

PHANTOM

swiss solar

156-TCA

BIFACIAL DOUBLEGLASS

650W | UP TO **26.37%**

► **TOPCon ADVANCE**
TECHNOLOGY

Next-generation cell architecture with enhanced passivation for higher output, reduced LID & PID, and stable performance under high temperatures and low light.

► **DuraGlassX™**

Ultra-strong tempered glass with advanced anti-reflective coating ensures maximum transparency, impact resistance, and long-term durability in extreme climates.

► **Phantom Design**

Deep black cells with an elegant black frame deliver a modern, premium look that blends seamlessly into architectural projects.

► **AluForce™ Black Frames**

Equivalent to up to +32% higher frame strength under front and side load tests.



COMPLETE SYSTEM AND PRODUCT CERTIFICATIONS



PHANTOM 156-TCA BIFACIAL DOUBLEGLASS 630-650

up to
26.37%
maximum efficiency

0~3
power
tolerance

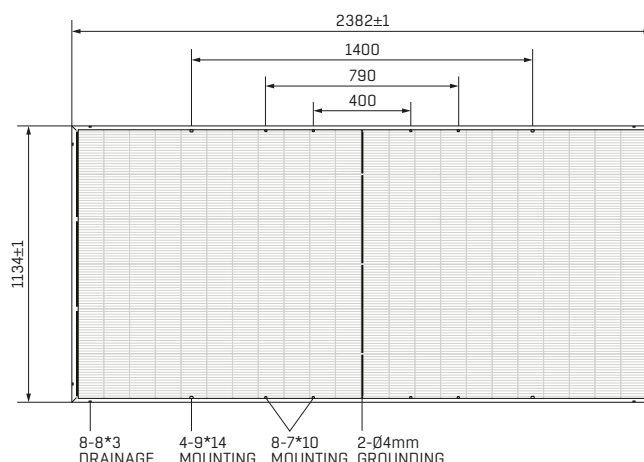
<1%
first year
power degradation

0.35%
year 2-30
power degradation

N-TYPE CELL
lower operating
temperature

MECHANICAL CHARACTERISTICS

Solar Cells	N-type Mono
No. of Cells	132 (12x11)
Dimensions	2382x 1134 x 30mm
Weight	33.5kg
Front / Back Glass	2.0mm coated semi-tempered glass
Frame	Anodized aluminium alloy
Junction Box	Ip68 rated (3 by pass diodes)
Output Cables	4.0mm ² , 250mm (+) / 350mm (-) Length can be customized
Connectors	Mc4 compatible
Mechanical load test	Front 6200Pa / Rear 4200Pa



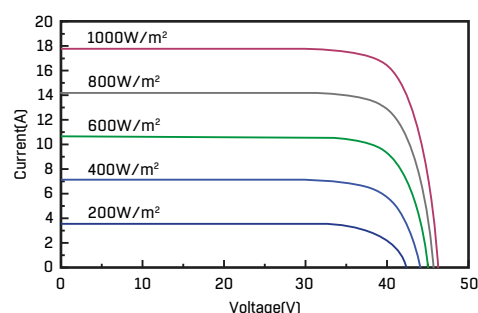
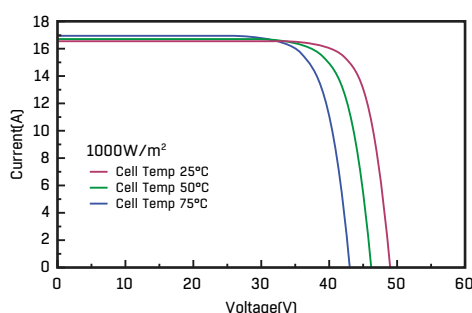
ELECTRICAL PARAMETERS

POWER CLASS	PH156-TCA-630		PH156-TCA-635		PH156-TCA-640		PH156-TCA-645		PH132-TCA-650	
	STC	BNPI	STC	BNPI	STC	BNPI	STC	BNPI	STC	BNPI
Maximum Power (P _{max})	630W	690W	635W	695W	640W	701W	645W	706W	650W	712W
Open Circuit Voltage (V _{oc})	48.68±3%		49.86±3%		50.04±3%		50.22±3%		50.40±3%	
Short Circuit Current (I _{sc})	16.04±3%	17.70±3%	16.10±3%	17.77±3%	16.16±3%	17.84±3%	16.22±3%	17.90±3%	16.28±3%	17.97±3%
Voltage at Maximum Power (V _{mpp})	41.64V		41.78V		41.91V		42.05V		42.19V	
Current Maximum Power (I _{mpp})	15.13A	16.57A	15.20A	16.63A	15.27A	16.73A	15.34A	16.79A	15.41A	16.88A
MODULE EFFICIENCY (%)	23.32%	25.54%	23.51%	25.73%	23.69%	25.95%	23.88%	26.14%	24.07%	26.37%

STC: Irradiance 1000W/m², cell temperature 25°C, AM1.5G | NOCT: Irradiance 800W/m², ambient temperature 20°C, wind speed 1m/s, AM1.5G m²

PACKING CONFIGURATION

Container	40'HQ
Pieces per pallet	37
Pallets per container	20
Pieces per container	740



OPERATING CHARACTERISTICS

Operating Module Temperature	-40°C to +85°C
Maximum System Voltage	1500 DC (IEC)
Maximum Series Fuse Rating	28A
Power Tolerance	0/+5W

TEMPERATURE CHARACTERISTICS

Nominal Operating Cell Temperature	45±2°C
Temperature Coefficient of P _{max}	-0.29%/°C
Temperature Coefficient of V _{oc}	-0.25%/°C
Temperature Coefficient of I _{sc}	+0.045%/°C