

MODULES										
REF.	QTY.	MAKE AND MODEL	P _{MAX}	PTC	ISC	IMP	VOC	VMP	TEMP. COEFF. OF VOC	FUSE RATING
PM1-14	14	CANADIAN SOLAR CS1U-410MS	410W	383W	9.70A	9.23A	53.6V	44.5V	-0.155V/°C (-0.29%/°C)	20A

INVERTERS									
REF.	QTY.	MAKE AND MODEL	AC VOLTAGE	GROUND	RATED POWER	MAX OUTPUT CURRENT	MAX INPUT CURRENT	MAX INPUT VOLTAGE	WEIGHTED EFFICIENCY
I1	1	SOLAR EDGE SE6000H-US [240V]	240V	NOT SOLIDLY GROUNDED	6,000W	25.0A	16.5A	480V	99.0%

OPTIMIZERS							
REF.	QTY.	MODEL	RATED INPUT POWER	MAX OUTPUT CURRENT	MAX INPUT ISC	MAX DC VOLTAGE	WEIGHTED EFFICIENCY
PO1-14	14	SOLAR EDGE P505	505W	15A	11.0A	83V	98.8%

DISCONNECTS				OCPDS				
REF.	QTY.	MAKE AND MODEL	RATED CURRENT	MAX RATED VOLTAGE	REF.	QTY.	RATED CURRENT	MAX VOLTAGE
SW1	1	SQUARE D D223NRB OR EQUIV.	100A	240VAC	F1-2	2	35A	240VAC
					CB1	1	35A	240VAC

SYSTEM SUMMARY		
	STRING 1	STRING 2
DC SOURCE CIRCUIT CURRENT	15A	15A
NUMBER OF OPTIMIZERS	7	7
NOMINAL STRING VOLTAGE	380V	380V
ARRAY OPERATING CURRENT	7.6A	7.6A
ARRAY STC POWER	5,740W	
ARRAY PTC POWER	5,361W	
MAX AC CURRENT	25A	
MAX AC POWER OUTPUT	6,000W	
DERATED AC POWER OUTPUT	5,243W	

- ### NOTES
- SOLAR EDGE SYSTEM MEETS REQUIREMENTS FOR PHOTOVOLTAIC RAPID SHUTDOWN SYSTEM (PVRSS), AS PER NEC 690.12(B).
 - MATING CONNECTORS SHALL COMPLY WITH NEC 690.33.
 - THE SPECIFIED OPTIMIZER CAN BE SUBSTITUTED WITH A P505. THIS OPTIMIZER HAS AN INPUT VOLTAGE WINDOW WIDE ENOUGH TO ACCOMMODATE THE OUTPUT VOLTAGE RANGE OF THE MODULE AT THE DESIGN TEMPERATURES, HAS A MAX INPUT CURRENT RATING THAT IS ABOVE THE MAX OUTPUT CURRENT OF THE MODULE, AND A MAX POWER INPUT THAT IS ABOVE THE RATED POWER OUTPUT OF THE MODULE.
 - DC PV CONDUCTORS ARE NOT SOLIDLY-GROUNDED. NO DC PV CONDUCTOR SHALL BE WHITE- OR GRAY-COLORED
 - ALL METAL ENCLOSURES, RACEWAYS, CABLES AND EXPOSED NONCURRENT-CARRYING METAL PARTS OF EQUIPMENT SHALL BE GROUNDED TO EARTH AS REQUIRED BY NEC 250.4(A) AND PART III OF ARTICLE 250 AND EQUIPMENT GROUNDING CONDUCTORS SHALL BE SIZED ACCORDING TO NEC 690.45. THE GROUNDING ELECTRODE SYSTEM SHALL ADHERE TO NEC 690.47(A) AND NEC 250.169. THE DC GROUNDING ELECTRODE SHALL BE SIZED ACCORDING TO NEC 250.166 AND INSTALLED IN COMPLIANCE WITH NEC 250.64.
 - MAX DC VOLTAGE OF ARRAY FIXED BY THE INVERTER AT 380V REGARDLESS OF TEMPERATURE. THE MAX DC VOLTAGE OF THE MODULE AT -15°C IS 59.8V (-15°C - 25°C) X -0.155V/°C + 53.6V = 59.8V).
 - POINT-OF-CONNECTION IS ON LOAD SIDE OF SERVICE DISCONNECT, IN COMPLIANCE WITH NEC 705.12(B)(2)(3)(B). OUTPUT IS BACKFED THROUGH BREAKER IN MAIN PANEL.
 - THE BREAKER SHALL BE LOCATED AT THE OPPOSITE END OF THE BUSBAR FROM THE MAIN BREAKER. THE BREAKER SHALL NOT BE MARKED FOR "LINE" AND "LOAD".
 - PV SYSTEM DISCONNECT SHALL BE A VISIBLE KNIFE-BLADE TYPE DISCONNECT THAT IS ACCESSIBLE AND LOCKABLE BY THE UTILITY. THE DISCONNECT SHALL BE LOCATED WITHIN 10 FT OF UTILITY METER. DISCONNECT SHALL BE GROUPED IN ACCORDANCE WITH NEC 230.72.

CONDUCTOR AND CONDUIT SCHEDULE W/ELECTRICAL CALCULATIONS														
ID	TYPICAL	CONDUCTOR	CONDUIT / CABLE	CURRENT-CARRYING CONDUCTORS IN CONDUIT / CABLE	OCPD	EGC	TEMP. CORR. FACTOR	FILL FACTOR	CONT. CURRENT	MAX. CURRENT (125%)	BASE AMP.	DERATED AMP.	TERM. TEMP. RATING	AMP. @ TERM. TEMP. RATING
1	2	10 AWG PV WIRE, COPPER	FREE AIR	N/A	N/A	6 AWG BARE, COPPER	0.76 (55°C)	1.0	15A	18.75A	55A	41.8A	75°C	50A
2	1	10 AWG THWN-2, COPPER	0.75" DIA. EMT	4	N/A	10 AWG THWN-2, COPPER	0.96 (33°C)	0.8	15A	18.75A	40A	30.72A	90°C	40A
3	1	8 AWG THWN-2, COPPER	0.75" DIA. EMT	2	35A	10 AWG THWN-2, COPPER	0.96 (33°C)	1.0	25A	31.25A	55A	52.8A	75°C	50A
4	1	8 AWG THWN-2, COPPER	0.75" DIA. EMT	2	35A	10 AWG THWN-2, COPPER	0.96 (33°C)	1.0	25A	31.25A	55A	52.8A	75°C	50A

- ### GENERAL ELECTRICAL NOTES
- UTILITY HAS 24-HR UNRESTRICTED ACCESS TO ALL PHOTOVOLTAIC SYSTEM COMPONENTS LOCATED AT THE SERVICE ENTRANCE.
 - CONDUCTORS EXPOSED TO SUNLIGHT SHALL BE LISTED AS SUNLIGHT RESISTANT PER NEC ARTICLE 300.6 (C) (1) AND ARTICLE 310.10 (D).
 - CONDUCTORS EXPOSED TO WET LOCATIONS SHALL BE SUITABLE FOR USE IN WET LOCATIONS PER NEC ARTICLE 310.10 (C).

- ### GROUNDING NOTES
- ALL EQUIPMENT SHALL BE PROPERLY GROUNDED PER THE REQUIREMENTS OF NEC ARTICLES 250 & 690
 - PV MODULES SHALL BE GROUNDED TO MOUNTING RAILS USING MODULE LUGS OR RACKING INTEGRATED GROUNDING CLAMPS AS ALLOWED BY LOCAL JURISDICTION. ALL OTHER EXPOSED METAL PARTS SHALL BE GROUNDED USING UL-LISTED LAY-IN LUGS.
 - INSTALLER SHALL CONFIRM THAT MOUNTING SYSTEM HAS BEEN EVALUATED FOR COMPLIANCE WITH UL 2703 "GROUNDING AND BONDING" WHEN USED WITH PROPOSED PV MODULE.
 - IF THE EXISTING MAIN SERVICE PANEL DOES NOT HAVE A VERIFIABLE GROUNDING ELECTRODE, IT IS THE CONTRACTOR'S RESPONSIBILITY TO INSTALL A SUPPLEMENTAL GROUNDING ELECTRODE.
 - AC SYSTEM GROUNDING ELECTRODE CONDUCTOR (GEC) SHALL BE A MINIMUM SIZE #8AWG WHEN INSULATED, #6AWG IF BARE WIRE.
 - EQUIPMENT GROUNDING CONDUCTORS SHALL BE SIZED ACCORDING TO NEC ARTICLE 690.45, AND BE A MINIMUM OF #10AWG WHEN NOT EXPOSED TO DAMAGE, AND #6AWG SHALL BE USED WHEN EXPOSED TO DAMAGE
 - GROUNDING AND BONDING CONDUCTORS, IF INSULATED, SHALL BE COLOR CODED GREEN, OR MARKED GREEN IF #4AWG OR LARGER



GRID-TIED SOLAR POWER SYSTEM

5.74 SE CANADIAN SOLAR 410

SINGLE-LINE DIAGRAM

PROJECT ID: 164609
 DATE: 11/30/21
 CREATED BY: W.K.
 CHECKED BY:

REVISIONS	

1 SINGLE-LINE DIAGRAM
 PV-3 SCALE: NTS

DC RACEWAYS

2

SW1 - DISCONNECT
(SQUARE D D223NRB)

3 5 6

I1 - INVERTER
(SOLAR EDGE SE6000H-US000BXX4)

3 4

MSP - MAIN SERVICE PANEL
(HOMELINE)

1 5 6 7 8

1 SEE NOTE NO. 4 (MSP)

PHOTOVOLTAIC SYSTEM EQUIPPED WITH RAPID SHUTDOWN

TURN RAPID SHUTDOWN SWITCH TO THE 'OFF' POSITION TO SHUT DOWN PV SYSTEM AND REDUCE SHOCK HAZARD IN THE ARRAY.

NEC690.56(C)(1) AND IFC1204.5.1,1204.5.1

6 AC DISCONNECT (SW1, CB1 IN MSP)

**MAXIMUM AC OPERATING CURRENT: 25.0A
MAXIMUM AC OPERATING VOLTAGE: 240V**

NEC690.54

2 SEE NOTE NO. 5 (DC RACEWAYS)

**WARNING
PHOTOVOLTAIC POWER SOURCE**

NEC690.31(G)(3)

4 DC DISCONNECT (I1)

**DIRECT-CURRENT PV POWER SOURCE
MAXIMUM VOLTAGE: 380V
MAX CIRCUIT-CURRENT: 37.5A
DC-TO-DC CONVERTER RATED CURRENT: 15.0A**

NEC690.53

7 ANY AC ELECTRICAL PANEL THAT IS FED BY BOTH THE UTILITY AND THE PHOTOVOLTAIC SYSTEM (MSP)

**! WARNING !
DUAL POWER SOURCE. SECOND SOURCE IS PHOTOVOLTAIC SYSTEM.**

NEC705.12(B)(3)

3 EACH DISCONNECTING MEANS FOR PHOTOVOLTAIC EQUIPMENT (SW1, I1)

**! WARNING !
ELECTRIC SHOCK HAZARD. TERMINALS ON BOTH LINE AND LOAD SIDES MAY BE ENERGIZED IN THE OPEN POSITION.**

NEC690.13(B)

5 AC SOLAR DISCONNECT (SW1, CB1 IN MSP)

PV SYSTEM DISCONNECT

NEC690.13(B)

8 SOLAR BREAKER (MSP)

**! WARNING !
INVERTER OUTPUT CONNECTION. DO NOT RELOCATE THIS OVERCURRENT DEVICE.**

NEC705.12(B)(2)(3)(B)

LABELING NOTES	
1	ALL PLAQUES AND SIGNAGE REQUIRED BY 2017 NEC AND 2018 IFC WILL BE INSTALLED AS REQUIRED.
2	LABELS, WARNING(S) AND MARKING SHALL COMPLY WITH ANSI Z535.4, WHICH REQUIRES THAT DANGER, WARNING, AND CAUTION SIGNS USED THE STANDARD HEADER COLORS, HEADER TEXT, AND SAFETY ALERT SYMBOL ON EACH LABEL. THE ANSI STANDARD REQUIRES A HEADING THAT IS AT LEAST 50% TALLER THAN THE BODY TEXT, IN ACCORDANCE WITH NEC 110.21(B).
3	A PERMANENT PLAQUE OR DIRECTORY SHALL BE INSTALLED PROVIDING THE LOCATION OF THE SERVICE DISCONNECTING MEANS AND THE PHOTOVOLTAIC SYSTEM DISCONNECTING MEANS IF NOT IN THE SAME LOCATION IN ACCORDANCE WITH NEC 690.56(B).
4	LABEL(S) WITH MARKING, "TURN RAPID SHUTDOWN SWITCH TO THE 'OFF' POSITION TO SHUT DOWN PV SYSTEM AND REDUCE SHOCK HAZARD IN THE ARRAY," SHALL BE LOCATED WITHIN 3 FT OF SERVICE DISCONNECTING MEANS. THE TITLE SHALL UTILIZE CAPITALIZED LETTERS WITH A MINIMUM HEIGHT OF 3/8" IN BLACK ON A YELLOW BACKGROUND, AND REMAINING TEXT SHALL BE CAPITALIZED WITH A MINIMUM HEIGHT OF 3/16" IN BLACK ON WHITE BACKGROUND
5	LABEL(S) WITH MARKING, "WARNING PHOTOVOLTAIC POWER SOURCE," SHALL BE LOCATED AT EVERY 10 FEET OF EACH DC RACEWAY AND WITHIN ONE FOOT OF EVERY TURN OR BEND AND WITHIN ONE FOOT ABOVE AND BELOW ALL PENETRATIONS OF ROOF/CEILING ASSEMBLIES, WALLS AND BARRIERS. THE LABEL SHALL HAVE 3/8" TALL LETTERS AND BE REFLECTIVE WITH WHITE TEXT ON A RED BACKGROUND

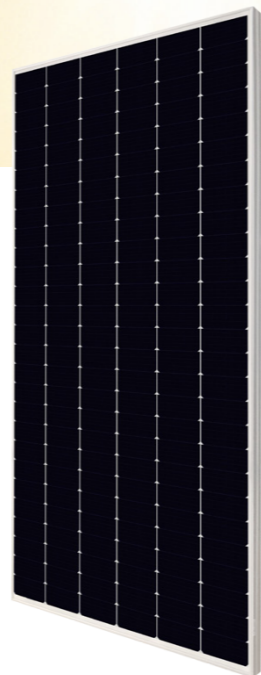


GRID-TIED SOLAR POWER SYSTEM

SAFETY LABELS

DOC ID: 164609-202812-1
DATE: 11/30/21
CREATOR: W.K.
REVIEWER:

REVISIONS	



HiDM

HIGH DENSITY MONO PERC MODULE
400 W ~ 420 W
CS1U-400|405|410|415|420MS

MORE POWER

- UP TO 20.37%** Maximize the light absorption area, module efficiency up to 20.37 %
- 42°C** Low NMOT: 42 ± 3 °C
Low temperature coefficient (Pmax): -0.37 % / °C
- +** Better shading tolerance

MORE RELIABLE

- Lower internal current,** lower hot spot temperature
- Cell crack risk limited in small region,** enhance the module reliability
- ***** Heavy snow load up to 5400 Pa, wind load up to 2400 Pa

25 years linear power output warranty

10 years product warranty on materials and workmanship

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 / CEC AU
 UL 1703 / IEC 61215 performance: CEC listed (US) / FSEC (US Florida)
 IEC61701 ED2: VDE / IEC62716: VDE
 UL 1703: CSA / Take-e-way



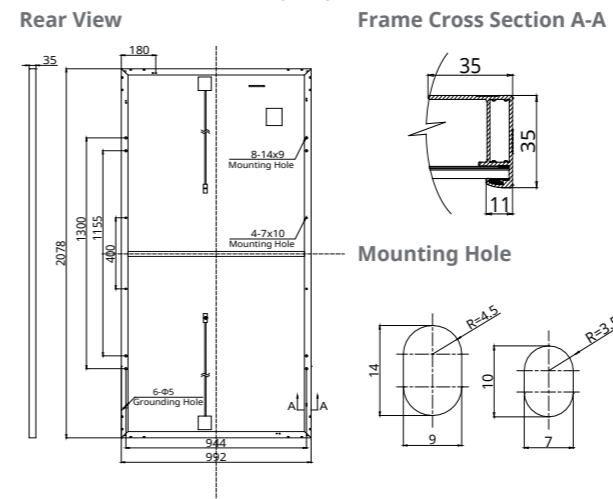
* We can provide this product with special BOM specifically certified with salt mist, and ammonia tests. Please talk to our local technical sales representatives to get your customized solutions.

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 30 GW deployed around the world since 2001.

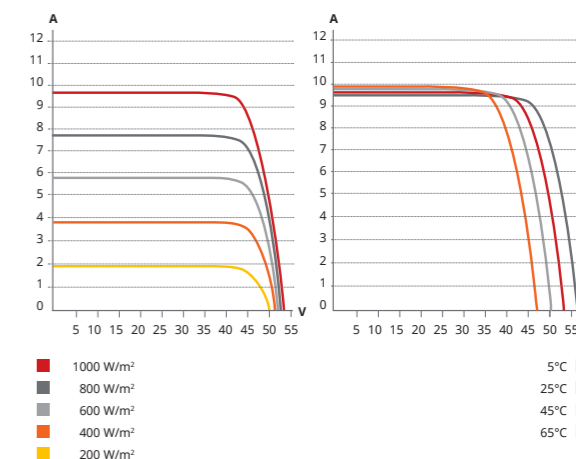
CANADIAN SOLAR INC.

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

ENGINEERING DRAWING (mm)



CS1U-405MS / I-V CURVES



ELECTRICAL DATA | STC*

CS1U	400MS	405MS	410MS	415MS	420MS
Nominal Max. Power (Pmax)	400 W	405 W	410 W	415 W	420 W
Opt. Operating Voltage (Vmp)	44.1 V	44.3 V	44.5 V	44.7 V	44.9 V
Opt. Operating Current (Imp)	9.08 A	9.16 A	9.23 A	9.30 A	9.37 A
Open Circuit Voltage (Voc)	53.4 V	53.5 V	53.6 V	53.7 V	53.8 V
Short Circuit Current (Isc)	9.60 A	9.65 A	9.70 A	9.75 A	9.80 A
Module Efficiency	19.40%	19.65%	19.89%	20.13%	20.37%
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*

CS1U	400MS	405MS	410MS	415MS	420MS
Nominal Max. Power (Pmax)	298 W	302 W	306 W	310 W	313 W
Opt. Operating Voltage (Vmp)	40.2 V	40.4 V	40.6 V	40.8 V	41.0 V
Opt. Operating Current (Imp)	7.42 A	7.47 A	7.53 A	7.59 A	7.65 A
Open Circuit Voltage (Voc)	50.2 V	50.3 V	50.4 V	50.5 V	50.6 V
Short Circuit Current (Isc)	7.74 A	7.78 A	7.82 A	7.86 A	7.90 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	Mono-crystalline
Dimensions	2078 × 992 × 35 mm (81.8 × 39.1 × 1.38 in)
Weight	23.4 kg (51.6 lbs)
Front Cover	3.2 mm tempered glass
Frame	Anodized aluminium alloy
J-Box	IP67, 4 bypass diodes
Cable	4.0 mm ² (IEC), 12 AWG (UL)
Cable length (Including connector)	1000 mm (39.4 in) (+) and 640 mm (25.2 in) (-) *; leap-frog connection: 1780 mm (70.1 in)**
Connector	T4 series
Per Pallet	30 pieces
Per Container (40' HQ)	660 pieces

* Adjacent two modules (portrait: left and right modules, landscape: up and down modules) need to be rotated 180 degrees.

** Need to confirm with the tracker suppliers there are no mounting or operation risks when cables go across the torque tube and bearing house.

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.

CANADIAN SOLAR INC.

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

Power Optimizer

For North America

P370 / P400 / P401 / P485 / P505



POWER OPTIMIZER

PV power optimization at the module-level

- Specifically designed to work with SolarEdge inverters
- Up to 25% more energy
- Superior efficiency (99.5%)
- Mitigates all types of module mismatch losses, from manufacturing tolerance to partial shading
- Flexible system design for maximum space utilization
- Fast installation with a single bolt
- Next generation maintenance with module-level monitoring
- Meets NEC requirements for arc fault protection (AFCI) and Photovoltaic Rapid Shutdown System (PVRSS)
- Module-level voltage shutdown for installer and firefighter safety

Power Optimizer

For North America

P370 / P400 / P401 / P485 / P505

Optimizer model (typical module compatibility)	P370 (for higher-power 60 and 72-cell modules)	P400 (for 72 & 96-cell modules)	P401 (for high power 60 and 72 cell modules)	P485 (for high-voltage modules)	P505 (for higher current modules)	
INPUT						
Rated Input DC Power ⁽¹⁾	370		400		485	505
Absolute Maximum Input Voltage (Voc at lowest temperature)	60	80	60	125	83	Vdc
MPPT Operating Range	8 - 60	8 - 80	8-60	12.5 - 105	12.5 - 83	Vdc
Maximum Short Circuit Current (Isc)	11	10.1	11.75	11	14	Adc
Maximum Efficiency			99.5			%
Weighted Efficiency			98.8			%
Overvoltage Category			II			
OUTPUT DURING OPERATION (POWER OPTIMIZER CONNECTED TO OPERATING SOLAREEDGE INVERTER)						
Maximum Output Current			15			Adc
Maximum Output Voltage		60		85		Vdc
OUTPUT DURING STANDBY (POWER OPTIMIZER DISCONNECTED FROM SOLAREEDGE INVERTER OR SOLAREEDGE INVERTER OFF)						
Safety Output Voltage per Power Optimizer			1 ± 0.1			Vdc
STANDARD COMPLIANCE						
Photovoltaic Rapid Shutdown System	NEC 2014, 2017 ⁽²⁾ & 2020			NEC 2014 & 2020	NEC 2014, 2017 ⁽²⁾ & 2020	
EMC	FCC Part 15 Class B, IEC61000-6-2, IEC61000-6-3					
Safety	IEC62109-1 (class II safety), UL1741					
Material	UL94 V-0, UV Resistant					
RoHS	Yes					
INSTALLATION SPECIFICATIONS						
Maximum Allowed System Voltage	1000					
Compatible inverters	All SolarEdge Single Phase and Three Phase inverters					
Dimensions (W x L x H)	129 x 153 x 27.5 / 5.1 x 6 x 1.1	129 x 153 x 33.5 / 5.1 x 6 x 1.3	129 x 153 x 29.5 / 5.1 x 6 x 1.16	129 x 153 x 33.5 / 5.1 x 6 x 1.3	129 x 162 x 59 / 5.1 x 6.4 x 2.3	mm / in
Weight (including cables)	655 / 1.4	750 / 1.7	655 / 1.4	845 / 1.9	1064 / 2.3	gr / lb
Input Connector	MC4 ⁽³⁾			Single or dual MC4 ⁽³⁾⁽⁴⁾	MC4 ⁽³⁾	
Input Wire Length	0.16 / 0.52, 0.9 / 2.95 ⁽⁴⁾	0.16 / 0.52	0.16 / 0.52, 0.9 / 2.95 ⁽⁴⁾	0.16 / 0.52	0.16 / 0.52	m / ft
Output Wire Type / Connector	Double Insulated / MC4					
Output Wire Length	1.2 / 3.9					
Operating Temperature Range ⁽⁵⁾	-40 to +85 / -40 to +185					
Protection Rating	IP68 / NEMA6P					
Relative Humidity	0 - 100					

(1) Rated power of the module at STC will not exceed the optimizer "Rated Input DC Power". Modules with up to +5% power tolerance are allowed

(2) NEC 2017 requires max input voltage be not more than 80V

(3) For other connector types please contact SolarEdge

(4) For dual version for parallel connection of two modules use P485-4NMDMRM. In the case of an odd number of PV modules in one string, installing one P485 dual version power optimizer connected to one PV module. When connecting a single module seal the unused input connectors with the supplied pair of seals

(5) For ambient temperature above +85°C / +185°F power de-rating is applied. Refer to Power Optimizers Temperature De-Rating Technical Note for more details

PV System Design Using a SolarEdge Inverter ⁽⁶⁾⁽⁷⁾	Single Phase HD-Wave	Single phase	Three Phase for 208V grid	Three Phase for 277/480V grid	
Minimum String Length (Power Optimizers)	P370, P400, P401	8	10	18	
	P485, P505	6	8	14	
Maximum String Length (Power Optimizers)		25	25	50	
Maximum Nominal Power per String		5700 ⁽⁸⁾ (6000 with SE7600-US - SE11400-US)	5250 ⁽⁸⁾	6000 ⁽⁹⁾	12750 ⁽¹⁰⁾
Parallel Strings of Different Lengths or Orientations	Yes				

(6) For detailed string sizing information refer to: http://www.solaredge.com/sites/default/files/string_sizing_na.pdf

(7) It is not allowed to mix P485/P505 with P370/P400/P401 in one string

(8) If the inverters rated AC power ≤ maximum nominal power per string, then the maximum power per string will be able to reach up to the inverters maximum input DC power. Refer to: <https://www.solaredge.com/sites/default/files/se-power-optimizer-single-string-design-application-note.pdf>

(9) For 208V grid: it is allowed to install up to 7,200W per string when the maximum power difference between each string is 1,000W

(10) For 277/480V grid: it is allowed to install up to 15,000W per string when the maximum power difference between each string is 2,000W

Single Phase Inverter with HD-Wave Technology

for North America

SE3000H-US / SE3800H-US / SE5000H-US / SE6000H-US /
SE7600H-US / SE10000H-US / SE11400H-US



INVERTERS

Optimized installation with HD-Wave technology

- Specifically designed to work with power optimizers
- Record-breaking 99% weighted efficiency
- Quick and easy inverter commissioning directly from a smartphone using the SolarEdge SetApp
- Fixed voltage inverter for longer strings
- Integrated arc fault protection and rapid shutdown for NEC 2014 and 2017, per article 690.11 and 690.12
- UL1741 SA certified, for CPUC Rule 21 grid compliance
- Small, lightweight, and easy to install both outdoors or indoors
- Built-in module-level monitoring
- Optional: Faster installations with built-in consumption metering (1% accuracy) and production revenue grade metering (0.5% accuracy, ANSI C12.20)

/ Single Phase Inverter with HD-Wave Technology for North America

SE3000H-US / SE3800H-US / SE5000H-US / SE6000H-US /
SE7600H-US / SE10000H-US / SE11400H-US

MODEL NUMBER	SE3000H-US	SE3800H-US	SE5000H-US	SE6000H-US	SE7600H-US	SE10000H-US	SE11400H-US	
APPLICABLE TO INVERTERS WITH PART NUMBER	SEXXXXH-XXXXBXX4							
OUTPUT								
Rated AC Power Output	3000	3800 @ 240V 3300 @ 208V	5000	6000 @ 240V 5000 @ 208V	7600	10000	11400 @ 240V 10000 @ 208V	VA
Maximum AC Power Output	3000	3800 @ 240V 3300 @ 208V	5000	6000 @ 240V 5000 @ 208V	7600	10000	11400 @ 240V 10000 @ 208V	VA
AC Output Voltage Min.-Nom.-Max. (211 - 240 - 264)	✓	✓	✓	✓	✓	✓	✓	Vac
AC Output Voltage Min.-Nom.-Max. (183 - 208 - 229)	-	✓	-	✓	-	-	✓	Vac
AC Frequency (Nominal)	59.3 - 60 - 60.5 ¹⁾							Hz
Maximum Continuous Output Current @240V	12.5	16	21	25	32	42	47.5	A
Maximum Continuous Output Current @208V	-	16	-	24	-	-	48.5	A
Power Factor	1, Adjustable - 0.85 to 0.85							
GFDI Threshold	1							A
Utility Monitoring, Islanding Protection, Country Configurable Thresholds	Yes							
INPUT								
Maximum DC Power @240V	4650	5900	7750	9300	11800	15500	17650	W
Maximum DC Power @208V	-	5100	-	7750	-	-	15500	W
Transformer-less, Ungrounded	Yes							
Maximum Input Voltage	480							Vdc
Nominal DC Input Voltage	380			400				Vdc
Maximum Input Current @240V ²⁾	8.5	10.5	13.5	16.5	20	27	30.5	Adc
Maximum Input Current @208V ²⁾	-	9	-	13.5	-	-	27	Adc
Max. Input Short Circuit Current	45							Adc
Reverse-Polarity Protection	Yes							
Ground-Fault Isolation Detection	600k Ω Sensitivity							
Maximum Inverter Efficiency	99	99.2						%
CEC Weighted Efficiency	99						99 @ 240V 98.5 @ 208V	%
Nighttime Power Consumption	< 2.5							W

¹⁾ For other regional settings please contact SolarEdge support

²⁾ A higher current source may be used; the inverter will limit its input current to the values stated

/ Single Phase Inverter with HD-Wave Technology for North America

SE3000H-US / SE3800H-US / SE5000H-US / SE6000H-US/
SE7600H-US / SE10000H-US / SE11400H-US

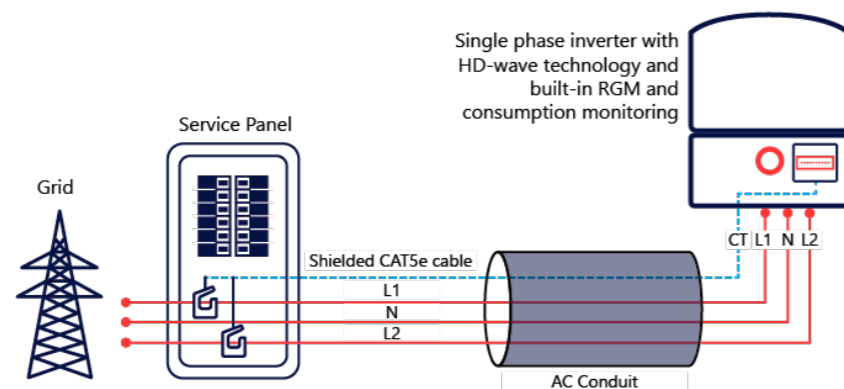
MODEL NUMBER	SE3000H-US	SE3800H-US	SE5000H-US	SE6000H-US	SE7600H-US	SE10000H-US	SE11400H-US
ADDITIONAL FEATURES							
Supported Communication Interfaces	RS485, Ethernet, ZigBee (optional), Cellular (optional)						
Revenue Grade Metering, ANSI C12.20	Optional ⁽³⁾						
Consumption metering							
Inverter Commissioning	With the SetApp mobile application using Built-in Wi-Fi Access Point for Local Connection						
Rapid Shutdown - NEC 2014 and 2017 690.12	Automatic Rapid Shutdown upon AC Grid Disconnect						
STANDARD COMPLIANCE							
Safety	UL1741, UL1741 SA, UL1699B, CSA C22.2, Canadian AFCI according to T.I.L. M-07						
Grid Connection Standards	IEEE1547, Rule 21, Rule 14 (HI)						
Emissions	FCC Part 15 Class B						
INSTALLATION SPECIFICATIONS							
AC Output Conduit Size / AWG Range	1" Maximum / 14-6 AWG			1" Maximum /14-4 AWG			
DC Input Conduit Size / # of Strings / AWG Range	1" Maximum / 1-2 strings / 14-6 AWG			1" Maximum / 1-3 strings / 14-6 AWG			
Dimensions with Safety Switch (HxWxD)	17.7 x 14.6 x 6.8 / 450 x 370 x 174			21.3 x 14.6 x 7.3 / 540 x 370 x 185			in / mm
Weight with Safety Switch	22 / 10	25.1 / 11.4	26.2 / 11.9	38.8 / 17.6		lb / kg	
Noise	< 25			<50		dBA	
Cooling	Natural Convection						
Operating Temperature Range	-40 to +140 / -40 to +60 ⁽⁴⁾						
Protection Rating	NEMA 4X (Inverter with Safety Switch)						

⁽³⁾ Inverter with Revenue Grade Meter P/N: SExxxxH-US000BNC4; Inverter with Revenue Grade Production and Consumption Meter P/N: SExxxxH-US000BN14 . For consumption metering, current transformers should be ordered separately: SEACT0750-200NA-20 or SEACT0750-400NA-20. 20 units per box

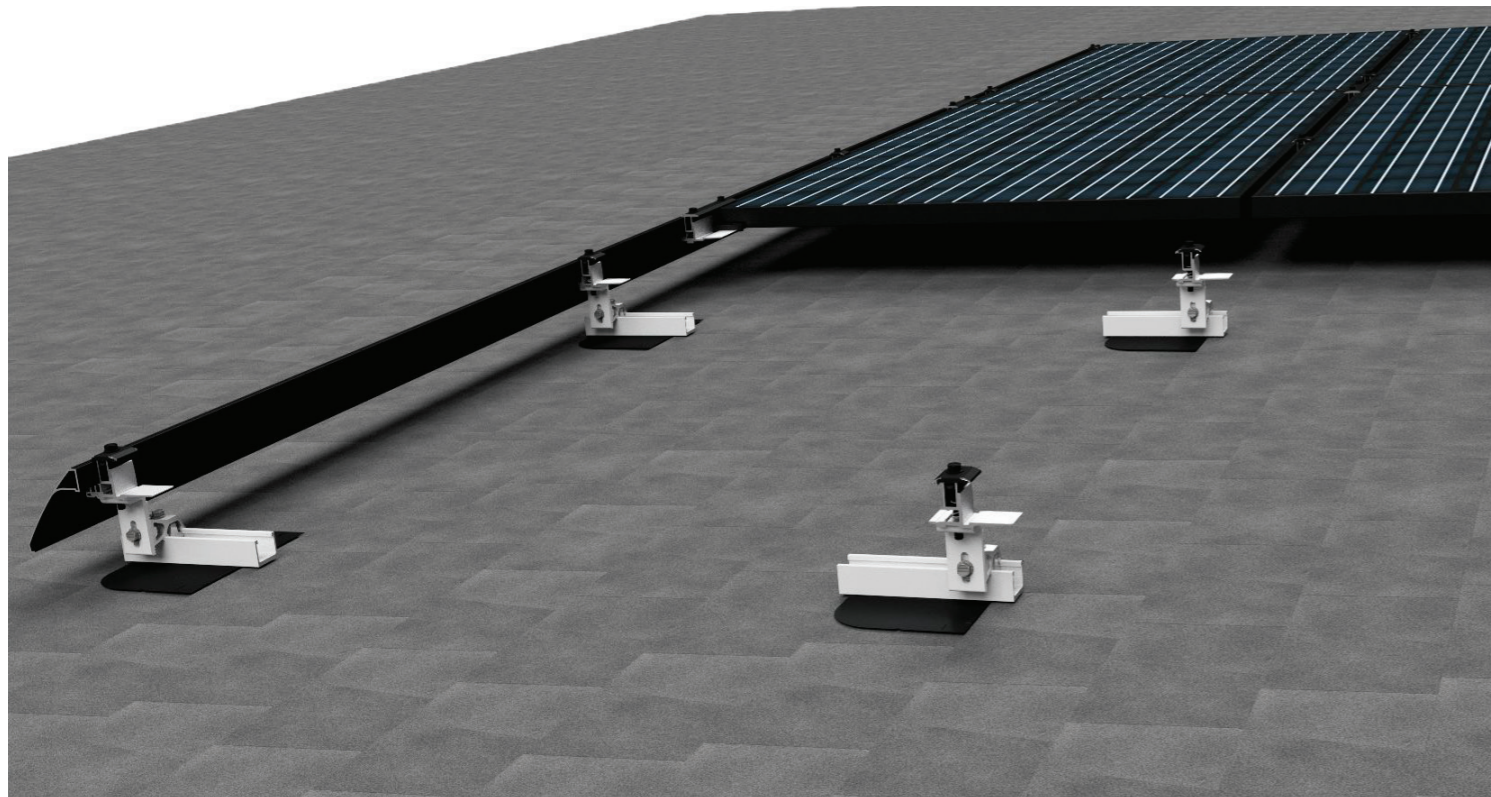
⁽⁴⁾ Full power up to at least 50°C / 122°F; for power de-rating information refer to: <https://www.solaredge.com/sites/default/files/se-temperature-derating-note-na.pdf>

How to Enable Consumption Monitoring

By simply wiring current transformers through the inverter's existing AC conduits and connecting them to the service panel, homeowners will gain full insight into their household energy usage helping them to avoid high electricity bills



RL Universal



SnapNrack RL Universal

is designed to provide the fastest, most intuitive install experience for residential roofs. The direct mount system features four basic components for easy material management. Features incredible flexibility with a single Universal mounts that fit module heights from 32 - 40 mm and the highest spans of any current rail less system.



Flash Track with Patented Umbrella Technology

- Single Umbrella lag screw secures flashing and flash track to roof in one complete action
- Umbrella technology provides weatherproofing with a long-lasting mechanical seal
- Flash track is designed for maximum versatility with 6 inches of North-South adjustability for all Mounts

Mounts

- Single mount used at all locations on array
- Extreme time saver by eliminating link interference through the flexibility of the Mount to change orientation
- Features a rock-in channel nut design for easy attachment to Flash Track
- Slotted riser provides leveling for easy height adjustments

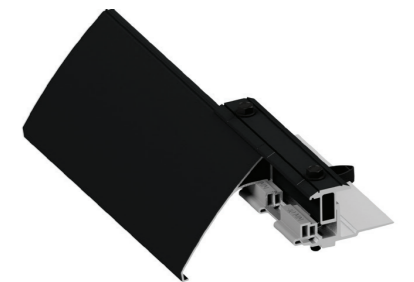


Links

- Simple design provides mounting platform between two to four modules
- Clamps onto top of modules securing them in place while providing row-to-row bonding
- Next row of modules easily slides into place as with the Mounts

Skirt

- Easily locks to bottom of module mounts and links for clean aesthetics
- Ensures a strong structure for leveling and alignment of first row of modules
- Skirt length is compatible with both portrait and landscape module orientations



Installing Solar Has Never Been This Fast & Easy



System designed with maximum versatility for any arrays including staggered



All parts fit in a box for easy logistics



Drop-in features make the install process intuitive and fast



Simple design allows system to be installed by single installer on the roof



Listed to UL Standard 2703 for Grounding/Bonding and Fire Classification

Quality. Innovative. Superior.

SnapNrack Solar Mounting Solutions are engineered to optimize material use and labor resources and improve overall installation quality and safety.

877-732-2860

www.snapnrack.com

contact@snapnrack.com

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July 30, 2019

SnapNrack
775 Fiero Lane, Ste. 200
San Luis Obispo, CA 93401
TEL: (877) 732-2860

Attn.: SnapNrack - Engineering Department

Re: Report # 2019-02916B.01 – SnapNrack RL Universal Rail-less System
Subject: Engineering Certification for the State of New Jersey

PZSE, Inc. – Structural Engineers has provided engineering and span tables for the SnapNrack RL Universal Rail-less System, as presented in PZSE Report # 2019-02916B.01, "Engineering Certification for the SnapNrack RL Universal Rail-less System (2019-02916-B.01)". All information, data, and analysis therein are based on, and comply with, the following building codes and typical specifications:

- Building Codes:
1. ASCE/SEI 7-16, Minimum Design Loads for Buildings and Other Structures, by American Society of Civil Engineers
 2. 2018 International Building Code, by International Code Council, Inc.
 3. 2018 International Residential Code, by International Code Council, Inc.
 4. AC428, Acceptance Criteria for Modular Framing Systems Used to Support Photovoltaic (PV) Panels, November 1, 2012 by ICC-ES
 5. Aluminum Design Manual 2015, by The Aluminum Association, Inc.
 6. ANSI/AWC NDS-2015, National Design Specification for Wood Construction, by the American Wood Council

Design Criteria:

Ground Snow Load = 0 - 90 (psf)
Basic Wind Speed = 105 - 180 (mph)
Roof Mean Height = 0 - 60 (ft)
Roof Pitch = 0 - 90 (degrees)
Exposure Category = B, C & D

This letter certifies that the loading criteria and design basis for the SnapNrack RL Universal Rail-less System Span Tables are in compliance with the above codes.

If you have any questions on the above, do not hesitate to call.

Prepared by:
PZSE, Inc. – Structural Engineers
Roseville, CA



Certification Details

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SnapNrack RL Universal system has been evaluated by Underwriters Laboratories (UL) and Listed to UL Standard 2703 for Grounding/Bonding, and Fire Classification.

Grounding/Bonding

Only specific components have been evaluated for bonding, and are identified as being in the ground path. The RL Universal components that have been evaluated for bonding are the Mount Assembly, Ridge Mount Assembly, Link Assembly, Skirt, Flash Track, Ground Lugs and Smart Clips.

The following system components are not required to be bonded to the system based on the exceptions in clause 9.1 of UL 2703 1st Ed.: Skirt Spacer, Umbrella Bolt, Flashing and Positioning Springs. Wire management clips are utilized to route conductors away from these components and must be assembled according to the instructions.

This mounting system may be used to ground and/or mount a PV module complying with UL 1703 only when the specific module has been evaluated for grounding and/or mounting in compliance with the included instructions. See Appendix A for the list of modules tested with the RL Universal system for integrated grounding.

Ground Lugs have been evaluated to both UL 467 and UL 2703 Listing requirements. The following ground lugs have been approved for use: SnapNrack model 242-02101, 242-92202, and IlSCO models GBL-4DBT and SGB-4.

The following components have been evaluated for bonding as the fault current ground path: Mount Assembly, Ridge Mount Assembly, Link Assembly, Flash Track and Ground Lugs. In order to maintain the Listing for bonding, wire management clips must be assembled to route conductors away from parts that have not been evaluated for bonding.

A Listed (QIMS) and Unlisted Component (KDER3) grounding lug, SnapNrack part no. 242-92202, is attached to the module frame flange, Flash Track or Ridge Mount Track for the normal attachment of a Grounding Electrode Conductor, which provides bonding within the system and eventual connection to a Grounding Electrode, as required by the U.S. NEC. Details of part no. 242-92202 can be found in Volume 1, Section 4, and Volume 2, Section 2. When this method is used, the grounding symbol is stamped onto the body of the ground lug to identify the grounding terminal.

An alternate method of grounding, A UL Listed (QIMS) and Unlisted Component (KDER3) grounding lug, SnapNrack part no. 242-02101 is attached to the Flash Track. Details of part no. 242-02101 can be found in Volume 1, Section 4, and Volume 2, Section 1. When this method is used, the grounding symbol is stamped onto the body of the ground lug to identify the grounding terminal.

An alternate method of grounding, a UL Listed (KDER and QIMS) grounding lug, IlSCO (E34440 and E354420) model SGB-4 is attached to the module frame flange, Flash Track or Ridge Mount Track. When this method is used, the grounding terminal is identified by the green colored screws of the lug.

An alternate method of grounding, a UL Listed (KDER and QIMS) grounding lug, IlSCO (E34440 and E354420) model GBL-4BDT is attached to the module frame flange through the specified hardware and torque values. When this method is used, the grounding terminal is identified by the green colored set screw of the lug.

An alternate method of grounding, Enphase R/C (QIKH2)(QIMS2) model M250, M215 & C250 is bonded to the Listed PV module frame by the Enphase R/C (QIMS2) Model EFM-XXMM anodization piercing mounting/clamping kit. The total roof-mounted PV system is bonded (modules and microinverters) together and the assembly is bonded to ground through the Enphase R/C (QIMS2) Engage Cables; Model ETXX-240, ETXX-208 or ETXX-277, when properly grounded at the service entrance.

R/C (QIMS2), Dynoraxx (E357716) photovoltaic bonding device cat. no. Dynobond is an optional component that may be used with this system. The Dynobond device has been evaluated to provide module to module bonding. The Dynobond device attaches to the frame flange of adjacent modules Listed (QIMS), SnapNrack MLPE Frame Attachment Kit model 242-02151 has been investigated to bond approved MLPE device back plates to frames of modules.

Tested MLPE devices include the following:

- NRTL Listed, SolarEdge Optimizer Model P300-5NC4ARS, P320-5NC4ARS, P370-5NC4AFS, or P400-5NC4AFS
 - Enphase R/C (QIKH2)(QIMS2) M250, M215 & C250
 - Enphase - NRTL Listed Microinverter models IQ6-60-2-US, IQ7-60-2-US, IQ7-60-B-US
 - Celestica International - Rapid Shutdown Device models DG-006-F001201x and DG-006-F001401x
- The following MLPE devices have been evaluated for attachment to the Flash Track using the SnapNrack MLPE Rail Attachment Kit, and the Flash Track has been evaluated for use with Listed (QIMS) and Unlisted Component (KDER3) grounding lug, SnapNrack part no. 242-92202.
- SMA - Rapid Shutdown Device model RSB-2S-US-10
- Additional MLPE devices were evaluated for attachment to the module with the SnapNrack MLPE Frame Attachment Kit model 242-02151 or through the device mounting means. These devices have not been evaluated for bonding, as the enclosures are entirely polymeric:
- Ginlong - Rapid Shutdown Device model Solis-MLRSD-R1-1G and Solis-MLRSD-R2-1G
 - Tigo - Monitoring Device models TSR-4-F, TSR-4-M, TSR-4-O, TSR-4-S, TS4-R-M-DUO, TS4-R-O-DUO, TS4-R-S-DUO

When installing the MLPEs per the specifications in the MLPE Installation section of this manual, the system is bonded to the optimizer backing plate.

Fire

RL Universal has been investigated for a Class A System Fire Classification for a Steep-Sloped Roof with Type 1 and Type 2 modules. Because the system was tested at 5 inches above the test roof fixture RL Universal can be installed without any height restrictions due to System Fire Classification. See Appendix A for potential module-specific height restrictions due to module temperature. The Skirt is considered an optional component with respect to Fire Classification, as RL Universal maintains the same Fire Classification Rating both with and without the skirt.

SnapNrack recommends a periodic re-inspection of the completed installation for loose components, loose fasteners, and any corrosion, such that if found, the affected components are to be immediately replaced.

Wind-Driven Rain Test

Only the following components have been evaluated for the Wind-Driven Rain Test per UL Subject 2582:

Comp Flashing, Composition Umbrella Flashing, Flash Track, Umbrella Bolt. Testing was conducted without roofing sealant and without the Umbrella Bolt Gasket

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Appendix A

APPROVED MODULE INFORMATION

The following modules have completed the UL 2703 Listing process for bonding and fire classification and have been approved for use with the RL Universal mounting system by the module manufacturer. Module manufacturer approval letters can be found at www.snaprack.com.

RL Universal has been evaluated for Bonding of the following UL/NRTL Listed PV modules to UL 2703 requirements:

Manufacturer	Model	Wattage
Canadian Solar	CS6K-XXX-M	240-335
	CS6K-XXX-M-SD	240-305
	CS6K-XXX-P	220-320
	CS6K-XXX-P-SD	240-300
	CS6K-XXX-MS	240-335
	CS3K-XXX-P	250-350
	CS3K-XXX-MS	280-345
	CS3U-XXX-MS	350-420
	CS3U-XXX-P	295-420
	CS1K-XXX-MS	285-345
	CS1H-XXX-MS	310-350
	CS1H-XXX-MS-AB	310-350
	Hanwha Q Cells	Q.PEAK DUO-G5-XXX
Q.PEAK DUO-BLK-G5-XXX		290-360
Q.PLUS DUO-G5-XXX		290-360
Q.PEAK DUO-G7-XXX		310-350
Q.PEAK DUO-BLK-G7-XXX		290-350
Q.PEAK DUO-G7.2-XXX		310-350
Q.PEAK DUO-G6+-XXX		320-360
Q.PEAK DUO-BLK-G6+-XXX		310-350
Q.PEAK DUO-G6-XXX		320-360
Q.PEAK DUO-BLK-G6-XXX		310-350
Q.PEAK DUO-G8+-XXX		290-360
Q.PEAK DUO-BLK-G8+-XXX		290-360
Q.PEAK DUO-G8-XXX		290-360
Q.PEAK DUO-BLK-G8-XXX	290-360	
JA Solar	JAM60S09-XXX/PR	310-325
	JAM60S10-XXX/MR	330-345
	JAM60S10-XXX/PR	320-335
	JAM60S12-XXX/PR	305-320
	JAM72S09-XXX/PR	370-395
	JAM72S10-XXX/MR	395-415
	JAM72S10-XXX/PR	380-405
	JAM72S12-XXX/PR	365-385
Jinko Solar	JKMXXXM-60	200-305
	JKMXXXP-60	200-290
	JKMXXXP-60-J4	200-290
	JKMXXXP-60-V	200-290

Appendix A

Manufacturer	Model	Wattage
Jinko Solar	JKMXXXP-60B-J4	200-290
	JKMXXXPP-60	200-290
	JKMXXXPP-60-V	200-300
	JKMXXXM-72	250-365
	JKMXXXP-72	250-360
	JKMXXXP-72-V	250-360
	JKMXXXPP-72	250-360
	JKMXXXPP-72-V	250-360
	JKMXXXP-72	250-330
LG	LGXXXNIC-A5	320-345
	LGXXXNIK-A5	310-355
	LGXXXQ1C-A5	340-385
	LGXXXQ1K-A5	315-375
	LGXXXS1C-A5	280-320
	LGXXXN2C-B3	330-340
	LGXXXN2W-B3	330-340
	LGXXXNIC-G4	280-340
	LGXXXNIK-G4	280-300
	LGXXXS1C-G4	250-300
	LGXXXN2C-G4	360-395
	LGXXXN2K-G4	360-385
	LGXXXN2W-G4	360-395
	LGXXXS2C-G4	300-360
	LGXXXS2W-G4	300-360
	LGXXXNIC-V5	325-345
	LGXXXN1W-V5	325-345
	LGXXXN2T-V5	385-430
	LGXXXN2T-J5	385-405
	LGXXXN1T-V5	310-340
Longi	LR6-60-XXXM	270-300
	LR6-60BK-XXXM	270-300
	LR6-60HV-XXXM	270-300
	LR6-60PB-XXXM	280-320
	LR6-60PE-XXXM	280-320
	LR6-60PH-XXXM	280-320
	LR6-60HPB-XXXM	295-320
	LR6-60HPH-XXXM	300-320
	LR4-72HPH-XXXM	420-455
	Mission Solar	MSEXXS05T
MSEXXS05K		270-290
MSEXXSQ5T		280-300
MSEXXSQ5K		285-305
MSEXXMM4J		320-330
MSEXXMM6J		320-330
MSEXXS06W		320-340
MSEXXS04J	320-350	

Appendix A

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Manufacturer	Model	Wattage
Mission Solar	MSEXXS06J	320-350
	MSEXXSQ6S	345-365
	MSEXXSQ4S	345-365
	MSEXXS8K	315-335
	MSEXXS8T	310-330
	MSEXXS9S	375-400
Panasonic	VBHNXXKA03	310-325
	VBHNXXKA04	310-325
	VBHNXXSA17	325-335
	VBHNXXSA18	325-335
	VBHN325SA17E	325-330
	VBHXXRA18N	325-340
	VBHXXRA03K	320-335
Phono Solar	PSXXM-20/U	270-320
	PSXXMH-20/U	270-320
REC	RECXXTP2	260-300
	RECXXTP2-BLK	260-300
	RECXXTP2M	300-315
	RECXXAA	340-380
Silfab	SLAXX-M	225-320
	SLAXX-P	225-275
	SSAXX-M	225-300
	SSAXX-P	225-270
	SILXXBL	280-330
	SILXXML	280-320
	SILXXNL	280-320
	SLGXX-M	265-380
	SLGXX-P	265-320
	SSGXX-M	265-360
	SSGXX-P	265-320
	SILXXNT	350-380
Solaria	Solaria PowerXT-XXR-PX	315-385
	Solaria PowerXT-XXR-BX	315-385
	Solaria PowerXT-XXR-AC	315-385
Talesun	TP660M-XXX	240-300
	TP660P-XXX	235-285
	TP672M-XXX	290-360
	TP672P-XXX	280-345

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