



Bijlage 12.d

Zonnepaneel

Sinnefjild Leeuwarderstraatweg

Op de volgende pagina's ziet u voorbeelden van zonnepanelen van verschillende fabrikanten. Deze typen zonnepanelen zouden technisch gezien toegepast kunnen worden. De kleur van een zonnepaneel is donkerblauw en/of zwartblauw. De maatvoering van het toe te passen zonnepaneel kan wat afwijken; dit is afhankelijk van het type zonnepaneel, de producent en voortschrijdende techniek. Hierbij moet worden opgemerkt dat het gaat om ondergeschikte eigenschappen binnen de minimum en maximum afmetingen (bandbreedte) van de omgevingsvergunning. De (internationale) markt voor zonnepanelen is volop in ontwikkeling. De keuze voor het type zonnepaneel hangt o.a. af van de beschikbaarheid op de (internationale) markt, de prijs en het vermogen. De definitieve keuze kan daarom pas worden gemaakt als de bouw van het zonnepark in zicht is. De fabrikant, het type zonnepaneel en de exacte afmetingen worden ruim voor de start van de bouwwerkzaamheden door initiatiefnemer aangeleverd bij het bevoegd gezag.

Productbladen voorbeelden zonnepanelen:

Aangehecht op de volgende pagina's.

Hi-MO^H

LR5-72HGD

S90M

- High-performance PV modules for utility power plants
- Advanced HPDC cell technology delivers superior module efficiency and power
- High bifaciality and excellent power temperature coefficient achieves high energy yield
- LONGi lifecycle quality ensures long-term performance

12

12-year Warranty for
Materials and Processing

30

30-year Warranty for Extra
Linear Power Output

Complete System and Product Certifications

IEC 61215, IEC 61730, UL 61730

ISO9001:2015: ISO Quality Management System

ISO14001: 2015: ISO Environment Management System

ISO45001: 2018: Occupational Health and Safety

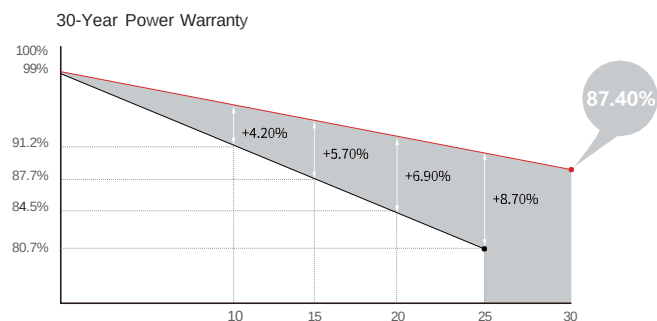
IEC62941: Guideline for module design qualification and type approval

LONGi

C US

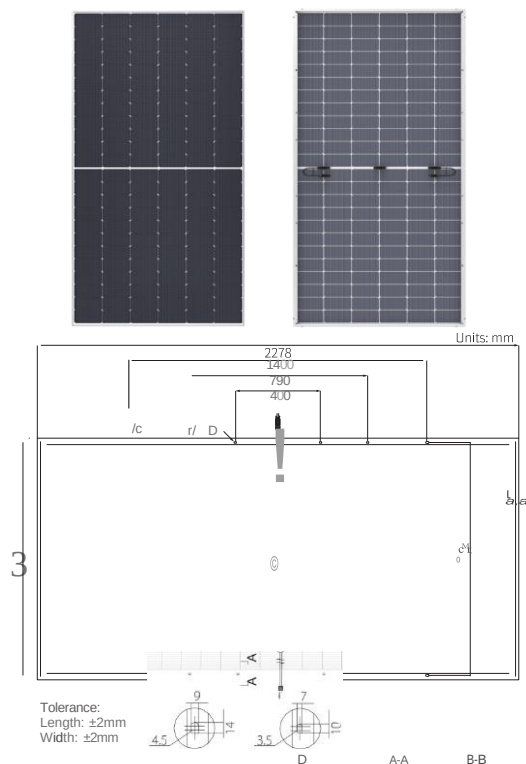


Additional Value



Mechanical Parameters

Cell Orientation	144 (6X24)
Junction Box	IP68, three diodes
Output Cable	4mm ² , +400, -200mm/±1400mm length can be customized
Glass	Dual glass, 2.0+2.0mm heat strengthened glass
Frame	Anodized aluminum alloy frame
Weight	31.8kg
Dimension	2278X 1134X30mm
Packaging	36pcs per pallet/ 180pcs per 20' GP / 720pcs per 40' HC



Electrical Characteristics

STC : AM1.5 1000W/m' 25°C

NOCT: AM1.5 800W/m' 20°C 1m/s

Test uncertainty for Pmax: ±3%

Module Type														
Testing Condition	STC	NOCT	STC	NOCT	STC	NOCT	STC	NOCT	STC	NOCT	STC	NOCT	STC	NOCT
Maximum Power (Pmax/W)														
Open Circuit Voltage (Voc/V)	50.99	48.46	51.09	48.55	51.19	48.65	51.30	48.75	51.41	48.86	51.52	48.96	51.63	49.07
Short Circuit Current (Isc/A)	13.89	11.16	13.97	11.22	14.05	11.29	14.14	11.35	14.22	11.42	14.30	11.48	14.38	11.55
Voltage at Maximum Power (Vmp/V)	42.82	40.69	42.91	40.78	43.00	40.87	43.11	40.97	43.22	41.07	43.33	41.18	43.44	41.28
Current at Maximum Power (Imp/A)	13.08	10.48	13.17	10.55	13.26	10.62	13.34	10.68	13.42	10.75	13.51	10.82	13.59	10.89
Module Efficiency(%)	21.7		21.9		22.1		22.3		22.5		22.6		22.8	

Electrical characteristics with different rear side power gain (reference to 575W front)

Pmax /W	Voc/V	Isc /A	Vmp/V	Imp/A	Pmaxgain
604	51.30	14.84	43.11	14.00	5%
633	51.30	15.55	43.11	14.67	10%
661	51.40	16.26	43.21	15.34	15%
690	51.40	16.96	43.21	16.01	20%
719	51.40	17.67	43.21	16.67	25%

Operating Parameters

Operational Temperature	-40°C - +85°C
Power Output Tolerance	0-3%
Voc and Isc Tolerance	±3%
Maximum System Voltage	DC1500V (IEC/UL)
Maximum Series Fuse Rating	30A
Nominal Operating Cell Temperature	45±2°C
Protection Class	Class II
Bifaciality	80±5%
Fire Rating	ULtype 29 IEC Class C

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	+0.045%/°C
Temperature Coefficient of Voc	-0.230%/°C
Temperature Coefficient of Pmax	-0.280%/°C

DEEP BLUE 3.0

Mono

MBB Half-cell Module
JAM72S30

Series

offers the
, reduced
enhanced



Higher output power



Lower LCOE



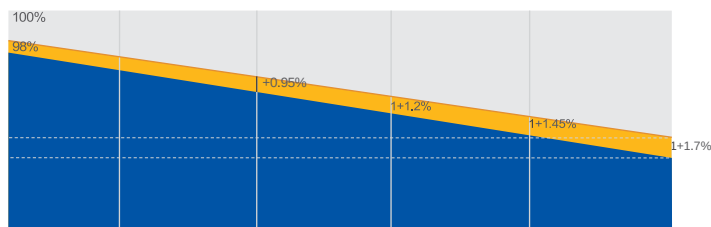
Less shading and lower resistive loss



Better mechanical loading tolerance

Superior Warranty

- 12-year product warranty
- 25-year linear power output warranty



■ New linear power warranty ■ Standard module linear power warranty

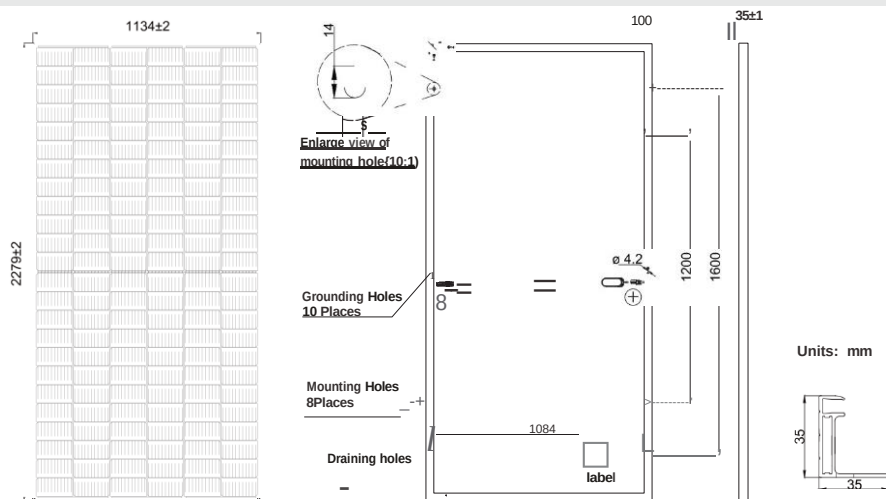
Comprehensive Certificates

- IEC 61215, IEC 61730, UL 61215, UL 61730
- ISO 9001: 2015 Quality management systems
- ISO 14001: 2015 Environmental management systems
- ISO 45001: 2018 Occupational health and safety management systems
- IEC TS 62941: 2016 Terrestrial photovoltaic (PV) modules - Guidelines for increased confidence in PV module design qualification and type approval



MECHANICAL DIAGRAMS

SPECIFICATIONS



Remark: customized frame color and cable length available upon request

	Mono
Weight	28.6kg±3%
Dimensions	2279±2mmx1134±2mmx35±1mm
Cable Cross Section Size	4mm ² (IEC) , 12AWG(UL)
No. of cells	144(6x24)
Junction Box	IP68, 3 diodes
Connector	QC 4.10(1000V) QC 4.10-35(1500V)
Cable Length (Including Connector)	Portrait: 300mm(+)/400mm(-); Landscape: 1200mm(+)/1200mm(-)
Packaging Configuration	31pcs/Pallet, 620pcs/40ft Container

ELECTRICAL PARAMETERS AT STC

TYPE

Rated Maximum Power(Pmax) [W]

Open Circuit Voltage(Voc) [V]

Maximum Power Voltage(Vmp) [V]

Short Circuit Current(Isc) [A]

Maximum Power Current(Imp) [A]

Module Efficiency[%]

Power Tolerance

Temperature Coefficient of Isc(a_Isc)

Temperature Coefficient of Voc(J3_Voc)

Temperature Coefficient of Pmax(y_Pmp)

STC

JAM / ZS3U

JAM / ZS3U

JAM / ZS3U

JAM / ZS3U

JAM / ZS3U

JAM / ZS3U

0-+5W

+0.045%/°C

-0.275%/°C

-0.350%/°C

Irradiance 1000W/m², cell temperature 25°C, AM1.5G

Remark: Electrical data in this catalog do not refer to a single module and they are not part of the offer. They only serve for comparison among different module types.

ELECTRICAL PARAMETERS AT NOCT

TYPE

Rated Max Power(Pmax) [W]

Open Circuit Voltage(Voc) [V]

Max Power Voltage(Vmp) [V]

Short Circuit Current(Isc) [A]

Max Power Current(Imp) [A]

NOCT

JAM72S30

JAM72S30

JAM72S30

JAM72S30

JAM72S30

JAM72S30

Irradiance 800W/m², ambient temperature 20°C, wind speed 1m/s, AM1.5G

OPERATING CONDITIONS

Maximum System Voltage 1000V/1500V DC

Operating Temperature -40 °C-+85 °C

Maximum Series Fuse Rating 25A

Maximum Static Load, Front* 5400Pa(112lb/ft²)
Maximum Static Load, Back* 2400Pa(50lb/ft²)

NOCT 45±2°C

Safety Class Class II

Fire Performance UL Type 1



TWMHF

N-type Half-cell
Bifacial Module (66)

66HD

High Power Output
Low LCOE



Maximum Power



www.tw-solar.com



Utility-scale
PV Plants



12
YEAR
Materials
Warranty

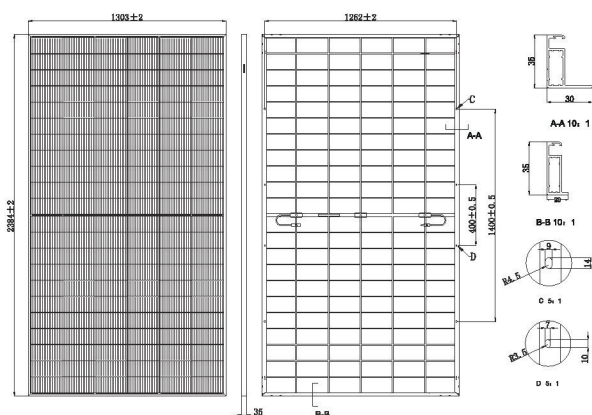


30
YEAR
Power
Warranty



Learn More

DRAWINGS (Unit: mm)



ELECTRICAL CHARACTERISTICS (STC)

Module Type: TWMHF-66HDXXX

Maximum Power: Pmax [W]

Open Circuit Voltage: Voc [V]	49.99	50.14	50.29	50.44	50.59
Short Circuit Current: Isc [A]	17.39	17.45	17.51	17.57	17.63
Voltage at Maximum Power: Vmp [V]	42.02	42.17	42.32	42.47	42.62
Current at Maximum Power: Imp [A]	16.54	16.60	16.66	16.72	16.78
Module Efficiency: η [%]	22.4	22.5	22.7	22.9	23.0

ELECTRICAL CHARACTERISTICS (NMOT)

Maximum Power: Pmax [W]

Open Circuit Voltage: Voc [V]	47.70	47.85	47.99	48.13	48.28
Short Circuit Current: Isc [A]	14.02	14.07	14.11	14.16	14.21
Voltage at Maximum Power: Vmp [V]	39.74	39.88	40.01	40.14	40.28
Current at Maximum Power: Imp [A]	13.30	13.35	13.40	13.45	13.50

* STC: Irradiance 1000W/m², Cell Temperature 25°C, Air Mass1.5, Measuring Tolerance: ±3%

* NMOT: Irradiance 800W/m², Ambient Temperature 20°C, Air Mass1.5, Wind Speed 1m/s

ELECTRICAL CHARACTERISTICS (Rear Power Gain)

5%	Maximum Power: Pmax[W]					
	Module Efficiency: η [%]	23.5	23.7	23.8	24.0	24.2
15%	Maximum Power: Pmax[W]	799	805	811	817	822
	Module Efficiency: η [%]	25.7	25.9	26.1	26.3	26.5
25%	Maximum Power: Pmax[W]	869	875	881	888	894
	Module Efficiency: η [%]	28.0	28.2	28.4	28.6	28.8

TEMPERATURE PARAMETERS

Temperature Coefficient (Pmax)	-0.26%/°C
Temperature Coefficient (Voc)	-0.24%/°C
Temperature Coefficient (Isc)	+0.04%/°C
NMOT	44±2°C

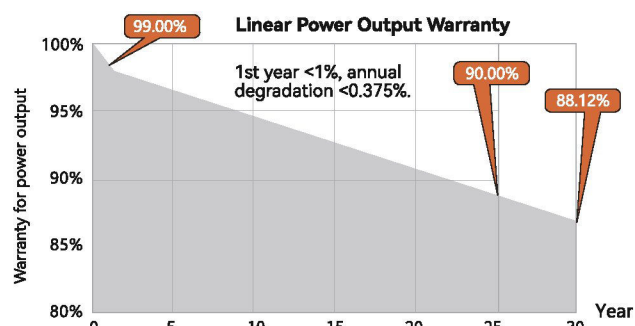
MAXIMUM RATINGS

Operational Temperature	-40°C~+85°C
Maximum System Voltage	1500V DC
Maximum Series Fuse Rating	35A
Power Output Tolerance	0~+5W
Maximum Bifaciality	85±5%

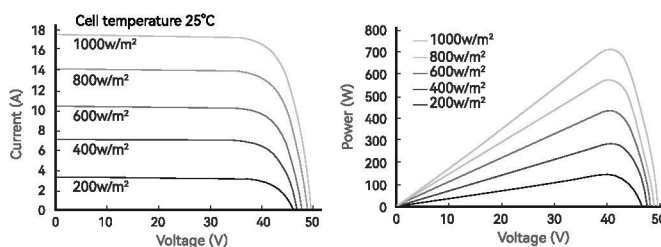
MECHANICAL PARAMETERS

Cells	THC (N type Heterojunction Cell)
Cell Orientation	132[6X22]
Dimension	2384±2X1303±2X35mm
Weight	38.7kg
Front Glass	2.0mm high transmittance, AR tempered glass
Rear Glass	2.0mm semi-tempered glass
Frame	Anodized aluminum alloy frame
Junction Box	IP68, 3 diodes
Output Cable	4.0mm ²
Cable Length	+400mm, -200mm, length can be customized
Wind/Snow Load	2400Pa/5400Pa
Packaging	31pcs per pallet, 558pcs per 40'HC

WARRANTY



I-V CURVE



CERTIFICATIONS

Quality Management System and Product Certification

ISO 9001:2015 / quality management system
ISO 14001:2015 / environmental management system
ISO 45001:2018 / occupation health safety management system
ISO 50001:2011 / energy management system
IEC TS 62941—2016 / PV industry quality management system
IEC 61215/61730, IEC 62804(PID), IEC 61701(Salt),
IEC 62716 (Ammonia), IEC 60068-2-68(Sand)

