

# THREE-PHASE STRING INVERTER 125 KW CSI-125KTL-GI-E

Canadian Solar's grid-tied, transformer-less string inverters help accelerate the use of three-phase string architecture for commercial rooftop and small ground-mount applications. An NRTL approved, cost-effective alternative to central inverters, these inverters are modular design building blocks that provide high yield and enable significant BoS cost savings. They provide up to 98.8 % conversion efficiency, and a wide operating range for maximum energy harvest.



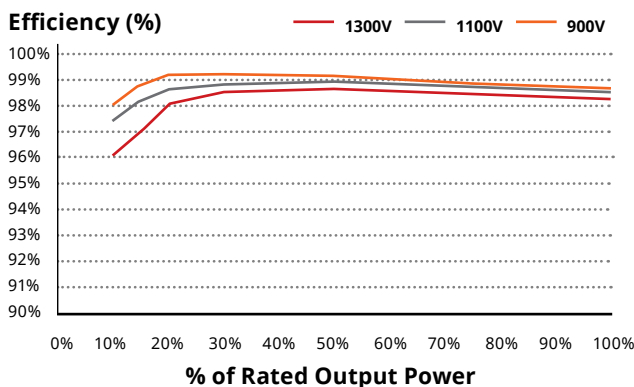
**Standard warranty, extension up to 20 years**

## KEY FEATURES

- Maximum efficiency of 99.1%, CEC efficiency of 98.6%
- Single MPPT for higher conversion efficiency
- Transformerless design
- PID mitigation capability

## EFFICIENCY CURVE

CSI-125KTL-GI-E @ 900 V



## HIGH RELIABILITY

- Advanced thermal design with variable speed fans
- Ground-fault detection and interruption circuit

## BROAD ADAPTIBILITY

- NEMA 4X (IP65), outdoor application
- Utility interactive controls: active power derating, reactive power control and over frequency derating
- Integrated wiring box design
- Integrated DC and AC load rated disconnects
- Wide MPPT range for flexible string sizing
- AC terminals compatible with copper and aluminum conductors
- Supports up to 20 DC string inputs

**CANADIAN SOLAR INC.** is committed to providing high quality solar products, solar system solutions and services to customers around the world. As a leading PV project developer and manufacturer of solar modules with over 33 GW deployed around the world since 2001, Canadian Solar Inc. is one of the most bankable solar companies worldwide.

\*For detailed information, please refer to the Installation Manual.

## CANADIAN SOLAR INC.

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<b>SYSTEM/TECHNICAL DATA</b>	
<b>MODEL NAME</b>	<b>CSI-125KTL-GI-E</b>
<b>DC INPUT</b>	
Max. PV Power	187.5kW
Max. DC Input Voltage	1500 V <sub>DC</sub>
Operating DC Input Voltage Range	860-1450 V <sub>DC</sub>
Start-up DC Input Voltage	900 V <sub>DC</sub>
Number of MPP Trackers	1
MPPT Full Power Voltage Range	860-1450 V <sub>DC</sub>
Operating Current (Imp)	150 A
Max. Input Current (Isc)	300 A
Number of DC Inputs	20
DC Disconnection Type	Load rated DC switch
<b>AC OUTPUT</b>	
Rated AC Output Power	125 kW
Max. AC Output Power	125 kW
Rated Output Voltage	600 V <sub>AC</sub>
Output Voltage Range*	528-660 V <sub>AC</sub>
Grid Connection Type	3/N/PE
Nominal AC Output Current	120 A
Rated Output Frequency	50/60 Hz
Output Frequency Range*	47-62 Hz
Power Factor	1 default (±0.8 adjustable)
Current THD	< 3 %
AC Disconnection Type	Load rated AC switch
<b>SYSTEM</b>	
Topology	Transformerless
Max. Efficiency	99.1 %
EU Efficiency	98.6 %
Night Consumption	< 2 W
<b>ENVIRONMENT</b>	
Protection Degree	NEMA 4X (IP65)
Cooling	Intelligent Redundant Cooling
Operating Temperature Range	-25 ° C to +60 ° C
Storage Temperature Range	-40 ° C to +70 ° C
Operating Humidity	0 - 100 %
Operating Altitude	4000 m
Audible Noise	<55 dBA @ 1 m
<b>DISPLAY AND COMMUNICATION</b>	
Display	LED
Communication	Standard: RS485 (Modbus RTU), AND either MODBUS or ETHERNET
<b>MECHANICAL DATA</b>	
Dimensions (W / H / D)	1176 x 713.5 x 315 mm
Weight	84 kg
Installation Angle	Back title up to 15 degrees
DC Inputs	MC4/ T4
DC Fuse Rating	20A
<b>SAFETY</b>	
Safety and EMC Standard	IEC62109-1/-2, IEC/EN 61000-2/-4
Grid Standard	VDE0126-1-1, IEC61683 or EN50530
Smart-Grid Features	Voltage-Ride Thru, Frequency-Ride Thru, Soft-Start, Volt-Var, Frequency-Watt, Volt-Watt

\*The "Output Voltage Range" and "Output Frequency Range" may differ according to specific grid standard.

\* 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.

Caution: For professional use only. The installation and handling of PV equipment requires professional skills and should only be performed by qualified professionals. Please read the safety and installation instructions before using the product.

# 100/125kW, 1500Vdc String Inverters for North America



**CPS SCH100/125KTL-DO/US-600**

The 100 & 125kW high power CPS three phase string inverters are designed for ground mount applications. The units are high performance, advanced and reliable inverters designed specifically for the North American environment and grid. High efficiency at 99.1% peak and 98.5% CEC, wide operating voltages, broad temperature ranges and a NEMA Type 4X enclosure enable this inverter platform to operate at high performance across many applications. The CPS 100/125kW products ship with the Standard or Centralized Wire-box, each fully integrated and separable with AC and DC disconnect switches. The Standard Wire-box includes touch safe fusing for up to 20 strings. The CPS Flex Gateway enables communication, controls and remote product upgrades.

## Key Features

- NFPA 70, NEC 2014 and 2017 compliant
- Touch safe DC Fuse holders adds convenience and safety
- CPS Flex Gateway enables remote FW upgrades
- Integrated AC & DC disconnect switches
- 1 MPPT with 20 fused inputs for maximum flexibility
- Copper and Aluminum compatible AC connections
- NEMA Type 4X outdoor rated, tough tested enclosure
- Advanced Smart-Grid features (CA Rule 21 certified)
- kVA Headroom yields 100kW @ 0.9PF and 125kW @ 0.95PF
- Generous 1.87 and 1.5 DC/AC Inverter Load Ratios
- Separable wire-box design for fast service
- Standard 5 year warranty with extensions to 20 years



100/125KTL Standard Wire-box



100/125KTL Centralized Wire-box

Model Name	CPS SCH100KTL-DO/US-600	CPS SCH125KTL-DO/US-600
<b>DC Input</b>		
Max. PV Power	187.5kW	
Max. DC Input Voltage	1500V	
Operating DC Input Voltage Range	860-1450Vdc	
Start-up DC Input Voltage / Power	900V / 250W	
Number of MPP Trackers	1	
MPPT Voltage Range <sup>1</sup>	870-1300Vdc	
Max. PV Input Current (Isc x1.25)	275A	
Number of DC Inputs	20 PV source circuits, pos. & neg. fused (Standard Wire-box) 1 PV output circuit, 1-2 terminations per pole, non-fused (Centralized Wire-box)	
DC Disconnection Type	Load-rated DC switch	
DC Surge Protection	Type II MOV (with indicator/remote signaling), Up=2.5kV, In=20kA (8/20uS)	
<b>AC Output</b>		
Rated AC Output Power	100kW	125kW
Max. AC Output Power <sup>2</sup>	100kVA (111KVA @ PF>0.9)	125kVA (132KVA @ PF>0.95)
Rated Output Voltage	600Vac	
Output Voltage Range <sup>3</sup>	528-660Vac	
Grid Connection Type <sup>4</sup>	3Φ / PE / N (Neutral optional)	
Max. AC Output Current @600Vac	96.2/106.8A	120.3/127.2A
Rated Output Frequency	60Hz	
Output Frequency Range <sup>3</sup>	57-63Hz	
Power Factor	>0.99 (±0.8 adjustable)	>0.99 (±0.8 adjustable)
Current THD	<3%	
Max. Fault Current Contribution (1-cycle RMS)	41.47A	
Max. OCPD Rating	150A	175A
AC Disconnection Type	Load-rated AC switch	
AC Surge Protection	Type II MOV (with indicator/remote signaling), Up=2.5kV, In=20kA (8/20uS)	
<b>System</b>		
Topology	Transformerless	
Max. Efficiency	99.1%	
CEC Efficiency	98.5%	
Stand-by / Night Consumption	<4W	
<b>Environment</b>		
Enclosure Protection Degree	NEMA Type 4X	
Cooling Method	Variable speed cooling fans	
Operating Temperature Range	-22°F to +140°F / -30°C to +60°C (derating from +113°F / +45°C)	
Non-Operating Temperature Range <sup>5</sup>	-40°F to +158°F / -40°C to +70°C maximum	
Operating Humidity	0-100%	
Operating Altitude	8202ft / 2500m (no derating)	
Audible Noise	<65dBA@1m and 25°C	
<b>Display and Communication</b>		
User Interface and Display	LED Indicators, WiFi + APP	
Inverter Monitoring	Modbus RS485	
Site Level Monitoring	CPS Flex Gateway (1 per 32 inverters)	
Modbus Data Mapping	SunSpec/CPS	
Remote Diagnostics / FW Upgrade Functions	Standard / (with Flex Gateway)	
<b>Mechanical</b>		
Dimensions (WxHxD)	45.28x24.25x9.84in (1150x616x250mm) with Standard Wire-box 39.37x24.25x9.84in (1000x616x250mm) with Centralized Wire-box	
Weight	Inverter: 121lbs / 55kg; Wire-box: 55lbs / 25kg (Standard Wire-box); 33lbs / 15kg (Centralized Wire-box)	
Mounting / Installation Angle	15 - 90 degrees from horizontal (vertical or angled)	
AC Termination	M10 Stud Type Terminal Block [3Φ] (Wire range: 1/0AWG - 500kcmil CU/AL, Lugs not supplied) Screw Clamp Terminal Block [N] (#12 - 1/0AWG CU/AL)	
DC Termination	Screw Clamp Fuse Holder (Wire range: #12 - #6AWG CU) - Standard Wire-box Busbar, M8 PEMserts (Wire range: #1AWG - 250kcmil CU/AL, Lugs not supplied) - Centralized Wire-box	
Fused String Inputs	15A or 20A fuses provided (Determined by product SKU)	
<b>Safety</b>		
Safety and EMC Standard	UL1741-SA-2016, CSA-C22.2 NO.107.1-01, IEEE1547a-2014; FCC PART15	
Selectable Grid Standard	IEEE 1547a-2014, CA Rule 21, ISO-NE	
Smart-Grid Features	Volt-RideThru, Freq-RideThru, Ramp-Rate, Specified-PF, Volt-VAr, Freq-Watt, Volt-Watt	
<b>Warranty</b>		
Standard <sup>6</sup>	5 years	
Extended Terms	10, 15 and 20 years	

1) See user manual for further information regarding MPPT Voltage Range when operating at non-unity PF

2) \*Max. AC Apparent Power\* rating valid within MPPT voltage range and temperature range of -30°C to +40°C (-22°F to +104°F) for 100KW PF ≥0.9 and 125KW PF ≥0.95

3) The "Output Voltage Range" and "Output Frequency Range" may differ according to the specific grid standard.

4) Wye neutral-grounded, Delta may not be corner-grounded.

5) See user manual for further requirements regarding non-operating conditions.

6) 5 year warranty effective for units purchased after October 1st, 2019.



# SUNNY HIGHPOWER PEAK3 125-US / 150-US

SHP 125-US-20 / SHP 150-US-20



## Cost effective

- Modular architecture reduces BOS and maximizes system uptime
- Compact design and high power density maximize transportation and logistical efficiency

## Maximum flexibility

- Scalable 1,500 VDC building block with best-in-class performance
- Flexible architecture creates scalability while maximizing land usage

## Simple install, commissioning

- Ergonomic handling and simple connections enable quick installation
- Centralized commissioning and control with SMA Data Manager

## Highly innovative

- SMA Smart Connected reduces O&M costs and simplifies field-service
- Powered by award winning ennexOS cross sector energy management platform

## SUNNY HIGHPOWER PEAK3 125-US / 150-US

A superior modular solution for large-scale power plants

The PEAK3 1,500 VDC inverter offers high power density in a modular architecture that achieves a cost-optimized solution for large-scale PV integrators. With fast, simple installation and commissioning, the Sunny Highpower PEAK3 is accelerating the path to energization. SMA has also brought its field-proven Smart Connected technology to the PEAK3, which simplifies O&M and contributes to lower lifetime service costs. The PEAK3 power plant solution is powered by the ennexOS cross sector energy management platform, 2018 winner of the Intersolar smarter E AWARD.

Technical Data	Sunny Highpower PEAK3 125-US	Sunny Highpower PEAK3 150-US
<b>Input (DC)</b>		
Maximum array power	187500 W <sub>p</sub> STC	225000 W <sub>p</sub> STC
Maximum system voltage	1500 VDC	
Rated MPP voltage range	705 V ... 1450 V	880 V ... 1450 V
MPPT operating voltage range	684 V ... 1500 V	855 V ... 1500 V
MPP trackers	1	
Maximum operating input current	180 A	
Maximum input short-circuit current	325 A	
<b>Output (AC)</b>		
Nominal AC power	125000 W	150000 W
Maximum apparent power	125000 VA	150000 VA
Output phases / line connections	3 / 3-PE	
Nominal AC voltage	480 V	600 V
Compatible transformer winding configuration	Wye-grounded	
Maximum output current	151 A	
Rated grid frequency	60 Hz	
Grid frequency / range	50 Hz, 60 Hz / -6 Hz ... +6 Hz	
Power factor at rated power / adjustable displacement	1 / 0.0 leading ... 0.0 lagging	
Harmonics (THD)	<3%	
<b>Efficiency</b>		
CEC efficiency	98.5 %	99.0 %
<b>Protection and safety features</b>		
Ground fault monitoring: Riso / Differential current	● / ●	
DC reverse polarity protection	●	
AC short circuit protection	●	
Monitored surge protection (Type 2): DC / AC	● / ●	
Protection class / overvoltage category (as per UL 840)	I / IV	
<b>General data</b>		
Device dimensions (W / H / D)	770 / 830 / 444 mm (30.3 / 32.7 / 17.5 in.)	
Device weight	98 kg (216 lbs)	
Operating temperature range	-25 °C ... +60 °C (-13 °F ... +140 °F)	
Storage temperature range	-40 °C ... +70 °C (-40 °F ... +158 °F)	
Audible noise emission (full power @ 1m and 25 °C)	< 69 dB(A)	
Internal consumption at night	< 5 W	
Topology	Transformerless	
Cooling concept	OptiCool (forced convection, variable speed fans)	
Enclosure protection rating	Type 4X (as per UL 50E)	
Maximum permissible relative humidity (non-condensing)	100%	
<b>Additional information</b>		
Mounting	Rack mount	
DC connection	Terminal lugs - up to 600 kcmil CU/AL	
AC connection	Screw terminals - up to 300 kcmil CU/AL	
LED indicators (Status/Fault/Communication)	●	
SMA Speedwire (Ethernet network interface)	● (2 x RJ45 ports)	
Data protocols: SMA Modbus / SunSpec Modbus	● / ●	
Integrated Plant Control / Q on Demand 24/7	● / ●	
Off-grid capable / SMA Hybrid Controller compatible	- / ●	
SMA Smart Connected (proactive monitoring and service)	●	
<b>Certifications</b>		
Certifications and approvals	UL 62109, UL 1998, CAN/CSA-C22.2 No.62109	
FCC compliance	FCC Part 15, Class A	
Grid interconnection standards	IEEE 1547, UL 1741 SA - CA Rule 21, HECO Rule 14H	
Advanced grid support capabilities	L/HFRT, L/HVRT, Volt-VAR, Volt-Watt, Frequency-Watt, Ramp Rate Control, Fixed Power Factor	
<b>Warranty</b>		
Standard	5 years	
Optional extensions	10 / 15 / 20 years	
Type designation	SHP 125-US-20	SHP 150-US-20

Technical data as of May 2020 ● Standard features ○ Optional features – Not available

SHP150-US-17 Changes to products and services, including those resulting from country-specific requirements, as well as deviations from technical data are subject to change at any time without notice. SMA assumes no liability for typographical or other errors. Please visit www.SMA-Solar.com for the latest information.

# Cheetah HC 72M

## 390-410 Watt

MONO PERC HALF CELL MODULE

Positive power tolerance of 0~+3%

- Half Cell
- Mono PERC 72 Cell



PERC



### KEY FEATURES



#### 5 Busbar Solar Cell

5 busbar solar cell adopts new technology to improve the efficiency of modules, offers a better aesthetic appearance, making it perfect for rooftop installation.



#### High Efficiency

Higher module conversion efficiency (up to 20.38%) benefit from half cell structure (low resistance characteristic).



#### PID Resistance

Excellent Anti-PID performance guarantee limited power degradation for mass production.



#### Low-light Performance

Advanced glass and cell surface textured design ensure excellent performance in low-light environment.



#### Severe Weather Resilience

Certified to withstand: wind load (2400 Pascal) and snow load (5400 Pascal).



#### Durability Against Extreme Environmental Conditions

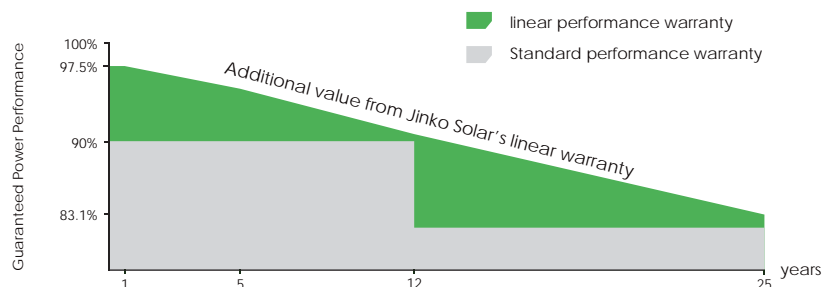
High salt mist and ammonia resistance certified by TUV NORD.

### LINEAR PERFORMANCE WARRANTY

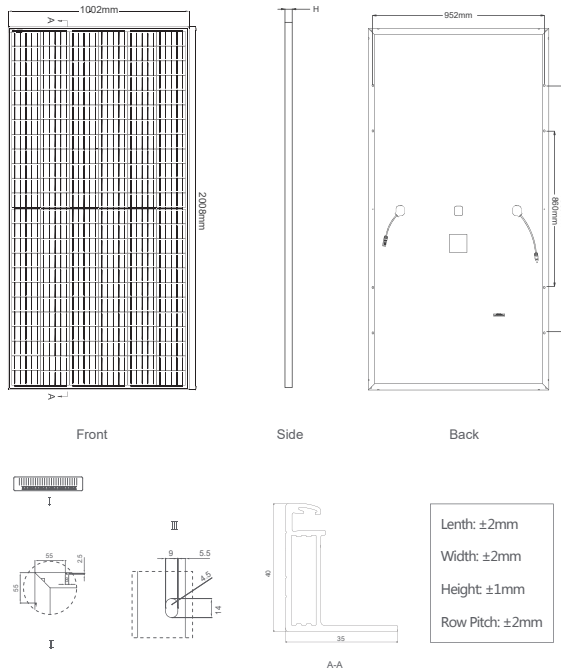
12 Year Product Warranty • 25 Year Linear Power Warranty



- ISO9001:2015, ISO14001:2015, OHSAS18001 certified factory
- IEC61215, IEC61730, UL1703 certified product



## Engineering Drawings

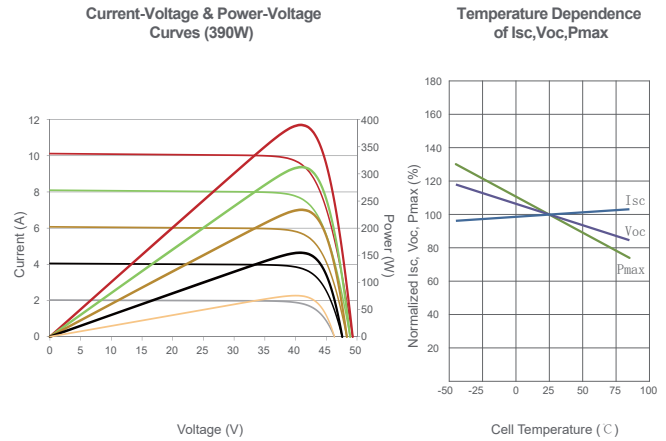


## Packaging Configuration

( Two pallets =One stack )

27pcs/pallet , 54pcs/stack, 594pcs/40'HQ Container

## Electrical Performance & Temperature Dependence



## Mechanical Characteristics

Cell Type	Mono PERC 158.75×158.75mm
No.of Half-cells	144 (6×24)
Dimensions	2008×1002×40mm (79.06×39.45×1.57 inch)
Weight	22.5 kg (49.6 lbs)
Front Glass	3.2mm, Anti-Reflection Coating, High Transmission, Low Iron, Tempered Glass
Frame	Anodized Aluminium Alloy
Junction Box	IP67 Rated
Output Cables	TÜV 1x4.0mm <sup>2</sup> , (+) 290mm, (-) 145mm or Customized Length

## SPECIFICATIONS

Module Type	JKM390M-72H		JKM395M-72H		JKM400M-72H		JKM405M-72H		JKM410M-72H	
	JKM390M-72H-V	JKM395M-72H-V	JKM395M-72H-V	JKM400M-72H-V	JKM400M-72H-V	JKM405M-72H-V	JKM405M-72H-V	JKM410M-72H-V	JKM410M-72H-V	
	STC	NOCT	STC	NOCT	STC	NOCT	STC	NOCT	STC	NOCT
Maximum Power (Pmax)	390Wp	294Wp	395Wp	298Wp	400Wp	302Wp	405Wp	306Wp	410Wp	310Wp
Maximum Power Voltage (Vmp)	41.1V	39.1V	41.4V	39.3V	41.7V	39.6V	42.0V	39.8V	42.3V	40.0V
Maximum Power Current (Imp)	9.49A	7.54A	9.55A	7.60A	9.60A	7.66A	9.65A	7.72A	9.69A	7.76A
Open-circuit Voltage (Voc)	49.3V	48.0V	49.5V	48.2V	49.8V	48.5V	50.1V	48.7V	50.4V	48.9V
Short-circuit Current (Isc)	10.12A	8.02A	10.23A	8.09A	10.36A	8.16A	10.48A	8.22A	10.60A	8.26A
Module Efficiency STC (%)	19.38%		19.63%		19.88%		20.13%		20.38%	
Operating Temperature (°C)	-40°C~+85°C									
Maximum System Voltage	1000/1500VDC (IEC)									
Maximum Series Fuse Rating	20A									
Power Tolerance	0~+3%									
Temperature Coefficients of Pmax	-0.35%/°C									
Temperature Coefficients of Voc	-0.29%/°C									
Temperature Coefficients of Isc	0.048%/°C									
Nominal Operating Cell Temperature (NOCT)	45±2°C									

STC: Irradiance 1000W/m<sup>2</sup> Cell Temperature 25°C AM=1.5

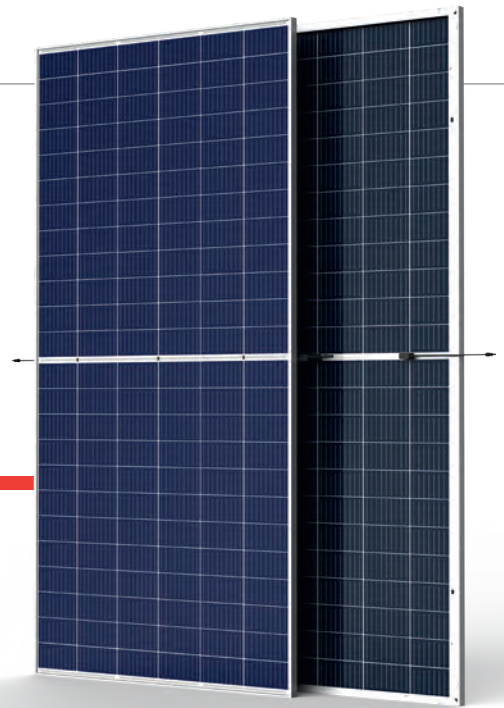
NOCT: Irradiance 800W/m<sup>2</sup> Ambient Temperature 20°C AM=1.5 Wind Speed 1m/s

\* Power measurement tolerance: ± 3%



# DUOMAX<sup>+</sup> twin

TSM-DEG15MC.20(II)



**144 HALF-CUT**  
MONOCRYSTALLINE CELLS

**385-410W**  
POWER OUTPUT RANGE

**20.0%**  
MAXIMUM EFFICIENCY

**0/+5W**  
POSITIVE POWER TOLERANCE

Founded in 1997, Trina Solar is the world's leading comprehensive solutions provider for solar energy. We believe close cooperation with our partners is critical to success. Trina Solar now distributes its PV products to over 60 countries all over the world. Trina Solar is able to provide exceptional service to each customer in each market and supplement our innovative, reliable products with the backing of Trina Solar as a strong, bankable partner. We are committed to building strategic, mutually beneficial collaboration with installers, developers, distributors and other partners.

## Comprehensive Product And System Certificates

IEC61215/IEC61730/UL1703  
IEC61701 Salt Mist Corrosion  
IEC62716 Ammonia Corrosion  
IEC60068 Blowing Sand  
ISO9001; ISO14001; OHSAS18001



### High power output

- Bifacial mono PERC cells combined with multi busbar technology
- Half-cut cells with lower thermal coefficients and reduced interconnection losses
- Power gain up to 25% when mounted on tracker, depending on albedo



### Optimized LCOE

- Maximum yield per space
- Savings in labour cost
- Best suited for tracking systems



### Highly reliable due to stringent quality control

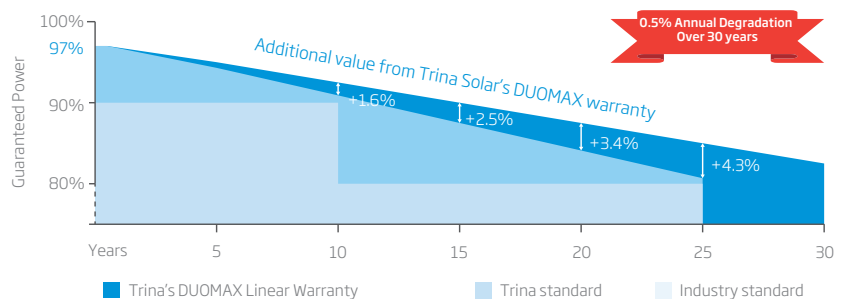
- Over 30 in-house tests (UV, TC, HF, and many more)
- In-house testing goes well beyond certification requirements
- PID resistant
- 2x 100% inline EL inspection



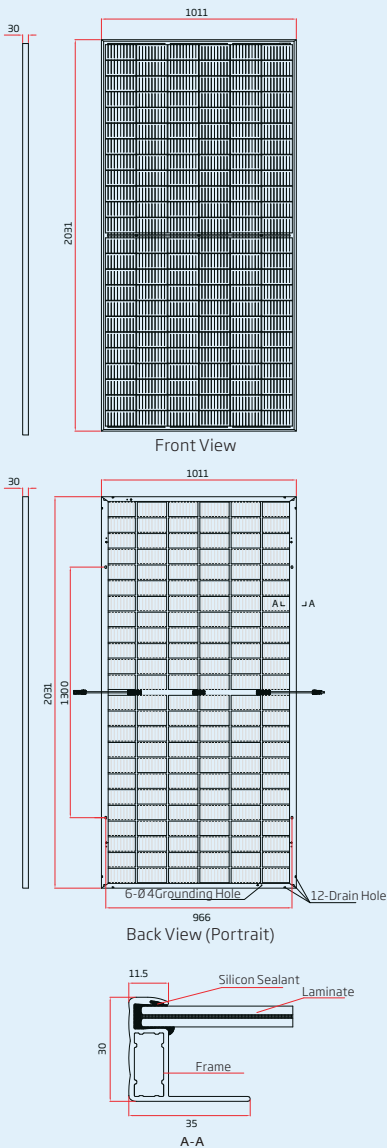
### Certified to withstand challenging environmental conditions

- Salt Mist Corrosion
- Ammonia Corrosion
- Blowing Sand

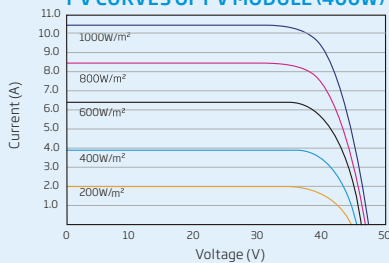
Trina Solar's DUOMAX Linear Performance Warranty



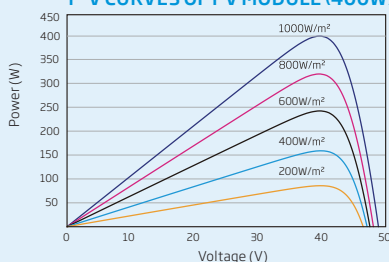
### DIMENSIONS OF PV MODULE TSM-DEG15MC.20(II) (unit: mm)



### I-V CURVES OF PV MODULE (400W)



### P-V CURVES OF PV MODULE (400W)



ELECTRICAL DATA @ STC	TSM-385	TSM-390	TSM-395	TSM-400	TSM-405	TSM-410
Peak Power Watts- $P_{MAX}$ (Wp)*	385	390	395	400	405	410
Power Output Tolerance- $P_{MAX}$ (W)	0/+5	0/+5	0/+5	0/+5	0/+5	0/+5
Maximum Power Voltage- $U_{MPP}$ (V)	41.1	41.4	41.7	42.0	42.3	42.6
Maximum Power Current- $I_{MPP}$ (A)	9.37	9.43	9.48	9.53	9.58	9.63
Open Circuit Voltage- $U_{OC}$ (V)	49.0	49.2	49.4	49.6	49.8	50.0
Short Circuit Current- $I_{SC}$ (A)	10.03	10.08	10.12	10.16	10.21	10.25
Module Efficiency $\eta_m$ (%)	18.7	19.0	19.2	19.5	19.7	20.0

STC: Irradiance 1000 W/m<sup>2</sup>, Cell Temperature 25 °C, Air Mass AM1.5  
\* Measuring tolerance: ±3%

### BI-FACIAL OUTPUT - BACK SIDE POWER GAIN

		TSM-385	TSM-390	TSM-395	TSM-400	TSM-405	TSM-410
10%	Power Output (W)	424	429	435	440	446	451
	Module Efficiency (%)	20.6	20.9	21.2	21.4	21.7	22.0
15%	Power Output (W)	443	429	454	460	466	472
	Module Efficiency (%)	21.6	20.9	22.1	22.4	22.7	23.0
25%	Power Output (W)	481	488	494	500	506	513
	Module Efficiency (%)	23.4	23.7	24.1	24.4	24.6	25.0

ELECTRICAL DATA @ NMOT	TSM-385	TSM-390	TSM-395	TSM-400	TSM-405	TSM-410
Maximum Power- $P_{MAX}$ (Wp)	290	294	298	302	305	309
Maximum Power Voltage- $U_{MPP}$ (V)	38.8	39.1	39.3	39.6	39.9	40.2
Maximum Power Current- $I_{MPP}$ (A)	7.48	7.53	7.57	7.61	7.65	7.69
Open Circuit Voltage- $U_{OC}$ (V)	46.7	46.9	47.1	47.3	47.5	47.7
Short Circuit Current- $I_{SC}$ (A)	8.09	8.13	8.16	8.19	8.23	8.27

NMOT: Irradiance 800 W/m<sup>2</sup>, Ambient Temperature 20 °C, Wind Speed 1 m/s.

### MECHANICAL DATA

Solar Cells	Monocrystalline
Cell Orientation	144 cells (6 x 24)
Module Dimensions	2031 x 1011 x 25mm
Weight	26.3 kg
Glass	2 mm, High Transmission, AR Coated Heat Strengthened Glass
Encapsulant Material	POE/EVA
Back Glass	2 mm, Heat Strengthened Glass (White Grid Glass)
Frame	25 mm Anodized Aluminium Alloy
J-Box	IP 68 rated
Cables	Photovoltaic Cable 4.0mm <sup>2</sup> , Portrait: N 280 mm/P 280 mm, Landscape: N 1900 mm /P 1900 mm
Connector	TS4

### TEMPERATURE RATINGS

NMOT (Nominal Module Operating Temperature)	41°C (±3K)
Temperature Coefficient of $P_{MAX}$	-0.37%/K
Temperature Coefficient of $U_{OC}$	-0.29%/K
Temperature Coefficient of $I_{SC}$	0.05%/K

### WARRANTY

- 10 year Product Workmanship Warranty
- 30 year Linear Performance Warranty

(Please refer to product warranty for details)

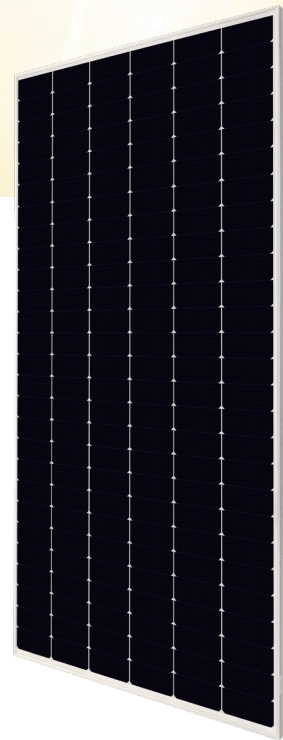
### MAXIMUM RATINGS

Operational Temperature	-40 to +85°C
Maximum System Voltage	1500V DC (IEC) 1500V DC (UL)
Max Series Fuse Rating	20A
Snow Load	2400 Pa (1600 Pa*)
Wind Load	2400 Pa (1600 Pa*)

\*design load with safety factor 1.5  
(DO NOT connect Fuse in Combiner Box with two or more strings in parallel connection)

### PACKAGING CONFIGURATION

Modules per box:	32 pieces
Modules per 40' container:	704 pieces






# HiDM

High density MONO PERC module




400W~420W

CS1U-400 | 405 | 410 | 415 | 420MS

### MORE POWER

-  Maximize the light absorption area, module efficiency up to 20.4 %
-  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\*

**15 years** enhanced product warranty on materials and workmanship\*

**25 years** linear power output warranty\*

\*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  
IEC 61701 ED2: VDE / IEC 62716: VDE  
UNI 9177 Reaction to Fire: Class 1 / Take-e-way



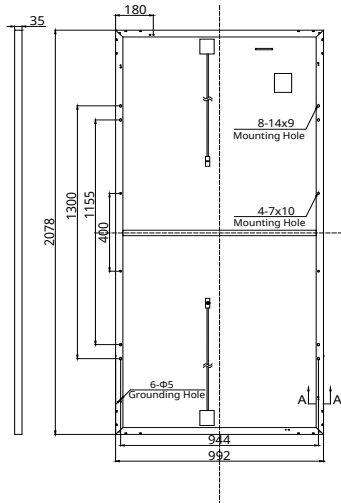
As there are different certification requirements in different markets, please contact your local Canadian Solar sales representative for the specific certificates applicable to the products in the region in which the products are to be used.

**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 40 GW deployed around the world since 2001.

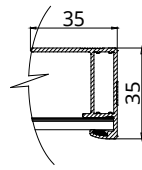
\* For detail information, please refer to Installation Manual.

## ENGINEERING DRAWING (mm)

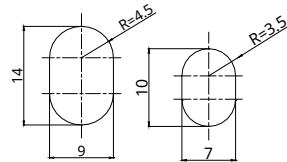
### Rear View



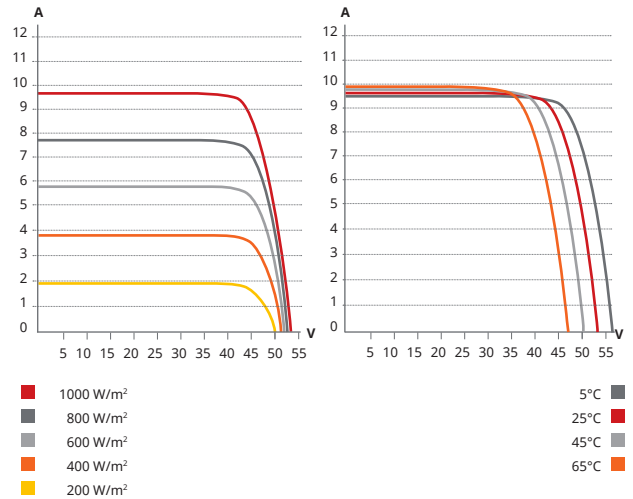
### Frame Cross Section A-A



### Mounting Hole



## 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	19.4%	19.6%	19.9%	20.1%	20.4%
Operating Temperature	-40°C ~ +85°C				
Max. System Voltage	1500V (IEC) or 1000V (IEC)				
Module Fire Performance	CLASS C (IEC 61730)				
Max. Series Fuse Rating	15 A				
Application Classification	Class A				
Power Tolerance	0 ~ + 10 W				

\* Under Standard Test Conditions (STC) of irradiance of 1000 W/m<sup>2</sup>, spectrum AM 1.5 and cell temperature of 25°C.

## ELECTRICAL DATA | NMOT\*

CS1U	400MS	405MS	410MS	415MS	420MS
Nominal Max. Power (Pmax)	296 W	300 W	304 W	307 W	311 W
Opt. Operating Voltage (Vmp)	40.8 V	41.0 V	41.2 V	41.4 V	41.5 V
Opt. Operating Current (Imp)	7.26 A	7.32 A	7.37 A	7.43 A	7.48 A
Open Circuit Voltage (Voc)	49.9 V	50.0 V	50.1 V	50.2 V	50.3 V
Short Circuit Current (Isc)	7.75 A	7.79 A	7.83 A	7.87 A	7.91 A

\* Under Nominal Module Operating Temperature (NMOT), irradiance of 800 W/m<sup>2</sup> 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	IP68, 4 bypass diodes
Cable	4.0 mm <sup>2</sup> (IEC)
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 or H4 UTX or MC4-EVO2
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	43±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](http://www.canadiansolar.com), [support@canadiansolar.com](mailto:support@canadiansolar.com)

**99.996%  
UPTIME.  
ENGINEERED  
SIMPLICITY.**

**7%  
LOWER  
LCOE**

**31%  
LOWER  
LIFETIME  
O&M**

## DuraTrack® HZ v3

Three decades of field-tested design improvements have resulted in the DuraTrack® HZ v3 — the most durable, reliable tracking system under the sun. While our single-bolt module clamp and forgiving tolerances streamline installation, and our flexibly linked architecture maximizes power density, it's our innovative use of fewer components and a failure-free wind management system that makes Array Technologies the best choice for solar trackers. **Better. Stronger. Smarter.**



### HIGHEST POWER DENSITY.

Higher density means more power and more profit. DuraTrack HZ v3 offers the unique ability to maximize the power density of each site, boasting 100 modules per row and higher density than our closest competition.



### LEADING TERRAIN ADAPTABILITY.

Our flexibly linked architecture, with articulating driveline joints and forgiving tolerances, creates the most adaptable system on the market for following natural land contours while creating the greatest power generation potential from every site.



### FEWER COMPONENTS. GREATER RELIABILITY.

Array was founded on a philosophy of engineered simplicity. Minimizing potential failure points (167 times fewer components than competitors), DuraTrack HZ v3 consistently delivers higher reliability and superior uptime.



### FAILURE-FREE WIND DESIGN.

DuraTrack HZ v3 was designed and field tested to withstand some of the harshest conditions on the planet. It is the only tracker on the market that reliably handles wind events with a fully integrated, fully mechanical, passive wind-load mitigation system without the need for complex communication systems, batteries, or power.



### ZERO SCHEDULED MAINTENANCE.

Maintenance-free motors and gears, fewer moving parts, and industrial-grade components—what does this mean for our customers? No scheduled maintenance required. While our competitors average two unscheduled maintenance events per day, we average only one per year.

**COST VERSUS VALUE**

We believe value is more than the cost of a tracking system. It's about building with forgiving tolerances and fewer parts so construction crews can work efficiently. It means protecting your investment with a failure-free wind management system. It also includes increasing power density. But most of all, value is measured in operational uptime, or reliability.

**THE GLOBAL LEADER IN RELIABILITY**

Array has spent decades designing and perfecting the most reliable tracker on the planet. Fewer moving parts, stronger components and intelligent design that protects your investment in the harshest weather are but a few of the innovative differences that keep your system running flawlessly all day and you resting easy at night.

**ARRAY TECHNOLOGIES, INC.**

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Albuquerque, NM 87109 USA

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+1 855.TRACKPV (872.2578)  
+1.505.881.7572

sales@arraytechinc.com

**arraytechinc.com**

**30 GW** YEARS OF OPERATION

**167x** FEWER COMPONENTS THAN COMPETITIVE TRACKERS

**STRUCTURAL & MECHANICAL FEATURES/SPECIFICATIONS**

Tracking Type	Horizontal single axis
Less than 1 drive motor /MW	Up to 1.152 MW DC
String Voltage	Up to 1,500V DC
Maximum Linked Rows	32
Maximum Row Size	100 modules crystalline, and bifacial; 240 modules First Solar 4; 78 modules First Solar 6
Drive Type	Rotating gear drive
Motor Type	2 HP, 3 PH, 480V AC
East-West/North-South Dimensions	Site / module specific
Array Height	54" standard, adjustable (48" min height above grade)
Ground Coverage Ratio (GCR)	Flexible, 28-45% typical, others supported on request
Terrain Flexibility	N-S tolerance: 0-15% standard, 26% optional; Driveline: 40° in all directions
Modules Supported	Most commercially available, including frameless crystalline, thin film, and bifacial
Tracking Range of Motion	± 52° standard, ± 62° optional
Operating Temperature Range	-30°F to 140°F (-34°C to 60°C)
Module Configuration available.	Single-in-portrait standard, including bifacial. Four-in-landscape (thin film)
Module Attachment	Single fastener, high-speed mounting clamps with integrated grounding. Traditional rails for crystalline in landscape, custom racking for thin film and frameless crystalline and bifacial per manufacturer specs.
Materials	Pre-galv steel, HDG steel and aluminum structural members, as required
Allowable Wind Load (ASCE 7-10)	140 mph, 3-second gust exposure C
Wind Protection	Failure free passive mechanical system protects against wind damage without the use of complex communications systems, batteries — no power required

**ELECTRONIC CONTROLLER FEATURES/SPECIFICATIONS**

Solar Tracking Method	Algorithm with GPS input
Control Electronics	MCU plus Central Controller
Data Feed	MODBUS over Ethernet to SCADA system
Night-time Stow	Yes
Tracking Accuracy	± 2° standard, field adjustable
Backtracking	Yes

**INSTALLATION, OPERATION & MAINTENANCE**

Software	SmarTrack optimization available
PE Stamped Structural Calculations & Drawings	Yes
On-site Training and System Commissioning	Yes
Connection Type	Fully bolted connections, no welding
In-field Fabrication Required	No
Dry Slide Bearings and Articulating Driveline Connections	No lubrication required
Scheduled Maintenance	None required
Module Cleaning Compatibility	Robotic, Tractor, Manual

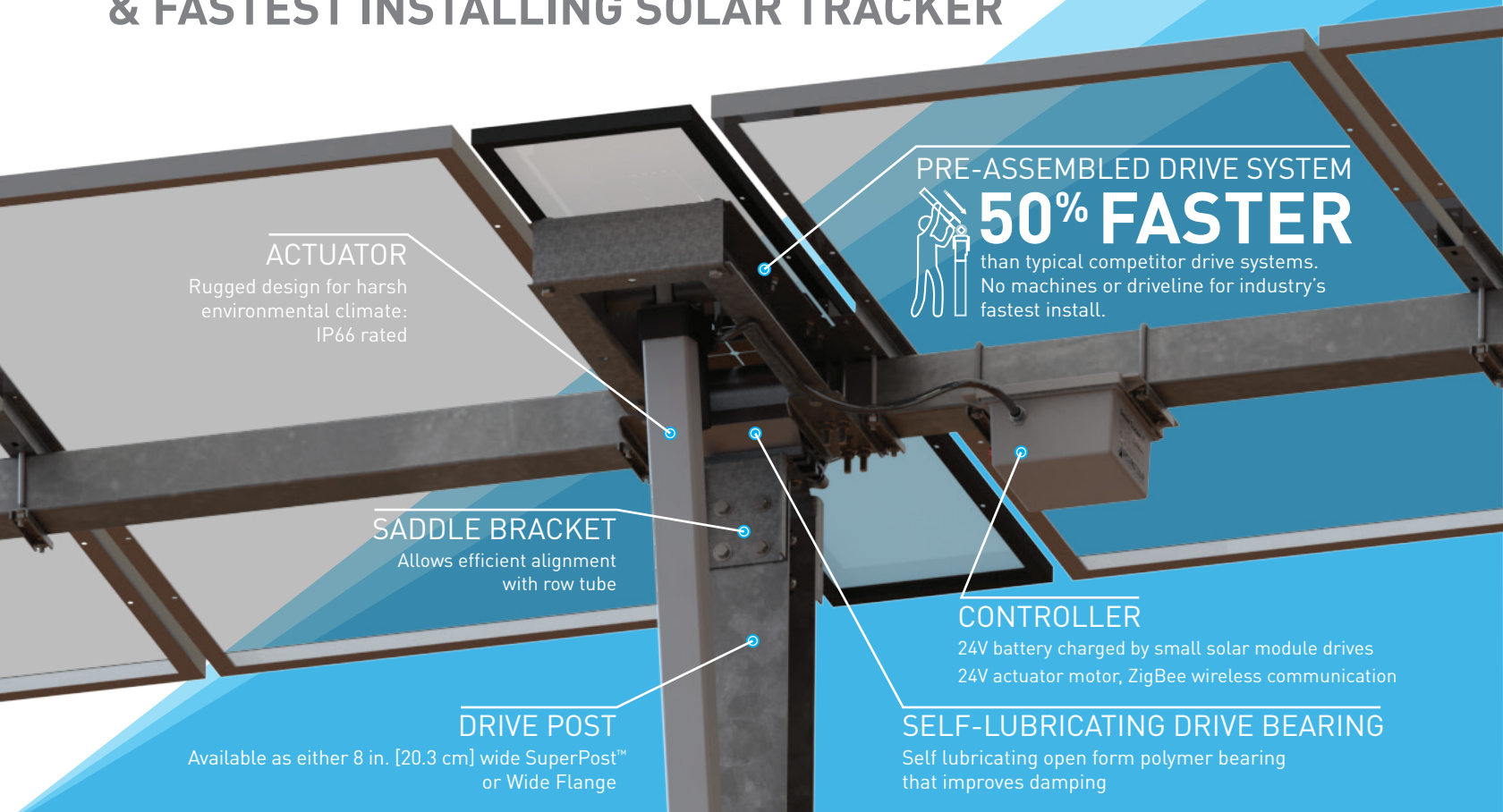
**GENERAL**

Annual Power Consumption (kWh per 1 MW)	400 kWh per MW per year, estimate
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TECHNICAL DATASHEET

**GENIUS TRACKER™ 1P**

WORLD'S HIGHEST POWER PRODUCING  
& FASTEST INSTALLING SOLAR TRACKER



**ACTUATOR**  
Rugged design for harsh environmental climate: IP66 rated

PRE-ASSEMBLED DRIVE SYSTEM  
**50% FASTER**  
than typical competitor drive systems. No machines or driveline for industry's fastest install.

**SADDLE BRACKET**  
Allows efficient alignment with row tube

**CONTROLLER**  
24V battery charged by small solar module drives 24V actuator motor, ZigBee wireless communication

**DRIVE POST**  
Available as either 8 in. [20.3 cm] wide SuperPost™ or Wide Flange

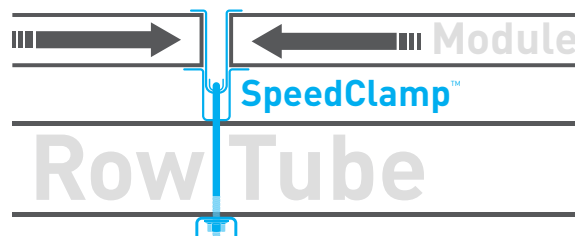
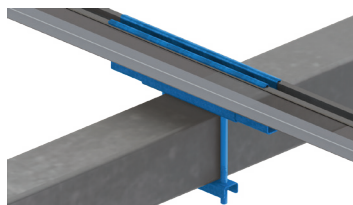
**SELF-LUBRICATING DRIVE BEARING**  
Self lubricating open form polymer bearing that improves damping

**OWNER BENEFITS**

**UP TO 6.75% MORE POWER PRODUCTION**  
RESULTS IN **HIGHER KWH OUTPUT** AND **UP TO 40% HIGHER ROE**  
based on project specifics

**INSTALLER BENEFITS**

**200% FASTER INSTALL SPEED** WITH **SPEEDCLAMP™** THAN ANY OTHER TRACKER



## OWNER BENEFITS

### UP TO 40% HIGHER ROE

Combine to increase owner cash flow

### HIGHER MODULE DENSITY

Increased row spacing means more time facing the sun and less time running from the shade, adds up to 5% more power production than competitors

### WEATHERSMART™

Proprietary algorithm optimizes tilt angle based on weather data to maximize power production, adds up to 1.25% additional power production

### LOWEST O&M COST

Lowest grass cutting & module washing cost

Zero maintenance drive system

## INSTALLER BENEFITS

### FASTEST INSTALLING SYSTEM

Advanced design innovations & pre-assembled components

### SPEEDCLAMP™

Mounts modules with no mounting hardware, speeds module installation up to 200%

### PRE-ASSEMBLED DRIVE ARM

Can be lifted by one worker, no machine required. 50% faster than typical competitors

### PE STAMPED DRAWINGS

Design loads according to local building codes: ASCE 7, NBC, Eurocode, AS1170, GB 50009

### PROPRIETARY INTEGRATED HARDWARE™

For faster structure assembly, module mounting and reduced O&M cost. Oversized Serrated Flange Nyloc Nut and Oversized Flange Star Bolt with integrated star washer eliminates the need for washers and star washers

## GameChange Solar

### HEADQUARTERS

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### ASIA OFFICES

Wuxi, China  
 Mumbai, India

**DISCLAIMER:** GameChange Solar provides this documentation without warranty in any form either expressed or implied. GameChange Solar may revise this document at any time without notice.

<b>Modules</b>	<b>Modules Supported</b>	Most commercially available modules, including frameless crystalline and thin film	
<b>Civil</b>	<b>Slope Tolerance (N-S)</b>	7% standard, can go to 15% special order	
	<b>Slope Tolerance (E-W)</b>	15%	
	<b>Tracker follows slope (Y/N)</b>	Yes	
<b>Structural</b>	<b>Drive Type</b>	Robust linear actuator stainless steel & aluminum	
	<b>Posts per MW</b>	350-400/MW for 1 up portrait / 2 up landscape or 250-300/MW for 2 up portrait	
	<b>Design Wind Load</b>	105 mph [46.9 m/s](Std) / 130 mph [58.1 m/s](Premium 1) / 150 mph [67 m/s](Premium 2)	
	<b>Snow Load</b>	5 psf [0.24 kPa](Std) / 20 psf [0.96 kPa](Premium 1) / 40 psf [1.92 kPa](Premium 2) / 60 psf [2.87 kPa](Premium 3)	
	<b>Tracking Range (Std)</b>	45°, 52°	
	<b>Tracking Range (Premium)</b>	60°	
	<b>Post Sections</b>	G235 [55 µm] galvanized steel (or HDG option) roll formed standard posts, HDG wide flange option also available	
	<b>Post Size (Interior) &amp; (Exterior)</b>	6 x 6 in. [15.24 x 15.24 cm] roll form shape or W6x7, W6x9, W6x12 or W6x15 wide flange	
	<b>Motor Foundation</b>	6.5 x 8 in. [16.51 x 20.32 cm] roll form hat or W6x15 or larger wide flange	
	<b>Standard Embedment</b>	5 - 7 ft. [1.52 - 2.13 m]	
	<b>Flood Plain Allowance</b>	Up to 6 ft. [1.83 m]	
<b>Design</b>	<b>Module Configuration</b>	1 or 2 up in portrait for crystalline & First Solar Series 6™, 2 up landscape or 1 or 2 up in portrait for Bifacial, 3 to 4 up landscape for First Solar Series 4™	
	<b>Length per Table</b>	Up to 320 ft. [97.53 m] (for example 78 First Solar Series 6™ modules)	
	<b>Module Attachment</b>	SpeedClamp™ or bolts available for bottom mount frame modules or clamps for glass on glass modules	
	<b>Ground Coverage Ratio</b>	0.25 to 0.65	
	<b>Rows per Drive</b>	1 drive per tracker(table), distributed drive system	
	<b>Powering System</b>	Onboard solar module with battery	
	<b>Ground Clearance To Module</b>	18 - 48 in. [45.7 - 121.9 cm] typical	
	<b>Min / Max Ground to Top of Post</b>	56 in. [1.42 m] typical + 9 in. [22.86 cm] min. adjustment range	
	<b>Backtracking / Anti-shading</b>	Yes, although can be turned off as requested (i.e. for FSLR modules)	
	<b>Temperature Range</b>	-20° C [-40° C also available] + 48° C	
	<b>Electromagnetic Interference</b>	Compliant with FCC guidelines/ Applicable sections EN 61000	
	<b>Install</b>	<b>Specialty Tools Required</b>	No
		<b>Max Offload for Deliveries</b>	As per customer requirement
<b>Electrical</b>	<b>Tracking Method</b>	Time and location based algorithm	
	<b>String Design</b>	Compatible with any string size	
	<b>Cable Supports</b>	Hole punching as per customer requirement for nominal cost	
	<b>Linear Actuator Motor</b>	24V DC UL Listed	
	<b>Parasitic Loss</b>	0 amps	
	<b>Controller Box</b>	ZigBee® wireless communications, 24V solar module and battery	
	<b>Control System</b>	Master to Node: ZigBee® wireless communications	
		Master to SCADA/DAS: Modbus TCP communications	
	<b># of Motors</b>	20 to 52 / MW depending on module wattage and loading conditions (35 for typical conditions)	
	<b>1000V System or 1500V System</b>	Both	
	<b>Grounding Method</b>	Tracker structure is part of grounding path per UL 2703	
<b>UL Compliance</b>	UL 2703 / UL 3703		
<b>Ingress Protection</b>	IP66 stroke end / IP67 motor end (NEMA 4/4x equivalent)		
<b># Weather Station</b>	1 per 6 MW - 10 MW typical		
<b>Monitoring System</b>	Web portal interface available		
	Compatible with all standard third party monitoring vendors		
<b>Snow &amp; Flood Sensors</b>	Move modules to optimum location for weather events		
<b>Backup Power</b>	Solar module and battery providing integrated backup - 3 days		
<b>O&amp;M</b>	<b>Warranty</b>	5 year drive & control, 10 year structural standard, 10 / 20 also available	
<b>Shipping</b>	<b>Max load</b>	International - 18.5 to 22.5 metric tons per container USA - 45,000 lbs. [20,411 kg] per truckload, 5,000 lbs. [2,267 kg] maximum bundle size, 2,900 lbs. [1315.4 kg] or other maximum as requested by customers	
	<b>Shipping Containers or Flatbeds</b>	Flat beds for structure, dry vans for hardware	
	<b># Trucks or Containers per MWdc</b>	4 typical for trucks, 5 typical for containers	
<b>Commissioning</b>	<b>Backfeed required?</b>	No, Generator for power as alternative	





## NX Horizon Self-Powered Tracker

### Our most amazing tracker yet.

In our mission to make solar a mainstream energy source, NEXTracker has engineered the most intelligent and flexible tracking technology yet. Using sustainable design methods with outcomes that benefit people and the planet, we bring you: NX Horizon™.

NX Horizon (formerly referred to as the Self-Powered Tracker or SPT), brings self-contained motor power to each row, eliminating power wiring and trenching. Our advanced horizontal tracker has the widest rotational range available, lowest O&M costs, and requires far less power to operate than other trackers. By offering more powerful systems at a greater value, NEXTracker enables greater deployment of renewable energy worldwide.

### NX Horizon key features and benefits include:

- Self-powered system with smart performance communications: Self-contained units on each row include a dedicated PV panel to provide power to the controller which drives the motor and hosts intelligent control electronics to position each tracker. With smart communications built in, NX Horizon systems can be accessed remotely, providing customers with a granular view to optimize tracker performance, operations and maintenance.
- Independent balanced rows with 120 degree rotational range: Each NX Horizon row has its own controlled motor with rotational range that delivers up to 2% more energy than typical linked row trackers. These agile, independent rows stow in less than 90 seconds to reduce wind forces

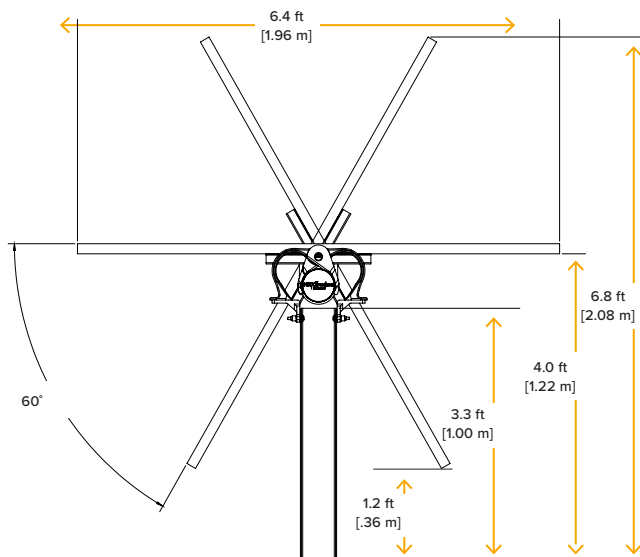
on the array, protecting the PV modules in harsh environments. NX Horizon solar trackers also have a mechanically balanced row design that aligns PV panels with the tracker's axis of rotation – which greatly reduces row torque, using less energy from the motor to track throughout the day.

- Self-grounded system with theft-proof fasteners: NX Horizon is the world's first horizontal tracker with an entirely self-grounded design. This means no separate bonding hardware is required. You save on material and associated costs by eliminating grounding washers, braided straps, bare copper wire, and grounding rods. What's more, we've designed our own fasteners that can only be removed with special tools – deterring PV theft.

# NX Horizon Specifications

<b>Tracking Technology</b>	Horizontal single-axis balanced-mass tracker with independently-driven rows
<b>Tracking Range</b>	Up to 120° (± 60°)
<b>Control System</b>	1 Self-Powered Controller (SPC) per tracker; 1 Network Control Unit (NCU) per 100 SPCs
<b>Communications</b>	Wireless ZigBee® mesh network/SCADA; no communication wiring required
<b>Drive System</b>	One slew gear, 24 VDC motor and self-powered controller w/dedicated solar panel per row
<b>DC Capacity</b>	23-35kWp per tracker row, depending on panel type. Row length up to 90 panels.
<b>System Voltage</b>	1,500 volt or 1,500 volt
<b>Power Consumption</b>	No grid power required
<b>Ground Coverage Ratio</b>	Fully configurable by customer; typical range 33%-50%
<b>Installation Method</b>	Rapid field assembly, no welding required
<b>Foundation Types</b>	Compatible with all major foundation types (driven pier, concrete foundation, ground screw)
<b>Standard Wind Design</b>	100 mph/161 kph, 3 second gust per ASCE7-10; configurable for higher wind speeds
<b>Safety Stowing</b>	Automated wind and snow stowing with self-contained backup power; no external power required
<b>Torsional Limiter</b>	Included at each foundation/bearing for additional wind and snow load protection
<b>Principal Materials</b>	Galvanized and stainless steel
<b>Grounding Method</b>	Self-grounding structure; separate materials and labor not required
<b>Compliance</b>	Grounding/bonding: UL2703; structural design: ASCE7-10
<b>Other Available Options</b>	Snow and flood sensors
<b>Warranty</b>	10 years on structural components; 5 years on drive and control systems
<b>Typical Dimensions</b>	Height 2.1 m/6.8 ft (@ 60°), Width 2.0 m/6.4 ft, Length 85 m/283 ft

Typical 72-cell c-Si configuration: 85 m row with 80 panels mounted in portrait:



**NEXTracker**

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 Fremont, CA 94555 USA  
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 nextracker.com

printed on post-consumer waste paper

