

Senate Bill 1 (SB1) defines the solar incentive programs for California, and PV modules must be listed on the SB1 compliant module list to be eligible for incentives in California. Senate Bill 1 encompasses two state-run programs, the California Solar Initiative and the New Solar Homes Partnership, as well as solar incentive programs administered by publicly owned utilities.

The California Solar Initiative (CSI) is for all market segments with the exception of new residential construction. The New Solar Homes Partnership (NSHP) is for the new residential construction market segment. The requirement for PV module eligibility is certification to UL 1703 by a NRTL whose OSHA scope includes UL 1703¹ and additional performance parameter testing at an International Laboratory Accreditation Cooperation (ILAC) affiliated laboratory. The following is a non-exhaustive list of ILAC affiliated laboratories:

- Bodycote Materials Testing Canada Inc. (Canada)
- ETL SEMKO Laboratory of Intertek Testing Services Shanghai Co., Ltd. (China)
- Metrology & Testing Center of China Electronics Technology Group Corporation No. 18th Research Institute (Tianjin, China)
- National Center of Supervision & Inspection on Solar Photovoltaic Products Quality (Jiangsu, China)
- TÜV Rheinland (Shanghai) Co., Ltd. (China)
- Fraunhofer - ISE, Institut für Solare Energiesysteme (Germany)
- PI Photovoltaik Institut Berlin AG (Germany)
- TÜV Rheinland Immissionsschutz und Energiesysteme GmbH (Germany)
- VDE Testing and Certification Institute (Germany)
- Electronics Test & Development Centre (Bangalore, India) – **61215 ONLY**
- European Solar Test Installation (Italy)
- Eurotest Laboratori Srl (Italy)
- Japan Electrical Safety and Environment Technology Laboratories (Tokyo, Japan)
- TÜV Rheinland Japan, Ltd. (Yokohama, Japan)
- Korea Testing Laboratory (Seoul, Korea) – **61215 ONLY**
- AT4 wireless, S.A. (Spain)
- CIEMAT – PVlabDER (Spain)
- Fundacion Cener – CIEMAT (Spain) – **61215 ONLY**
- Florida Solar Energy Center (USA)
- Intertek Testing Services NA, Inc. (Lake Forest, CA, USA) (*formerly known as ETL*)
- TÜV Rheinland PTL, LLC (USA) (*formerly known as ASU-PTL*)
- UL Photovoltaic Technology Center of Excellence (San Jose, CA, USA)

¹ For a list of NRTLs and to view NRTL OSHA scopes, visit <http://www.osha.gov/dts/otpca/nrtl/>

Private labeling of PV modules: *Some businesses wish to private label PV modules for another manufacturer. Such products will be accepted as eligible should the application form be submitted with a Multiple Listee letter from the listing agency (the NRTL). The Multiple Listee process is how the listing agency certifies private-labeled products. The Multiple Listee letter is evidence of certification of the product to UL 1703. No re-testing of the performance parameters is required for private labeling.*

The process for adding PV modules to the SB1 list is as follows:

1. The manufacturer gets their product certified to UL 1703. UL, CSA, and Intertek are the NRTLs who can currently perform this certification. Each module power rating shall have a unique model number identified in the UL 1703 certification. The “List of Eligible SB1 Guidelines Compliant Photovoltaic Modules” will only include unique model numbers specified in the UL 1703 certification.
2. The manufacturer gets additional performance parameter testing completed by an ILAC-affiliated laboratory as listed above. Detailed information on the tests can be found on the equipment request form in Step 3. The additional performance parameter testing required is shown below:

Crystalline modules

IEC 61215, Edition 2.0, Sections:

- 10.2 Maximum Power Determination
- 10.4 Measurement of Temperature Coefficients
- 10.5 Measurement of NOCT
- 10.6 Performance at STC and NOCT
- 10.7 Performance at Low Irradiance

Thin-film modules

IEC 61646, Edition 2.0, Sections:

- 10.2 Maximum Power Determination
- 10.4 Measurement of Temperature Coefficients
- 10.5 Measurement of NOCT
- 10.6 Performance at STC and NOCT
- 10.7 Performance at Low Irradiance
- 10.19 Light Soaking

Note: Special test setup is required for NOCT determination of BIPV modules. BIPV NOCT determination setup is as follows:

- *Tilt angle: the test BIPV modules shall be positioned so that they are tilted at $23^{\circ} \pm 5^{\circ}$ (5:12 roof pitch) to the horizontal.*
- *Configuration: the test BIPV modules shall be located in the middle of an array that is at least four feet high and four feet wide. The array shall be surrounded on all sides with a minimum of three feet of the building system for which the BIPV system is designed to be compatible, and the*

entire assembly shall be installed and sealed as specified by the manufacturer for a normal installation.

- *Substrate and underlayment: the test BIPV modules shall be installed on a substrate of oriented strand board with a minimum thickness of 15/32 inch that is covered by #30 roofing felt with a minimum R-10 continuous insulation under and in contact with the oriented strand board and include any other manufacturer-recommended underlayments.*
3. The manufacturer fills out the Energy Commission equipment application form, found here: http://gosolarcalifornia.org/equipment/documents/EQUIPMENT_REQUEST.DOC
 4. The manufacturer emails a copy of the UL 1703 Certification Letter, the ILAC laboratory test report, and the Energy Commission equipment application form to [Daria Mashnik](#). **All documentation must be in English – KEMA will reject any test reports that are not in English.**

The PV module eligibility list is updated monthly on the first of the month. The cut-off date for the monthly update is the 15th day of the preceding month; all documentation must be submitted before this date.

Grouping of modules for performance parameter testing purposes

For testing and reporting of performance values by an ILAC accredited laboratory, families of similar modules may be grouped together to reduce the required number of tests.

Multiple model numbers may be included in a group, provided that the models are identical except for the STC power rating. Identical applies to all of the following, but is not limited to: all materials, processes (including cell process), cell technology, cell size, encapsulation system, superstrate, backsheet/substrate, cell interconnection materials and techniques, and internal electric circuitry.

For each group, the following tests shall be performed on a model number that has a STC power rating that is within 95 percent (rounded to the nearest Watt) of the highest STC power rating in the group:

1. Nominal Operating Cell Temperature (NOCT) determination
2. Temperature coefficient of short-circuit current
3. Temperature coefficient of open-circuit voltage
4. Temperature coefficient of maximum power current
5. Temperature coefficient of maximum power voltage
6. Temperature coefficient of maximum power

Each group can be further categorized into subgroups where one model number will have further testing performed. All model numbers included in the subgroup shall have the same number of cells. The subgroup may contain model numbers such that the highest STC power rating in the subgroup is 105 percent (rounded to the nearest Watt) of the subgroup's tested model number's STC rating and the lowest STC power rating in the subgroup is 95 percent (rounded to the nearest Watt) of the subgroup's tested model number's STC rating. The tested model number in each subgroup shall be tested for:

At STC:

1. Short-circuit current
2. Open-circuit voltage
3. Current at maximum power
4. Voltage at maximum power
5. Maximum power

At maximum power and NOCT:

1. Short-circuit current (optional)
2. Open-circuit voltage (optional)
3. Current at maximum power
4. Voltage at maximum power

At maximum power and low irradiance:

1. Short-circuit current (optional)
2. Open-circuit voltage (optional)
3. Current at maximum power
4. Voltage at maximum power

Example: If a manufacturer has a family of identical modules with STC power ratings of 160 W, 165 W, 170 W, 175 W, 180 W, 185 W, 190 W, 195 W, and 200 W, the following testing is required. For the 190 W module, NOCT determination and temperature coefficient testing shall be performed. The results from these tests are applicable to the entire group of modules. Subgroups can then be created as follows:

185 W, 190 W, 195 W, and 200 W

170 W, 175 W, and 180 W

160 W and 165 W

For the 190 W, 175 W, and 160 W modules, the specified voltage, current, and maximum power testing at the following conditions shall be performed: STC, NOCT, and low irradiance. The results from these tests are applicable to the modules in the respective subgroup.