

650W

HORAY

TIER1
BloombergNEF

HS **199R-144** TC-D *Delta* N-type Bifacial Modules



SMBB Half-Cell Technology

More uniform current collection capability, reducing the current heat loss of the internal cells.



Higher Output Power

The output power of 144 half-cells monocrystalline modules is up to 650W.



Low Light Features

Higher performance under low light environment.



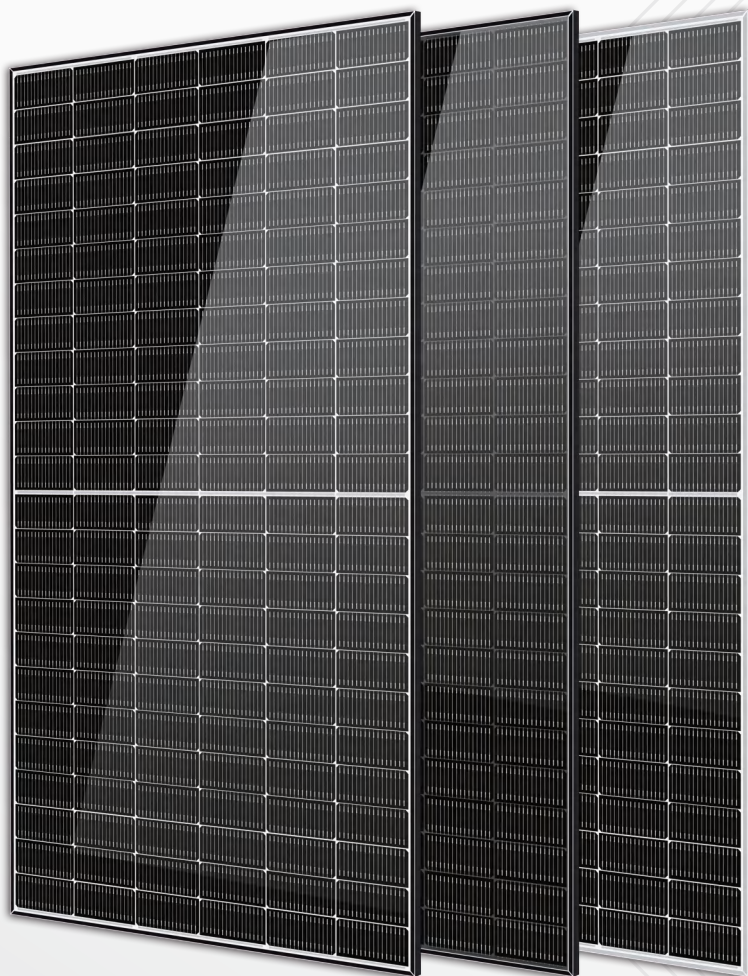
Harsh Environmental Adaptability

Strict salt spray and ammonia corrosion test by the third party.



N-type With Very Low LID

N-type solar cell has very low LID naturally which can reduce power degradation.



IEC61215:2021

IEC61730:2023

ISO9001:2015 Quality Management System

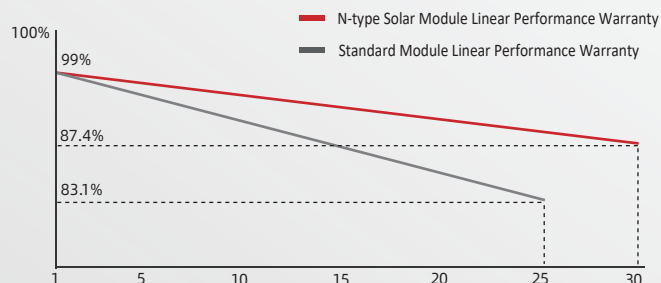
ISO14001:2015 Environmental Management System

ISO45001:2018 Occupational Health and Safety Management System

CE: Europe Standard

China Quality Certification Centre

Solar Product Certification



15-year product warranty



30-year linear power output warranty

HEADQUARTER: HORAY SOLAR CO., LTD.

GLOBAL MARKETING AND SERVICE: HORAY SOLAR GMBH

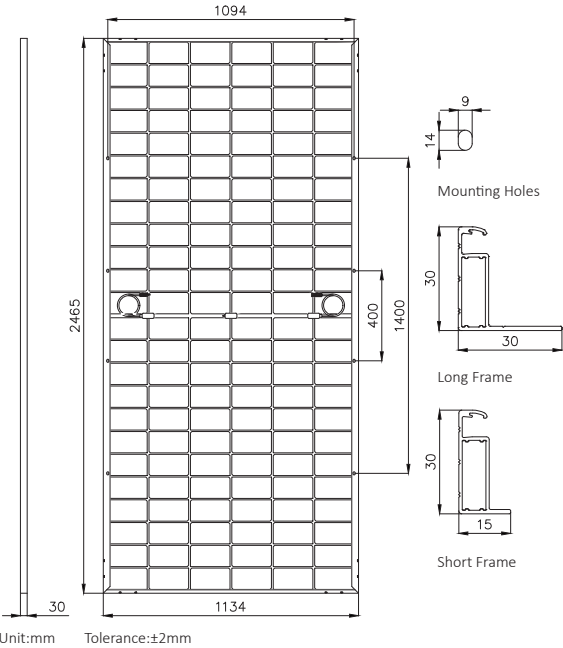
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MECHANICAL DIAGRAMS



ELECTRICAL CHARACTERISTICS

Module Type	HS630TC-MHD-D		HS635TC-MHD-D		HS640TC-MHD-D		HS645TC-MHD-D		HS650TC-MHD-D	
Testing Condition	STC	NMOT	STC	NMOT	STC	NMOT	STC	NMOT	STC	NMOT
Maximum Power(Pmax/W)	630	480	635	484	640	488	645	491	650	495
Open Circuit Voltage(Voc/V)	47.98	47.98	48.05	48.05	48.08	48.08	48.16	48.16	48.20	48.20
Short Circuit Current(Isc/A)	16.49	12.56	16.59	12.64	16.71	12.73	16.81	12.81	16.93	12.90
Maximum Power Voltage(Vmp/V)	40.70	40.70	40.76	40.76	40.79	40.79	40.85	40.85	40.89	40.89
Maximum Power Current(Impp/A)	15.48	11.80	15.58	11.87	15.69	11.96	15.79	12.03	15.90	12.11
Module Efficiency(%)	22.5		22.7		22.9		23.1		23.3	

* Under Standard Test Conditions (STC) of irradiance of 1000 W/m², spectrum AM 1.5 and cell temperature of 25°C.

* Under Nominal Module Operating Temperature (NMOT), irradiance of 800 W/m², spectrum AM 1.5, ambient temperature 20°C, wind speed 1 m/s.

ELECTRICAL CHARACTERISTICS WITH 10% SOLAR IRRADIATION RATIO (BNPI)

Maximum Power(Pmax/W)	693	699	704	710	715
Open Circuit Voltage(Voc/V)	47.98	48.05	48.08	48.16	48.20
Short Circuit Current(Isc/A)	18.13	18.25	18.38	18.50	18.62
Maximum Power Voltage(Vmp/V)	40.70	40.76	40.79	40.85	40.89
Maximum Power Current(Impp/A)	17.03	17.14	17.26	17.37	17.49

*Rear side power gain:The additional gain from the rear side compared to the power of the front side at the standard test condition.It depends on mounting (structure,height,tilt angle etc.)and albedo of the ground.

OPERATING PARAMETERS

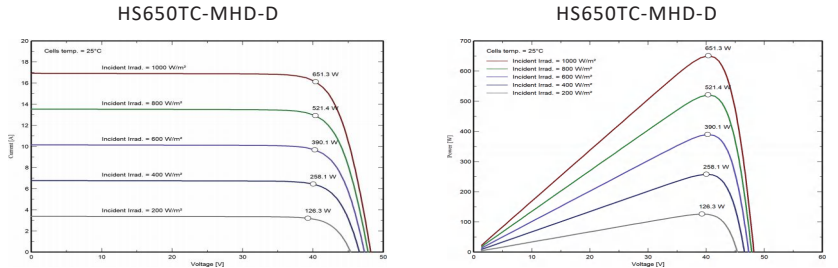
Operational Temperature	-40°C~+85°C
Power Output Tolerance	0~3%
Maximum System Voltage	1500V
Maximum Series Fuse Rating	30A
Nominal Operating Cell Temperature	45±2°C
Protection Class	Class II
Bifaciality	80±5%
Fire Rating	IEC Class A

*The actual test value may be slightly deviated from the technical parameters due to the difference in test methods.

MECHANICAL PARAMETERS

Weight	34.5kg
Dimension	2465×1134×30mm
Cell Orientation	144 (6×24)
Junction Box	IP68, three diodes
Output Cable	4mm ² ,±300mm (length can be customized)
Connector	MC4 compatible
Glass	2.0+2.0mm AR coated heat strengthened glass
Frame	Anodized aluminum alloy frame
Packaging	36pcs per pallet/648pcs per 40'HC

CURVES OF PV MODULE



MECHANICAL LOADING

Front Side Maximum Static Loading	5400Pa
Rear Side Maximum Static Loading	2400Pa
Hailstone Test	25mm Hailstone at the speed of 23m/s

TEMPERATURE RATINGS (STC)

Temperature Coefficient of Isc	+0.04%/°C
Temperature Coefficient of Voc	-0.23%/°C
Temperature Coefficient of Pmax	-0.28%/°C



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