



# ASTORIOS

per aspera ad astra

PRODUCT CATALOG

# CONTENTS:

ASTORIOS: ADVANCING FRONTIERS

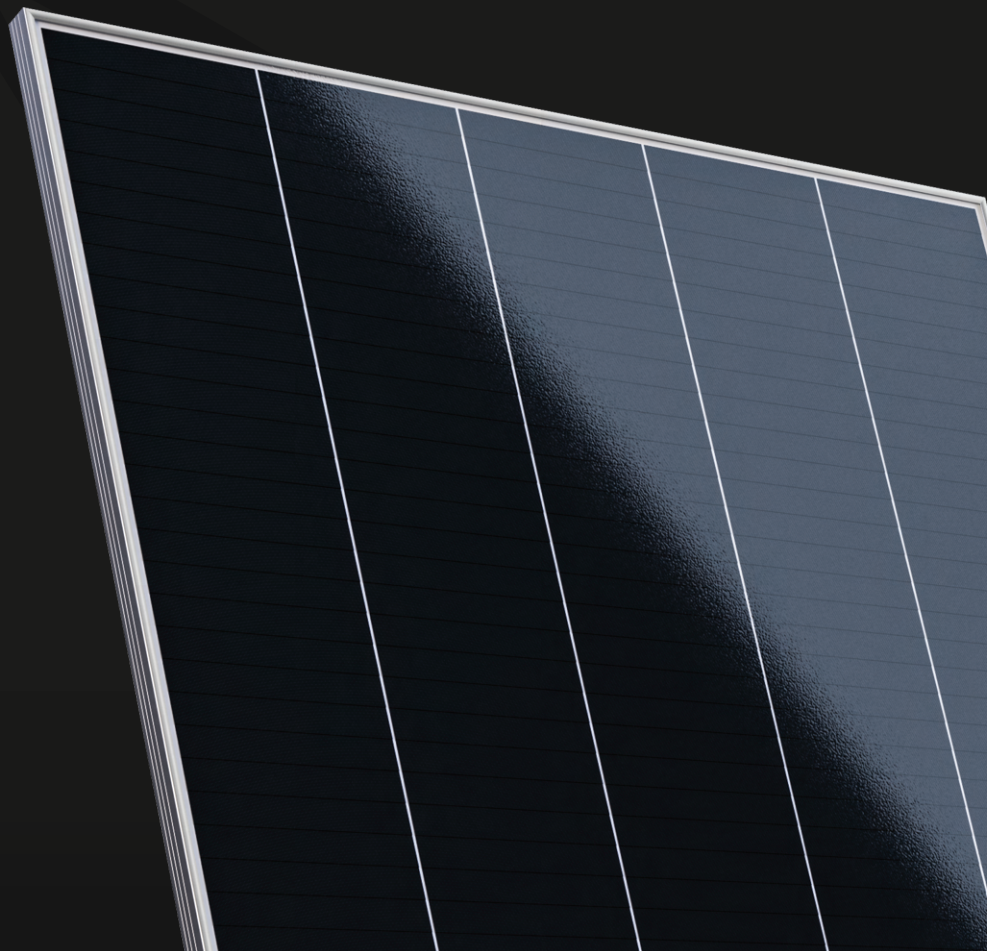
TOPCON PV MODULES

HETEROJUNCTION PV MODULES

HALF CUT PV MODULES

C&I BATTERY ENERGY STORAGE SYSTEMS

CERTIFICATION



# ASTORIOS: Advancing Frontiers

## Our Mission

We are determined to pursue perfection in our business by combining advanced technologies in manufacturing unparalleled expertise, and a relentless dedication to customer satisfaction. We aim to deliver tailored solutions for a diverse range of industries, establishing ourselves as a trusted partner in the global market, while upholding the highest standards of quality, sustainability, and innovation. Together, we are creating a more connected and efficient world for generations to come.

## Our Vision

Leveraging years of experience and passion for innovation, with commitment to excellence, enduring through challenges, we push the boundaries of what's possible for the brighter future powered by an endless source of energy – the sun.

## About Us

ASTORIOS Holding Inc. is an international renewable energy company based in the USA. We specialize in manufacturing and supplying premium quality photovoltaic modules and battery energy storage systems to the global market.

Our commitment to customer satisfaction goes beyond delivering exceptional products; we strive to provide timely support, maintain direct contact, and offer a comprehensive range of services that cater to our clients' unique needs with diligent attention to detail.

ASTORIOS worldwide distributorship network is rapidly expanding, ensuring local sales and tailored services for our diverse customers. Our team is always available for direct contact and support, fostering strong relationships with both customers and distributors.

ASTORIOS's products are certified by all necessary international and local standards for production, quality, safety, management, packaging, and operation. Our manufacturing facilities undergo regular inspections by third-party certifiers, who conduct rigorous production surveillance to ensure compliance with our uncompromising, multi-step quality control process.

We manufacture rooftop, commercial, and utility-scale photovoltaic modules as well as battery storage systems in fully automated, robotized facilities, using the finest raw materials and the most advanced technology available. In addition to our standard offerings, we can also supply customized products tailored to our clients' specific requirements.

To provide our customers with cutting-edge technology and a variety of options, we collaborate with leading component suppliers. This enables our global network of distributors to meet the diverse needs of their customers ranging from large utility-scale projects to residential installations.

At ASTORIOS, we are committed to supporting your long-term business growth by providing exceptional products and unparalleled service for you and your customers. Together, we are advancing the renewable energy industry and paving the way for a sustainable future.

# TOPCon PV MODULES

Experience the cutting-edge performance of ASTORIOS's N-Type Tunnel Oxide Passivated Contact (TOPCon) PV modules, setting new standards in efficiency, stability, and affordability within the solar industry.

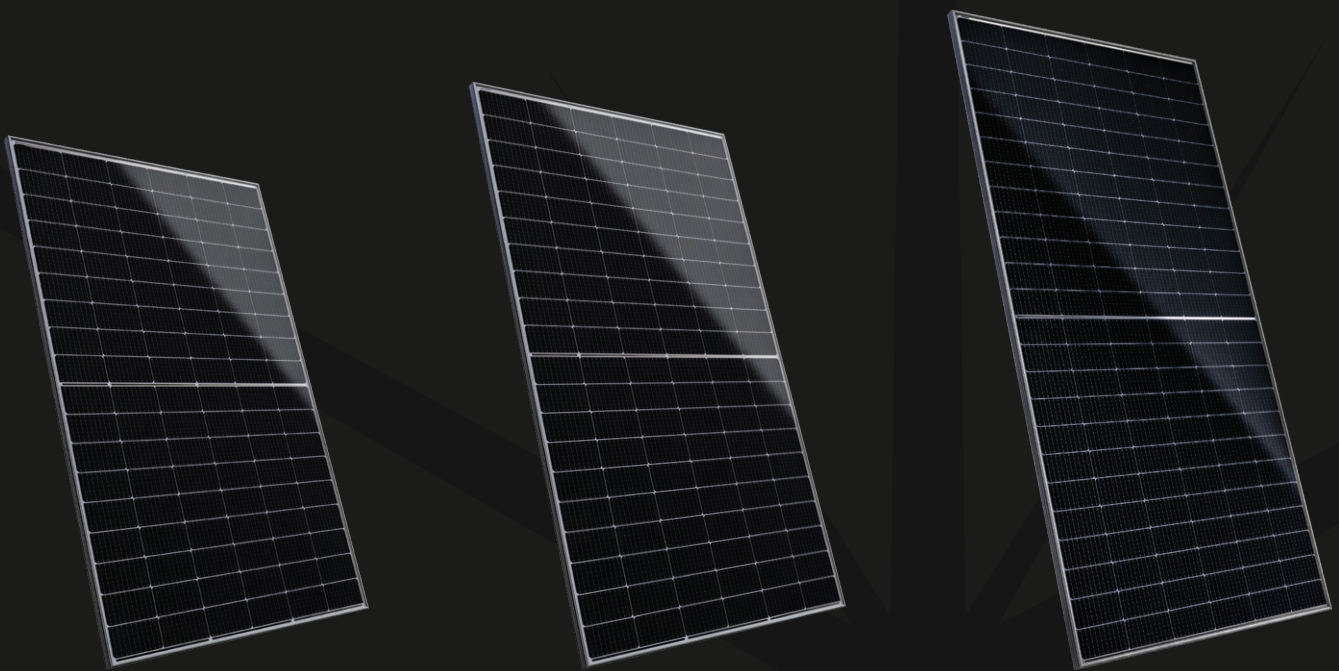
Our TOPCon PV modules boast a remarkable 23% maximum module efficiency, making them a highly competitive choice among advanced solar technologies with lower balance of system (BOS) cost, requiring less space and installation effort. TOPCon technology is an efficient choice for a variety of applications with numerous other advantages over conventional solar panel solutions.

The high-performance capabilities of our N-Type TOPCon PV modules make them an attractive investment for both residential and commercial applications. They are especially well-suited for projects requiring maximum energy generation within limited space constraints.

To compare 585 Wp N-Type TOPCon solar panels have the same dimensions as 550 Wp P-Type PERC solar panels.

N-Type TOPCon cells benefit from a unique layer structure that offers superior performance compared to traditional P-type cells, leading to increased efficiency, minimal power losses, and resistance to high temperature, designed to withstand extreme weather conditions, offering reliable performance even in the most challenging environments. These characteristics result in the elimination of potential-induced degradation (PID) and light-induced degradation (LID).

Exceptional longevity and durability are hallmarks of our N-Type TOPCon technology, ensuring that our modules continue to perform optimally over time, providing long-lasting performance and reliability.



ASTR 108HCND/10 Series 430-440 Wp

ASTR 120HCND/10 Series 475-485 Wp

ASTR 144HCN/10 Series 575-585 Wp



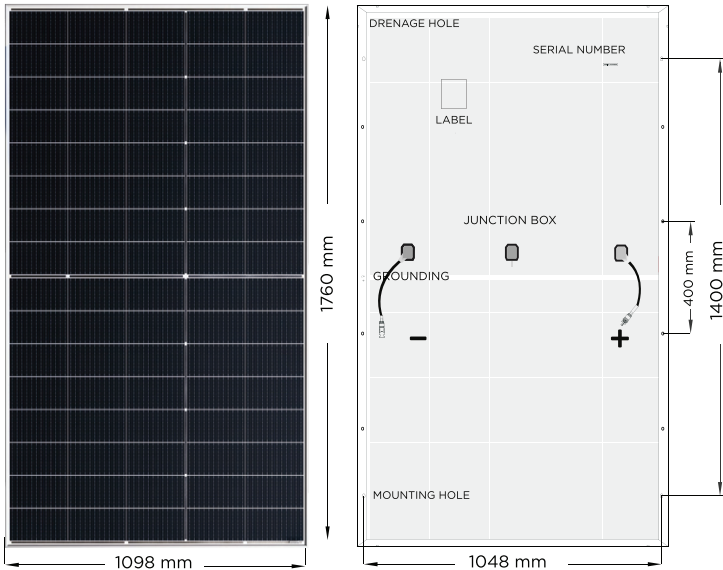


## HIGH EFFICIENCY PHOTOVOLTAIC MODULE BIFACIAL, DOUBLE GLASS

ASTR 80HCND/12 Series 410-420 Wp

TOPCON N-TYPE HALF CUT CELLS

**21.8%**  
**MAXIMUM MODULE EFFICIENCY**



### MATERIAL CHARACTERISTICS

Dimensions	1760 × 1098 × 30 mm (35 mm optional)
Weight	23.8 kg (24.1kg optional)
Number of cells	80 pcs (5x16)
Glass front/rear	2mm, High transparency, AR coated
Cell layout	Bifacial, Half Cut N-Type 18BB (210 mm)
Frame	Silver color (Black optional), anodized aluminum alloy
Junction box	IP68 Rated, 3 bypass diodes
Connector type	Staubli MC4-Evo 2 / MC4 (Original)
Cable	4 mm <sup>2</sup> , 300 mm

### PACKAGING INFORMATION

One pallet quantity	36 pcs (31 pcs optional)
40 ft HC/HQ container	900 pcs (806 pcs optional)

### TEMPERATURE PARAMETERS

Temperature Coefficient of Pmax	-0.30 % / °C
Temperature Coefficient of Voc	-0.25 % / °C
Temperature Coefficient of Isc	+0.046 % / °C
Operating Temperature	- 40°C to + 85°C
Normal Operating Cell Temperature (NOCT)	44±2°C

### MAXIMUM RATINGS

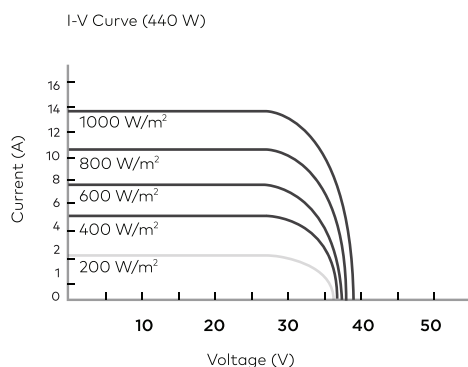
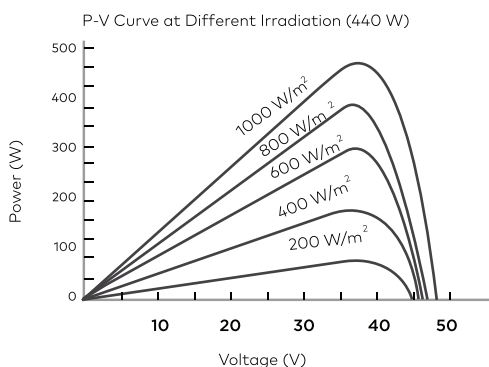
Max. System Voltage	1500V DC - (H)
Max. Series Fuse Rating	35A
Uplift load (wind)	2400 Pa*
Downforce (snow)	5400 Pa*

\*For more information please refer to Instruction Manual

MODULE TYPE 80HCND/12	410 Wp		415 Wp		420 Wp	
	STC	NMOT	STC	NMOT	STC	NMOT
<b>ELECTRICAL CHARACTERISTICS</b>						
Maximum power (Pmax/Wp)	410	312	415	316	420	320
Open circuit voltage (Voc / V)	28.80	26.73	29.00	26.93	29.20	27.13
Short circuit current (Isc / A)	18.06	14.75	18.11	14.80	18.16	14.85
Maximum power voltage (Vmp / V)	24.00	22.49	24.20	22.69	24.40	22.89
Maximum power current (Imp / A)	17.08	13.87	17.15	13.92	17.21	13.97
Module efficiency at STC (ηm / %)	21.30		21.50		21.80	
Power tolerance (Pmax)			0-+3%			

NMOT: Irradiance 800 W/m<sup>2</sup>, ambient temperature 20°C and wind speed 1 m/s

STC: Irradiance of 1000 W/m<sup>2</sup> with spectrum AM 1.5 and a module temperature of 25°C



**30 YEARS**  
Performance Guarantee

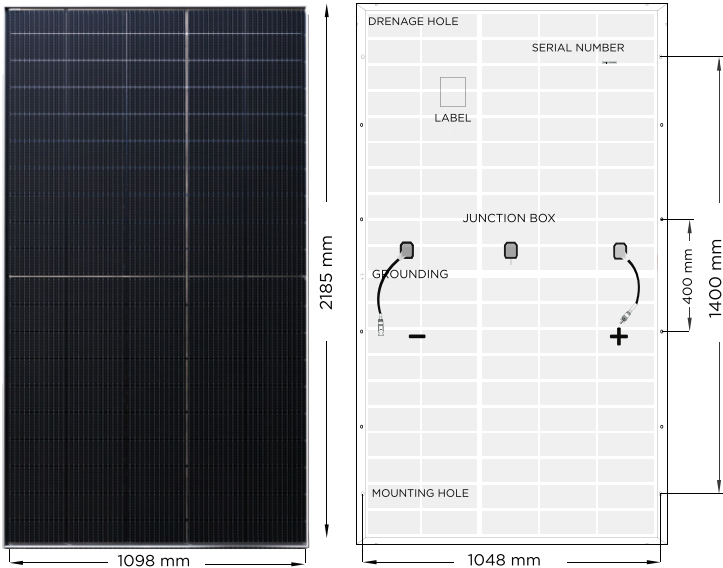
**20 YEARS**  
Product Warranty

## HIGH EFFICIENCY PHOTOVOLTAIC MODULE BIFACIAL, DOUBLE GLASS

ASTR 100HCND/12 Series 515-525 Wp

TOPCON N-TYPE HALF CUT CELLS

**21.9%**  
MAXIMUM MODULE EFFICIENCY



### MATERIAL CHARACTERISTICS

Dimensions	2185 x 1098 x 35 mm
Weight	29.7kg
Number of cells	100 pcs (5x20)
Glass front/rear	2mm, High transparency, AR coated
Cell layout	Mono-crystalline, Half Cut N-Type 18BB (210 mm)
Frame	Silver color (Black optional), anodized aluminum alloy
Junction box	IP68 Rated, 3 bypass diodes
Connector type	Staubli MC4-Evo 2 / MC4 (Original)
Cable	4 mm <sup>2</sup> , 300 mm

### TEMPERATURE PARAMETERS

Temperature Coefficient of Pmax	-0.30 % / °C
Temperature Coefficient of Voc	-0.25 % / °C
Temperature Coefficient of Isc	+0.046 % / °C
Operating Temperature	- 40°C to + 85°C
Normal Operating Cell Temperature (NOCT)	44±2°C

### MAXIMUM RATINGS

Max. System Voltage	1500V DC - (H)
Max. Series Fuse Rating	35A
Uplift load (wind)	2400 Pa*
Downforce (snow)	5400 Pa*

### PACKAGING INFORMATION

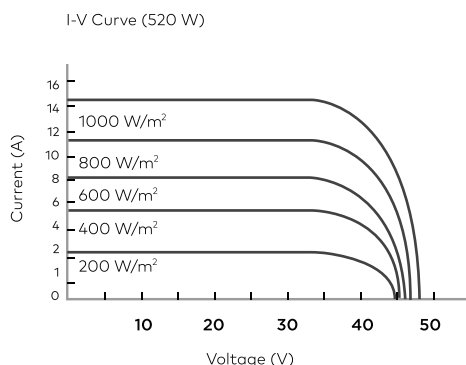
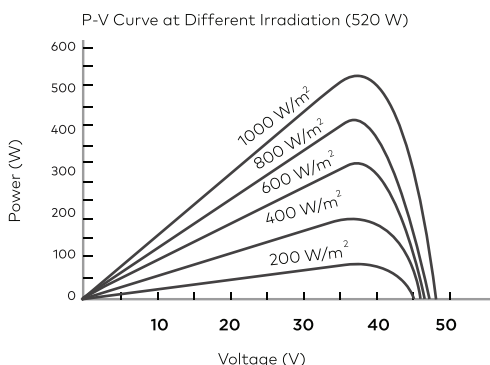
One pallet quantity	31 pcs
40 ft HC/HQ container	620 pcs

\*For more information please refer to Instruction Manual

MODULE TYPE 100HCND/12	515 Wp		520 Wp		525 Wp	
	STC	NMOT	STC	NMOT	STC	NMOT
<b>ELECTRICAL CHARACTERISTICS</b>						
Maximum power (Pmax/Wp)	515	392	520	396	525	400
Open circuit voltage (Voc / V)	35.80	33.60	36.00	33.80	36.20	34.00
Short circuit current (Isc / A)	18.06	14.45	18.11	14.50	18.16	14.55
Maximum power voltage (Vmp / V)	29.80	28.02	30.00	28.22	30.20	28.42
Maximum power current (Imp / A)	17.28	13.99	17.33	14.04	17.38	14.08
Module efficiency at STC (ηm / %)	21.50		21.70		21.90	
Power tolerance (Pmax)			0-+3%			

NMOT: Irradiance 800 W/m<sup>2</sup>, ambient temperature 20°C and wind speed 1 m/s

STC: Irradiance of 1000 W/m<sup>2</sup> with spectrum AM 1.5 and a module temperature of 25°C



**30 YEARS**  
Performance Guarantee

**20 YEARS**  
Product Warranty

# ASTORIOS

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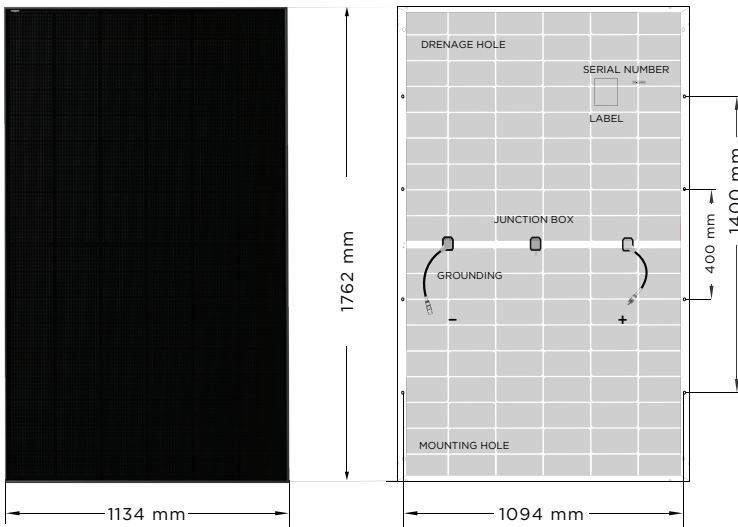
## ULTRA BLACK HIGH EFFICIENCY BIFACIAL, DOUBLE GLASS PHOTOVOLTAIC MODULE

ASTR 108HCND/10 Series 425-445 Wp

TOPCON N-TYPE HALF CUT CELLS

### 22.27%

MAXIMUM MODULE EFFICIENCY



### MATERIAL CHARACTERISTICS

Dimensions	1762 x 1134 x 30 mm (1.998 m <sup>2</sup> )
Weight	22.5 kg
Number of cells	108 pcs (6x18)
Cells Type	Mono-crystalline, Half Cut N-Type 16BB/10 BB (186x182 mm)
Glass front/back	2 mm, High transparency, AR coated
Frame	Black color, Anodized aluminum alloy
Junction box	IP68 Rated, 3 bypass diodes
Connector type	Staubli MC4 (Original)
Cable	4 mm <sup>2</sup> , 300 mm

### PACKAGING INFORMATION

One pallet quantity	36 pcs
40 ft HC/HQ container	936 pcs

### TEMPERATURE PARAMETERS

Temperature Coefficient of Pmax	-0.30 % / °C
Temperature Coefficient of Voc	-0.25 % / °C
Temperature Coefficient of Isc	+0.046 % / °C
Operating Temperature	-40°C to +85 °C
Normal Operating Cell Temperature (NOCT)	44±2°C

### MAXIMUM RATINGS

Max. System Voltage	1500V DC -(H)
Max. Series Fuse Rating	25 A
Uplift load (wind)	2400 Pa*
Downforce load (snow)	5400 Pa*

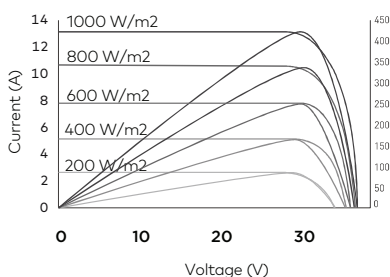
\*For more information please refer to Instruction Manual

MODULE TYPE 108HCND/10	425 Wp		430 Wp		435 Wp		440 Wp		445 Wp	
	STC	NOCT	STC	NOCT	STC	NOCT	STC	NOCT	STC	NOCT
<b>ELECTRICAL CHARACTERISTICS</b>										
Maximum power (Pmax / Wp)	425	320	430	323	435	327	440	331	445	335
Open circuit voltage (Voc / V)	38.75	36.81	38.95	37.00	39.16	37.20	39.38	37.41	39.59	37.61
Short circuit current (Isc / A)	13.66	11.03	13.73	11.09	13.80	11.14	13.86	11.19	13.93	11.25
Maximum power voltage (Vmp / V)	32.18	29.99	32.38	30.10	32.59	30.33	32.81	30.56	33.02	30.76
Maximum power current (Imp / A)	13.21	10.67	13.28	10.73	13.35	10.78	13.41	10.83	13.48	10.89
Module efficiency at STC (ηm / %)	21.27		21.52		21.77		22.02		22.27	
Power tolerance (Pmax)	(0,+5) Wp									

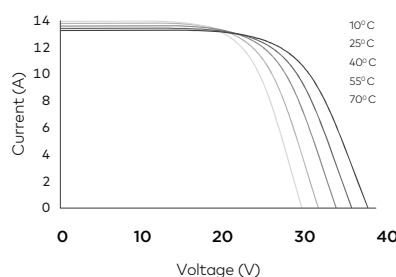
STC: Irradiance of 1000 W/m<sup>2</sup> with spectrum AM 1.5 and a module temperature of 25°C

NOCT: Irradiance 800 W/m<sup>2</sup>, ambient temperature 20°C and wind speed 1 m/s

I-V/P-V Curve at Different Irradiation (420W)  
Cell temperature 25°C



I-V Curve at Different Temperature (420W)  
Irradiation 1000 W/m<sup>2</sup>



## 30 YEARS

Performance Guarantee

## 20 YEARS

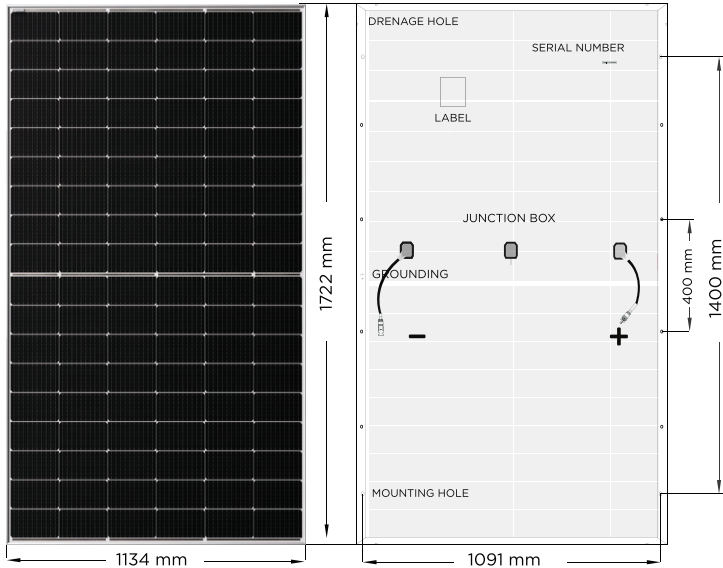
Product Warranty

## HIGH EFFICIENCY PHOTOVOLTAIC MODULE BIFACIAL, DOUBLE GLASS

ASTR 108HCND/10 Series 430-440 Wp

TOPCON N-TYPE HALF CUT CELLS

**22.5%**  
**MAXIMUM MODULE EFFICIENCY**



### MATERIAL CHARACTERISTICS

Dimensions	1722 x 1134 x 30 mm (35 mm optional)
Weight	25.8kg (26.1kg optional)
Number of cells	108 pcs (6x18)
Glass front/rear	2mm, High transparency, AR coated
Cell layout	Mono-crystalline, Half Cut N-Type 16BB (182mm)
Frame	Silver color (Black optional), anodized aluminum alloy
Junction box	IP68 Rated, 3 bypass diodes
Connector type	Staubli MC4-Evo 2 / MC4 (Original)
Cable	4 mm <sup>2</sup> , 300 mm

### PACKAGING INFORMATION

One pallet quantity	36 pcs (31 pcs optional)
40 ft HC/HQ container	828 pcs (806 pcs optional)

### TEMPERATURE PARAMETERS

Temperature Coefficient of Pmax	-0.30 % / °C
Temperature Coefficient of Voc	-0.25 % / °C
Temperature Coefficient of Isc	+0.046 % / °C
Operating Temperature	- 40°C to + 85°C
Normal Operating Cell Temperature (NOCT)	44±2°C

### MAXIMUM RATINGS

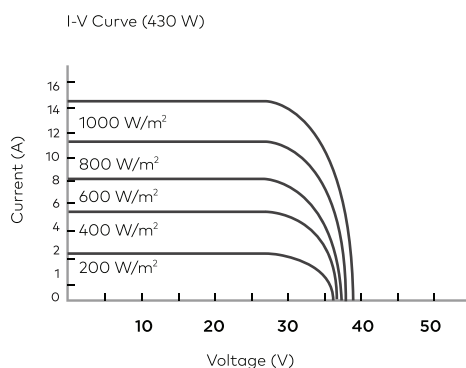
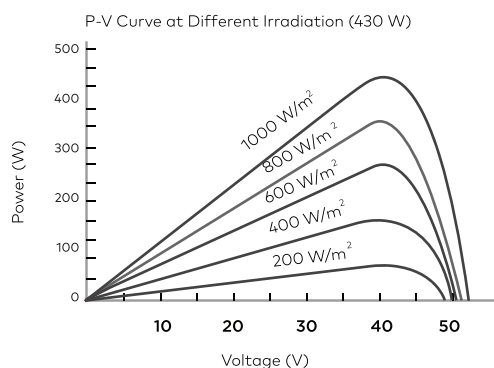
Max. System Voltage	1500V DC - (H)
Max. Series Fuse Rating	25A
Uplift load (wind)	2400 Pa*
Downforce (snow)	5400 Pa*

\*For more information please refer to Instruction Manual

MODULE TYPE 108HCND/10	430 Wp		435 Wp		440 Wp	
	STC	NMOT	STC	NMOT	STC	NMOT
Maximum power (Pmax/Wp)	430	324	435	328	440	332
Open circuit voltage (Voc / V)	38.49	36.56	38.68	36.74	38.87	36.92
Short circuit current (Isc / A)	14.23	11.49	14.31	11.56	14.39	11.63
Maximum power voltage (Vmp / V)	31.88	29.66	32.06	28.81	32.24	29.96
Maximum power current (Imp / A)	13.49	10.93	13.57	11.01	13.65	11.09
Module efficiency at STC (ηm / %)	22.00		22.30		22.50	
Power tolerance (Pmax)			0-+3%			

NMOT: Irradiance 800 W/m<sup>2</sup>, ambient temperature 20°C and wind speed 1 m/s

STC: Irradiance of 1000 W/m<sup>2</sup> with spectrum AM 1.5 and a module temperature of 25°C



**30 YEARS**  
Performance Guarantee

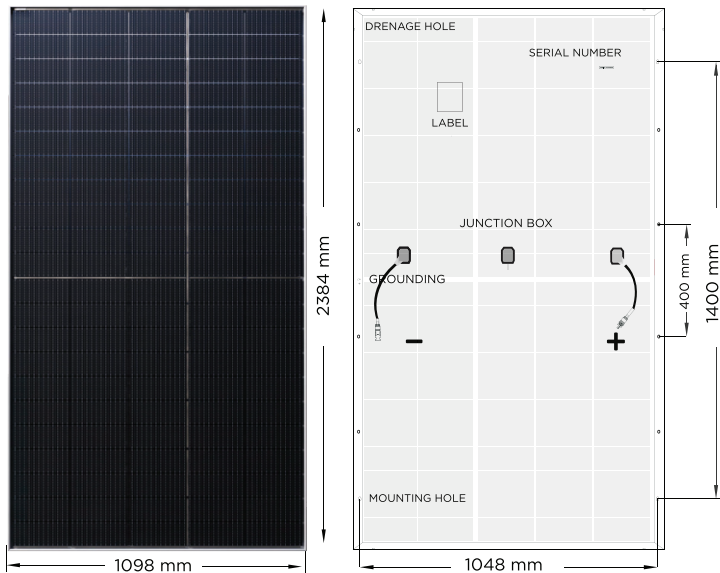
**20 YEARS**  
Product Warranty

## HIGH EFFICIENCY BIFACIAL, DOUBLE GLASS PHOTOVOLTAIC MODULE

ASTR 110HCND/12 Series 590-595 Wp

TOPCON N-TYPE HALF CUT CELLS

**22.8%**  
**MAXIMUM MODULE EFFICIENCY**



### MATERIAL CHARACTERISTICS

Dimensions	2384 x 1098 x 35 mm
Weight	32.1kg
Number of cells	110 pcs (5x22)
Glass front/back	2mm, High transparency, AR coated
Cell layout	Half Cut N-Type, Bifacial 18BB (210mm)
Frame	Silver color (Black optional), anodized aluminum alloy
Junction box	IP68 Rated, 3 bypass diodes
Connector type	Staubli MC4-Evo 2 / MC4 (Original)
Cable	4 mm <sup>2</sup> , 300 mm

### TEMPERATURE PARAMETERS

Temperature Coefficient of Pmax	-0.30 % / °C
Temperature Coefficient of Voc	-0.25 % / °C
Temperature Coefficient of Isc	+0.046 % / °C
Operating Temperature	- 40°C to + 85°C
Normal Operating Cell Temperature (NOCT)	44±2°C

### MAXIMUM RATINGS

Max. System Voltage	1500V DC - (H)
Max. Series Fuse Rating	35A
Uplift load (wind)	2400 Pa*
Downforce (snow)	5400 Pa*

### PACKAGING INFORMATION

One pallet quantity	31 pcs
40 ft HC/HQ container	620 pcs

\*For more information please refer to Instruction Manual

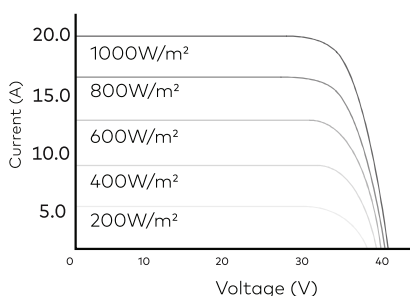
### MODULE TYPE 110HCND/12

ELECTRICAL CHARACTERISTICS	590 Wp		595 Wp	
	STC	NMOT	STC	NMOT
Maximum power (Pmax/Wp)	590	446	595	450
Open circuit voltage (Voc / V)	40.40	37.50	40.60	37.70
Short circuit current (Isc / A)	18.36	15.01	18.41	15.06
Maximum power voltage (Vmp / V)	33.80	31.43	34.00	31.63
Maximum power current (Imp / A)	17.46	14.15	17.50	14.18
Module efficiency at STC (ηm / %)	22.60		22.80	
Power tolerance (Pmax)			0-+3%	

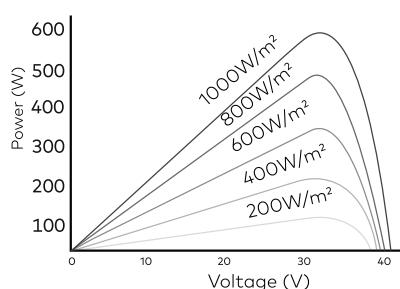
NMOT: Irradiance 800 W/m<sup>2</sup>, ambient temperature 20°C and wind speed 1 m/s

STC: Irradiance of 1000 W/m<sup>2</sup> with spectrum AM 1.5 and a module temperature of 25°C

I-V Curve at Different Temperature (600 W)



P-V Curve (600 W)



**30 YEARS**  
Performance Guarantee

**20 YEARS**  
Product Warranty

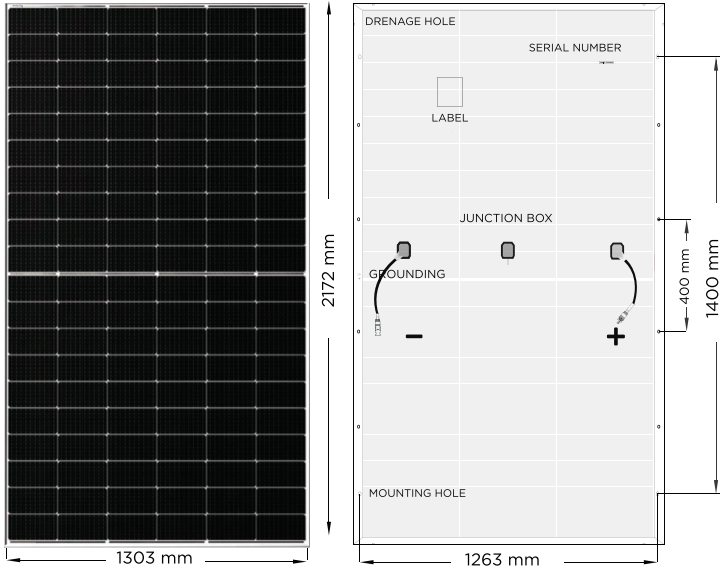


## HIGH EFFICIENCY PHOTOVOLTAIC MODULE BIFACIAL, DOUBLE GLASS

ASTR 120HCND/12 Series 620-630 Wp

TOPCON N-TYPE HALF CUT CELLS

**22.4%**  
**MAXIMUM MODULE EFFICIENCY**



### MATERIAL CHARACTERISTICS

Dimensions	2172 x 1303 x 35 mm
Weight	35.3kg
Number of cells	120 pcs (6x20)
Glass front/rear	2mm, High transparency, AR coated
Cell layout	Bifacial, Half Cut N-Type 18BB (210 mm)
Frame	Silver color (Black optional), anodized aluminum alloy
Junction box	IP68 Rated, 3 bypass diodes
Connector type	Staubli MC4-Evo 2 / MC4 (Original)
Cable	4 mm <sup>2</sup> , 300 mm

### TEMPERATURE PARAMETERS

Temperature Coefficient of Pmax	-0.30 % / °C
Temperature Coefficient of Voc	-0.25 % / °C
Temperature Coefficient of Isc	+0.046 % / °C
Operating Temperature	- 40°C to + 85°C
Normal Operating Cell Temperature (NOCT)	44±2°C

### MAXIMUM RATINGS

Max. System Voltage	1500V DC - (H)
Max. Series Fuse Rating	35A
Uplift load (wind)	2400 Pa*
Downforce (snow)	5400 Pa*

### PACKAGING INFORMATION

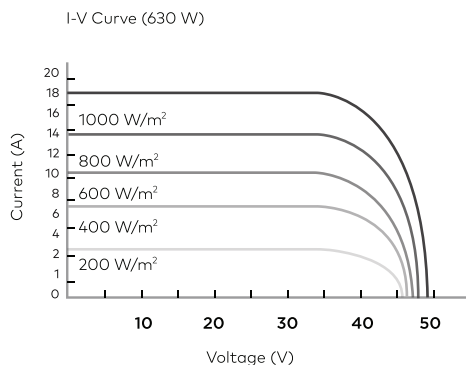
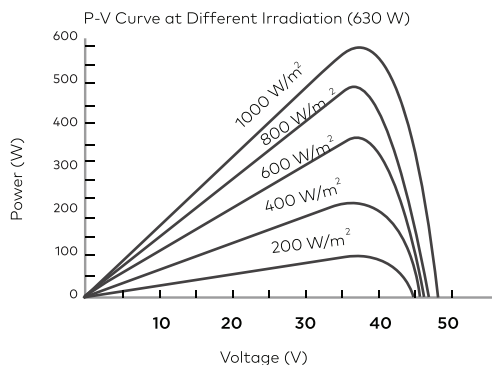
One pallet quantity	31 pcs
40 ft HC/HQ container	558 pcs

\*For more information please refer to Instruction Manual

MODULE TYPE 120HCND/12	620 Wp		625 Wp		630 Wp	
	STC	NMOT	STC	NMOT	STC	NMOT
<b>ELECTRICAL CHARACTERISTICS</b>						
Maximum power (Pmax/Wp)	620	469	625	473	630	476
Open circuit voltage (Voc / V)	42.90	40.60	43.10	40.80	43.30	41.00
Short circuit current (Isc / A)	18.31	14.77	18.36	14.81	18.41	14.85
Maximum power voltage (Vmp / V)	35.7	33.80	35.90	33.90	36.10	34.30
Maximum power current (Imp / A)	17.37	13.89	17.41	13.93	17.46	13.96
Module efficiency at STC (ηm / %)	22.00		22.20		22.40	
Power tolerance (Pmax)			0-+3%			

NMOT: Irradiance 800 W/m<sup>2</sup>, ambient temperature 20°C and wind speed 1 m/s

STC: Irradiance of 1000 W/m<sup>2</sup> with spectrum AM 1.5 and a module temperature of 25°C



**30 YEARS**  
Performance Guarantee

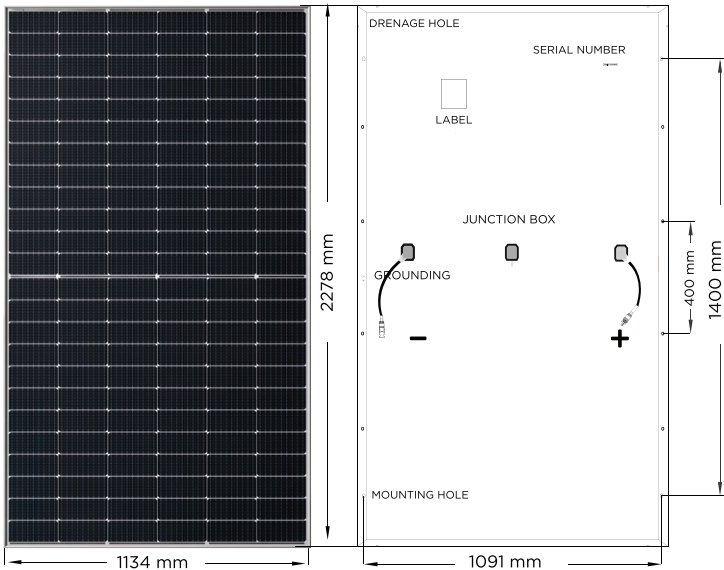
**20 YEARS**  
Product Warranty

## HIGH EFFICIENCY PHOTOVOLTAIC MODULE

ASTR 144HCN/10 Series 575-585 Wp

TOPCON N-TYPE HALF CUT CELLS

**22.7%**  
**MAXIMUM MODULE EFFICIENCY**



### MATERIAL CHARACTERISTICS

Dimensions	2278 x 1134 x 35 mm
Weight	29.0kg
Number of cells	144 pcs (6x24)
Glass	3.2mm, High transparency, AR coated
Cell layout	Mono-crystalline, Half Cut N-Type 16BB (182 mm)
Frame	Silver color, anodized aluminum alloy
Junction box	IP68 Rated, 3 bypass diodes
Connector type	Staubli MC4-Evo 2 / MC4 (Original)
Cable	4 mm <sup>2</sup> , 300 mm

### TEMPERATURE PARAMETERS

Temperature Coefficient of Pmax	-0.30 % / °C
Temperature Coefficient of Voc	-0.25 % / °C
Temperature Coefficient of Isc	+0.046 % / °C
Operating Temperature	- 40°C to + 85°C
Normal Operating Cell Temperature (NOCT)	44±2°C

### MAXIMUM RATINGS

Max. System Voltage	1500V DC - (H)
Max. Series Fuse Rating	25A
Uplift load (wind)	2400 Pa*
Downforce (snow)	5400 Pa*

### PACKAGING INFORMATION

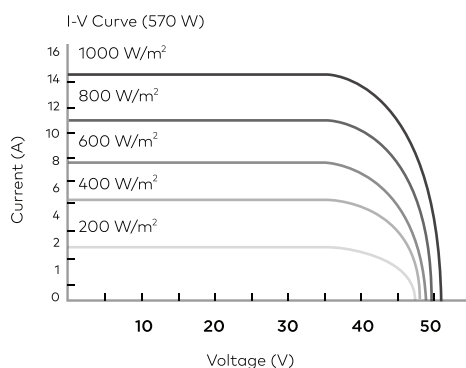
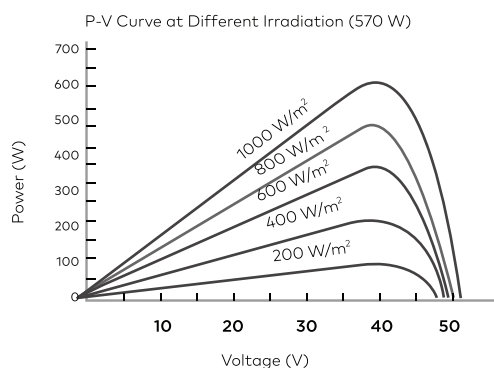
One pallet quantity	31 pcs
40 ft HC/HQ container	620 pcs

\*For more information please refer to Instruction Manual

MODULE TYPE 144HCN/10	575 Wp		580 Wp		585 Wp	
	STC	NMOT	STC	NMOT	STC	NMOT
<b>ELECTRICAL CHARACTERISTICS</b>						
Maximum power (Pmax/Wp)	575	432	580	436	585	440
Open circuit voltage (Voc / V)	51.27	48.33	51.47	48.46	51.67	48.60
Short circuit current (Isc / A)	14.31	11.62	14.37	11.68	14.43	11.75
Maximum power voltage (Vmp / V)	42.44	39.60	42.59	39.69	42.75	39.81
Maximum power current (Imp / A)	13.55	10.92	13.62	10.99	13.69	11.05
Module efficiency at STC (ηm / %)	22.30		22.50		22.70	
Power tolerance (Pmax)			0-+3%			

NMOT: Irradiance 800 W/m<sup>2</sup>, ambient temperature 20°C and wind speed 1 m/s

STC: Irradiance of 1000 W/m<sup>2</sup> with spectrum AM 1.5 and a module temperature of 25°C



**30 YEARS**  
Performance Guarantee

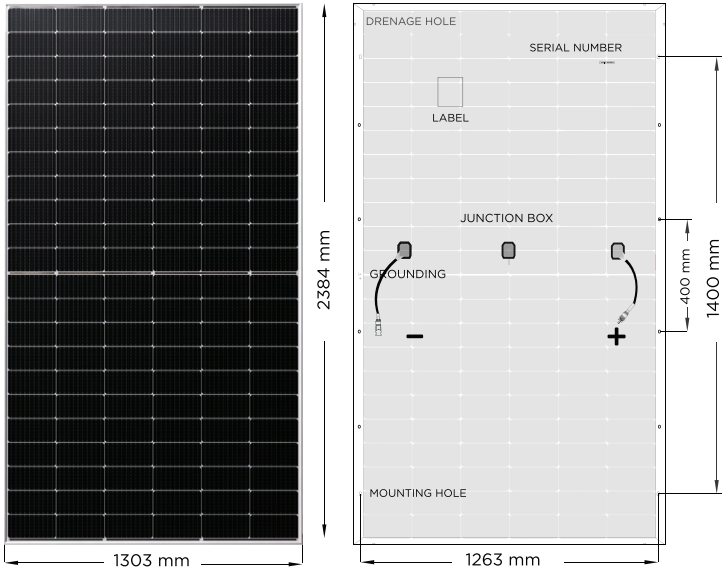
**15 YEARS**  
Product Warranty

## HIGH EFFICIENCY PHOTOVOLTAIC MODULE BIFACIAL, DOUBLE GLASS

ASTR 132HCND/12 Series 685-695 Wp

TOPCON N-TYPE HALF CUT CELLS

**22.5%**  
**MAXIMUM MODULE EFFICIENCY**



### MATERIAL CHARACTERISTICS

Dimensions	2384 x 1303 x 35 mm
Weight	38.7kg
Number of cells	132 pcs (6x22)
Glass front/back	2mm, High transparency, AR coated
Cell layout	Half Cut N-Type, Bifacial 18BB (210mm)
Frame	Silver color (Black optional), anodized aluminum alloy
Junction box	IP68 Rated, 3 bypass diodes
Connector type	Staubli MC4-Evo 2 / MC4 (Original)
Cable	4 mm <sup>2</sup> , 300 mm

### TEMPERATURE PARAMETERS

Temperature Coefficient of Pmax	-0.30 % / °C
Temperature Coefficient of Voc	-0.25 % / °C
Temperature Coefficient of Isc	+0.046 % / °C
Operating Temperature	- 40°C to + 85°C
Normal Operating Cell Temperature (NOCT)	44±2°C

### MAXIMUM RATINGS

Max. System Voltage	1500V DC - (H)
Max. Series Fuse Rating	35A
Uplift load (wind)	2400 Pa*
Downforce (snow)	5400 Pa*

### PACKAGING INFORMATION

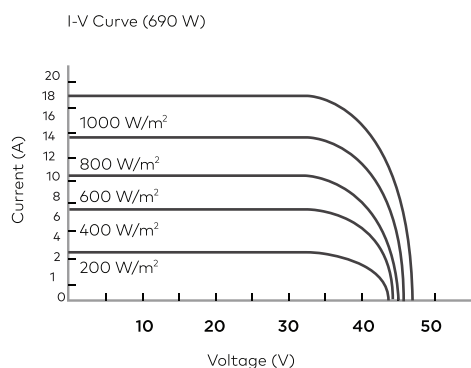
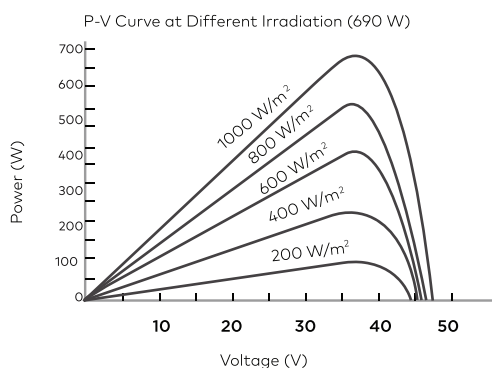
One pallet quantity	31 pcs
40 ft HC/HQ container	558 pcs

\*For more information please refer to Instruction Manual

MODULE TYPE 132HCND/12	685 Wp		690 Wp		695 Wp	
	STC	NMOT	STC	NMOT	STC	NMOT
<b>ELECTRICAL CHARACTERISTICS</b>						
Maximum power (Pmax/Wp)	685	518	690	522	695	524
Open circuit voltage (Voc / V)	47.30	44.80	47.50	45.00	47.70	45.20
Short circuit current (Isc / A)	18.34	14.79	18.39	14.83	18.44	14.87
Maximum power voltage (Vmp / V)	39.40	37.30	39.60	37.50	39.80	37.70
Maximum power current (Imp / A)	17.39	13.90	17.43	13.94	17.47	13.97
Module efficiency at STC (ηm / %)	22.10		22.30		22.50	
Power tolerance (Pmax)			0-+3%			

NMOT: Irradiance 800 W/m<sup>2</sup>, ambient temperature 20°C and wind speed 1 m/s

STC: Irradiance of 1000 W/m<sup>2</sup> with spectrum AM 1.5 and a module temperature of 25°C



**30 YEARS**  
Performance Guarantee

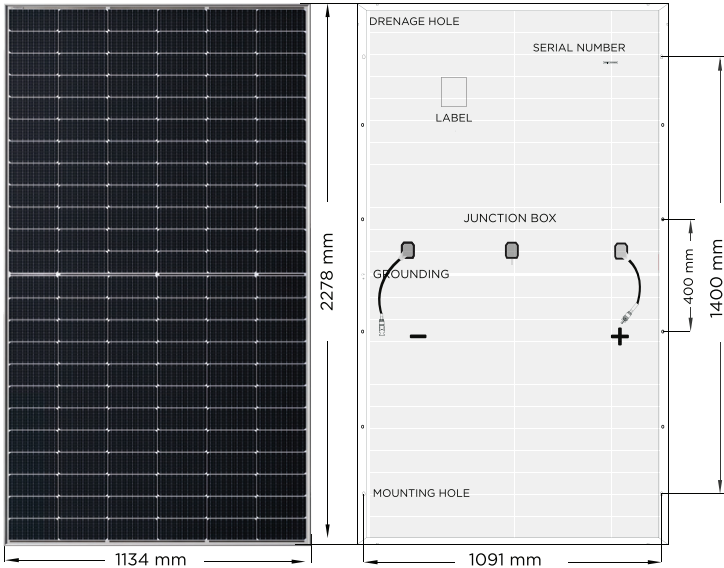
**20 YEARS**  
Product Warranty

## HIGH EFFICIENCY PHOTOVOLTAIC MODULE BIFACIAL, DOUBLE GLASS

ASTR 144HCND/10 Series 575-585 Wp

TOPCON N-TYPE HALF CUT CELLS

**22.7%**  
**MAXIMUM MODULE EFFICIENCY**



### MATERIAL CHARACTERISTICS

Dimensions	2278 × 1134 × 30 mm (35 mm optional)
Weight	32.0kg (32.3kg optional)
Number of cells	144 pcs (6x24)
Glass front/rear	2mm, High transparency, AR coated
Cell layout	Half Cut N-Type, Bifacial 16BB (182mm)
Frame	Silver color (Black optional), anodized aluminum alloy
Junction box	IP68 Rated, 3 bypass diodes
Connector type	Staubli MC4-Evo 2 / MC4 (Original)
Cable	4 mm <sup>2</sup> , 300 mm

### PACKAGING INFORMATION

One pallet quantity	36 pcs (31 pcs optional)
40 ft HC/HQ container	720 pcs (620 optional)

### TEMPERATURE PARAMETERS

Temperature Coefficient of Pmax	-0.30 % / °C
Temperature Coefficient of Voc	-0.25 % / °C
Temperature Coefficient of Isc	+0.046 % / °C
Operating Temperature	- 40°C to + 85°C
Normal Operating Cell Temperature (NOCT)	44±2°C

### MAXIMUM RATINGS

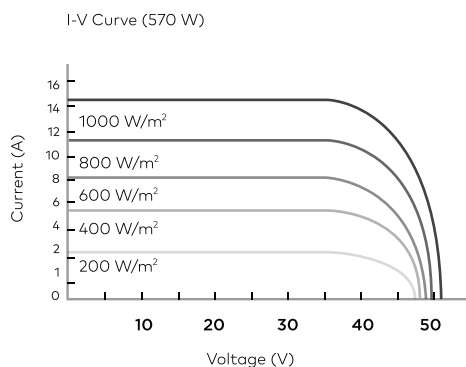
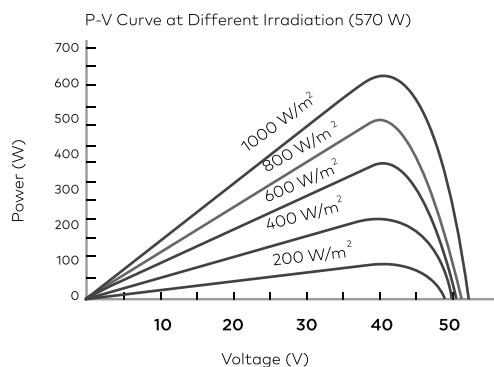
Max. System Voltage	1500V DC - (H)
Max. Series Fuse Rating	25A
Uplift load (wind)	2400 Pa*
Downforce (snow)	5400 Pa*

\*For more information please refer to Instruction Manual

MODULE TYPE 144HCND/10	575 Wp		580 Wp		585 Wp	
	STC	NMOT	STC	NMOT	STC	NMOT
<b>ELECTRICAL CHARACTERISTICS</b>						
Maximum power (Pmax/Wp)	575	432	580	436	585	440
Open circuit voltage (Voc / V)	51.27	48.33	51.47	48.46	51.67	48.60
Short circuit current (Isc / A)	14.31	11.62	14.37	11.68	14.43	11.75
Maximum power voltage (Vmp / V)	42.44	39.60	42.59	39.69	42.75	39.81
Maximum power current (Imp / A)	13.55	10.92	13.62	10.99	13.69	11.05
Module efficiency at STC (ηm / %)	22.30		22.50		22.70	
Power tolerance (Pmax)			0-+3%			

NMOT: Irradiance 800 W/m<sup>2</sup>, ambient temperature 20°C and wind speed 1 m/s

STC: Irradiance of 1000 W/m<sup>2</sup> with spectrum AM 1.5 and a module temperature of 25°C



**30 YEARS**  
Performance Guarantee

**20 YEARS**  
Product Warranty

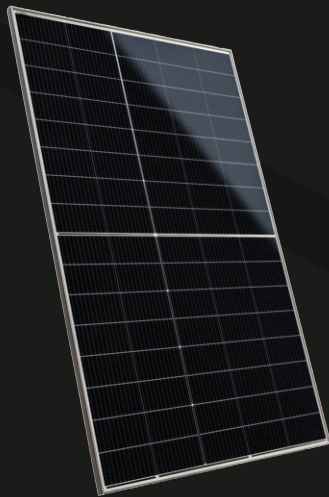
# HETEROJUNCTION PV MODULES

Heterojunction (HJT) technology, integrated into ASTORIOS PV modules, stands out as one of the most efficient solutions in the solar industry. This efficiency makes it ideal for use in spaces with limited area, high-capacity requirements, and similar applications.

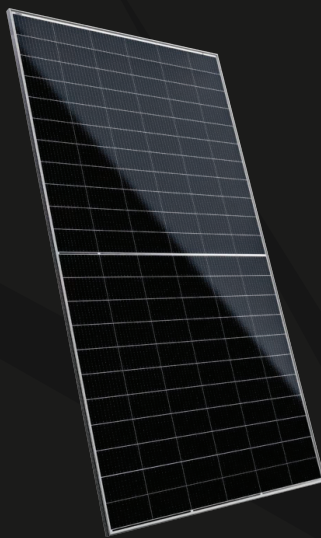
HJT N-type bifacial solar cell technology leverages the advantages of both crystalline and amorphous silicon, delivering exceptional efficiency and performance. It represents a significant advancement in solar cell technology, enhancing conversion rates and power output to unprecedented levels. HJT technology addresses common limitations of standard photovoltaic modules by reducing recombination and improving performance in hot climates.

Thanks to its natural bifacial symmetrical structure, HJT solar modules can achieve bifaciality of up to 97%, with energy yield gains exceeding 30% due to rear-side power generation. This makes HJT technology increasingly popular for utility-scale applications that capitalize on albedo resources.

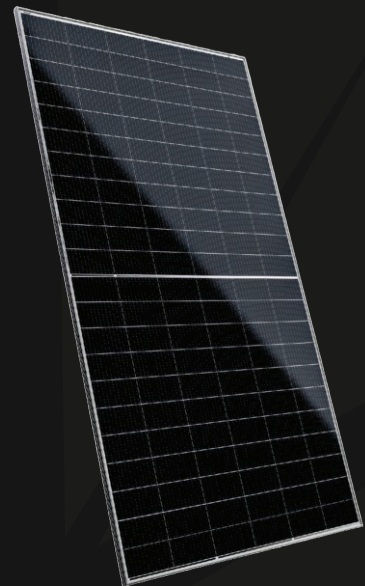
HJT solar cells utilize n-type wafers, which eliminate light-induced degradation (LID), and their indium tin oxide layer is conductive, preventing potential-induced degradation (PID). Additionally, HJT technology is less susceptible to temperature fluctuations, making it particularly suitable for high-temperature environments that typically degrade the performance of standard crystalline silicon (c-Si) modules.



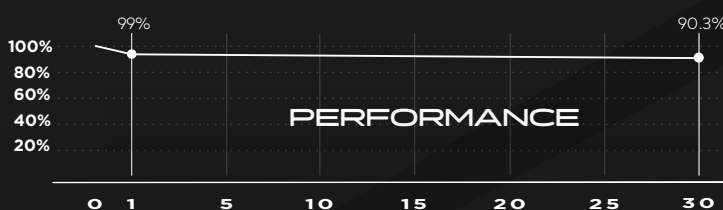
ASTR **80HCHD/12**  
Series **420-440 Wp**



ASTR **120HCHD/12**  
Series **635-660 Wp**



ASTR **132HCHD/12**  
Series **695-730 Wp**

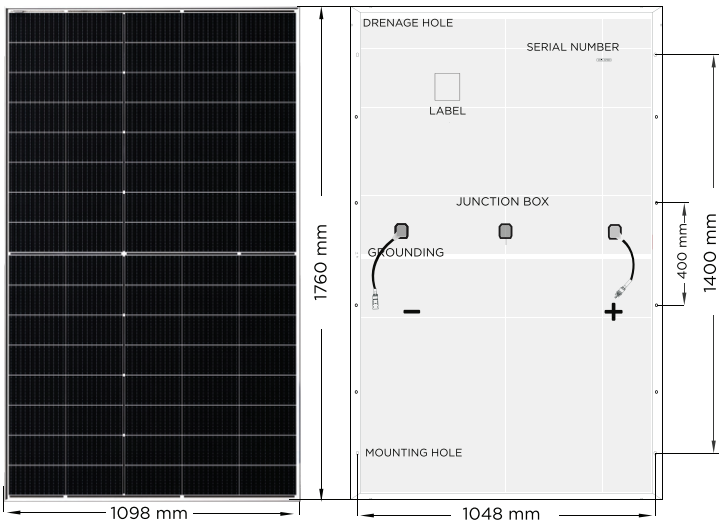




## HETEROJUNCTION BIFACIAL, DOUBLE GLASS PHOTOVOLTAIC MODULE

ASTR 80HCHD/12 Series 420-440 Wp

**22.7%**  
**MAXIMUM MODULE EFFICIENCY**



### MATERIAL CHARACTERISTICS

Dimensions	1760 × 1098 × 30 mm (35 mm optional)
Weight	23.8kg (24.1kg optional)
Number of cells	80 pcs (5x16)
Glass front/rear	2mm, High transparency, AR coated
Cell layout	HJT Mono 18BB/20BB (210 mm)
Frame	Silver color (Black optional), anodized aluminum alloy
Junction box	IP68 Rated, 3 bypass diodes
Connector type	Staubli MC4-Evo 2 / MC4 (Original)
Cable	4 mm <sup>2</sup> , 300 mm

### TEMPERATURE PARAMETERS

Temperature Coefficient of Pmax	-0.243 % / °C
Temperature Coefficient of Voc	-0.223 % / °C
Temperature Coefficient of Isc	+0.026 % / °C
Operating Temperature	- 40°C to + 85°C
Normal Operating Cell Temperature (NOCT)	43±2°C

### MAXIMUM RATINGS

Max. System Voltage	1500V DC - (H)
Max. Series Fuse Rating	35A
Uplift load (wind)	2400 Pa*
Downforce (snow)	5400 Pa*

### PACKAGING INFORMATION

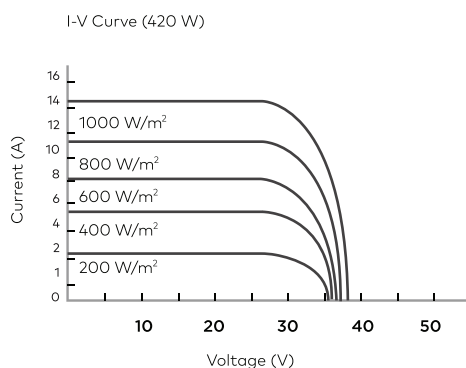
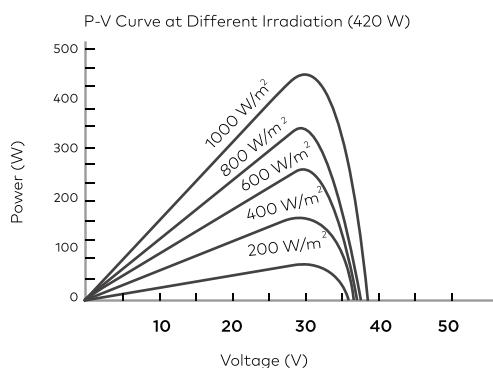
One pallet quantity	36 pcs (31 pcs optional)
40 ft HC/HQ container	900 pcs (806 pcs optional)

\*For more information please refer to Instruction Manual

MODULE TYPE 80HCHD/12	420 Wp		425 Wp		430 Wp		435 Wp		440 Wp	
	STC	NMOT	STC	NMOT	STC	NMOT	STC	NMOT	STC	NMOT
<b>ELECTRICAL CHARACTERISTICS</b>										
Maximum power (Pmax/Wp)	420	321	425	325	430	329	435	333	440	337
Open circuit voltage (Voc / V)	30.12	28.81	30.38	29.07	30.64	29.32	30.90	29.57	31.16	29.84
Short circuit current (Isc / A)	17.43	14.10	17.49	14.15	17.55	14.20	17.61	14.25	17.67	14.30
Maximum power voltage (Vmp / V)	25.25	23.87	25.46	24.07	25.67	24.26	25.88	24.45	26.09	24.65
Maximum power current (Imp / A)	16.64	13.45	16.70	13.49	16.76	13.55	16.81	13.62	16.87	13.68
Module efficiency at STC (ηm / %)	21.80		22.00		22.30		22.50		22.70	
Power tolerance (Pmax)	0-+3%									

NMOT: Irradiance 800 W/m<sup>2</sup>, ambient temperature 20°C and wind speed 1 m/s

STC: Irradiance of 1000 W/m<sup>2</sup> with spectrum AM 1.5 and a module temperature of 25°C



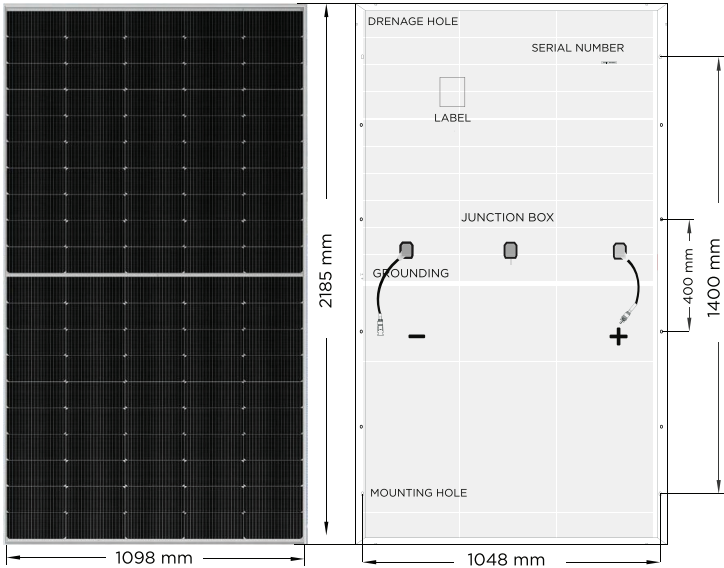
**30 YEARS**  
Performance Guarantee

**20 YEARS**  
Product Warranty

## HETEROJUNCTION BIFACIAL, DOUBLE GLASS PHOTOVOLTAIC MODULE

ASTR 100HCHD/12 Series 530-555 Wp

**23.1%**  
**MAXIMUM MODULE EFFICIENCY**



### MATERIAL CHARACTERISTICS

Dimensions	2185 x 1098 x 35 mm
Weight	29.7kg
Number of cells	100 pcs (5x20)
Glass front/rear	2mm, High transparency, AR coated
Cell layout	HJT Mono 18BB/20BB
Frame	Silver color, anodized aluminum alloy
Junction box	IP68 Rated, 3 bypass diodes
Connector type	Staubli MC4-Evo 2 / MC4 (Original)
Cable	4 mm <sup>2</sup> , 300 mm

### TEMPERATURE PARAMETERS

Temperature Coefficient of Pmax	-0.243 % / °C
Temperature Coefficient of Voc	-0.223 % / °C
Temperature Coefficient of Isc	+0.026 % / °C
Operating Temperature	- 40°C to + 85°C
Normal Operating Cell Temperature (NOCT)	43±2°C

### MAXIMUM RATINGS

Max. System Voltage	1500V DC - (H)
Max. Series Fuse Rating	35A
Uplift load (wind)	2400 Pa*
Downforce (snow)	5400 Pa*

### PACKAGING INFORMATION

One pallet quantity	31 pcs
40 ft HC/HQ container	620 pcs

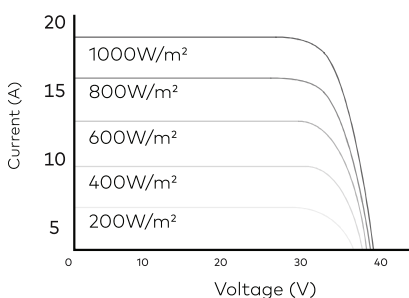
\*For more information please refer to Instruction Manual

MODULE TYPE 100HCHD/12	530 Wp		535 Wp		540 Wp		545 Wp		550 Wp		555 Wp	
	STC	NMOT	STC	NMOT	STC	NMOT	STC	NMOT	STC	NMOT	STC	NMOT
<b>ELECTRICAL CHARACTERISTICS</b>												
Maximum power (Pmax/Wp)	530	405	535	409	540	413	545	417	550	421	555	425
Open circuit voltage (Voc / V)	37.87	34.20	38.10	34.40	38.33	34.60	38.56	34.80	38.79	35.00	38.85	35.20
Short circuit current (Isc / A)	17.49	14.30	17.55	14.50	17.61	14.70	17.67	14.90	17.73	15.10	17.79	15.30
Maximum power voltage (Vmp / V)	31.78	29.70	31.96	29.90	32.14	30.10	32.33	30.30	32.52	30.50	32.71	30.70
Maximum power current (Imp / A)	16.68	13.64	16.74	13.68	16.81	13.72	16.87	13.76	16.93	13.81	16.99	13.87
Module efficiency at STC (ηm / %)	22.10		22.30		22.50		22.70		22.90		23.10	
Power tolerance (Pmax)	0-+3%											

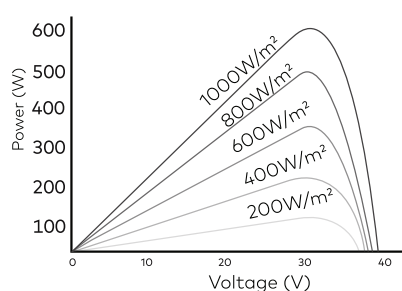
NMOT: Irradiance 800 W/m<sup>2</sup>, ambient temperature 20°C and wind speed 1 m/s

STC: Irradiance of 1000 W/m<sup>2</sup> with spectrum AM 1.5 and a module temperature of 25°C

I-V Curve at Different Temperature (550 W)



P-V Curve (550 W)



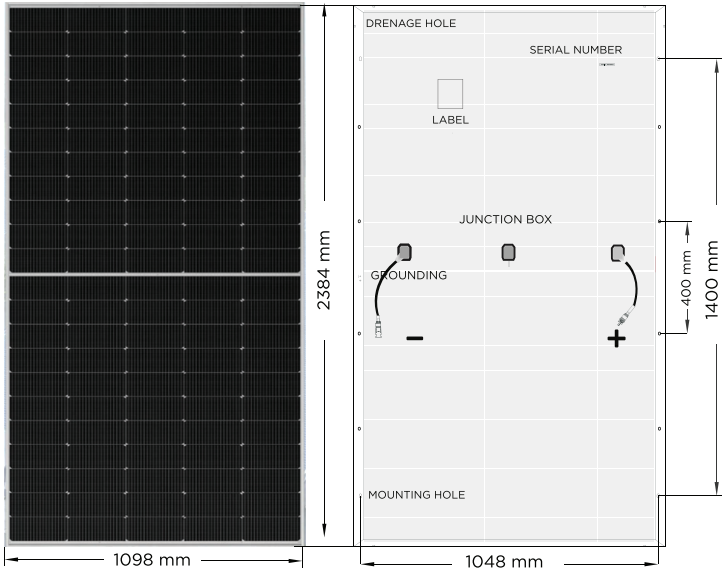
**30 YEARS**  
Performance Guarantee

**20 YEARS**  
Product Warranty

## HETEROJUNCTION BIFACIAL, DOUBLE GLASS PHOTOVOLTAIC MODULE

ASTR 110HCHD/12 Series 580-605 Wp

**23.2%**  
**MAXIMUM MODULE EFFICIENCY**



### MATERIAL CHARACTERISTICS

Dimensions	2384 x 1098 x 35 mm
Weight	32.1kg
Number of cells	110 pcs (5x22)
Glass front/rear	2mm, High transparency, AR coated
Cell layout	HJT Mono 18BB/20BB
Frame	Silver color, anodized aluminum alloy
Junction box	IP68 Rated, 3 bypass diodes
Connector type	Staubli MC4-Evo 2 / MC4 (Original)
Cable	4 mm <sup>2</sup> , 300 mm

### TEMPERATURE PARAMETERS

Temperature Coefficient of Pmax	-0.243 % / °C
Temperature Coefficient of Voc	-0.223 % / °C
Temperature Coefficient of Isc	+0.026 % / °C
Operating Temperature	- 40°C to + 85°C
Normal Operating Cell Temperature (NOCT)	43±2°C

### MAXIMUM RATINGS

Max. System Voltage	1500V DC - (H)
Max. Series Fuse Rating	35A
Uplift load (wind)	2400 Pa*
Downforce (snow)	5400 Pa*

### PACKAGING INFORMATION

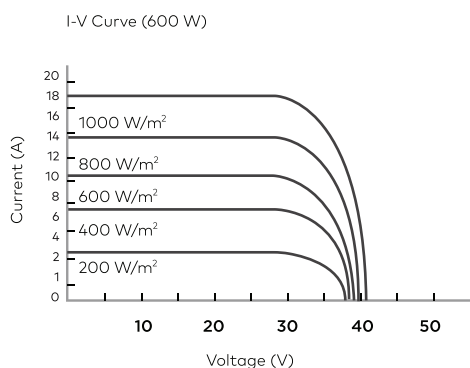
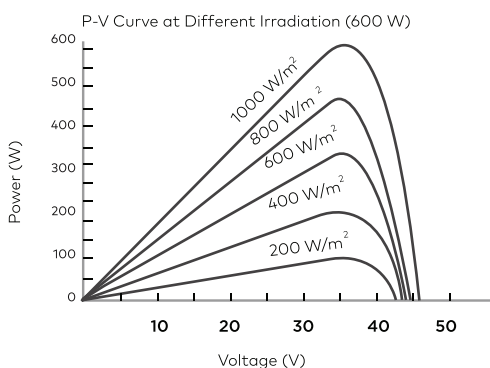
One pallet quantity	31 pcs
40 ft HC/HQ container	620 pcs

\*For more information please refer to Instruction Manual

MODULE TYPE 110HCHD/12	580 Wp		585 Wp		590 Wp		595 Wp		600 Wp		605 Wp	
	STC	NMOT	STC	NMOT	STC	NMOT	STC	NMOT	STC	NMOT	STC	NMOT
<b>ELECTRICAL CHARACTERISTICS</b>												
Maximum power (Pmax/Wp)	580	444	585	448	590	452	595	456	600	460	605	464
Open circuit voltage (Voc / V)	41.54	39.00	41.75	39.20	41.94	39.40	41.13	39.60	42.32	39.80	42.51	40.00
Short circuit current (Isc / A)	17.43	14.39	17.49	14.45	17.55	14.50	17.61	14.57	17.67	14.62	17.73	14.66
Maximum power voltage (Vmp / V)	34.88	32.90	35.05	33.10	35.12	33.30	35.19	33.50	35.26	33.70	35.33	33.90
Maximum power current (Imp / A)	16.63	13.50	16.69	13.54	16.76	13.58	16.83	13.62	16.90	13.66	16.97	13.70
Module efficiency at STC (ηm / %)	22.20		22.40		22.60		22.80		23.00		23.20	
Power tolerance (Pmax)	0-+3%											

NMOT: Irradiance 800 W/m<sup>2</sup>, ambient temperature 20°C and wind speed 1 m/s

STC: Irradiance of 1000 W/m<sup>2</sup> with spectrum AM 1.5 and a module temperature of 25°C



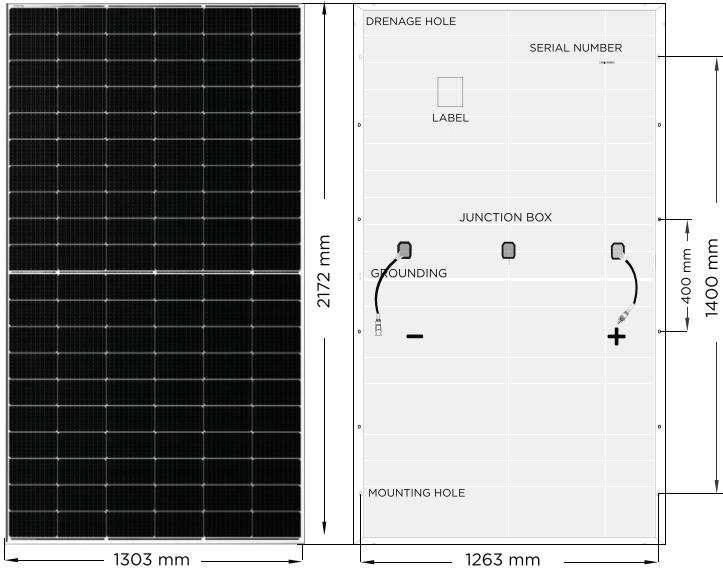
**30 YEARS**  
Performance Guarantee

**20 YEARS**  
Product Warranty

## HETEROJUNCTION BIFACIAL, DOUBLE GLASS PHOTOVOLTAIC MODULE

ASTR 120HCHD/12 Series 635-660 Wp

**23.6%**  
**MAXIMUM MODULE EFFICIENCY**



### MATERIAL CHARACTERISTICS

Dimensions	2172 x 1303 x 35 mm
Weight	35.3kg
Number of cells	120 pcs (6x20)
Glass front/rear	2mm, High transparency, AR coated
Cell layout	HJT Mono 18BB/20BB
Frame	Silver color, anodized aluminum alloy
Junction box	IP68 Rated, 3 bypass diodes
Connector type	Staubli MC4-Evo 2 / MC4 (Original)
Cable	4 mm <sup>2</sup> , 300 mm

### TEMPERATURE PARAMETERS

Temperature Coefficient of Pmax	-0.243 % / °C
Temperature Coefficient of Voc	-0.223 % / °C
Temperature Coefficient of Isc	+0.026 % / °C
Operating Temperature	- 40°C to + 85°C
Normal Operating Cell Temperature (NOCT)	43±2°C

### MAXIMUM RATINGS

Max. System Voltage	1500V DC - (H)
Max. Series Fuse Rating	35A
Uplift load (wind)	2400 Pa*
Downforce (snow)	5400 Pa*

### PACKAGING INFORMATION

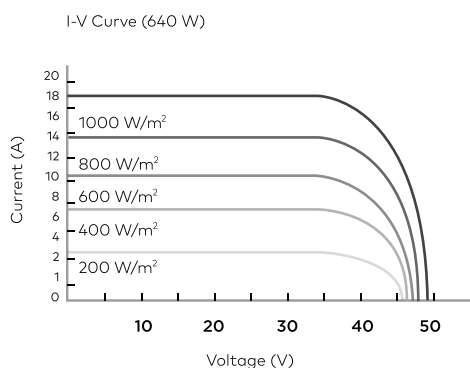
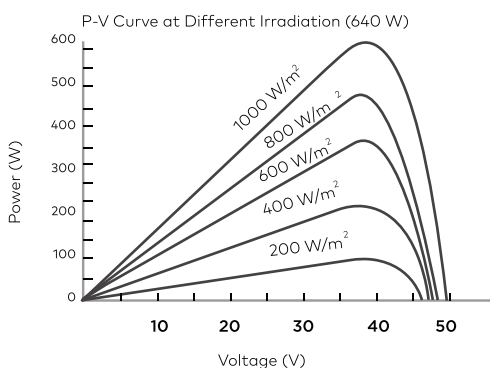
One pallet quantity	31 pcs
40 ft HC/HQ container	558 pcs

\*For more information please refer to Instruction Manual

MODULE TYPE 120HCHD/12	635 Wp		640 Wp		645 Wp		650 Wp		655 Wp		660 Wp	
	STC	NMOT	STC	NMOT	STC	NMOT	STC	NMOT	STC	NMOT	STC	NMOT
<b>ELECTRICAL CHARACTERISTICS</b>												
Maximum power (Pmax/Wp)	<b>635</b>	497	<b>640</b>	501	<b>645</b>	505	<b>650</b>	509	<b>655</b>	513	<b>660</b>	517
Open circuit voltage (Voc / V)	<b>44.70</b>	41.25	<b>44.76</b>	41.50	<b>44.82</b>	41.75	<b>44.88</b>	42.00	<b>44.94</b>	42.25	<b>45.00</b>	42.50
Short circuit current (Isc / A)	<b>17.27</b>	15.05	<b>17.33</b>	15.10	<b>17.42</b>	15.15	<b>17.53</b>	15.20	<b>17.64</b>	15.25	<b>17.75</b>	15.30
Maximum power voltage (Vmp / V)	<b>39.31</b>	35.94	<b>39.37</b>	36.14	<b>39.48</b>	36.34	<b>39.60</b>	36.54	<b>39.72</b>	36.74	<b>39.84</b>	36.94
Maximum power current (Imp / A)	<b>16.17</b>	13.83	<b>16.27</b>	13.87	<b>16.34</b>	13.90	<b>16.42</b>	13.93	<b>16.50</b>	13.97	<b>16.58</b>	14.00
Module efficiency at STC (ηm / %)	<b>22.60</b>		<b>22.80</b>		<b>23.00</b>		<b>23.20</b>		<b>23.40</b>		<b>23.60</b>	
Power tolerance (Pmax)	<b>0-+3%</b>											

NMOT: Irradiance 800 W/m<sup>2</sup>, ambient temperature 20°C and wind speed 1 m/s

STC: Irradiance of 1000 W/m<sup>2</sup> with spectrum AM 1.5 and a module temperature of 25°C



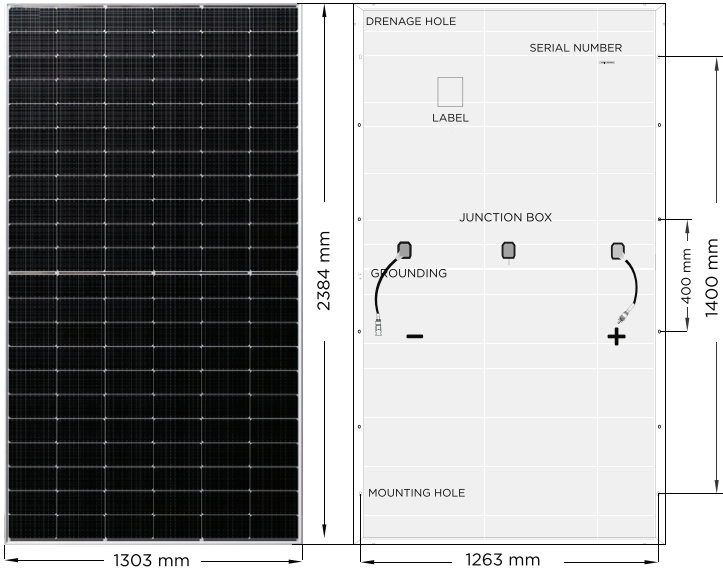
**30 YEARS**  
Performance Guarantee

**20 YEARS**  
Product Warranty

## HETEROJUNCTION BIFACIAL, DOUBLE GLASS PHOTOVOLTAIC MODULE

ASTR 132HCHD/12 Series 695-730 Wp

**23.9%**  
**MAXIMUM MODULE EFFICIENCY**



### MATERIAL CHARACTERISTICS

Dimensions	2384 x 1303 x 35 mm
Weight	38.7kg
Number of cells	132 pcs (6x22)
Glass front/rear	2mm, High transparency, AR coated
Cell layout	HJT Mono 18BB/20BB
Frame	Silver color, anodized aluminum alloy
Junction box	IP68 Rated, 3 bypass diodes
Connector type	Staubli MC4-Evo 2 / MC4 (Original)
Cable	4 mm <sup>2</sup> , 300 mm

### TEMPERATURE PARAMETERS

Temperature Coefficient of Pmax	-0.243 % / °C
Temperature Coefficient of Voc	-0.223 % / °C
Temperature Coefficient of Isc	+0.026 % / °C
Operating Temperature	- 40°C to + 85°C
Normal Operating Cell Temperature (NOCT)	43±2°C

### MAXIMUM RATINGS

Max. System Voltage	1500V DC - (H)
Max. Series Fuse Rating	35A
Uplift load (wind)	2400 Pa*
Downforce (snow)	5400 Pa*

### PACKAGING INFORMATION

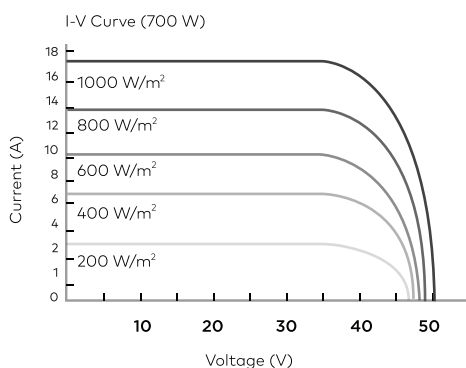
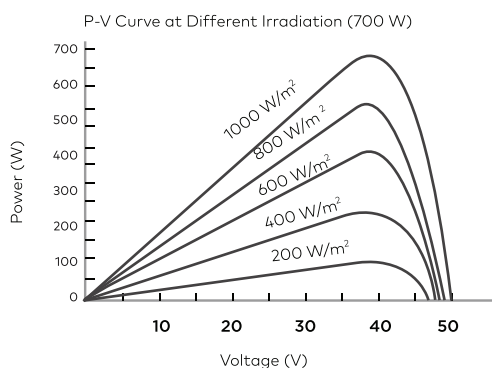
One pallet quantity	31 pcs
40 ft HC/HQ container	558 pcs

\*For more information please refer to Instruction Manual

MODULE TYPE 132HCHD/12	695 Wp		700 Wp		705 Wp		710 Wp		715 Wp		720 Wp		725 Wp		730 Wp	
	STC	NMOT	STC	NMOT	STC	NMOT	STC	NMOT	STC	NMOT	STC	NMOT	STC	NMOT	STC	NMOT
<b>ELECTRICAL CHARACTERISTICS</b>																
Maximum power (Pmax/Wp)	695	538	700	542	705	546	710	550	715	554	720	558	725	562	730	566
Open circuit voltage (Voc / V)	49.10	45.75	49.17	45.82	49.24	45.89	49.30	45.96	49.37	46.03	49.44	46.10	49.51	46.17	49.58	46.24
Short circuit current (Isc / A)	17.22	14.43	17.31	14.50	17.39	14.57	17.47	14.63	17.55	14.70	17.62	14.77	17.70	14.84	17.78	14.91
Maximum power voltage (Vmp / V)	43.02	38.73	43.21	38.91	43.40	39.10	43.59	39.29	43.78	39.49	43.96	39.67	44.14	39.86	44.32	40.05
Maximum power current (Imp / A)	16.18	13.90	16.23	13.93	16.27	13.96	16.30	14.00	16.33	14.03	16.39	14.07	16.43	14.10	16.48	14.13
Module efficiency at STC (ηm / %)	22.50		22.70		22.90		23.10		23.30		23.50		23.70		23.90	
Power tolerance (Pmax)	0-+3%															

NMOT: Irradiance 800 W/m<sup>2</sup>, ambient temperature 20°C and wind speed 1 m/s

STC: Irradiance of 1000 W/m<sup>2</sup> with spectrum AM 1.5 and a module temperature of 25°C



**30 YEARS**  
Performance Guarantee

**20 YEARS**  
Product Warranty



# HALF CUT PV MODULES (P-Type, PERC)

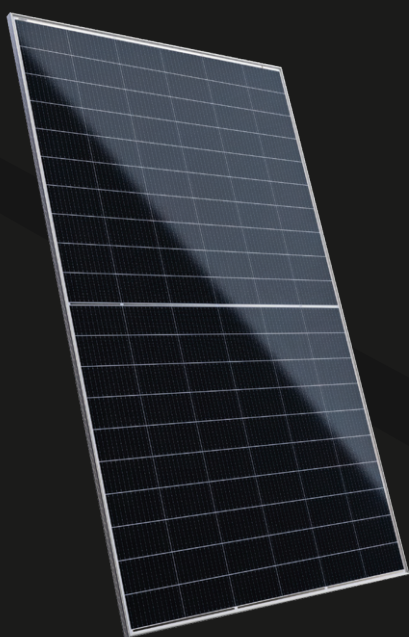
Passivated Emitter Rear Contact (PERC) Half Cut technology is a time-tested and widely-used standard in solar panel manufacturing worldwide.

Nowadays, modules manufactured with this technology are more affordable and mainly used for a large industrial energy generation systems installation, where there are no strict size limitations.

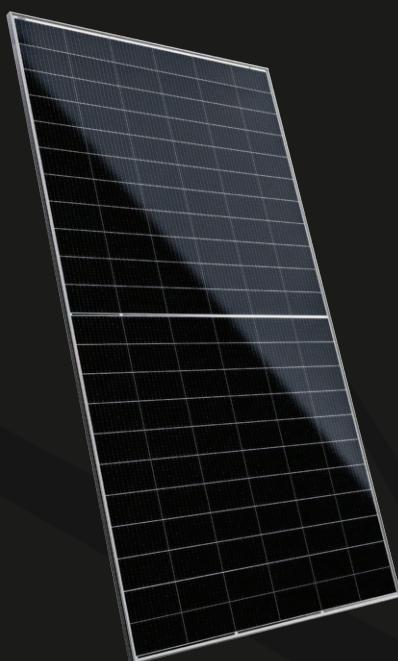
Multi-busbar technology is used in these modules for greater light absorption and high electrical conductivity, resulting in more efficient output. These PV modules are less affected by partial shading due to separation of the module's connections into two halves. When one half of the module is shaded, the other is unaffected by shade.

Advanced cutting, soldering, and sorting technologies for PV cells minimize the risk of hot-spots and ensure proper module temperature control. Each solar panel undergo current sorting to prevent mismatch in energy generation and subsequent degradation. Proper sorting results in higher energy output. Easy maintenance and higher energy output achieved through the easy-to-clean glass surfaces with high transparency.

Usage of high-quality components, including sealants, and rigorous quality control in every step of production ensure PID resistance (Potential Induced Degradation) throughout the module's lifetime.



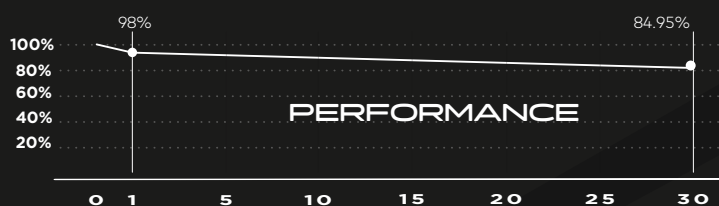
ASTR 120HCD/12 Series  
610-620 Wp



ASTR 132HCD/12 Series  
670-680 Wp



ASTR 144HCD/10 Series  
545-555 Wp

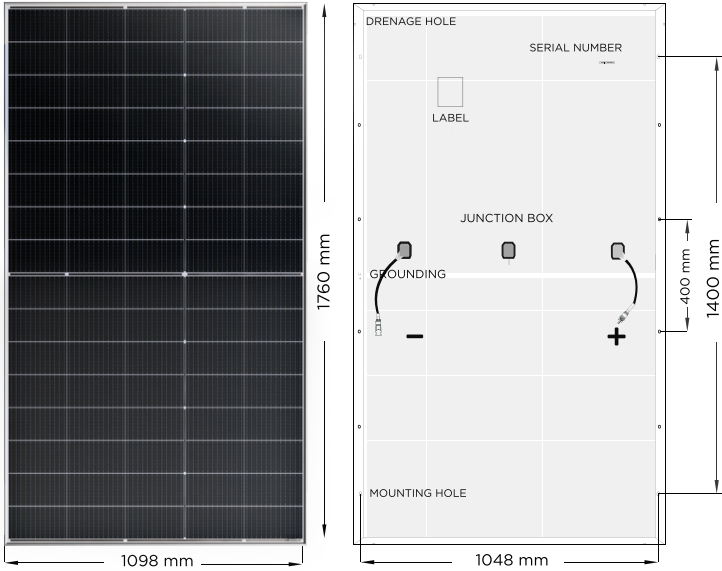


## BIFACIAL, DOUBLE GLASS PHOTOVOLTAIC MODULE

ASTR 80HCD/12 Series 405-415 Wp

HALF CUT PERC CELLS

**21.5%**  
**MAXIMUM MODULE EFFICIENCY**



### MATERIAL CHARACTERISTICS

Dimensions	1760 x 1098 x 30 mm
Weight	23.8kg
Number of cells	80 pcs (5x16)
Glass front/back	2mm, High transparency, AR coated
Cell layout	Bifacial, Half Cut PERC 12BB (210 mm)
Frame	Silver color (Black optional), anodized aluminum alloy
Junction box	IP68 Rated, 3 bypass diodes
Connector type	Staubli MC4-Evo 2 / MC4 (Original)
Cable	4 mm <sup>2</sup> , 300 mm

### TEMPERATURE PARAMETERS

Temperature Coefficient of Pmax	-0.35 % / °C
Temperature Coefficient of Voc	-0.27 % / °C
Temperature Coefficient of Isc	+0.048 % / °C
Operating Temperature	- 40°C to + 85°C
Normal Operating Cell Temperature (NOCT)	44±2°C

### MAXIMUM RATINGS

Max. System Voltage	1500V DC - (H)
Max. Series Fuse Rating	35A
Uplift load (wind)	2400 Pa*
Downforce (snow)	5400 Pa*

\*For more information please refer to Instruction Manual

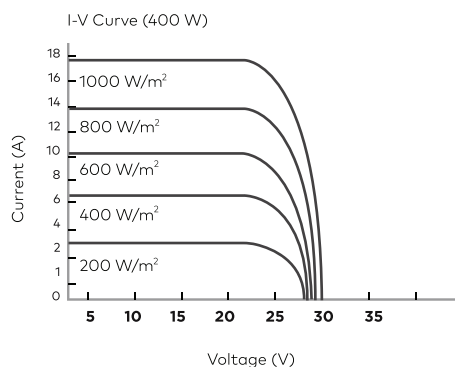
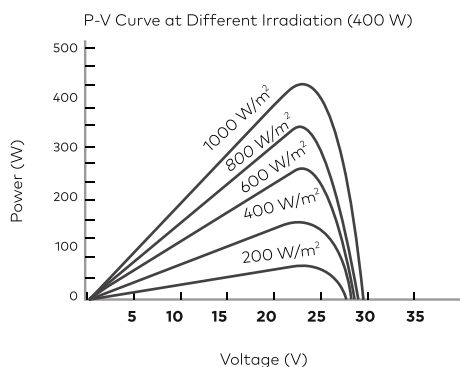
### PACKAGING INFORMATION

One pallet quantity	36 pcs
40 ft HC/HQ container	900 pcs

MODULE TYPE 80HCD/12	405 Wp		410 Wp		415 Wp	
	STC	NMOT	STC	NMOT	STC	NMOT
<b>ELECTRICAL CHARACTERISTICS</b>						
Maximum power (Pmax/Wp)	405	306	410	310	415	314
Open circuit voltage (Voc / V)	29.60	27.90	29.80	28.10	30.00	28.30
Short circuit current (Isc / A)	17.47	14.02	17.53	14.07	17.60	14.13
Maximum power voltage (Vmp / V)	24.60	22.90	24.80	23.10	25.00	23.30
Maximum power current (Imp / A)	16.45	13.37	16.53	13.43	16.61	13.48
Module efficiency at STC (ηm / %)	21.00		21.30		21.50	
Power tolerance (Pmax)			0-+3%			

NMOT: Irradiance 800 W/m<sup>2</sup>, ambient temperature 20°C and wind speed 1 m/s

STC: Irradiance of 1000 W/m<sup>2</sup> with spectrum AM 1.5 and a module temperature of 25°C



**30 YEARS**  
Performance Guarantee

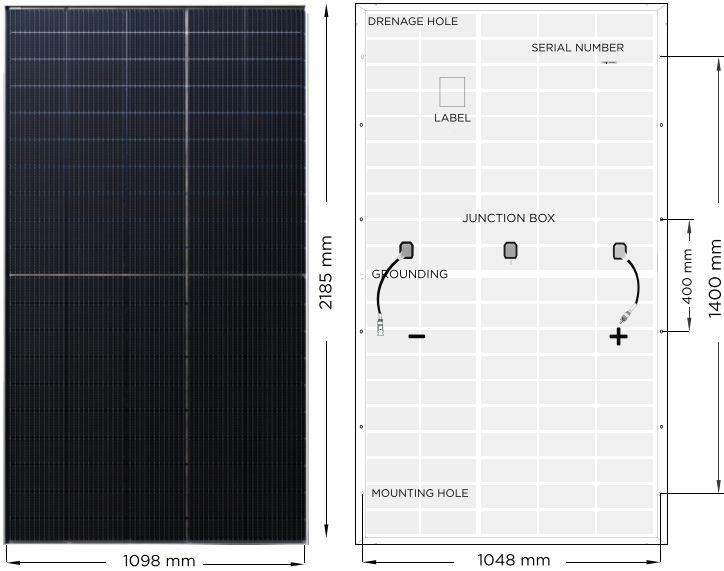
**15 YEARS**  
Product Warranty

## BIFACIAL, DOUBLE GLASS PHOTOVOLTAIC MODULE

ASTR 100HCD/12 Series 505-515 Wp

HALF CUT PERC CELLS

**21.5%**  
MAXIMUM MODULE EFFICIENCY



### MATERIAL CHARACTERISTICS

Dimensions	2185 x 1098 x 35 mm
Weight	29.7kg
Number of cells	100 pcs (5x20)
Glass front/back	2mm, High transparency, AR coated
Cell layout	Bifacial, Half Cut PERC 12BB (210 mm)
Frame	Silver color (Black optional), anodized aluminum alloy
Junction box	IP68 Rated, 3 bypass diodes
Connector type	Staubli MC4-Evo 2 / MC4 (Original)
Cable	4 mm <sup>2</sup> , 300 mm

### TEMPERATURE PARAMETERS

Temperature Coefficient of Pmax	-0.35 % / °C
Temperature Coefficient of Voc	-0.27 % / °C
Temperature Coefficient of Isc	+0.048 % / °C
Operating Temperature	- 40°C to + 85°C
Normal Operating Cell Temperature (NOCT)	44±2°C

### MAXIMUM RATINGS

Max. System Voltage	1500V DC - (H)
Max. Series Fuse Rating	35A
Uplift load (wind)	2400 Pa*
Downforce (snow)	5400 Pa*

\*For more information please refer to Instruction Manual

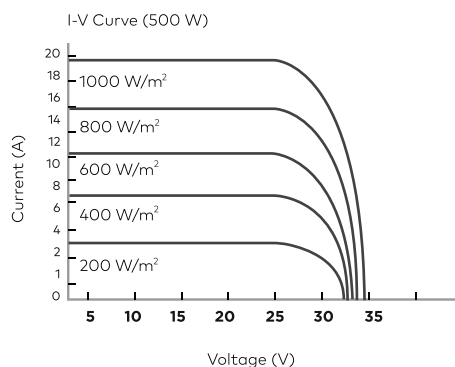
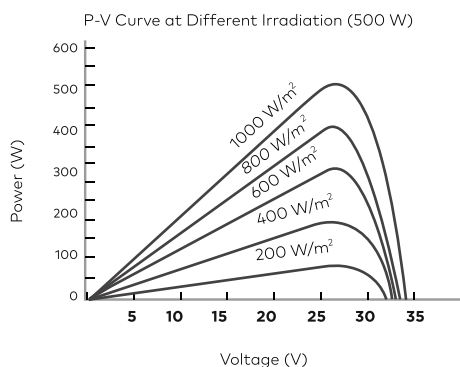
### PACKAGING INFORMATION

One pallet quantity	31 pcs
40 ft HC/HQ container	620 pcs

MODULE TYPE 100HCD/12	505 Wp		510 Wp		515 Wp	
	STC	NMOT	STC	NMOT	STC	NMOT
<b>ELECTRICAL CHARACTERISTICS</b>						
Maximum power (Pmax/Wp)	505	382	510	386	515	390
Open circuit voltage (Voc / V)	34.70	32.70	34.90	32.90	35.10	33.10
Short circuit current (Isc / A)	18.63	15.01	18.71	15.08	18.79	15.15
Maximum power voltage (Vmp / V)	29.00	27.00	29.20	27.20	29.40	27.40
Maximum power current (Imp / A)	17.42	14.17	17.47	14.21	17.52	14.25
Module efficiency at STC (ηm / %)	21.10		21.30		21.50	
Power tolerance (Pmax)			0-+3%			

NMOT: Irradiance 800 W/m<sup>2</sup>, ambient temperature 20°C and wind speed 1 m/s

STC: Irradiance of 1000 W/m<sup>2</sup> with spectrum AM 1.5 and a module temperature of 25°C



**30 YEARS**  
Performance Guarantee

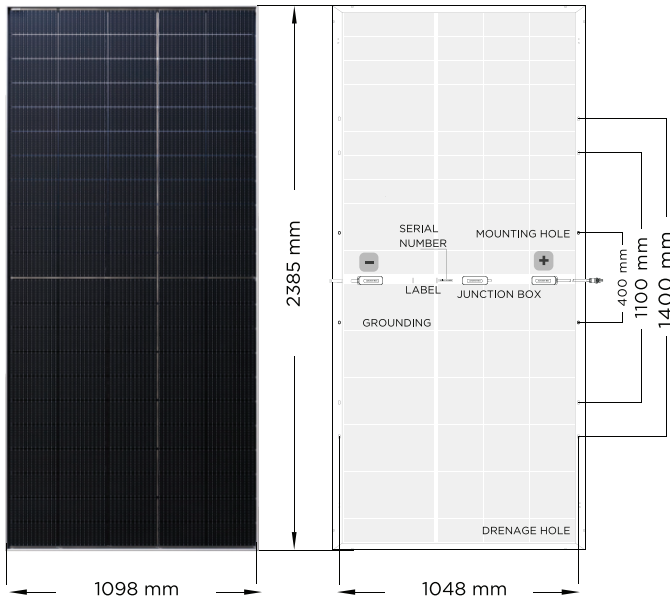
**15 YEARS**  
Product Warranty

## BIFACIAL, DOUBLE GLASS PHOTOVOLTAIC MODULE

ASTR 110HCD/12 Series 555-565 Wp

HALF CUT PERC CELLS

**21.6%**  
MAXIMUM MODULE EFFICIENCY



### MATERIAL CHARACTERISTICS

Dimensions	2385 x 1098 x 35 mm
Weight	32.1 kg
Number of cells	110 pcs (5x22)
Glass front/back	2mm, High transparency, AR coated
Cell layout	Bifacial, Half Cut PERC 12BB
Frame	Silver color (Black optional), anodized aluminum alloy
Junction box	IP68 Rated, 3 bypass diodes
Connector type	Staubli MC4-Evo 2 / MC4 (Original)
Cable	4 mm <sup>2</sup> , 300 mm

### TEMPERATURE PARAMETERS

Temperature Coefficient of Pmax	-0.35 % / °C
Temperature Coefficient of Voc	-0.27 % / °C
Temperature Coefficient of Isc	+0.048 % / °C
Operating Temperature	- 40°C to + 85°C
Normal Operating Cell Temperature (NOCT)	44±2°C

### MAXIMUM RATINGS

Max. System Voltage	1500V DC - (H)
Max. Series Fuse Rating	35A
Uplift load (wind)	2400 Pa*
Downforce (snow)	5400 Pa*

\*For more information please refer to Instruction Manual

### PACKAGING INFORMATION

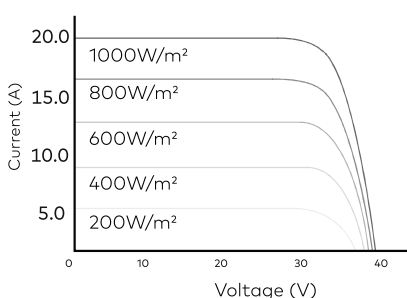
One pallet quantity	31 pcs
40 ft HC/HQ container	620 pcs

MODULE TYPE 110HCD/12	555 Wp		560 Wp		565 Wp	
	STC	NMOT	STC	NMOT	STC	NMOT
<b>ELECTRICAL CHARACTERISTICS</b>						
Maximum power (Pmax/Wp)	555	420	560	425	565	429
Open circuit voltage (Voc / V)	38.10	35.90	38.30	36.10	38.50	36.30
Short circuit current (Isc / A)	18.56	14.96	18.61	15.00	18.66	15.04
Maximum power voltage (Vmp / V)	31.80	29.60	32.00	29.80	32.19	30.00
Maximum power current (Imp / A)	17.45	14.23	17.51	14.27	17.56	14.30
Module efficiency at STC (ηm / %)	21.20		21.40		21.60	
Power tolerance (Pmax)			0-+3%			

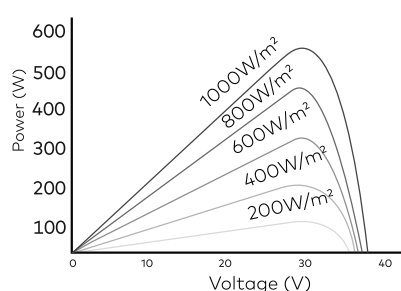
NMOT: Irradiance 800 W/m<sup>2</sup>, ambient temperature 20°C and wind speed 1 m/s

STC: Irradiance of 1000 W/m<sup>2</sup> with spectrum AM 1.5 and a module temperature of 25°C

I-V Curve at Different Temperature (550 W)



P-V Curve (550 W)



**30 YEARS**  
Performance Guarantee

**15 YEARS**  
Product Warranty

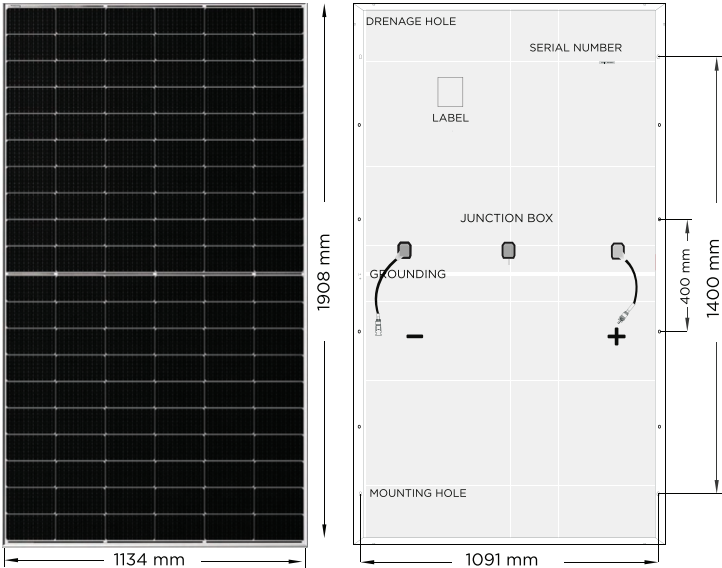


## BIFACIAL, DOUBLE GLASS PHOTOVOLTAIC MODULE

ASTR 120HCD/10 Series 450-460 Wp

HALF CUT PERC CELLS

**21.4%**  
**MAXIMUM MODULE EFFICIENCY**



### MATERIAL CHARACTERISTICS

Dimensions	1908 x 1134 x 30 mm (35 mm optional)
Weight	28.4kg (28.7kg optional)
Number of cells	120 pcs (6x20)
Glass front/back	3.2mm, High transparency, AR coated
Cell layout	Bifacial, Half Cut PERC 9BB/10BB (182 mm)
Frame	Silver color (Black optional), anodized aluminum alloy
Junction box	IP68 Rated, 3 bypass diodes
Connector type	Staubli MC4-Evo 2 / MC4 (Original)
Cable	4 mm <sup>2</sup> , 300 mm

### TEMPERATURE PARAMETERS

Temperature Coefficient of Pmax	-0.35 % / °C
Temperature Coefficient of Voc	-0.27 % / °C
Temperature Coefficient of Isc	+0.048 % / °C
Operating Temperature	- 40°C to + 85°C
Normal Operating Cell Temperature (NOCT)	44±2°C

### MAXIMUM RATINGS

Max. System Voltage	1500V DC - (H)
Max. Series Fuse Rating	20A
Uplift load (wind)	2400 Pa*
Downforce (snow)	5400 Pa*

### PACKAGING INFORMATION

One pallet quantity	36 pcs (31 pcs optional)
40 ft HC/HQ container	756 pcs (744 pcs optional)

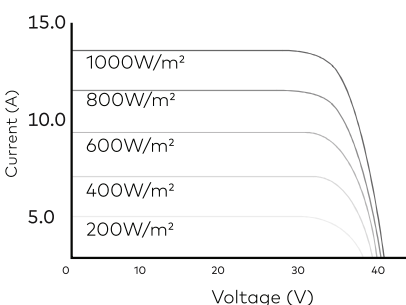
\*For more information please refer to Instruction Manual

MODULE TYPE 120HCD/10	450 Wp		455 Wp		460 Wp	
	STC	NMOT	STC	NMOT	STC	NMOT
<b>ELECTRICAL CHARACTERISTICS</b>						
Maximum power (Pmax/Wp)	450	335	455	339	460	343
Open circuit voltage (Voc / V)	41.18	39.23	41.33	39.29	41.48	39.35
Short circuit current (Isc / A)	13.85	11.15	13.93	11.26	14.01	11.37
Maximum power voltage (Vmp / V)	33.91	31.92	34.06	31.97	34.20	32.02
Maximum power current (Imp / A)	13.27	10.49	13.36	10.60	13.45	10.70
Module efficiency at STC (ηm / %)	21.00		21.20		21.40	
Power tolerance (Pmax)			0-+3%			

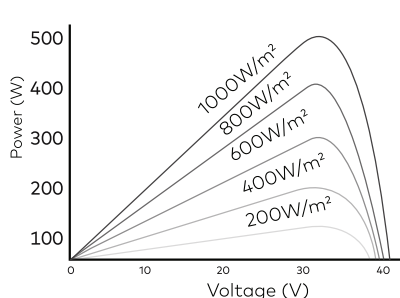
NMOT: Irradiance 800 W/m<sup>2</sup>, ambient temperature 20°C and wind speed 1 m/s

STC: Irradiance of 1000 W/m<sup>2</sup> with spectrum AM 1.5 and a module temperature of 25°C

I-V Curve at Different Temperature (440 W)



P-V Curve (440 W)



**30 YEARS**  
Performance Guarantee

**15 YEARS**  
Product Warranty

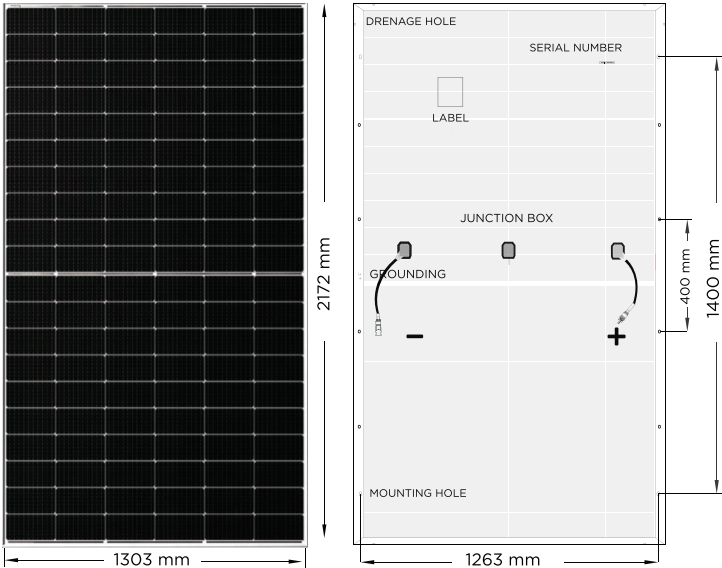


## BIFACIAL, DOUBLE GLASS PHOTOVOLTAIC MODULE

ASTR 120HCD/12 Series 610-620 Wp

HALF CUT PERC CELLS

**22%**  
**MAXIMUM MODULE EFFICIENCY**



### MATERIAL CHARACTERISTICS

Dimensions	2172 x 1303 x 35 mm
Weight	35.3kg
Number of cells	120 pcs (6x20)
Glass front/back	2mm, High transparency, AR coated
Cell layout	Bifacial, Half Cut PERC 12BB (210 mm)
Frame	Silver color (Black optional), anodized aluminum alloy
Junction box	IP68 Rated, 3 bypass diodes
Connector type	Staubli MC4-Evo 2 / MC4 (Original)
Cable	4 mm <sup>2</sup> , 300 mm

### TEMPERATURE PARAMETERS

Temperature Coefficient of Pmax	-0.35 % / °C
Temperature Coefficient of Voc	-0.27 % / °C
Temperature Coefficient of Isc	+0.048 % / °C
Operating Temperature	- 40°C to + 85°C
Normal Operating Cell Temperature (NOCT)	44±2°C

### MAXIMUM RATINGS

Max. System Voltage	1500V DC - (H)
Max. Series Fuse Rating	35A
Uplift load (wind)	2400 Pa*
Downforce (snow)	5400 Pa*

\*For more information please refer to Instruction Manual

### PACKAGING INFORMATION

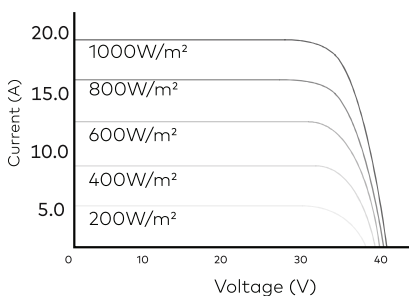
One pallet quantity	31 pcs
40 ft HC/HQ container	558 pcs

MODULE TYPE 120HCD/12	610 Wp		615 Wp		620 Wp	
	STC	NMOT	STC	NMOT	STC	NMOT
<b>ELECTRICAL CHARACTERISTICS</b>						
Maximum power (Pmax/Wp)	610	462	615	466	620	471
Open circuit voltage (Voc / V)	41.90	39.50	42.10	39.70	42.30	39.90
Short circuit current (Isc / A)	18.63	15.00	18.68	15.04	18.74	15.08
Maximum power voltage (Vmp / V)	34.80	32.40	35.00	32.60	35.21	32.80
Maximum power current (Imp / A)	17.52	14.26	17.56	14.30	17.61	14.33
Module efficiency at STC (ηm / %)	21.60		21.80		22.00	
Power tolerance (Pmax)			0-+3%			

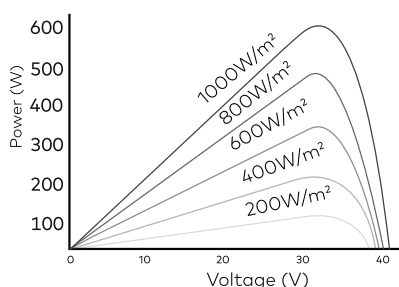
NMOT: Irradiance 800 W/m<sup>2</sup>, ambient temperature 20°C and wind speed 1 m/s

STC: Irradiance of 1000 W/m<sup>2</sup> with spectrum AM 1.5 and a module temperature of 25°C

I-V Curve at Different Temperature (600 W)



P-V Curve (600 W)



**30 YEARS**  
Performance Guarantee

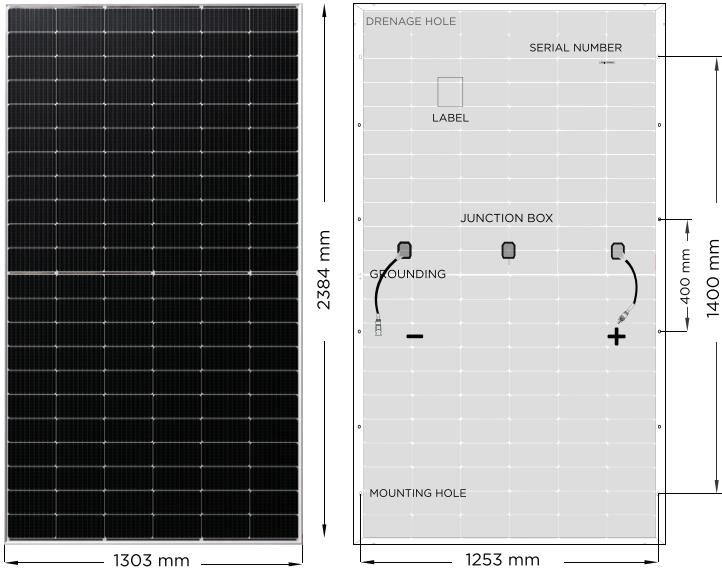
**15 YEARS**  
Product Warranty

## BIFACIAL, DOUBLE GLASS PHOTOVOLTAIC MODULE

ASTR 132HCD/12 Series 670-680 Wp

HALF CUT PERC CELLS

**21.9%**  
**MAXIMUM MODULE EFFICIENCY**



### MATERIAL CHARACTERISTICS

Dimensions	2384 x 1303 x 35 mm
Weight	38.7kg
Number of cells	132 pcs (6x22)
Glass front/back	2mm, High transparency, AR coated
Cell layout	Bifacial, Half Cut PERC 12BB
Frame	Silver color (Black optional), anodized aluminum alloy
Junction box	IP68 Rated, 3 bypass diodes
Connector type	Staubli MC4-Evo 2 / MC4 (Original)
Cable	4 mm <sup>2</sup> , 300 mm

### TEMPERATURE PARAMETERS

Temperature Coefficient of Pmax	-0.35 % / °C
Temperature Coefficient of Voc	-0.27 % / °C
Temperature Coefficient of Isc	+0.048 % / °C
Operating Temperature	- 40°C to + 85°C
Normal Operating Cell Temperature (NOCT)	44±2°C

### MAXIMUM RATINGS

Max. System Voltage	1500V DC - (H)
Max. Series Fuse Rating	35A
Uplift load (wind)	2400 Pa*
Downforce (snow)	5400 Pa*

### PACKAGING INFORMATION

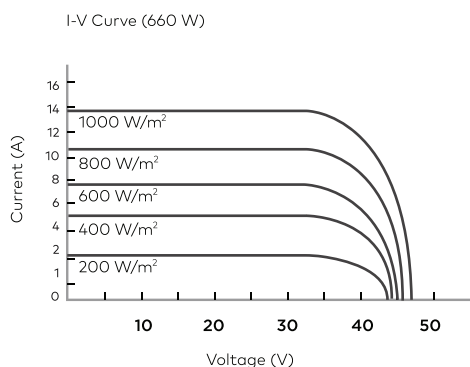
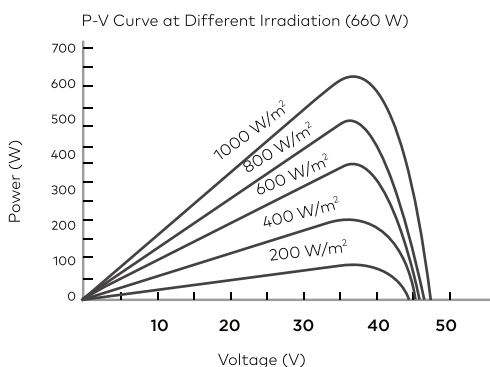
One pallet quantity	31 pcs
40 ft HC/HQ container	558 pcs

\*For more information please refer to Instruction Manual

MODULE TYPE 132HCD/12	670 Wp		675 Wp		680 Wp	
	STC	NMOT	STC	NMOT	STC	NMOT
<b>ELECTRICAL CHARACTERISTICS</b>						
Maximum power (Pmax/Wp)	670	509	675	513	680	517
Open circuit voltage (Voc / V)	46.00	43.40	46.20	43.60	46.40	43.80
Short circuit current (Isc / A)	18.65	15.00	18.70	15.04	18.75	15.08
Maximum power voltage (Vmp / V)	38.20	35.70	38.40	35.90	38.60	36.10
Maximum power current (Imp / A)	17.54	14.27	17.58	14.30	17.62	14.33
Module efficiency at STC (ηm / %)	21.50		21.70		21.90	
Power tolerance (Pmax)			0-+3%			

NMOT: Irradiance 800 W/m<sup>2</sup>, ambient temperature 20°C and wind speed 1 m/s

STC: Irradiance of 1000 W/m<sup>2</sup> with spectrum AM 1.5 and a module temperature of 25°C



**30 YEARS**  
Performance Guarantee

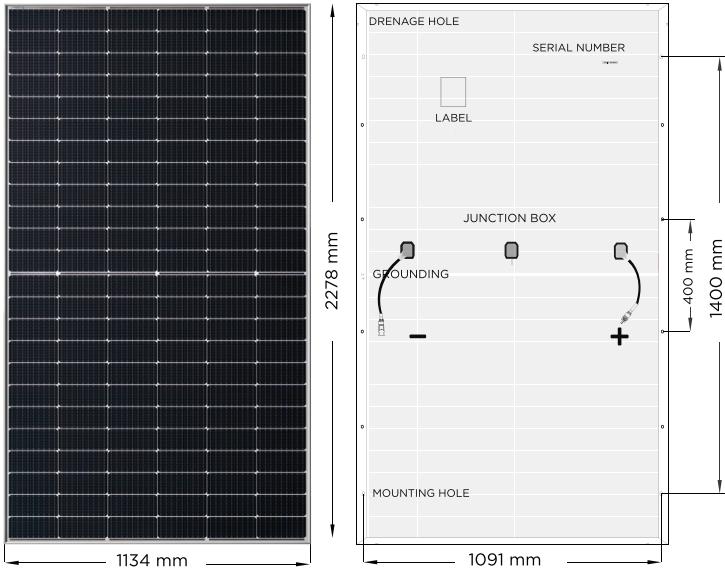
**15 YEARS**  
Product Warranty

## BIFACIAL, DOUBLE GLASS PHOTOVOLTAIC MODULE

ASTR 144HCD/10 Series 545-555 Wp

HALF CUT PERC CELLS

**21.6%**  
**MAXIMUM MODULE EFFICIENCY**



### MATERIAL CHARACTERISTICS

Dimensions	2278 x 1134 x 30 mm (35 mm optional)
Weight	32.0kg (32.3kg optional)
Number of cells	144 pcs (6x24)
Glass front/rear	2mm, High transparency, AR coated
Cell layout	Half Cut PERC, Bifacial 9BB / 10BB (182mm)
Frame	Silver color (Black optional), anodized aluminum alloy
Junction box	IP68 Rated, 3 bypass diodes
Connector type	Staubli MC4-Evo 2 / MC4 (Original)
Cable	4 mm <sup>2</sup> , 300 mm

### PACKAGING INFORMATION

One pallet quantity	36 pcs (31 pcs optional)
40 ft HC/HQ container	720 pcs (620 pcs optional)

### TEMPERATURE PARAMETERS

Temperature Coefficient of Pmax	-0.35 % / °C
Temperature Coefficient of Voc	-0.27 % / °C
Temperature Coefficient of Isc	+0.048 % / °C
Operating Temperature	- 40°C to + 85°C
Normal Operating Cell Temperature (NOCT)	44±2°C

### MAXIMUM RATINGS

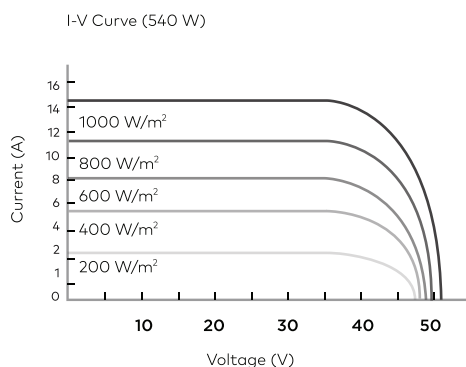
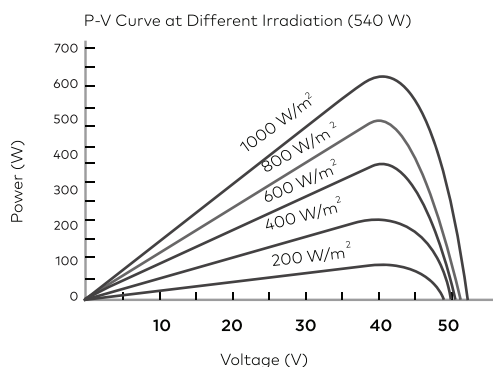
Max. System Voltage	1500V DC - (H)
Max. Series Fuse Rating	25A
Uplift load (wind)	2400 Pa*
Downforce (snow)	5400 Pa*

\*For more information please refer to Instruction Manual

MODULE TYPE 144HCD/10	545 Wp		550 Wp		555 Wp	
	STC	NMOT	STC	NMOT	STC	NMOT
<b>ELECTRICAL CHARACTERISTICS</b>						
Maximum power (Pmax/Wp)	545	406	550	410	555	414
Open circuit voltage (Voc / V)	49.52	46.88	49.62	47.00	49.72	47.12
Short circuit current (Isc / A)	13.94	11.25	14.03	11.32	14.10	11.39
Maximum power voltage (Vmp / V)	40.80	38.32	40.90	38.46	41.00	38.62
Maximum power current (Imp / A)	13.36	10.58	13.45	10.64	13.54	10.72
Module efficiency at STC (ηm / %)	21.30		21.50		21.60	
Power tolerance (Pmax)			0-+3%			

NMOT: Irradiance 800 W/m<sup>2</sup>, ambient temperature 20°C and wind speed 1 m/s

STC: Irradiance of 1000 W/m<sup>2</sup> with spectrum AM 1.5 and a module temperature of 25°C



**30 YEARS**  
Performance Guarantee

**15 YEARS**  
Product Warranty

# COMMERCIAL AND INDUSTRIAL BATTERY ENERGY STORAGE SYSTEMS

At ASTORIOS, we provide advanced BESS for C&I projects. Our expertise extends to manufacturing innovative solutions, system integration, and supply chain excellence, ensuring full satisfaction to our customers.

Our customized, modular, cabinet, and containerized BESS products (from 40 kW to MW+) for C&I are perfectly suited to businesses in search of energy storage solutions that are both flexible and efficient. Systems are engineered for easy deployment and integration, making them a perfect choice for various applications – self-consumption, backup and emergency power supply, peak shaving and valley filling, demand reduction and fuel saving, frequency modulation, and grid quality adjustment. ASTORIOS Lithium Iron Phosphate BESS are equipped with advanced intelligent integrated systems including fire protection (detection and suppression), short circuit protection, liquid and air cooling, efficient space utilization, intrusion detection, communication, and monitoring interfaces. This integration not only enhances the safety of our energy storage solutions but also ensures they operate at peak efficiency, delivering unparalleled performance and reliability.

ASTORIOS recognizes the importance of intelligent energy management. That's why our BESS are seamlessly integrated with advanced Energy Management Systems (EMS). This integration allows for sophisticated and high-level complexity management of energy resources, ensuring optimal performance and efficiency.

ASTORIOS BESS solutions integrate the following components (optional):

- Human Machine Interface (HMI)
- Energy Management Systems (EMS)
- Backup power sources management system (diesel generators, UPS)
- Power Conversion System (PCS)
- Static Transfer Switch (STS)
- State of Charge (SoC) monitoring
- State of Health (SoH) monitoring
- Controller Area Network (CAN) and RS485 standards compatibility
- Remote management and control (SCADA, Modbus, Ethernet)
- Electrical data monitoring and cloud storage system
- Temperature monitoring system
- Firefighting system
- Overvoltage, reverse current, short circuit, and other electrical protection systems

Quality is at the heart of everything we do at ASTORIOS. Our BESS are a testament to our commitment to premium quality. Engineered to handle high-complexity applications, our systems ensure reliability and longevity, meeting the demanding needs of commercial energy storage.





# CERTIFICATION

ASTORIOS production lines, processes, technologies, and products have been certified by leading companies in the industry. The production lines and manufacturing processes have been certified according to management and safety requirements, while the technologies have been evaluated to meet the industry's standards. Products have undergone numerous tests, trials, and modifications to meet the highest standards of quality, reliability, safety, and long-term performance in extreme weather and harsh conditions.

Certification involves periodic inspections by certifying companies of the manufacturing and products, testing and examination for any changes in technology or components, calibration of testing stations, and rigorous quality assurance checks using automated equipment specified in certification standards.

Manufacturing raw materials and component suppliers as well meet international quality standards. All our suppliers are certified to insure the top tier level of production. Components and raw materials are required to pass strict test control before being used in production.

## PV MODULES

The multi-stage quality control system in the manufacturing process includes inspection of the raw materials and components, soldering, electro-luminescent (EL) and optical testing using micro-shot cameras in the test station to detect any defects or damage. After the lamination and assembly of frames and connectors, the modules undergo visual inspection, followed by testing on the second test station and on the station for determining electrical characteristics. Only solar panels that pass the quality control at all stages and sorting at the final stage can be shipped to customers.

UL 61730 Requirements for photovoltaic module design and safety standards in the United States  
IEC61215/61730 Requirements for module design and safety evaluation  
IEC62804 PID resistance  
IEC61701 Salt resistance  
IEC62716 Ammonia resistance  
IEC60068-2-68 Sand and Dust Resistance  
IC TS 62941-2016 PV Industry quality management system  
ISO 9001:2015 Quality Management standards  
ISO 14001:2015 Environmental Management System  
ISO 45001:2018 Occupational Health and Safety Management System  
ISO 50001:2011 Energy management standards  
CE Declaration of conformity to European Union standards

## BATTERY ENERGY STORAGE SYSTEMS

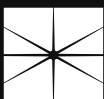
ASTORIOS uses Lithium iron phosphate (LIFEPO4, LFP) batteries to ensure that our customers benefit from premium characteristics while upholding the highest safety standards. To guarantee long mechanical lifespans and durability, we use only reliable casing materials. ASTORIOS's products are certified by all necessary international standards for production, quality, safety, management, packaging, and operation.

IIEC62119-2017 Requirements for the safe operation of lithium cells and batteries  
IEC62477 Safety Requirements for PECS (Power electric converter systems)  
SPS-C KBIA-10104-03-7312 Safety test and performance test requirements  
EN IEC 61000-6-1:2019 Electromagnetic compatibility (Immunity standard for residential, commercial and light-industrial environments)  
EN IEC 61000-6-2:2019 Electromagnetic compatibility (Immunity standard for residential, commercial and light-industrial environments)  
EN IEC 61000-6-3:2021 Electromagnetic compatibility (Emission standard for residential, commercial and light-industrial environments)  
EN IEC 61000-6-4:2019 Electromagnetic compatibility (Emission standard for industrial environments)





# ASTORIOS



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