



Expedited Permitting Process
Residential Roof-Top Mounted Solar Installations

Form 4 – Solar PV Standard Plan – Simplified Microinverter and ACM Systems

SCOPE: Use this plan ONLY for electrical review of systems using utility-interactive Microinverters or AC Modules (ACM) not exceeding a combined system AC inverter output rating of 10 kW, with a maximum of 3 branch circuits, one PV module per inverter, and installed on the roof of a one- or two-family dwelling or accessory structure. The photovoltaic system must interconnect to a single-phase AC service panel of 120/240 Vac with service panel bus bar rating of 225 A or less. Plan also applies to supply side connections (between the meter and the service disconnects), where permitted by the local utility. This plan is not intended for bipolar systems, hybrid systems or systems that utilize storage batteries, charge controllers or trackers. Systems must be in compliance with current California Building Standards Codes and local amendments of the authority having jurisdiction (AHJ). Other articles of the California Electrical Code (CEC) shall apply as specified in section 690.4. For systems beyond this scope or the criteria in this plan, consult the AHJ for details regarding comprehensive process.

MANUFACTURER'S SPECIFICATION SHEETS MUST BE PROVIDED for proposed inverters, modules, combiner/junction boxes and racking systems. Installation instructions for bonding and grounding equipment shall be provided and local AHJs may require additional details. Listed and labeled equipment shall be installed and used in accordance with any instructions included in the listing or labeling (CEC 110.3). Equipment intended for use with PV system shall be identified and listed for the application CEC 690.4(B).

Applicant and Site Information

Job Site Address: _____ Email : _____

Contractor/Engineer Name: _____ License # and Class: _____

Signature: _____ Date: _____ Phone Number: _____

1. General Requirements and System Information

Microinverter

Number of PV modules installed: _____

Number of Microinverters installed: _____

AC Module (ACM)

Number of ACMs installed: _____

Note: Listed Alternating-Current Module (ACM) is defined in CEC 690.2 and installed per CEC 690.6

1.1 Number of Branch Circuits, 1, 2 or 3: _____

1.2 Actual number of Microinverters or ACMs per branch circuit: 1. _____ 2. _____ 3. _____

1.3 Total AC system power rating = (Total Number of Microinverters or ACMs) * (AC inverter power output)
= _____ Watts

1.4 Lowest expected ambient temperature for this plan is between 4° to 0° C use 1.10 correction factor.

1.5 Average ambient high temperature for this plan: = +37° C
Note: Temperature correction factor Table 310.15(B)(1)

2. Microinverter or ACM Information and Ratings

Microinverter or ACM Manufacturer: _____

Model: _____

2.1 Rated (continuous) AC output power: _____ Watts

- 2.2 Nominal AC voltage rating: _____ Volts
- 2.3 Rated (continuous) AC output current: _____ Amps

If installing ACMs, skip [Steps 2.4 & 2.5]

- 2.4 Maximum DC input voltage rating of micro-inverters: _____ Volts (limited to 79 V, otherwise this expedited plan is not applicable)
- 2.5 Maximum input short circuit current: _____ Amps
- 2.6 Maximum AC output overcurrent protection device (OCPD): _____ Amps
- 2.7 Maximum number of microinverters or ACMs per branch circuit: _____

3. PV Module Information

(If installing ACMs, skip to [Step 4])

PV Module Manufacturer: _____

Model: _____

Module DC output power under standard test conditions (STC) = _____ Watts

- 3.1 Module V_{oc} at STC (from module nameplate): _____ Volts
- 3.2 Module I_{sc} at STC (from module nameplate): _____ Amps [cannot exceed Step 2.5]
- 3.3 Adjusted PV Module DC voltage at minimum temperature = 1.10
- 3.4 Adjusted DC voltage formula (module V_{oc} * 1.10 Volts (correction factor)): _____ Volts * 1.10 Volts = _____ Volts [cannot exceed Step 2.4]

4. Branch Circuit Output Information

Fill in [Table 3] to describe the branch circuit inverter output conductor and OCPD size.

Table 3. PV Array Configuration Summary			
	Branch 1	Branch 2	Branch 3
Number of Microinverters or ACMs [Step 1.2]			
Selected Conductor Size (AWG)			
Selected Branch and Inverter Output OCPD			

5. Solar Load Center (if used)

- 5.1 Circuit Power see [Step 1.3] = _____ Watts
- 5.2 Circuit Current = (Circuit Power) / (AC voltage) = _____ Amps
- 5.3 Solar Load Center Bus Bar Rating = Min. _____ Amps
- 5.4 Solar Load Center Feeder Breaker Rating = _____ Amps

NOTE: If OCPDs of circuits other than for the inverter outputs are present, solar load center bus bar rating must be a minimum of 100 Amps, and the feeder breaker is limited to a maximum of 60 Amps.

6. Point of Connection to Utility

- 6.1 Inverter(s) must be connected to either load or supply side of service disconnecting means. Either Step 6.2 or 6.3 below should be filled out, and either Single Line Diagram #1 or Single Line Diagram #2 should be filled out.

6.2 Load side connections only (Per 705.12(B)(3)(2)):

Is the PV OCPD positioned at the opposite end from input feeder location or main OCPD location?

- Yes No

(Combined inverter output OCPD size + Main OCPD size) ≤ [bus bar size × (120%)]

Bus Bar Size (Amps)	100	125	125	200	200	200	225	225	225
Main OCPD (Amps)	100	100	125	150	175	200	175	200	225
Maximum Combined Inverter OCPD with 120% of bus bar rating (Amps)	20	50	25	60 [†]	60 [†]	40	60 [†]	60 [†]	45

[†]This plan limits max system size to 10kW or less, so the OCPD size is limited to 60A. Reduction of Main Breaker is not permitted with this plan.

6.3 Supply side connections only (Per 705.11(A)):

Only use this section for connections on the supply side of the service disconnecting means. Select one:

- Utility- and AHJ-approved meter socket adapter.

Adapter name/model: _____

- Service equipment listed for the purpose of PV interconnection.

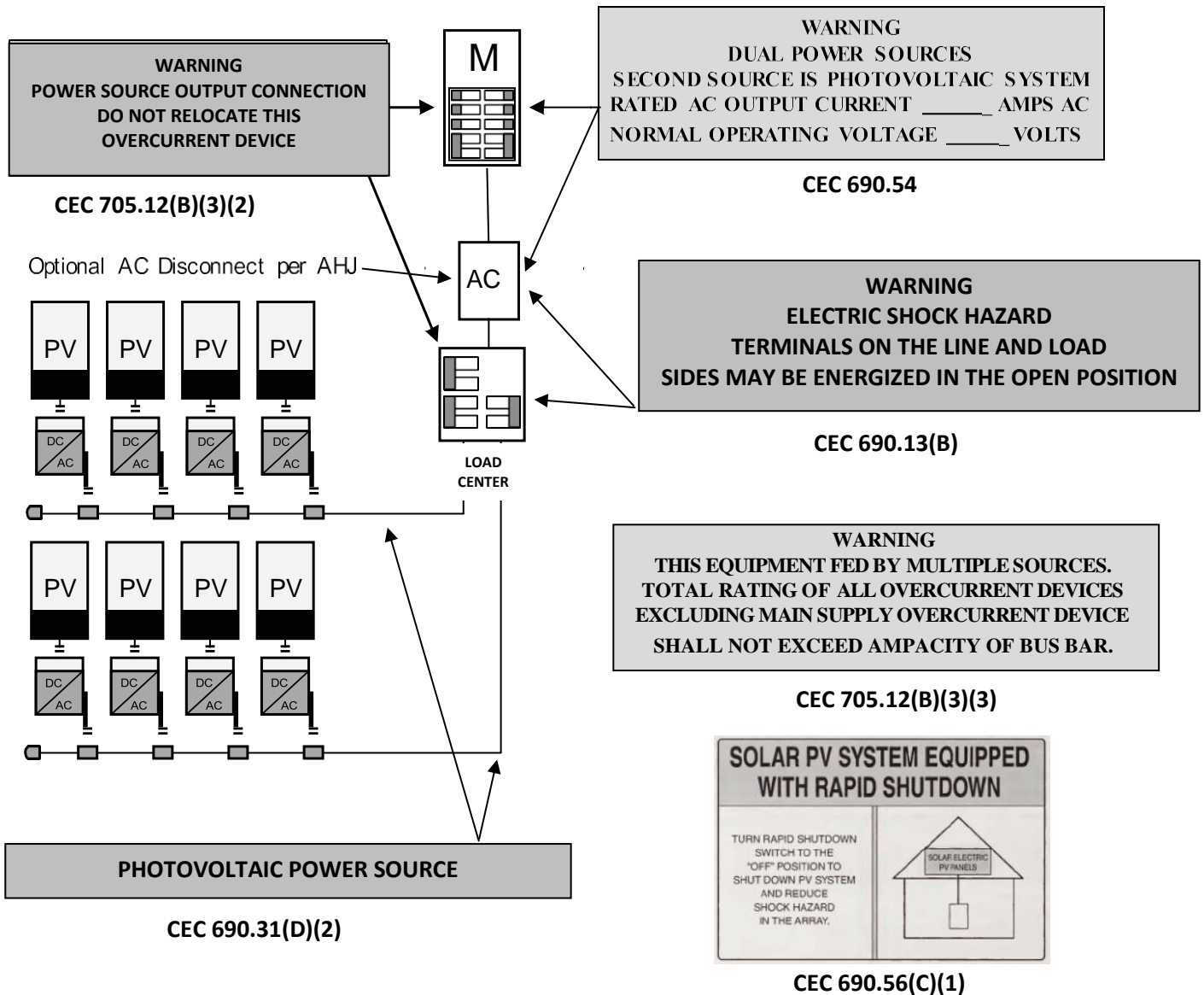
Description / model number(s): _____

7. Grounding and Bonding

For ACM systems and Microinverters with ungrounded a DC input follow the EGC requirements of (CEC690.43).

8. Markings

Informational note: ANSI Z535.4-2011 provides guidelines for the design of safety signs and labels for application to products. A phenolic plaque with contrasting colors between the text and background would meet the intent of the code for permanency. No type size is specified, but 20 point (3/8") should be considered the minimum. Labels required by this section shall be suitable for the environment where they are installed.



NOTE: CEC 705.10 requires a permanent plaque or directory denoting all electric power sources on or in the premises.

Solar PV Standard Plan — Simplified Microinverter & ACM Systems for One- and Two-Family Dwellings

Equipment Schedule	
TAG	
1	Solar PV Module or ACM:
2	Microinverter (if not ACM):
3	Junction Box:
4	Solar Load Center, Yes / No:
5	Performance Meter Yes / No:
6	*Utility External Disconnect Switch Yes / No:
7	Main Electrical Service Panel

**Single -Line Diagram #1 for Microinverters or ACM s
(Load Side Connection)**

Check a box for dc system grounding: Grounded, Ungrounded
 For ungrounded dc power systems, EGC is required
 For grounded dc power systems, GEC & EGC are required
 Refer to CEC 250.120 for EGC installation & Table 250.122 for sizing
 * Consult with your local AHJ and /or Utility

Branch Circuit OCPDs (Table 3)	
Branch 1 OCPD size	_____
Branch 2 OCPD size	_____
Branch 3 OCPD size	_____
Solar Load Center	_____
Busbar (Section 5)	_____

Main Service Panel OCPDs	
Main OCPD size: (table 5)	_____
Combined Inverter Output OCPD: (Table 4)	_____
Main Service Panel Busbar: (Table 5)	_____

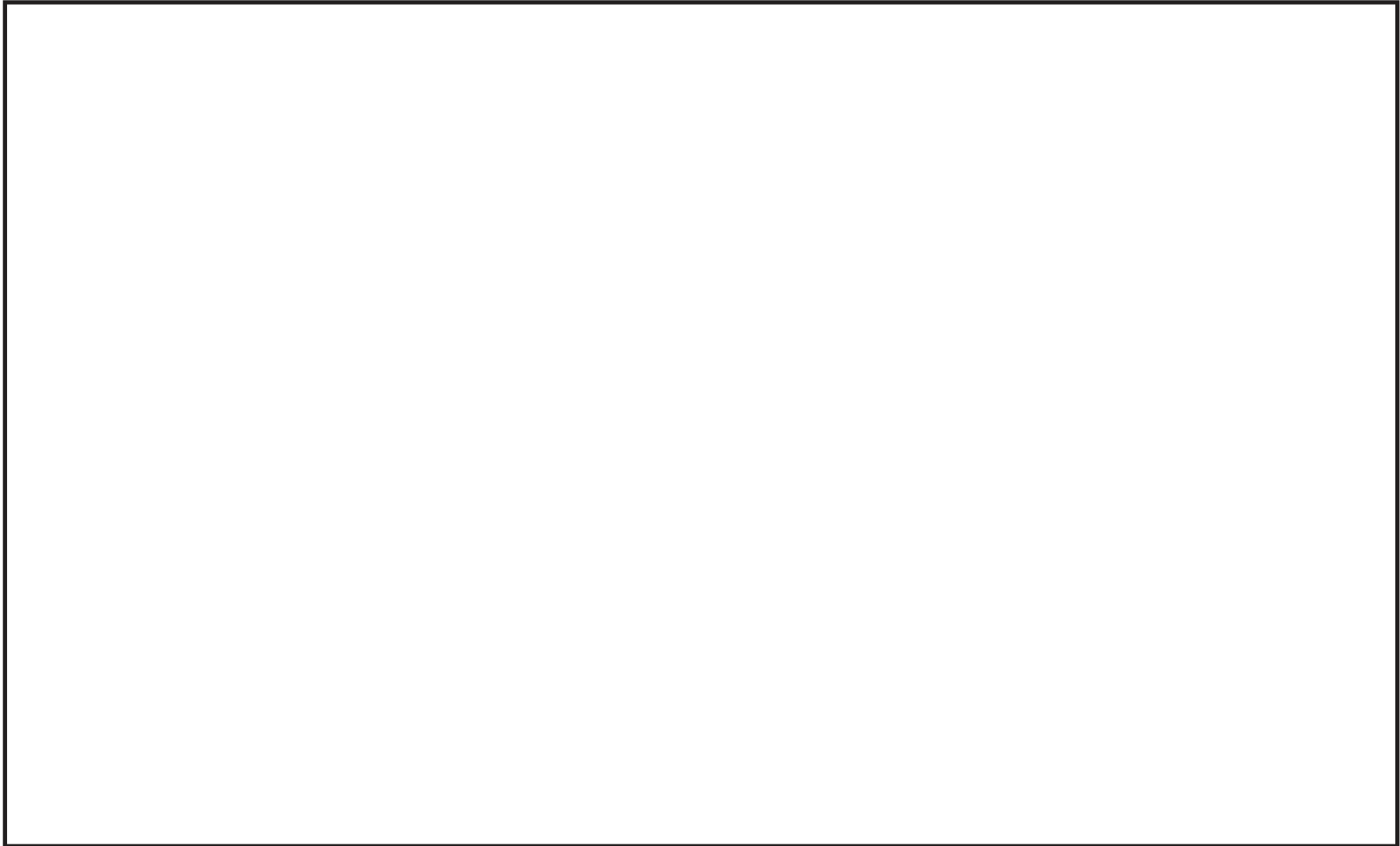
DC GEC, When Required A

Conductor, Cable and Conduit Schedule					
TAG	Description and Conductor Type: (Table 3)	Conductor Size	Number of Conductors	Conduit/ Conductor/ Cable Type	Conduit Size
A	Current-Carrying Conductors: (for each branch circuit)				
	EGC:				
	GEC (when required):				
B	Current-Carrying Conductors:				
	EGC:				
	GEC (when required):				

SOLAR PV STANDARD PLAN — SIMPLIFIED

Microinverter and ACM Systems for One- and Two-Family Dwellings

ROOF LAYOUT PLAN



Items required: roof layout of all panels, modules, clear access pathways and approximate locations of electrical disconnecting means and roof access points.