DOCKETED	
Docket Number:	19-BSTD-01
Project Title:	2019 Alternative Calculation Method Reference Manuals and Compliance Software Tools
TN #:	234111
Document Title:	Notice of Availability for CBECC Residential 2019 Beta Compliance Software
Description:	CBECC-RES-2019.13
Filer:	RJ Wichert
Organization:	California Energy Commission Staff
Submitter Role:	Commission Staff
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Docketed Date:	7/31/2020

CALIFORNIA ENERGY COMMISSION
1516 Ninth Street
Sacramento, California 95814

Main website: www.energy.ca.gov
CEC-57 (Revised 1/19)

Notice of Availability

REVISED 2019 RESIDENTIAL COMPLIANCE SOFTWARE, CBECC-RES 2019.1.3

Docket #19-BSTD-01

California Energy Commission (CEC) staff is posting a revision to the 2019 Residential compliance software, California Building Energy Code Compliance Residential (CBECC-Res). The updated software will be approved by the executive director by delegated authority of the CEC and available for download and use after a public review period.

Written comments should be submitted to the Docket Unit by 5:00 p.m. on August 30, 2020.

Changes included in CBECC-RES 2019.1.3

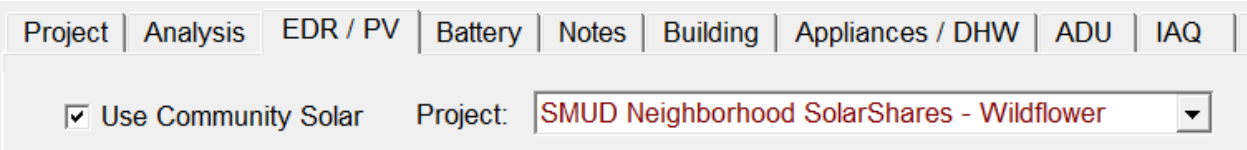
SMUD Neighborhood SolarShares Program - Wildflower

The CEC approved Sacramento Municipal Utility District's (SMUD) application to administer its Neighborhood SolarShares (NSS) Program as a community shared solar system at the February 20, 2020, business meeting. As stated in SMUD's approved application, the program will use the Wildflower photovoltaic (PV) array resource to serve NSS Program participants. Modeling of the performance characteristics of the Wildflower functionality is being incorporated into the residential compliance software, CBECC-Res.

CBECC-Res calculates hourly PV electricity production using the public domain algorithms that underly the PV Watts software, which is a web-based application developed by the National Renewable Energy Laboratory. There are certain inputs needed to describe the characteristics of a PV system that affect the calculated, hourly production. SMUD has provided the detailed performance characteristics of the Wildflower resource that include the values for the inputs that the software needs to conduct the hourly calculations. The following are the values used by the software when Wildflower is modeled (see attached specification sheets for the panels and inverter and the attached map layout for the Wildflower resource):

Module Type = Premium
Array Type = Tracking (one axis)
Power Electronics = None
Solar Access = 100 percent
Inverter Efficiency = 98.5 percent
Azimuth = 180°
Tilt = 0°
Temperature Coefficient = -0.001611 / °F [equal to -0.29% / °C]
System Losses = 14 percent

Modeling is launched in the compliance software using a checkbox on the “EDR / PV” tab called “Use Community Solar.” When this box is checked, “SMUD Neighborhood SolarShares - Wildflower” can be selected.



When chosen, all PV system user inputs that would be available for on-site solar systems are not necessary. The software uses the values of the inputs listed above, and the location and layout of the Wildflower resource, to calculate the hourly generation for Wildflower. Also, the use of on-site battery storage for compliance is not allowed because Joint Appendix JA12 states battery storage is only available for compliance purposes for battery systems installed in combination with an on-site PV system. The software automatically determines the size of the share of the Wildflower resource that is necessary to match the standard design’s annual time dependent valuation (TDV) electricity consumption. The following is an example of the information that will be provided by CBECC-Res. It shows the size of the share of the Wildflower resource required to match the TDV energy of an on-site solar system for the CEC’s 2100 square foot, single family building prototype.

Compliance Summary | CO2 Emissions | Energy Design Rating | Energy Use Details | CO2 Details

End Use	Standard Design Site (kWh)	Standard Design Site (therms)	Standard Design (kTDV/ft²-yr)	Proposed Design Site (kWh)	Proposed Design Site (therms)	Proposed Design (kTDV/ft²-yr)	Compliance Margin (kTDV/ft²-yr)
Space Heating	141	208.2	23.54	141	208.2	23.54	0.00
Space Cooling	210		17.60	210		17.60	0.00
IAQ Ventilation	237		3.13	237		3.13	0.00
Water Heating	85	114.4	12.05	85	114.4	12.05	0.00
Self Util/Flexibility Credit						0.00	0.00
Compliance Total			56.32			56.32	0.00
Photovoltaics	-4,262		-52.28	-3,925 *		-52.28	- %
Battery						0.00	
Flexibility							
Inside Lighting	506		7.37	506		7.37	
Appl. & Cooking	937	42.5	16.94	937	42.5	16.94	
Plug Loads	2,026		27.51	2,026		27.51	
Exterior	120		1.64	120		1.64	
TOTAL	0	365.2	57.50	337	365.2	57.50	

Generation Coincident Peak Demand (kW): Standard Design: 1.29 Proposed Design: 1.16 Reduction: 0.14

* PV System sized at 1.95 kWdc for Community Solar project 'SMUD Neighborhood SolarShares - Wildflower'

The software will display the required PV system size on-screen and report on the CF1R-PRF-01E in the energy design rating table and required special features table:

ENERGY DESIGN RATING

	Energy Design Ratings		Compliance Margins	
	Efficiency[1] (EDR)	Total[2] (EDR)	Efficiency[1] (EDR)	Total[2] (EDR)
Standard Design	45.6	23.9		
Proposed Design	45.6	23.9	0	0

RESULT: [3]: COMPLIES

1: Efficiency EDR includes improvements to the building envelope and more efficient equipment
2: Total EDR includes efficiency and demand response measures such as photovoltaic (PV) systems and batteries
3: Building complies when efficiency and total compliance margins are greater than or equal to zero

- Standard Design PV Capacity: 2.68 kWdc
- PV System sized at 1.95 kWdc for Community Solar project 'SMUD Neighborhood SolarShares - Wildflower'

REQUIRED SPECIAL FEATURES

The following are features that must be installed as condition for meeting the modeled energy performance for this computer analysis.

- Community Solar: 1.95 kWdc of SMUD Neighborhood SolarShares - Wildflower. Require SMUD's Attestation of Premise Registration in Neighborhood Solarshares for final inspection
- Whole house fan
- Cool roof
- Insulation below roof deck
- Window overhangs and/or fins

Ventilation Cooling Systems

Following the release of CBECC-Res 2019.1.0, CEC staff received feedback regarding Whole House Fan (WHF) compliance credit and modeling algorithms in the 2019 compliance software. Stakeholders have commented that the compliance credit given to

WHFs in 2019 is significantly lower than 2016 and requested that CEC staff review the software for errors.

Staff reviewed the WHF modeling algorithms and assumptions and found that the reduction in compliance credit is due to several factors, which include changes in hourly Time Dependent Valuation (TDV) energy factors, reduction in the Standard Design WHF fan efficacy and airflow rate, and reduction of HVAC load due to a more efficient Standard Design envelope.

During the WHF review, staff found minor errors in the WHF algorithms that are not contributing to the change in compliance credit between the code cycles. Staff is proposing corrections to the WHF morning start time to match sunrise time, and adjusting WHF availability to only run when the indoor to outdoor air temperature differential is greater than three degrees Fahrenheit.

Staff received additional stakeholder comments regarding WHF credit gaming from excessively oversized airflow, beyond what can be ventilated from a standard code-compliant attic. Because of this, staff is proposing a limit on WHF airflow of 3.5 CFM per square foot of conditioned floor area for the building. This limit is based on the maximum WHF CFM that can be ventilated from a code compliant single-family building plus a small amount of oversizing allowance to accommodate buildings with better than code ventilation.

Additional Updates and New Features in CBECC-Res 2019.1.3

- Multifamily Central Heat Pump Water Heater (HPWH) – more configurations, large compressor types, loop tank options and tank locations
- Solar Thermal PV Offset Credit – option to apply a portion of the multifamily project's PV generation as a credit toward energy efficiency TDV to offset the solar thermal system in the standard design model
- Addition of new HVAC equipment types including packaged terminal heat pump and variants
- Support for solar thermal systems certified by International Code Council-Solar Rating and Certification Corporation Solar Thermal Collector Certification (ICC-SRCC OG-100) and Solar Water Heater Certification (ICC-SRCC OG-300) programs
- Northwest Energy Efficiency Alliance (NEEA) HPWH Advanced Water Heating Specification program selection expanded to include 60 new brand/model options
- Access to battery storage charge and discharge rates

Revised Software Availability

The revised 2019 residential software, CBECC-Res 2019.1.3, will be posted to the Alternative Calculation Method Reference Manuals and compliance software tools docket for review, which can be found here:

https://efiling.energy.ca.gov/Lists/DocketLog.aspx?docketnumber=19-BSTD-01

Public Comment

Written comments: Written comments should be submitted to the Docket Unit by **5:00 p.m.** on **August 30, 2020**.

Written comments, attachments, and associated contact information (e.g., address, phone number, email address) become part of the viewable public record. This information may also become available via any Internet search engine.

The CEC encourages use of its electronic commenting system. Visit https://efiling.energy.ca.gov/Ecomment/Ecomment.aspx?docketnumber=19-BSTD-01, which links to the comment page for this docket. Select or enter a proceeding to be taken to the "Add Comment" page. Enter your contact information and a comment title describing the subject of your comment(s). Comments may be included in the "Comment Text" box or attached in a downloadable, searchable Microsoft® Word (.doc, .docx) or Adobe® Acrobat® (.pdf) file. Maximum file size is 10 MB.

Written comments may also be submitted by email. Include the Docket #19-BSTD-01 and REVISED 2019 RESIDENTIAL COMPLIANCE SOFTWARE, CBECC-RES 2019.1.3 in the subject line and send to docket@energy.ca.gov.

If preferred, a paper copy may be submitted to:

California Energy Commission
Docket Unit, MS-4
Re: Docket No. 19-BSTD-01
1516 Ninth Street
Sacramento, CA 95814-5512

Public Advisor and Other Commission Contacts

The CEC's Public Advisor's Office provides the public assistance in participating in CEC proceedings. For information on how to participate in this forum, or to request language services or other reasonable accommodations, please contact the public advisor, Noemí O. Gallardo, at publicadvisor@energy.ca.gov, or by phone at (916) 654-4489, or toll free at (800) 822-6228, or via fax at (916) 654-4493. Requests for language services

and reasonable accommodations should be made at least five days in advance. The CEC will work diligently to accommodate late requests.

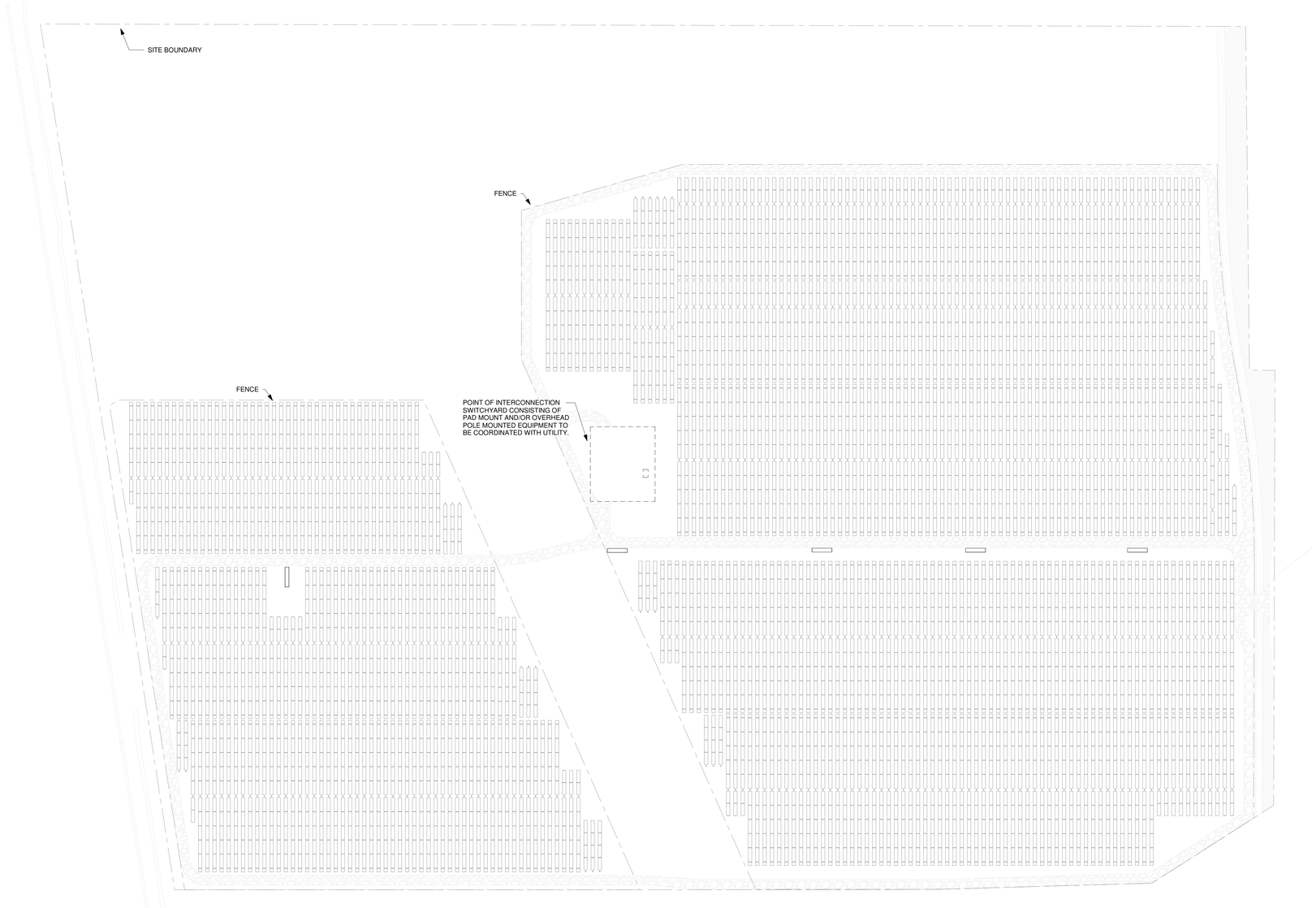
Media inquiries should be directed to the Media and Public Communications Office at mediaoffice@energy.ca.gov or (916) 654-4989.

Questions on the subject matter of this should be directed to Larry Froess at larry.froess@energy.ca.gov or (916) 654-4525.

Mail Lists:
buildingstandards list server
DACAG list server

SYSTEM SUMMARY

PROJECT LOCATION	SACRAMENTO COUNTY, CA
DESIGN TEMPERATURE	-3 C
PROJECT ELEVATION (MAX)	40' - 0"
PROJECT AREA	92 ACRES
STRING SIZE	28
MODULE TYPE	(1652) CS CS3W-395P (9800) CS CS3W-400P (20524) CS CS3W-405P (8820) CS CS3W-410P
MODULE WATTAGE	395 - 410
MODULE QTY.	40,796
INVERTER TYPE	SUNGROW SG125HV
INVERTER QTY.	115
SYSTEM SIZE (AC)	14,375 kVA 13,000 kW (AT POI)
SYSTEM SIZE (DC)	16,500.96 kW
ARRAY TYPE	NEXTRACKER HORIZON (25) X 28 MODULE ROW (182) X 56 MODULE ROW (356) X 84 MODULE ROW
GROUND COVER RATIO	47.80%
ARRAY TILT	0 DEGREES
RANGE OF MOTION	+/- 60 DEGREES
ARRAY AZIMUTH	180 DEGREES



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PHOTOVOLTAIC ARRAY SITE PLAN

1" = 100'-0"

PROJECT:

WILDFLOWER SOLAR

SACRAMENTO COUNTY, CALIFORNIA

REVISION SCHEDULE

DELTA	DESCRIPTION	DATE

STAMP:

DRAWN BY:

DESIGNED BY: Designer

APPROVED BY: Approver

SCALE: AS NOTED

DATE: Project Start Date

DRAWING TITLE:

PHOTOVOLTAIC ARRAY SITE PLAN

DRAWING NO.:

G-100

PRELIMINARY ONLY - NOT FOR CONSTRUCTION USE

NEW

CanadianSolar

HiKu

SUPER HIGH POWER POLY PERC MODULE

395 W ~ 420 W

CS3W-395|400|405|410|415|420P

MORE POWER

24 % higher power than conventional modules

Up to 4.5 % lower LCOE
Up to 2.7 % lower system cost

Low NMOT: 42 ± 3 °C
Low temperature coefficient (Pmax): -0.37 % / °C

Better shading tolerance

MORE RELIABLE

Lower internal current, lower hot spot temperature

Minimizes micro-crack impacts

Heavy snow load up to 5400 Pa, wind load up to 3600 Pa*

25 years **linear power output warranty***

12 years **enhanced product warranty on materials and workmanship***

*According to the applicable Canadian Solar Limited Warranty Statement.

MANAGEMENT SYSTEM CERTIFICATES*

ISO 9001:2015 / Quality management system
ISO 14001:2015 / Standards for environmental management system
OHSAS 18001:2007 / International standards for occupational health & safety

PRODUCT CERTIFICATES*

IEC 61215 / IEC 61730: VDE / CE / MCS / KS / INMETRO
UL 1703 / IEC 61215 performance: CEC listed (US)
UL 1703: CSA / IEC 61701 ED2: VDE / IEC 62716: VDE / IEC 60068-2-68: SGS
UNI 9177 Reaction to Fire: Class 1 / Take-e-way

* As there are different certification requirements in different markets, please contact your local Canadian Solar sales representative for the specific certificates applicable to the products in the region in which the products are to be used.

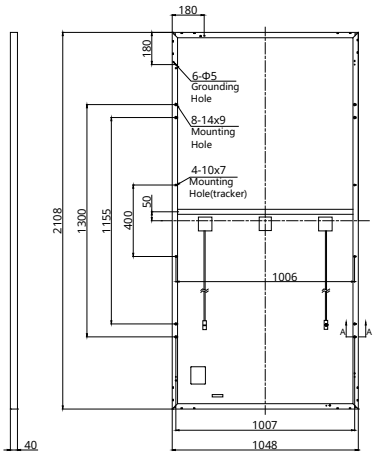
CANADIAN SOLAR INC. is committed to providing high quality solar products, solar system solutions and services to customers around the world. No. 1 module supplier for quality and performance/price ratio in IHS Module Customer Insight Survey. As a leading PV project developer and manufacturer of solar modules with over 38 GW deployed around the world since 2001.

* For detail information, please refer to Installation Manual.

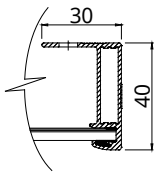
CANADIAN SOLAR INC.
545 Speedvale Avenue West, Guelph, Ontario N1K 1E6, Canada, www.canadiansolar.com, support@canadiansolar.com

ENGINEERING DRAWING (mm)

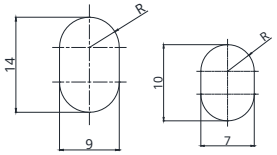
Rear View



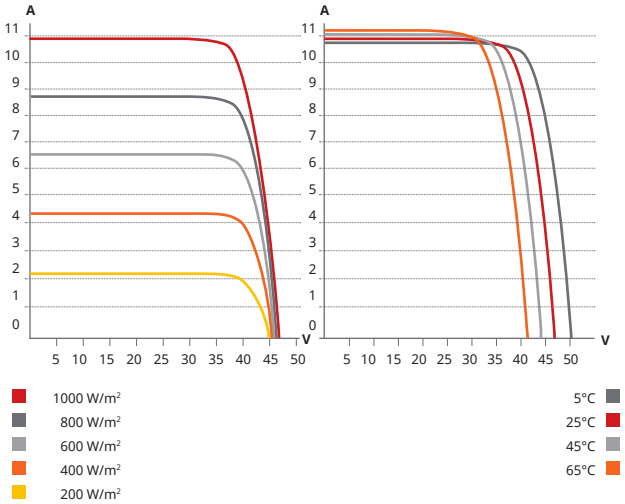
Frame Cross Section A-A



Mounting Hole



CS3W-400P / I-V CURVES



ELECTRICAL DATA | STC*

CS3W	395P	400P	405P	410P	415P	420P
Nominal Max. Power (Pmax)	395 W	400 W	405 W	410 W	415 W	420 W
Opt. Operating Voltage (Vmp)	38.5 V	38.7 V	38.9 V	39.1 V	39.3 V	39.5 V
Opt. Operating Current (Imp)	10.26 A	10.34 A	10.42 A	10.49 A	10.56 A	10.64 A
Open Circuit Voltage (Voc)	47.0 V	47.2 V	47.4 V	47.6 V	47.8 V	48.0 V
Short Circuit Current (Isc)	10.82 A	10.90 A	10.98 A	11.06 A	11.14 A	11.26 A
Module Efficiency	17.88%	18.11%	18.33%	18.56%	18.79%	19.01%
Operating Temperature	-40°C ~ +85°C					
Max. System Voltage	1500V (IEC/UL) or 1000V (IEC/UL)					
Module Fire Performance	TYPE 1 (UL 1703) or CLASS C (IEC 61730)					
Max. Series Fuse Rating	20 A					
Application Classification	Class A					
Power Tolerance	0 ~ + 5 W					

* Under Standard Test Conditions (STC) of irradiance of 1000 W/m², spectrum AM 1.5 and cell temperature of 25°C.

ELECTRICAL DATA | NMOT*

CS3W	395P	400P	405P	410P	415P	420P
Nominal Max. Power (Pmax)	294 W	297 W	301 W	305 W	308 W	312 W
Opt. Operating Voltage (Vmp)	35.8 V	36.0 V	36.1 V	36.3 V	36.5 V	36.7 V
Opt. Operating Current (Imp)	8.21 A	8.27 A	8.33 A	8.39 A	8.45 A	8.51 A
Open Circuit Voltage (Voc)	44.1 V	44.3 V	44.4 V	44.6 V	44.8 V	45.0 V
Short Circuit Current (Isc)	8.73 A	8.79 A	8.86 A	8.92 A	8.99 A	9.08 A

* Under Nominal Module Operating Temperature (NMOT), irradiance of 800 W/m², spectrum AM 1.5, ambient temperature 20°C, wind speed 1 m/s.

MECHANICAL DATA

Specification	Data
Cell Type	Poly-crystalline
Cell Arrangement	144 [2 X (12 X 6)]
Dimensions	2108 X 1048 X 40 mm (83.0 X 41.3 X 1.57 in)
Weight	24.9 kg (54.9 lbs)
Front Cover	3.2 mm tempered glass
Frame	Anodized aluminium alloy, crossbar enhanced
J-Box	IP68, 3 bypass diodes
Cable	4 mm² (IEC), 12 AWG (UL)
Cable Length (Including Connector)	Portrait: 500 mm (19.7 in) (+) / 350 mm (13.8 in) (-); landscape: 1400 mm (55.1 in); leap-frog connection: 1670 mm (65.7 in)*
Connector	T4 series or H4 UTX or MC4-EVO2
Per Pallet	27 pieces
Per Container (40' HQ)	594 pieces

* For detailed information, please contact your local Canadian Solar sales and technical representatives.

TEMPERATURE CHARACTERISTICS

Specification	Data
Temperature Coefficient (Pmax)	-0.37 % / °C
Temperature Coefficient (Voc)	-0.29 % / °C
Temperature Coefficient (Isc)	0.05 % / °C
Nominal Module Operating Temperature	42 ± 3°C

PARTNER SECTION

* The specifications and key features contained in this datasheet may deviate slightly from our actual products due to the on-going innovation and product enhancement. Canadian Solar Inc. reserves the right to make necessary adjustment to the information described herein at any time without further notice.
Please be kindly advised that PV modules should be handled and installed by qualified people who have professional skills and please carefully read the safety and installation instructions before using our PV modules.

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SG125HV

String Inverter for 1500 Vdc System

SUNGROW
Clean power for all

HIGH YIELD

- Patented five-level topology, max. efficiency 98.9 %, European efficiency 98.7 %, CEC efficiency 98.5 %
- Full power operation without derating at 50 ℃
- Patented anti-PID function

EASY O&M

- Virtual central solution, easy for O&M
- Compact design and light weight for easy installation

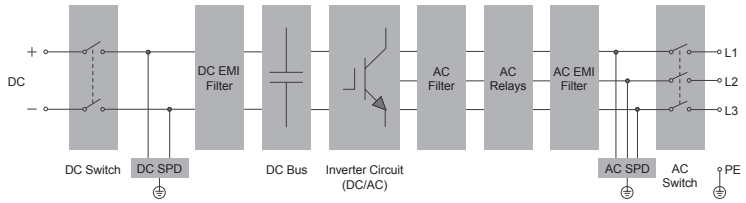
SAVED INVESTMENT

- DC 1500V,AC 600V, low system initial investment
- 1 to 5MW power block design for lower AC transformer and labor cost
- Max.DC/AC ratio up to 1.5

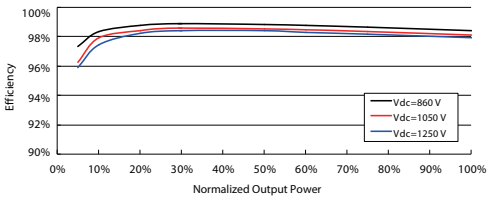
GRID SUPPORT

- Compliance with both IEC and UL safety,EMC and grid support regulations
- Low/High voltage ride through(L/HVRT)
- Active & reactive power control and power ramp rate control

CIRCUIT DIAGRAM



EFFICIENCY CURVE



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Type designation	SG125HV
Input (DC)	
Max. PV input voltage	1500 V
Min. PV input voltage / Start-up input voltage	860 V / 920 V
Nominal PV input voltage	1050 V
MPP voltage range	860 – 1450 V
MPP voltage range for nominal power	860 – 1250 V
No. of independent MPP inputs	1
No. of DC inputs	1
Max. PV input current	148 A
Max. DC short-circuit current	250 A
Output (AC)	
AC output power	125 kVA @ 50 ℃
Max. AC output current	120 A
Nominal AC voltage	3 / PE, 600 V
AC voltage range	480 – 690 V
Nominal grid frequency / Grid frequency range	50 Hz / 45 – 55 Hz, 60 Hz / 55 – 65 Hz
THD	< 3 % (at nominal power)
DC current injection	< 0.5 % In
Power factor at nominal power / Adjustable power factor	> 0.99 / 0.8 leading - 0.8 lagging
Feed-in phases / connection phases	3 / 3
Efficiency	
Max. efficiency / European efficiency	98.9% / 98.7%
CEC efficiency	98.5%
Protection	
DC reverse connection protection	Yes
AC short-circuit protection	Yes
Leakage current protection	Yes
Grid monitoring	Yes
DC switch	Yes
AC switch	Yes
Q at night function	optional
Anti-PID function	Yes
Overvoltage protection	DC Type II / AC Type II
General Data	
Dimensions (W*H*D)	670*902*296 mm 26.4''*35.5''*11.7''
Weight	76 kg 167.5 lb
Isolation method	Transformerless
Degree of protection	IP 65 NEMA 4X
Night power consumption	< 4 W
Operating ambient temperature range	-30 to 60 ℃ (> 50 ℃ derating) -22 to 140 ℉ (> 122 ℉ derating)
Allowable relative humidity range (non-condensing)	0 – 100 %
Cooling method	Smart forced air cooling
Max. operating altitude	4000 m (> 3000 m derating) 13123 ft (> 9843 ft derating)
Display / Communication	LED, Bluetooth+APP / RS485
DC connection type	OT or DT terminal (Max. 185 mm² 350 Kcmil)
AC connection type	OT or DT terminal (Max. 185 mm² 350 Kcmil)
Compliance	UL1741, UL1741SA, IEEE1547, IEEE1547.1, CSA C22.2 107.1-01-2001, FCC Part15 Sub-part B Class A Limits, California Rule 21, IEC 62109-1/-2, IEC 61000-6-2/-4, IEC 61727, IEC62116, BDEW, EN50549,VDE-AR-N 4110:2018, VDE-AR-N 4120:2018, UNE 206007-1:2013, P.O.12.3, UTE C15-712-1:2013, CEI 0-16:2017, IEC 61683, PEA, NTCO
Grid Support	LVRT, HVRT, ZVRT, active & reactive power regulation, PF control, soft start/ stop

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