTRICAL DIAGRAM

**NOTES FOR ALL DRAWINGS:**

OCPD = OVERCURRENT PROTECTION DEVICE

NATIONAL ELECTRICAL CODE® REFERENCES SHOWN AS (NEC XXX.XX)

**AC MODULE RATINGS (Guide Appendix C)**

AC MODULE MAKE	
AC MODULE MODEL	
NOMINAL OPERATING AC VOLTAGE	
NOMINAL OPERATING AC FREQUENCY	
MAXIMUM AC POWER	
MAXIMUM AC CURRENT	
MAXIMUM OCPD RATING	

**SIGNS—SEE GUIDE SECTION 7**

**SIGN FOR DC DISCONNECT**

N/A since no dc wiring

**SIGN FOR INVERTER OCPD AND AC DISCONNECT (IF USED)**

**SOLAR PV SYSTEM  
AC POINT OF CONNECTION**

AC OUTPUT CURRENT	
NOMINAL AC VOLTAGE	

**THIS PANEL FED BY MULTIPLE SOURCES (UTILITY AND SOLAR)**

**NOTES FOR ARRAY CIRCUIT WIRING (Guide Section 6 and 8 and Appendix F):**

- 1.) LOWEST EXPECT AMBIENT TEMPERATURE BASED ON ASHRAE MINIMUM MEAN EXTREME DRY BULB TEMPERATURE FOR ASHRAE LOCATION MOST SIMILAR TO INSTALLATION LOCATION. LOWEST EXPECTED AMBIENT TEMP \_\_\_\_°C
- 2.) HIGHEST CONTINUOUS AMBIENT TEMPERATURE BASED ON ASHRAE HIGHEST MONTH 2% DRY BULB TEMPERATURE FOR ASHRAE LOCATION MOST SIMILAR TO INSTALLATION LOCATION. HIGHEST CONTINUOUS TEMPERATURE \_\_\_\_°C
- 2.) 2009 ASHRAE FUNDAMENTALS 2% DESIGN TEMPERATURES DO NOT EXCEED 47°C IN THE UNITED STATES (PALM SPRINGS, CA IS 44.1°C). FOR 6 OR LESS CURRENT-CARRYING CONDUCTORS IN ROOF-MOUNTED SUNLIT CONDUIT AT LEAST 0.5" ABOVE ROOF AND USING THE OUTDOOR DESIGN TEMPERATURE OF 47°C OR LESS (ALL OF UNITED STATES),
  - a) 12 AWG, 90°C CONDUCTORS ARE GENERALLY ACCEPTABLE FOR AC MODULES INVERTER OUTPUT CIRCUITS WITH 12 AMPS OR LESS WHEN PROTECTED BY A 15-AMP OR SMALLER OCPD.
  - b) 10 AWG, 90°C CONDUCTORS ARE GENERALLY ACCEPTABLE FOR AC MODULES INVERTER OUTPUT CIRCUITS WITH 16 AMPS OR LESS WHEN PROTECTED BY A 20-AMP OR SMALLER OCPD.

**NOTES FOR INVERTER CIRCUITS (Guide Section 8 and 9):**

- 1) IF UTILITY REQUIRES A VISIBLE-BREAK SWITCH, DOES THIS SWITCH MEET THE REQUIREMENT? YES  NO  N/A
- 2) IF GENERATION METER REQUIRED, DOES THIS METER SOCKET MEET THE REQUIREMENT? YES  NO  N/A
- 3) SIZE PHOTOVOLTAIC POWER SOURCE (DC) CONDUCTORS BASED ON MAX CURRENT ON NEC 690.53 SIGN OR OCPD RATING AT DISCONNECT (N/A)
- 4) SIZE INVERTER OUTPUT CIRCUIT (AC) CONDUCTORS ACCORDING TO INVERTER OCPD AMPERE RATING. (See Guide Section 9)
- 5) TOTAL OF \_\_\_\_\_ INVERTER OUTPUT CIRCUIT OCPD(S), ONE FOR EACH AC MODULE CIRCUIT. DOES TOTAL SUPPLY BREAKERS COMPLY WITH 120% BUSBAR EXCEPTION IN 690.64(B)(2)(a)? YES  NO

Contractor Name, Address and Phone:	<b>Notes for One-Line Standard Electrical Diagram for Single-Phase PV Systems</b>			
	Site Name:			
	Site Address:			
	System AC Size:			
Drawn By: <b>Bill</b>	SIZE	FSCM NO	DWG NO	REV
Checked By: <b>Ted</b>	SCALE	NTS	Date:	SHEET