

48-TCA BIFACIAL DOUBLEGLASS

470W | UP TO 26.09%

▶ 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.

▶ DuraGlass™

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



up to
26.09%
maximum efficiency

0~3
power
tolerance

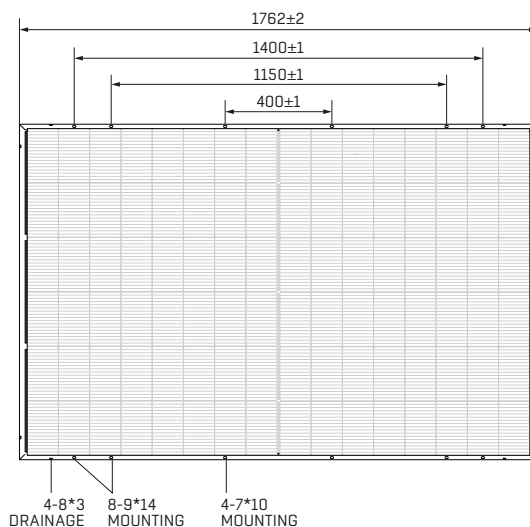
<1%
first year
power degradation

0.35%
year 2-30
power degradation

N-TYPE CELL
lower operating
temperature

MECHANICAL CHARACTERISTICS

Solar Cells	N-type Mono
No. of Cells	96 (12x8)
Dimensions	1762x 1134 x 30mm
Weight	24.7kg
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



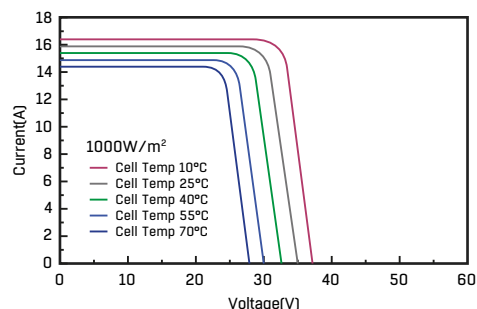
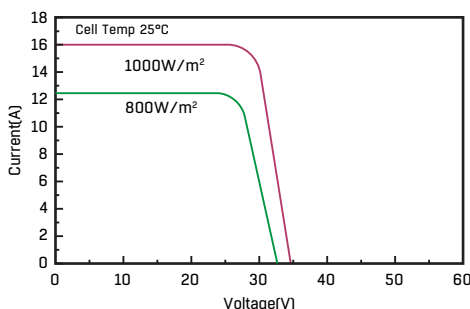
ELECTRICAL PARAMETERS

POWER CLASS	PH48-TCA-450		PH48-TCA-455		PH48-TCA-460		PH48-TCA-465		PH48-TCA-470	
	STC	BNPI	STC	BNPI	STC	BNPI	STC	BNPI	STC	BNPI
Maximum Power (Pmax)	450W	499W	455W	504W	460W	510W	465W	515W	470W	521W
Open Circuit Voltage (Voc)	34.57±3%	34.67±3%	34.62±3%	34.72±3%	34.67±3%	34.77±3%	34.72±3%	34.82±3%	34.77±3%	34.87±3%
Short Circuit Current (Isc)	16.27±3%	17.98±3%	16.43±3%	18.16±3%	16.58±3%	18.32±3%	16.74±3%	18.50±3%	16.90±3%	18.67±3%
Voltage at Maximum Power (Vmpp)	29.38V	29.47V	29.43V	29.52V	29.47V	29.56V	29.51V	29.60V	29.55V	29.64V
Current Maximum Power (Impp)	15.31A	16.92A	15.46A	17.09A	15.60A	17.24A	15.76A	17.41A	15.91A	17.58A
MODULE EFFICIENCY (%)	22.52%	24.97%	22.77%	25.25%	23.01%	25.53%	23.27%	25.81%	23.53%	26.09%

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	36
Pallets per container	26
Pieces per container	936



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 Pmax	-0.29%/°C
Temperature Coefficient of Voc	-0.25%/°C
Temperature Coefficient of Isc	+0.045%/°C

54-TCA BIFACIAL DOUBLEGLASS

520W | UP TO 25.90%

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

▶ DuraGlass™

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▶ Phantom Design

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▶ AluForce™ Black Frames

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



COMPLETE SYSTEM AND PRODUCT CERTIFICATIONS



up to
25.90%
maximum efficiency

0~3
power
tolerance

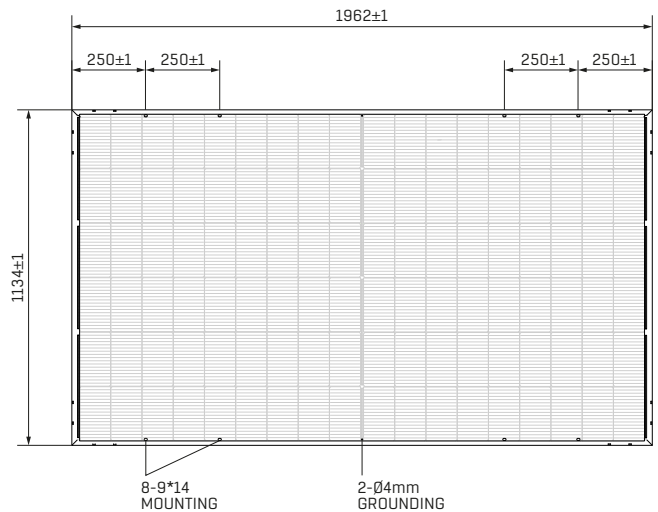
<1%
first year
power degradation

0.35%
year 2-30
power degradation

N-TYPE CELL
lower operating
temperature

MECHANICAL CHARACTERISTICS

Solar Cells	N-type Mono
No. of Cells	108 (12x9)
Dimensions	1962x 1134 x 30mm
Weight	27.4kg
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



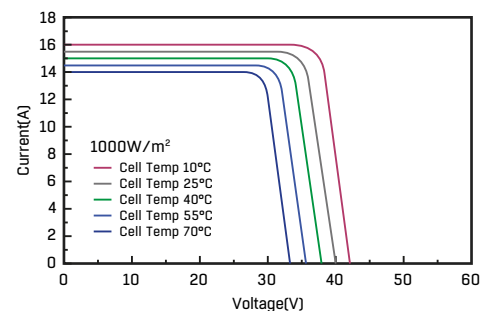
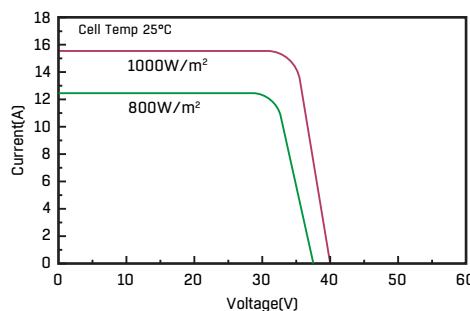
ELECTRICAL PARAMETERS

POWER CLASS	PH54-TCA-500		PH54-TCA-505		PH54-TCA-510		PH54-TCA-515		PH54-TCA-520	
	STC	BNPI	STC	BNPI	STC	BNPI	STC	BNPI	STC	BNPI
Maximum Power (Pmax)	500W	554W	505W	560W	510W	566W	515W	571W	520W	577W
Open Circuit Voltage (Voc)	39.48±3%	39.60±3%	39.54±3%	39.66±3%	39.60±3%	39.72±3%	39.66±3%	39.78±3%	39.72±3%	39.84±3%
Short Circuit Current (Isc)	15.83±3%	17.49±3%	15.96±3%	17.64±3%	16.09±3%	17.78±3%	16.22±3%	17.92±3%	16.35±3%	18.07±3%
Voltage at Maximum Power (Vmpp)	33.56V	33.66V	33.61V	33.71V	33.66V	33.76V	33.71V	33.81V	33.76V	33.86V
Current Maximum Power (Impp)	14.90A	16.46A	15.02A	16.60A	15.14A	16.74A	15.26A	16.88A	15.38A	17.02A
MODULE EFFICIENCY (%)	22.47%	24.92%	22.69%	25.16%	22.91%	25.41%	23.13%	25.65%	23.35%	25.90%

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	36
Pallets per container	24
Pieces per container	864



OPERATING CHARACTERISTICS

Operating Module Temperature	-40°C to +85°C
Maximum System Voltage	1500 DC (IEC)
Maximum Series Fuse Rating	30A
Power Tolerance	0/+5W

TEMPERATURE CHARACTERISTICS

Nominal Operating Cell Temperature	45±2°C
Temperature Coefficient of Pmax	-0.29%/°C
Temperature Coefficient of Voc	-0.25%/°C
Temperature Coefficient of Isc	+0.045%/°C

132-TCA BIFACIAL SINGLE GLASS

540W | UP TO 22.74%

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▶ DuraGlassX™

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▶ AluForce™ Black Frames

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COMPLETE SYSTEM AND PRODUCT CERTIFICATIONS



up to
22.74%
maximum efficiency

0~3
power
tolerance

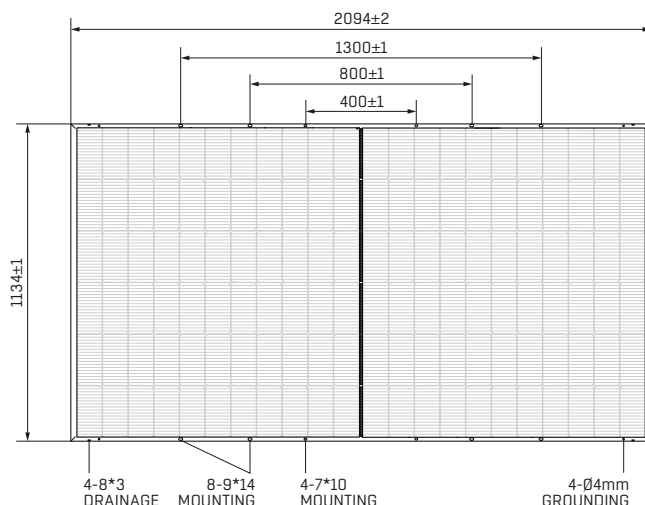
<1%
first year
power degradation

0.35%
year 2-30
power degradation

N-TYPE CELL
lower operating
temperature

MECHANICAL CHARACTERISTICS

Solar Cells	N-type Mono
No. of Cells	132 (6x22)
Dimensions	2094x 1134 x 30mm
Weight	25.3kg
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



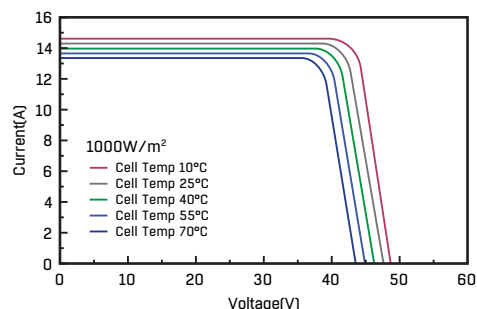
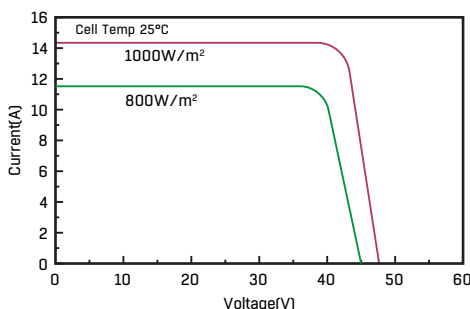
ELECTRICAL PARAMETERS

POWER CLASS	PH54-TCA-530			PH54-TCA-505			PH54-TCA-525			PH54-TCA-515			PH54-TCA-540		
	STC	STC	BNPI	STC	STC	BNPI	STC	STC	BNPI	STC	STC	BNPI	STC	STC	BNPI
Maximum power (Pmax)	500W	520W	554W	599W	560W	525W	500W	566W	515W	530W	520W	509W	507W	507W	517W
Open Circuit Voltage (Voc)	37.40V	37.10V	37.10V	37.10V	37.10V	37.10V	37.10V	37.10V	37.10V	37.10V	37.10V	37.10V	37.10V	37.10V	37.10V
Short Circuit Current (Isc)	37.10A	37.10A	37.10A	37.10A	37.10A	37.10A	37.10A	37.10A	37.10A	37.10A	37.10A	37.10A	37.10A	37.10A	37.10A
Voltage at Maximum power (Vmpp)	37.10V	37.10V	37.10V	37.10V	37.10V	37.10V	37.10V	37.10V	37.10V	37.10V	37.10V	37.10V	37.10V	37.10V	37.10V
Current Maximum Power (Impp)	37.10A	37.10A	37.10A	37.10A	37.10A	37.10A	37.10A	37.10A	37.10A	37.10A	37.10A	37.10A	37.10A	37.10A	37.10A
MODULE EFFICIENCY (%)	22.47%	22.47%	22.47%	22.47%	22.47%	22.47%	22.47%	22.47%	22.47%	22.47%	22.47%	22.47%	22.47%	22.47%	22.47%

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

PACKING CONFIGURATION

Container	40'HQ
Pieces per pallet	36
Pallets per container	22
Pieces per container	792



OPERATING CHARACTERISTICS

Operating Module Temperature	-40°C to +85°C
Maximum System Voltage	1500 DC (IEC)
Maximum Series Fuse Rating	30A
Power Tolerance	0/+5W

TEMPERATURE CHARACTERISTICS

Nominal Operating Cell Temperature	45±2°C
Temperature Coefficient of Pmax	-0.29%/°C
Temperature Coefficient of Voc	-0.25%/°C
Temperature Coefficient of Isc	+0.045%/°C

144-TCA BIFACIAL DOUBLEGLASS

605W | UP TO 25.98%

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COMPLETE SYSTEM AND PRODUCT CERTIFICATIONS



up to
25.98%
maximum efficiency

0~3
power
tolerance

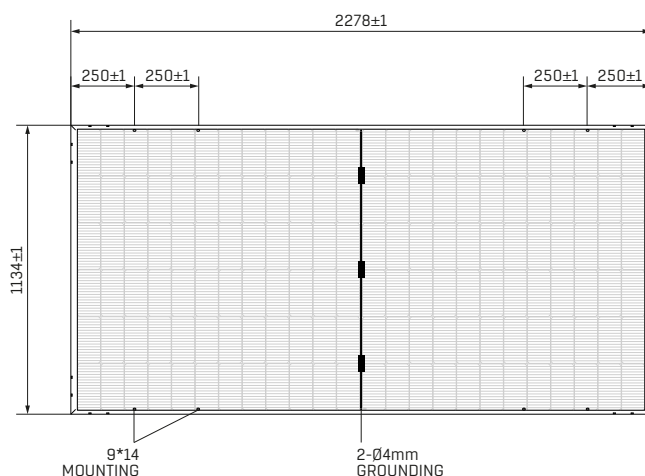
<1%
first year
power degradation

0.35%
year 2-30
power degradation

N-TYPE CELL
lower operating
temperature

MECHANICAL CHARACTERISTICS

Solar Cells	N-type Mono
No. of Cells	144 (12x12)
Dimensions	2278x 1134 x 30mm
Weight	31.5kg
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



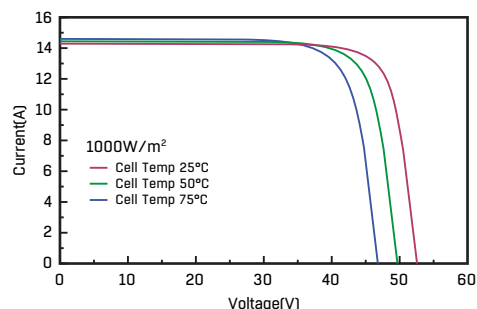
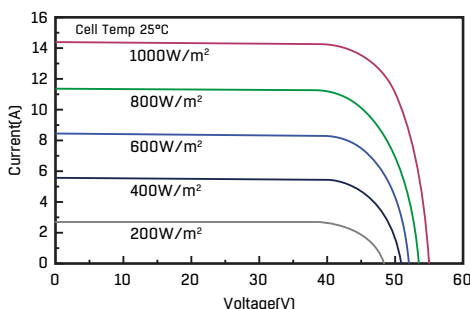
ELECTRICAL PARAMETERS

POWER CLASS	PH144-TCA-600		PH144-TCA-605	
	STC	BNPI	STC	BNPI
Maximum power (Pmax)	600W	665W	605W	671W
Open Circuit Voltage (Voc)	52.93±3%	53.09±3%	53.00±3%	53.16±3%
Short Circuit Current (Isc)	14.17±3%	15.66±3%	14.27±3%	15.77±3%
Voltage at Maximum power (Vmpp)	44.99V	45.13V	45.05V	45.19V
Current Maximum Power (Impp)	13.33A	14.74A	13.43A	14.84A
MODULE EFFICIENCY (%)	23.23%	25.75%	23.42%	25.98%

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	25A
Power Tolerance	0/+5W

TEMPERATURE CHARACTERISTICS

Nominal Operating Cell Temperature	45±2°C
Temperature Coefficient of Pmax	-0.29%/°C
Temperature Coefficient of Voc	-0.25%/°C
Temperature Coefficient of Isc	+0.045%/°C

156-TCA BIFACIAL DOUBLEGLASS

650W | UP TO 26.37%

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COMPLETE SYSTEM AND PRODUCT CERTIFICATIONS



up to
26.37%
maximum efficiency

0~3
power
tolerance

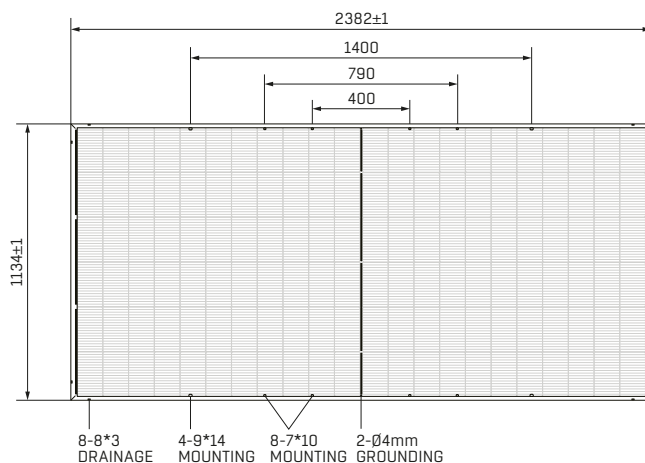
<1%
first year
power degradation

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



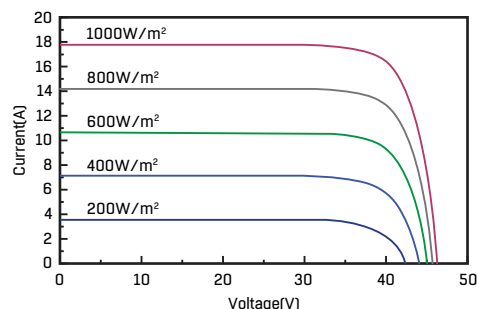
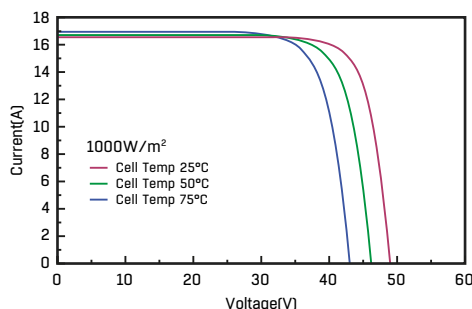
ELECTRICAL PARAMETERS

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 (Pmax)	630W	690W	635W	695W	640W	701W	645W	706W	650W	712W
Open Circuit Voltage (Voc)	49.68±3%		49.86±3%		50.04±3%		50.22±3%		50.40±3%	
Short Circuit Current (Isc)	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 (Vmpp)	41.64V		41.78V		41.91V		42.05V		42.19V	
Current Maximum Power (Impp)	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 Pmax	-0.29%/°C
Temperature Coefficient of Voc	-0.25%/°C
Temperature Coefficient of Isc	+0.045%/°C

66-TCA BIFACIAL DOUBLEGLASS

730W | UP TO 26.05%

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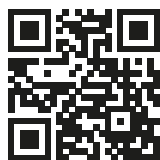
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COMPLETE SYSTEM AND PRODUCT CERTIFICATIONS



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maximum efficiency

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tolerance

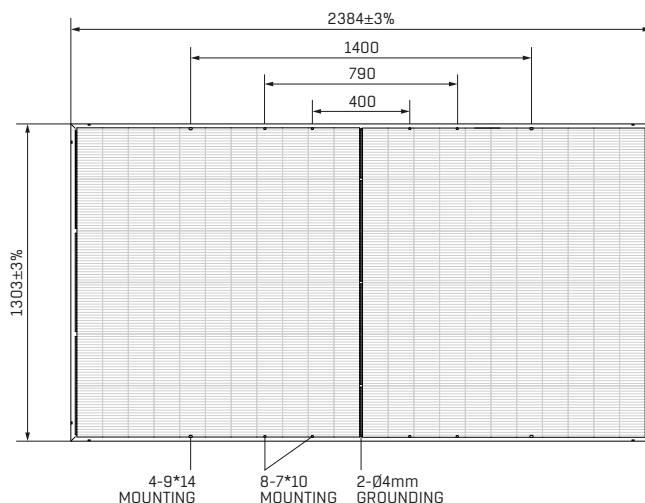
<1%
first year
power degradation

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	2384x 1303 x 35mm
Weight	38.5kg
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



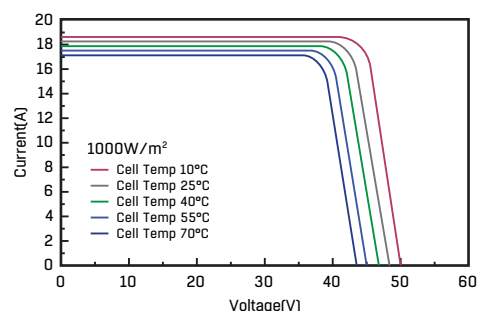
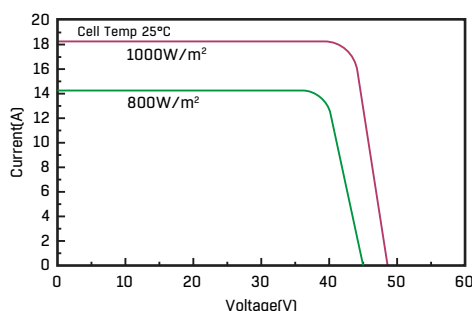
ELECTRICAL PARAMETERS

POWER CLASS	PH66-TCA-720		PH66-TCA-725		PH66-TCA-730	
	STC	BNPI	STC	BNPI	STC	BNPI
Maximum Power (Pmax)	720W	798W	725W	804W	730W	809W
Open Circuit Voltage (Voc)	49.10±3%V	49.25±3%V	49.26±3%V	49.41±3%V	49.40±3%V	49.55±3%V
Short Circuit Current (Isc)	18.56±3%A	20.51±3%A	18.63±3%A	20.59±3%A	18.71±3%A	20.67±3%A
Voltage at Maximum Power (Vmpp)	41.00V	41.12V	41.13V	41.26V	41.25V	41.37V
Current Maximum Power (Impp)	17.56A	19.40A	17.63A	19.48A	17.70A	19.56A
MODULE EFFICIENCY (%)	23.18%	25.69%	23.34%	25.87%	23.50%	26.05%

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	31
Pallets per container	18
Pieces per container	558



OPERATING CHARACTERISTICS

Operating Module Temperature	-40°C to +85°C
Maximum System Voltage	1500 DC (IEC)
Maximum Series Fuse Rating	30A
Power Tolerance	0/+5W

TEMPERATURE CHARACTERISTICS

Nominal Operating Cell Temperature	45±2°C
Temperature Coefficient of Pmax	-0.29%/°C
Temperature Coefficient of Voc	-0.25%/°C
Temperature Coefficient of Isc	+0.045%/°C