



BUILDING & SAFETY
8353 SIERRA AVE, FONTANA, CA 92335
(909) 350-7640
+ FAX: (909) 350-7676

Submittal Requirements for Expedited One- and Two-Family Residential Rooftop Solar Energy Installations (10KW or Less)

FORM PV 1

SUBMITTAL REQUIREMENTS

1. Completed **permit application form**. This permit application form and all other required PV forms can be downloaded at <http://www.fontana.org/index.aspx?nid=144>.
2. Two (2) complete sets of the following documents:
 - 1) A completed Eligibility Checklist form (**Form PV2**).
 - 2) A completed Solar PV Standard Plan (**Form PV3 & PV3S or PV4**).
 - 3) A **Roof Plan** showing roof layout, PV panels and the following fire safety items: approximate location of roof access point, location of code-compliant access pathways, PV system fire classification and the locations of all required labels and markings.
 - 4) A **Site Plan** showing all structures on property, property lines, PV panels, service meter, sub-panels, inverters, disconnects, etc.
 - 5) Listed/approved manufacturer **Specification Sheets** for all proposed equipment including modules, inverters, panels, racking system, support mounts, etc.
 - 6) A completed Structural Criteria form (**Form PV5**).

For non-qualifying systems, **provide structural drawings and calculations** stamped and signed by a California licensed architect or registered professional civil or structural engineer, along with the following information:

- The type of roof covering and the number of roof coverings installed.
- Type of roof framing, size of members and spacing.
- Weight of panels, support locations and method of attachment.
- Framing plan and details for any work necessary to strengthen the existing roof structure.
- Site-specific structural calculations.
- Wind Design: 129 MPH Ultimate Design Wind Speed (Vult), Exposure C.
- Where an approved racking system is used, provide documentation showing manufacture of the rack system, maximum allowable weight the system can support, attachment method to the roof or ground and product evaluation information or structural design for the rack system.

PLAN REVIEW

Permit applications can be submitted in person to the Building and Safety Division public counter. Only permit applications utilizing all standard plans (PV2, PV3 or PV4, and PV5) qualify for an expedited plan review timeframe within one to three working days.

FEES

Plan Check	Permit	Total
\$176	\$169.21*	\$345.21*

*Permit fee may vary:

- Strong Motion Instrumentation Program (SMIP) and Building Standards fees are based on overall project valuation cost.
- Additional fees apply for main panel upgrades.

INSPECTIONS

Once permit to construct the solar installation has been issued and the system has been installed, it must be inspected before final approval is granted for the solar system. On-site inspections can be scheduled by calling the Building and safety electronic voice response system at **(909) 350-7693**. Inspection requests received within business hours are typically scheduled for the next business day.

Contractor/owner-builder must be prepared to show conformance with all technical requirements in the field at the time of inspection. The inspector will verify that the installation is in conformance with applicable code requirements and with the approved plans.

The inspection checklist provides an overview of common points of inspection that the applicant should be prepared to show compliance, common checks include the following:

- 1) Number of PV modules and model number match plans and specification sheets.
- 2) Array conductors and components are installed in a neat and workman-like manner.
- 3) Conductors ratings and sizes match plans.
- 4) Appropriate signs are properly constructed, installed and displayed, including the following:
 - a. Sign identifying PV system attributes at DC disconnect
 - b. Sign identifying AC disconnect
 - c. Warning sign indicating Dual Power Sources
- 5) Equipment ratings are consistent with application and installed signs on the installation, including the following:
 - a. Inverter has a rating as high as max voltage on PV power source sign.
 - b. DC-side overcurrent circuit protection devices (OCPDs) are DC rated at least as high as max voltage on sign.
 - c. Switches and OCPDs are installed according to the manufacturer's specifications (i.e., many 600VDC switches require passing through the switch poles twice in a specific way).
 - d. Inverter is rated for the site AC voltage supplied and shown on the AC point of connection sign.
 - e. OCPD connected to the AC output of the inverter is rated at least 125% of maximum current on sign and is no larger than the maximum OCPD on the inverter listing label.
 - f. Sum of the main OCPD and the inverter OCPD is rated for not more than 120% of the bus bar rating for end fed main panels.
 - g. Sum of the main OCPD and the inverter OCPD is rated for not more than 100% of the bus bar rating for center fed main panels.
- 6) All exterior equipment including but not limited to raceways, junction boxes, combiner boxes, load centers, disconnects etc. are painted to match exterior of building.

DEPARTMENTAL CONTACT INFORMATION

For additional information regarding this permit process, please consult our departmental website at <http://www.fontana.org/index.aspx?nid=136> or contact Building and Safety at **(909) 350-7640**.



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Eligibility Checklist for Expedited One- and Two-Family Residential Rooftop Solar Energy Installations (10KW or Less)

FORM PV 2

GENERAL REQUIREMENTS

1. System size is 10 KW AC CEC rating or less. Y N
2. The solar array is roof-mounted on one- or two-family dwelling or accessory structure. Y N
3. The solar panel/module arrays will not exceed the maximum legal building height. Y N
4. Solar system is utility interactive and without battery storage. Y N
5. Permit application is completed and attached. Y N

ELECTRICAL REQUIREMENTS

1. No more than four photovoltaic module strings are connected to each Maximum PowerPoint Tracking (MPPT) input where source circuit fusing is included in the inverter.
 - a. No more than two strings per MPPT input where source circuit fusing is not included. Y N
 - b. Fuses (if needed) are rated to the series fuse rating of the PV module. Y N
 - c. No more than one noninverter-integrated DC combiner is utilized per inverter. Y N
2. For central inverter systems: No more than two inverters are utilized. Y N
3. The PV system is interconnected to a single-phase AC service panel of nominal 120/220 Vac with a bus bar rating of 225 A or less. Y N
4. The PV system is connected to the load side of the utility distribution equipment. Y N
5. A completed Solar PV Standard Plan is attached (**Form PV3 or PV4**). Y N

STRUCTURAL REQUIREMENTS

1. A completed Structural Criteria form is attached (**Form PV5**). Y N

FIRE SAFETY REQUIREMENTS

1. Clear access pathways provided. Y N
2. Fire classification solar system is provided. Y N
3. All required markings and labels are provided. Y N
4. A diagram of the roof layout of all panels, modules, clear access pathways and approximate locations of electrical disconnecting means and roof access points is completed and attached. Y N

Note: If any items are checked NO, revise design to fit within Eligibility Checklist, otherwise permit application may go through standard process.

Address: _____

Signature: _____



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**Solar PV Standard Plan – Simplified
Central/String Inverter Systems for
One- and Two-Family Dwellings
(10 KW or Less)**

FORM PV 3

Use this plan ONLY for utility-interactive central/string inverter systems. This plan is not intended for bipolar systems, hybrid systems or systems that utilize storage batteries, charge controllers, trackers, more than two inverters or more than one DC combiner (non-inverter-integrated) per inverter. Systems must be in compliance with current 2013 California Building Standards Code and City of Fontana amendments. Other Articles of the 2013 California Electrical Code (CEC) shall apply as specified in 690.3.

MANUFACTURER'S SPECIFICATION SHEETS MUST BE PROVIDED for proposed inverter, modules, combiner/junction boxes and racking systems. Installation instructions for bonding and grounding equipment shall be provided, Building and Safety 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[D]).

Job Address: _____

Contractor/Owner Builder: _____

Signature: _____ Date: _____ Phone: _____

Inverter 1 AC Output Power Rating: _____ Watts

Inverter 2 AC Output Power Rating (Attach Form PV 3S): _____ Watts

Combined Inverter Output Power Rating: _____ ≤ 10,000 Watts Total Modules Proposed: _____

1) Main Panel Upgrade Required?: <input type="checkbox"/> No <input type="checkbox"/> Yes (if yes) Buss _____ Main _____		
Module Manufacturer: _____ Model: _____		
2) Module V_{oc} (from module nameplate): _____ Volts	3) Module I_{sc} (from module nameplate): _____ Amps	
4) Module DC output power under standard test conditions (STC) = _____ Watts (STC)		

5) DC Module Layout

Identify each source circuit (string) for inverter 1 shown on the roof plan with a Tag (e.g., A, B, C...)	Number of modules per source circuit for inverter 1	Identify, by tag, which source circuits on the roof are to be paralleled (if none, put N/A)
		Combiner 1:
		Combiner 2:
Total number of source circuits for inverter 1: _____		

6) Are DC/DC Converters used (i.e. optimizers)? Yes No If No, skip to STEP 7. If Yes, enter info below.

DC/DC Converter Model #: _____	DC/DC Converter Max DC Input Voltage: _____ Volts
Max DC Output Current: _____ Amps	Max DC Output Current: _____ Volts
Max # of DC/DC Converters in an Input Circuit: _____	DC/DC Converter Max DC Input Power: _____ Watts

7) Max. System DC Voltage – Use A for systems without DC/DC converters, and B with DC/DC converters.

A. Module V_{OC} (STEP 2) = _____ x # in series (STEP 5) _____ x 1.12 = _____ V

Table 1. Maximum Number of PV Modules in Series Based on Module Rated V_{OC} for 600 Vdc Rated Equipment (CEC 690.7)

Max. Rated Module V_{OC} (*1.12) (Volts)	29.76	31.51	33.48	35.71	38.27	41.21	44.64	48.70	53.57	59.52	66.96	76.53	89.29
Max # of Modules for 600 Vdc	18	17	16	15	14	13	12	11	10	9	8	7	6

Use for DC/DC converters. The value calculated below must be less than DC/DC converter max DC input voltage (STEP #6).

B. Module V_{OC} (STEP 2) _____ x # of modules per converter (STEP 6) _____ x 1.12 = _____ V

Table 2. Largest Module V_{OC} for Single Module DC/DC Converter Configurations (With 80V AFCI Cap) (CEC 690.7 and 690.11)

Max. Rated Module V_{OC} (*1.12) (Volts)	30.4	33.0	35.7	38.4	41.1	43.8	46.4	49.1	51.8	54.5	57.1	59.8	62.5	65.2	67.9	70.5
DC/DC Converter Max DC Input (STEP #6) (Volts)	34	37	40	43	46	49	52	55	58	61	64	67	70	73	76	79

8) Maximum System DC Voltage from DC/DC Converters to Inverter – Only required if Yes in STEP 6

Maximum System DC Voltage = _____ Volts

9) Maximum Source Circuit Current

Is Module I_{SC} below 9.6 Amps (STEP 3)? Yes No (if No, provide comprehensive plan)

10) Sizing Source Circuit Conductors

Source Circuit Conductor Size = Min. #10 AWG copper conductor, 90°C wet (USE-2, PV Wire, XHHW-2, THWN-2, RHW-2). Maximum 8 conductors in roof-mounted conduit exposed to sunlight located minimum 1/2" from the roof covering (CEC 310)

11) Are PV source circuits combined prior to the inverter? Yes No

If No, use Single Line Diagram 1 and proceed to STEP 13.

If Yes, use Single Line Diagram 2 and proceed to STEP 12.

Is source circuit OCPD required? Yes No

Source circuit OCPD size (if needed): 15 Amps

12) Sizing PV Output Circuit Conductors – If a combiner box will NOT be used from [STEP 11],

Output Circuit Conductor Size = Min. #6 AWG copper conductor

13) Inverter DC Disconnect

Does the inverter have an integrated DC disconnect? Yes No If yes, proceed to STEP 14.

If no, the external DC disconnect to be installed is rated for _____ Amps (DC) and _____ Volts (DC)

14) Inverter information

Manufacturer: _____ Model: _____

Max. Continuous AC Output Current Rating: _____ Amps

Integrated DC Arc-Fault Circuit Protection? Yes No (If No is selected, provide comprehensive plan)

Grounded or Ungrounded System: Grounded Ungrounded

15) Sizing Inverter Output Circuit Conductors and OCPD

Inverter Output OCPD rating = _____ Amps (Table 3)

Inverter Output Circuit Conductor Size = _____ AWG (Table 3)

Table 3. Minimum Inverter Output OCPD and Circuit Conductor Size

Inverter Continuous Output Current Rating (Amps) (STEP#14)	12	16	20	24	28	32	36	40	48
Minimum OCPD Size (Amps)	15	20	25	30	35	40	45	50	60
Minimum Conductor Size (AWG, 75°C, Copper)	14	12	10	10	8	8	6	6	6

16) Point of Connection to Main Service Panel:

End Fed Service (Use Combined Value at 120% Buss) Center Fed Service (Use Combined Value at 100% Buss)

Bus Bar Rating: _____ Main OCPD: _____ Max Combined PV System OCPD @ 120% or 100%: _____

Table 4. Maximum Combined Supply OCPDs Based on Bus Bar Rating (Amps) per CEC 705.12(D)(2)

Bus bar Rating	100	125	125	200	200	200	225	225	225
Main OCPD	100	100	125	150	175	200	175	200	225
Max Combined PV System OCPD(s) at 120% of bus bar Rating	20	50	25	60*	60*	40	60*	60*	45
Max Combined PV System OCPD(s) at 100% of bus bar Rating	0	25	0	50	25	0	50	25	0

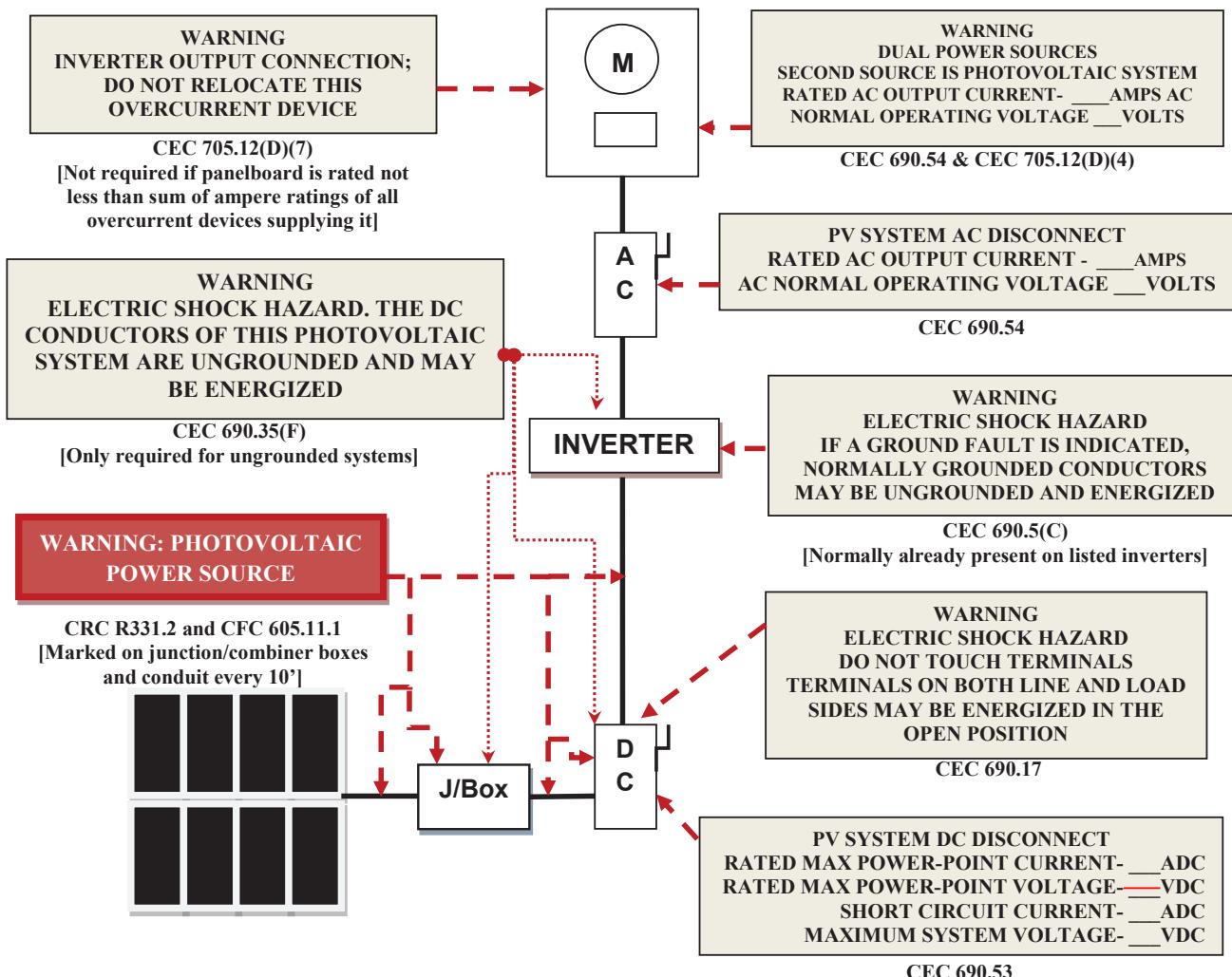
*This value has been lowered to 60 A from the calculated value to reflect 10kW AC size maximum. Reduction of the main breaker is not permitted with this plan. Otherwise, provide comprehensive plan).

Solar PV Standard Plan — Simplified

Central/String Inverter Systems for One- and Two-Family Dwellings

Markings

CEC Articles 690 and 705 and CRC Section R331 require the following labels or markings be installed at these components of the photovoltaic system:



Code Abbreviations:

California Electrical Code (CEC)
California Residential Code (CRC)
California Fire Code (CFC)

Informational note: ANSI Z535.4 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.

CEC 705.12 requires a permanent plaque or directory denoting all electric power sources on or in the premises.

Solar PV Standard Plan — Simplified

Central/String Inverter Systems for One- and Two-Family Dwellings

Solar PV Standard Plan — Simplified Central/String Inverter Systems for One- and Two-Family Dwellings

△ TAG	1 SOLAR PV MODULE / STRING	2 DC/DC CONVERTERS INSTALLED?	3 SOURCE CIRCUIT JUNCTION BOX INSTALLED?	4 COMBINER BOX	5 SEPARATE DC DISCONNECT INSTALLED?	6 INTERNAL INVERTER DC DISCONNECT:	7 CENTRAL INVERTER	8 LOAD CENTER INSTALLED?	9 PV PRODUCTION METER INSTALLED?	10 SEPARATE AC DISCONNECT INSTALLED?	11 CONNECT TO INVERTER #2
1	YES	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
2	YES	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
3	YES	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
4	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
5	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
6	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
7	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
8	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
9	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
10	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
11	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO

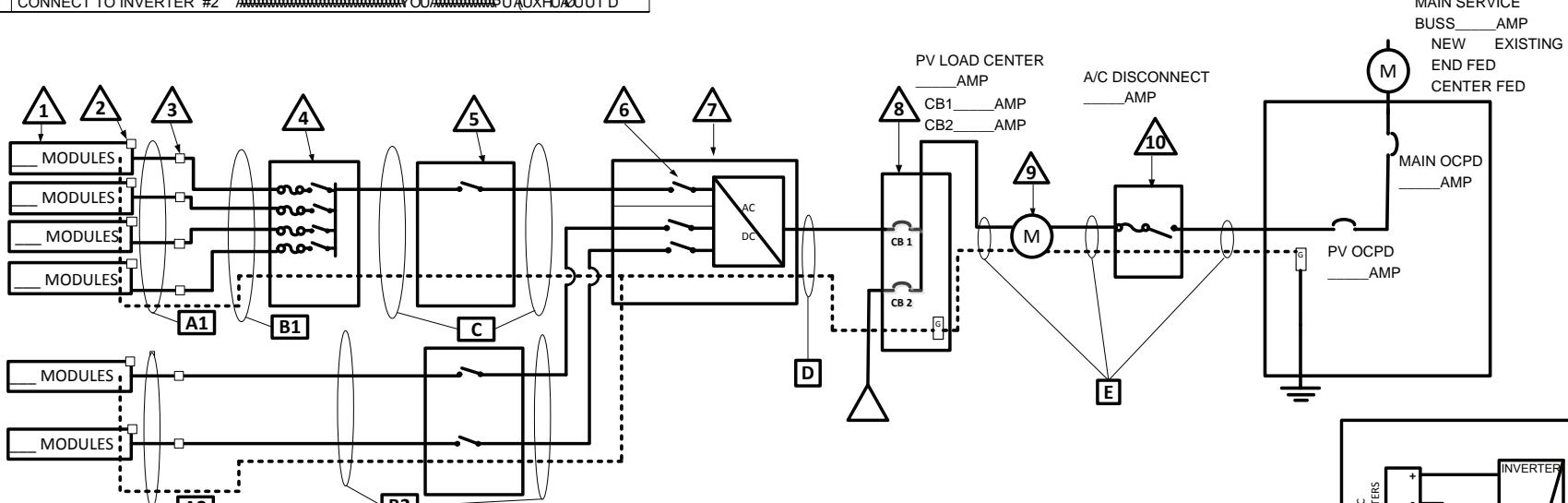
SINGLE-LINE DIAGRAM #2 – COMBINING STRINGS PRIOR TO INVERTER

CHECK A BOX FOR WHETHER SYSTEM IS GROUNDED OR UNGROUNDED:

GROUNDED (INCLUDE GEC)
 UNGROUNDED

FOR UNGROUNDED SYSTEMS:

- DC OCPD MUST DISCONNECT BOTH CONDUCTORS OF EACH SOURCE CIRCUIT
- UNGROUNDED CONDUCTORS MUST BE IDENTIFIED PER 210.5(C). WHITE-FINISHED CONDUCTORS ARE NOT PERMITTED.



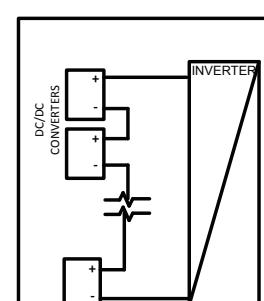
COMBINER/CONDUCTOR CONDUIT SCHEDULE				
<input type="checkbox"/>	CONDUCTOR TYPE	SIZE	QUANTITY	CONDUIT TYPE
A1	USE-2 OR PV-WIRE EGC/GEC			
B1	EGC/GEC			
C	EGC/GEC			
E	EGC/GEC			
D	EGC/GEC			

NON-COMBINED STRINGS CONDUCTOR/CONDUIT SCHEDULE (IF APPLICABLE)					
<input type="checkbox"/>	TAG	CONDUCTOR TYPE	SIZE	QUANTITY	CONDUIT TYPE
A2		USE-2 OR PV-WIRE EGC/GEC			
B2		EGC/GEC			

ENTER "N/A" WHERE SUITABLE FOR WHEN NOT USING CONDUIT OR CABLE AS PERMITTED BY CODE

MAIN SERVICE
BUSS
AMP
NEW
EXISTING
END FED
CENTER FED

MAIN OCPD
AMP



IF DC/DC CONVERTERS ARE USED, THEY
ARE RUN IN SERIES (FIXED SOURCE
CIRCUIT VOLTAGE DC/DC CONVERTERS)

SOLAR PV STANDARD PLAN

Roof Layout Diagram for One- and Two-Family Dwellings

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



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**Solar PV Standard Plan – Simplified
Central/String Inverter Systems for
One- and Two-Family Dwellings
(10 KW or Less)**

FORM PV 3S

Supplemental Calculation Sheets for Inverter #2

DC Information:

Module Manufacturer: _____	Model: _____	
S2) Module V _{oc} (from module nameplate): _____ Volts	S3) Module I _{sc} (from module nameplate): _____ Amps	
S4) Module DC output power under standard test conditions (STC) = _____ Watts (STC)		
S5) DC Module Layout		
Identify each source circuit (string) for inverter 1 shown on the roof plan with a Tag (e.g., A, B, C ...)	Number of modules per source circuit for inverter 1	Identify, by tag, which source circuits on the roof are to be paralleled (if none, put N/A)
		Combiner 1:
		Combiner 2:
Total number of source circuits for inverter 1: _____		
S6) Are DC/DC Converters used (i.e. optimizers)? <input type="checkbox"/> Yes <input type="checkbox"/> No If No, skip to STEP#S7. If Yes, enter info below.		
DC/DC Converter Model #: _____	DC/DC Converter Max DC Input Voltage: _____ Volts	
Max DC Output Current: _____ Amps	Max DC Output Voltage: _____ Volts	
Max # of DC/DC Converters in a source circuit: _____	DC/DC Converter Max DC Input Power: _____ Watts	

S7) Max. System DC Voltage – Use A for systems without DC/DC converters, and B with DC/DC converters (i.e. optimizers).

A Module V_{OC} (STEP S2) = _____ x # in series (STEP S5) _____ x 1.12 = _____ V

Table 1. Maximum Number of PV Modules in Series Based on Module Rated V_{OC} for 600 Vdc Rated Equipment (CEC 690.7)													
Max. Rated Module V_{OC} (*1.12) (Volts)	29.76	31.51	33.48	35.71	38.27	41.21	44.64	48.70	53.57	59.52	66.96	76.53	89.29
Max # of Modules for 600 Vdc	18	17	16	15	14	13	12	11	10	9	8	7	6

Use for DC/DC converters. The value calculated below must be less than DC/DC converter max DC input voltage (STEP #S6).

B. Module V_{OC} (STEP#S2) _____ x # of modules per converter (STEP S6) _____ x 1.12 = _____ V

Table 2. Largest Module V_{OC} for Single-Module DC/DC Converter Configurations (With 80V AFCI Cap) (CEC 690.7 and 690.11)																
Max. Rated Module V_{OC} (*1.12) (Volts)	30.4	33.0	35.7	38.4	41.1	43.8	46.4	49.1	51.8	54.5	57.1	59.8	62.5	65.2	67.9	70.5
DC/DC Converter Max DC Input (STEP #6) (Volts)	34	37	40	43	46	49	52	55	58	61	64	67	70	73	76	79

S8) Maximum System DC Voltage from DC/DC Converters to Inverter – Only required if Yes in STEP S6

Maximum System DC Voltage = _____ Volts

S9) Maximum Source Circuit Current

Is Module ISC below 9.6 Amps (STEP S3)? Yes No (if No, provide comprehensive plan)

S10) Sizing Source Circuit Conductors

Source Circuit Conductor Size = Min. #10 AWG copper conductor, 90°C wet (USE-2, PV Wire, XHHW-2, THWN-2, RHW-2). Maximum 8 conductors in roof-mounted conduit exposed to sunlight located minimum 1/2" from the roof covering (CEC 310)

S11) Are PV source circuits combined prior to the inverter? Yes No

If No, use Single Line Diagram 1 with Single Line Diagram 3 and proceed to STEP S13.

If Yes, use Single Line Diagram 2 with Single Line Diagram 4 and proceed to STEP S12.

Is source circuit OCPD required? Yes No

Source circuit OCPD size (if needed): 15 Amps

S12) Sizing PV Output Circuit Conductors – If a Combiner box will NOT be used from [STEP#S11],

Output Circuit Conductor Size = Min. #6 AWG copper conductor

S13) Inverter DC Disconnect

Does the inverter have an integrated DC disconnect? Yes No If yes, proceed to STEP S14.

If No, the external DC disconnect to be installed is rated for _____ Amps (DC) and _____ Volts (DC)

S14) Inverter information:

Manufacturer: _____ Model: _____

Max. Continuous AC Output Current Rating: _____ Amps

Integrated DC Arc-Fault Circuit Protection? Yes No (If No is selected, provide comprehensive plan)Grounded or Ungrounded System: GROUNDED UNGROUNDED**S15) Sizing Inverter Output Circuit Conductors and OCPD:**

Inverter Output OCPD rating = _____ Amps (Table 3)

Inverter Output Circuit Conductor Size = _____ AWG (Table 3)

Table 3. Minimum Inverter Output OCPD and Circuit Conductor Size

Inverter Continuous Output Current Rating (Amps) (STEP 14)	12	16	20	24	28	32	36	40	48
Minimum OCPD Size (Amps)	15	20	25	30	35	40	45	50	60
Minimum Conductor Size (AWG, 75°C, Copper)	14	12	10	10	8	8	6	6	6

Solar PV Standard Plan — Simplified Central/String Inverter Systems for One- and Two-Family Dwellings

EQUIPMENT SCHEDULE	
1	SOLAR PV MODULE / STRING
2	DC/DC CONVERTERS INSTALLED? YES NO (STEP S6)
3	SOURCE CIRCUIT JUNCTION BOX INSTALLED? YES NO (STEP S11 & 12)
4	SEPARATE DC DISCONNECT INSTALLED? YES NO (STEP S13)
5	INTERNAL INVERTER DC DISCONNECT: YES NO (STEP S14)
6	CENTRAL INVERTER
7	SEPARATE AC DISCONNECT INSTALLED? YES NO
8	TO LOAD CENTER ON LINE DIAGRAM 1

SINGLE-LINE DIAGRAM #3 – ADDITIONAL INVERTER FOR DIAGRAM #1

INVERTER # 2

CHECK A BOX FOR WHETHER SYSTEM IS GROUNDED OR UNGROUNDED: GROUNDED (INCLUDE GEC)
 UNGROUNDED

FOR UNGROUNDED SYSTEMS:

- DC OCPD MUST DISCONNECT BOTH CONDUCTORS OF EACH SOURCE CIRCUIT
- UNGROUNDED CONDUCTORS MUST BE IDENTIFIED PER 210.5(C). WHITE-FINISHED CONDUCTORS ARE NOT PERMITTED.

USE-2 OR PV-WIRE
EGC/GEC SIZE: _____

CONDUCTOR TYPE: _____
SIZE: _____
QUANTITY: _____
CONDUIT TYPE: _____
CONDUIT SIZE: _____
EGC/GEC SIZE: _____

CONDUCTOR TYPE: _____
SIZE: _____
QUANTITY: _____
CONDUIT TYPE: _____
CONDUIT SIZE: _____
EGC/GEC SIZE: _____

ENTER "N/A" WHERE SUITABLE FOR WHEN
NOT USING CONDUIT OR CABLE AS
PERMITTED BY CODE

IF DC/DC CONVERTERS ARE USED, CHECK THE BOX BELOW THE CORRESPONDING CONFIGURATION

PARALLEL DC/DC CONVERTERS ON ONE
SOURCE CIRCUIT (FIXED UNIT VOLTAGE
DC/DC CONVERTERS)

DC/DC CONVERTERS ARE ALL RUN
IN SERIES (FIXED SOURCE CIRCUIT
VOLTAGE DC/DC CONVERTERS)

Solar PV Standard Plan — Simplified

Central/String Inverter Systems for One- and Two-Family Dwellings

5 of 5

EQUIPMENT SCHEDULE	
1	SOLAR PV MODULE / STRING
2	DC/DC CONVERTERS INSTALLED? YES
3	NO (STEPS S6)
4	SOURCE CIRCUIT JUNCTION BOX INSTALLED? YES
5	NO (STEP S11 & S12)
6	COMBINER BOX (STEPS 11 & 12 REQUIRED)
7	SEPARATE DC DISCONNECT INSTALLED? YES
8	NO (STEP S13)
9	INTERNAL INVERTER DC DISCONNECT: YES
	NO (STEP S14)
10	CENTRAL INVERTER
11	SEPARATE AC DISCONNECT INSTALLED? YES
12	NO
13	TO LOAD CENTER ON LINE DIAGRAM 3

SINGLE-LINE DIAGRAM #4 – ADDITIONAL INVERTER FOR DIAGRAM #2

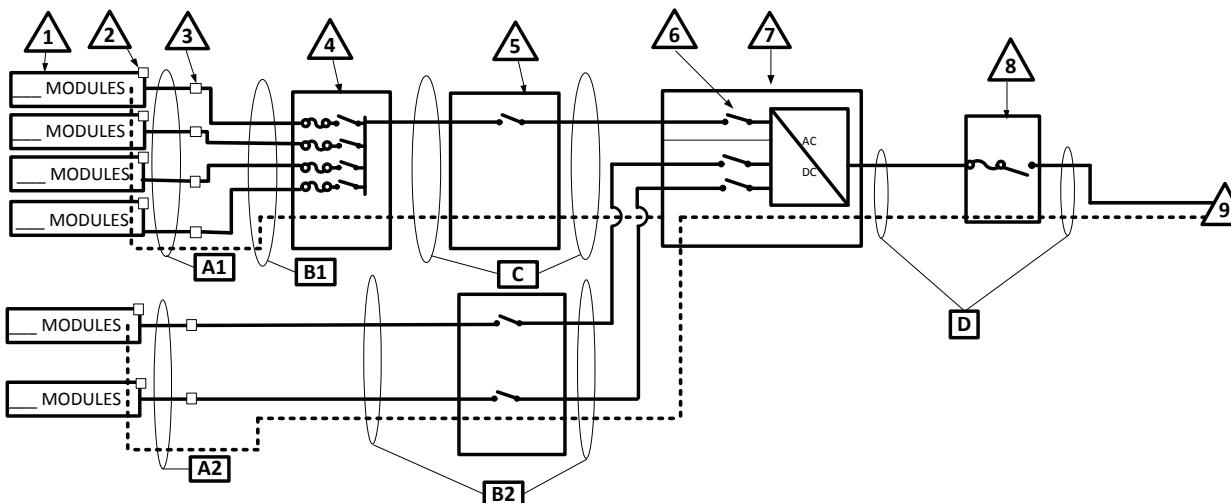
INVERTER # 2

CHECK A BOX FOR WHETHER SYSTEM IS GROUNDED OR UNGROUNDED:

GROUNDED (INCLUDE GEC)
 UNGROUNDED

FOR UNGROUNDED SYSTEMS:

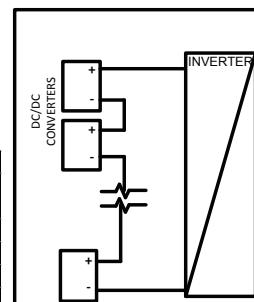
- DC OCPD MUST DISCONNECT BOTH CONDUCTORS OF EACH SOURCE CIRCUIT
- UNGROUNDED CONDUCTORS MUST BE IDENTIFIED PER 210.5(C). WHITE-FINISHED CONDUCTORS ARE NOT PERMITTED.



COMBINER/CONDUCTOR CONDUIT SCHEDULE					
TAG	CONDUCTOR TYPE	SIZE	QUANTITY	CONDUIT TYPE	CONDUIT SIZE
A1	USE-2 OR PV-WIRE				
	EGC/GEC				
B1					
	EGC/GEC				
C					
	EGC/GEC				
D					
	EGC/GEC				

NON-COMBINED STRINGS CONDUCTOR/CONDUIT SCHEDULE (IF APPLICABLE)					
TAG	CONDUCTOR TYPE	SIZE	QUANTITY	CONDUIT TYPE	CONDUIT SIZE
A2	USE-2 OR PV-WIRE				
	EGC/GEC				
B2					
	EGC/GEC				

ENTER "N/A" WHERE SUITABLE FOR WHEN NOT USING CONDUIT OR CABLE AS PERMITTED BY CODE



IF DC/DC CONVERTERS ARE USED, THEY ARE RUN IN SERIES (FIXED SOURCE CIRCUIT VOLTAGE DC/DC CONVERTERS)



BUILDING & SAFETY
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Structural Criteria for Expedited One and Two Family Residential Rooftop Solar Energy Installations (10KW or Less)

FORM PV 5

SITE CHECK FOR EXPOSURE B WIND CRITERIA

1. Wind Exposure Checks for Special Wind Regions:
 - a. Is the dwelling farther than 500 yards from large open fields or grasslands? Y N
 - b. Is the dwelling in a relatively flat area (grade less than 5%) and not within 500 yards of the crest of a tall hill? Y N
2. Steep Hill Wind Exposure Check:
 - a. Is the dwelling NOT on the top half of a very steep hill (average grade more than 15%), and NOT within 500 yards of the crest of such a hill? Y N
3. Map provided illustrates a 500 yard radius to justify conformance with items A and B above? Y N

ROOF CHECK

1. Visual Review/Contractor's Site Audit of Existing Conditions:
 - a. Is the roof a single roof without a reroof overlay? Y N
 - b. Does the roof structure appear structurally sound, without signs of alterations or significant structural deterioration or sagging? Y N
2. Roof Structure Data:
 - a. Measured roof slope is 6:12 or less? Y N
 - b. Measured rafter spacing (center-to-center) is 24" o.c. or less? Y N
 - c. Roof framing (rafter or manufactured truss) are at least 2 x 4 DF #2? Y N

SOLAR ARRAY CHECKS

1. Flush-mounted Solar Array:
 - a. Is the plane of the modules (panels) parallel to the plane of the roof? Y N
 - b. Is there a 2" to 10" gap between underside of module and the roof surface? Y N
 - c. Modules do not overhang any roof edges (ridges, hips, gable ends, eaves)? Y N
2. Do the modules plus support components weigh no more than: 4 psf? Y N
3. Does the array cover no more than half of the total roof area (all roof planes)? Y N
4. Are solar support component manufacturer's project-specific completed worksheets, tables with relevant cells circled, or web-based calculator results attached? Y N

5. Is a roof plan of the module and anchor layout attached? Y N

6. Downward Load Check (Anchor Layout Check):

- Horizontal anchor spacing (stand offs) in each direction does not exceed 4 ft. Y N

7. Wind Uplift Check (Anchor Fastener Check):

- Anchor fastener data:
 - Diameter of lag screw, hanger bolt or self-drilling screw: _____ inch
 - Embedment depth of rafter: _____ inch
 - Number of screws per anchor (typically one): _____
 - Are 5/16" diameter lag screws with 2.5" embedment into the rafter used, or does the anchor fastener meet the manufacturer's guidelines? Y N

SUMMARY

- All items above are checked YES. No additional calculations are required.
- One or more items are checked NO. Attach project-specific drawings and calculations stamped and signed by a California Registered Civil / Structural Engineer or California Licensed Architect.

Job Address: _____

Contractor/Installer: _____

Signature: _____ **Date:** _____ **Phone #:** _____