

Under Shanshan Group, Top 500 Enterprise in China, Ningbo Ulica Solar Co., Ltd. produces our own high quality solar cells and modules starting from August 2005. Our product range covers all from off-grid panels to on-grid panels, both mono-crystalline and poly-crystalline, suitable for all types of installation from residential to commercial projects



**12% more power than conventional modules**



**Lower power degradation**  
**Lower internal current**  
**Lower hot spot temperature**



**Cell crack risk limited in small region,**  
**enhance the module reliability**



**Outstanding mechanical load resistance**  
Snow load 5400Pa (Frontside), and Wind load 3800Pa (Backside)



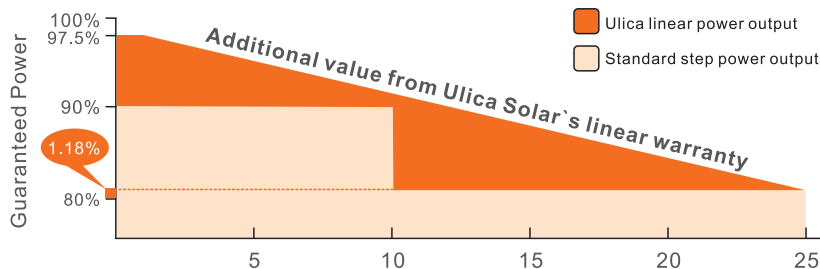
**High performance under low light conditions**  
Cloudy days, Rainy days



**Double EL test before and after lamination**  
Highly control the micro cracks and invisible defects.



**World famous insurance**  
CHUBB(USA), Solar Insurance&Finance(Netherlands)

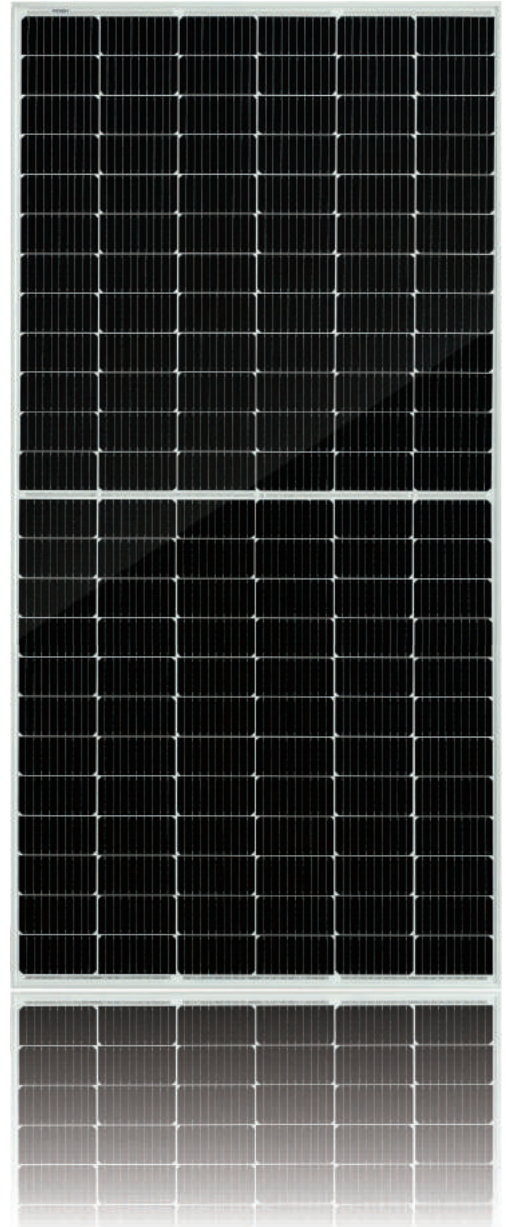


12-year Limited Product Warranty

25-year Limited Performance Warranty

Certificate Holder Name : Ningbo Ulica Solar Co.,Ltd

## MONO HALF-CELL PERC



# MONO 450W/455W/460W



## ELECTRICAL PERFORMANCE

Electrical Parameters Standard Test Conditions

Module Type			UL-450M-144HV	UL-455M-144HV	UL-460M-144HV
Power Output	P <sub>max</sub>	W	450	455	460
Power Tolerance	ΔP <sub>max</sub>	W		±3%	
Module Efficiency	η <sub>m</sub>	%	20.37	20.6	20.82
Voltage at P <sub>max</sub>	V <sub>m</sub>	V	41.0	41.2	41.4
Current at P <sub>max</sub>	I <sub>m</sub>	A	10.98	11.04	11.11
Open-Circuit Voltage	V <sub>oc</sub>	V	49.8 ±4%	50.0 ±4%	50.2 ±4%
Short-Circuit Current	I <sub>sc</sub>	A	11.55 ±4%	11.62 ±4%	11.69 ±4%

STC: 1000W/m<sup>2</sup> irradiance, 25°C module temperature, AM1.5

Remark: Sorting tolerance as 0~+5W in our factory.

## THERMAL CHARACTERISTICS

Nominal Operating Cell Temperature	NOCT	°C	43±2
Temperature Coefficient of P <sub>max</sub>	γ	%/°C	-0.360
Temperature Coefficient of V <sub>oc</sub>	β <sub>voc</sub>	%/°C	-0.290
Temperature Coefficient of I <sub>sc</sub>	α <sub>isc</sub>	%/°C	+0.049

## OPERATING CONDITIONS

Max. System Voltage	1500V
Max. Series Fuse Rating	20A
Operating Temperature Range	-40°C~85°C
Max static snow load	5400Pa
Max static wind load	3800Pa
Safety Class	II
Fire class rating	Class C

## CONSTRUCTION MATERIALS

Front Cover(material/type/thickness)	low-iron tempered glass/3.2mm
Cell(quantity/material/type/dimension)	144/monocrystalline/166X83mm
Encapsulant(material)	ethylene vinyl acetate(EVA)
Frame(material/anodization color)	anodized aluminum alloy/silver
Junction Box(protection degree)	IP68
Cable(length/cross-sectional area)	400mm/4mm <sup>2</sup>
Plug Connector	DC1500,PV-ZH202B/PV-JM601A/PV-JM608/PV-CY03L, Made in China

## GENERAL CHARACTERISTICS

Dimension(L/W/H)	2108x1048x35mm
Weight	24kg

## PACKING CONFIGURATION

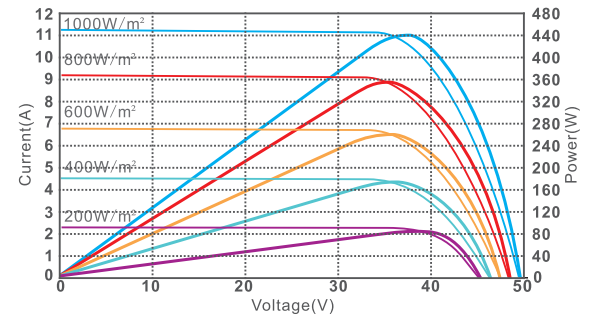
Pallet Size(L/W/H)	2150/1120/2500mm
Pallet Weight	1455kg
Pieces per Pallet	54pcs
Pieces per Container	548pcs

## INTERNATIONAL CERTIFICATES

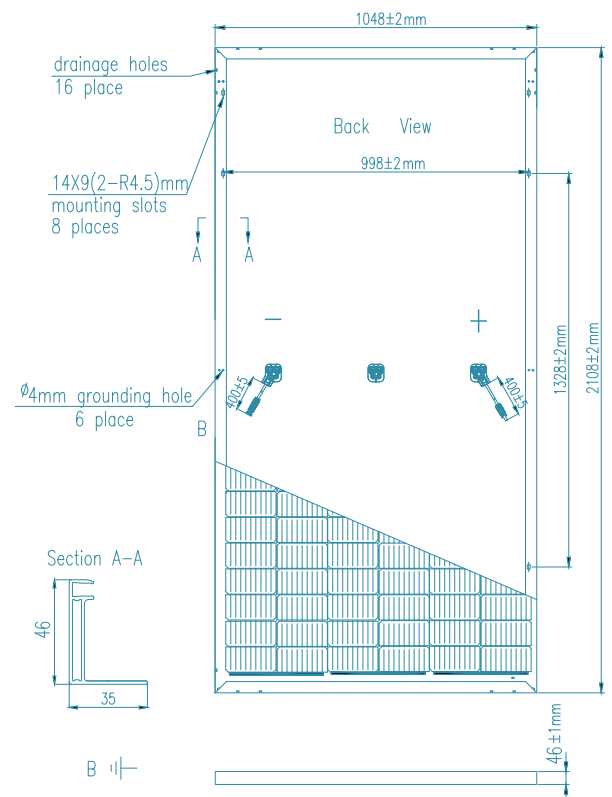
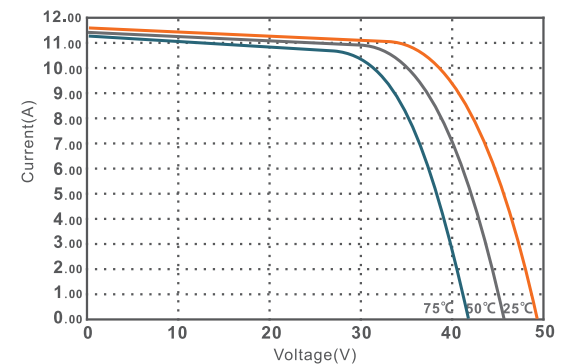
- TÜV SÜD, CE, JET, MCS, CQC, IMERTRO
- ISO9001:2015
- ISO14001:2015
- BS OHSAS 18001:2007

## I-V CURVE

I-V characteristics at different irradiances



I-V characteristics at different temperature



Please read the installation manual in this entirety before handing, installing, and operating Ulica Solar modules.

Due to continuous innovation, research and improvement, the specification is subject to change without prior notice.