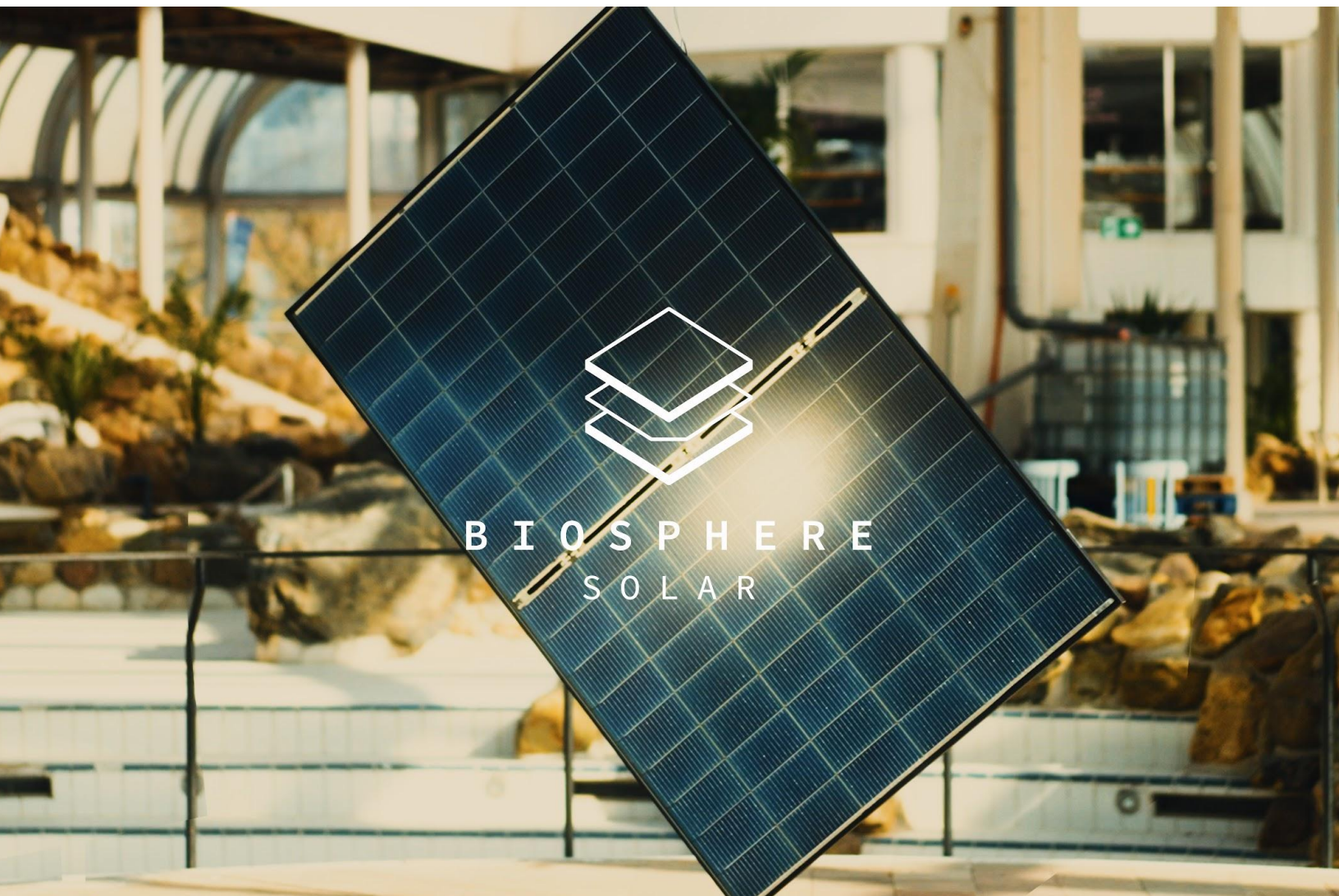




BIOSPHERE SOLAR V1.4-TOPCon

BROCHURE & TECHNICAL DATA SHEET

FULLY DISASSEMBLABLE & CIRCULAR | LONG LIFE | LOW DEGRADATION | BIFACIAL | 21.2% EFFICIENCY

Biosphere Solar is a Netherlands-based start-up on a mission to bring fair and circular standards to the solar industry and market. The start-up is developing laminate-free PV technology unique to the solar industry and market. The benefits of laminate-free PV are longer lifetimes, lower degradation, and full circularity with end-of-life options ranging from refurbishment, upgrades and repairs to full-high value recycling. Biosphere Solar takes back all end-of-life (EoL) modules for circular treatment. Version 1.4 is our first scalable and market-ready module line, manufactured in fully automatic open-door factory lines in China, Belgium and the Netherlands. These modules are intended for large scale B2B projects. Upon request, customised module designs are also available, including modules with colour print on the front sheet.

Disclaimer: this datasheet may be subject to changes. All rights reserved.

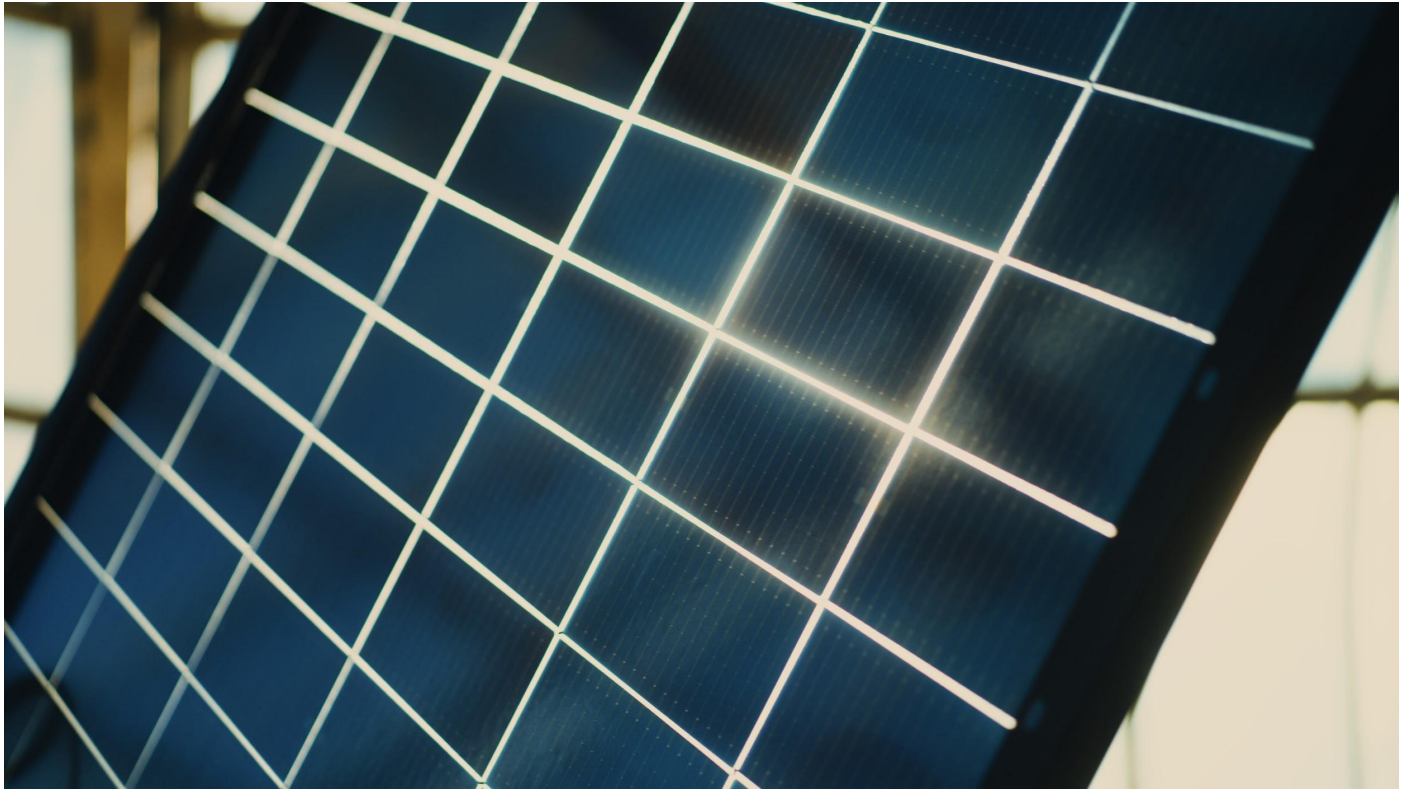
VERSION 1.4 DATASHEET

Electrical Characteristics

V1.4 comes in three versions; V1.4-108 aimed at the rooftop market, V1.4-120 aimed at the utility market, and custom modules. The modules will be certified under IEC61215 or IEC63017 by Q2 of 2025 by TUV Süd, following the strictest safety and quality requirements, which is also in accordance with the CE Low Voltage Directive (LVD).

Version Designation	V1.4-108-TOPCon	V1.4-120-TOPCon
Efficiency	21.2%	21.2%
Cell amount	108	120
Cell type	TOPCon (Bifacial)	TOPCon (Bifacial)
Glass	Glass-glass (3.2mm+3.2mm)	Glass-glass (3.2mm+3.2mm)
Encapsulant	Laminate-free	Laminate-free
Bypass diodes amount	3	3
Bypass diode type	g2x gf5q45e	g2x gf5q45e
Cable length	1m	1m
Connector type	Stäubli MC4 (PV-KBT4/6II-UR)	Stäubli MC4 (PV-KBT4/6II-UR)
Maximum system voltage	1500V	1500V

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Electrical Characteristics (STC)	V1.4-108	V1.4-120			Variance	
Nominal Max. Power (PMax)	430	480	Wp	+/-	2.9	%
Open Circuit Voltage (Voc)	37.8	42.0	V	+/-	1.9	%
Short Circuit Current (Isc)	12.1	12.1	A	+/-	0.5	%
Maximum Power Voltage (Vmpp)	33.1	36.8	V	+/-	1.6	%
Maximum Power Current (Impp)	11.4	11.5	A	+/-	1.3	%
Fill Factor	82	82	%	+/-	-	%
Temperature Coefficient (Isc)	0.046	0.046	%/K	+/-	-	%
Temperature Coefficient (Voc)	-0.26	-0.26	%/K	+/-	-	%
Temperature Coefficient (Pmax)	-0.32	-0.32	%/K	+/-	-	%

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Sustainability & Extended Producer Responsibility

Biosphere Solar takes utmost care for the sustainability of its products, and aims to be as transparent as possible about its upstream supply chain. All modules come with a product passport that shows the materials, production conditions, and supply chain.

Furthermore, V1.4 is PFAS-free and lead-free. The module's glass does contain small amounts of antimony, a choice we made in a careful trade-off between module cost and recyclability. Biosphere Solar takes back all modules at the end of life and ensures maximum end-of-life value for its customers.

Physical Characteristics

Biosphere Solar modules follow standardised sizing and fit with most standard mounting systems. The modules are subjected to stringent static mechanical load tests, hail tests, and dynamic mechanical load tests to ensure the modules can withstand any weather. Upon request, modules can also be delivered frameless.

Physical Characteristics V1.4-108			Physical Characteristics V1.4-120		
Weight	33.8	Kg	Weight	37.0	Kg
Dimensions Frameless	1128x1758x7.4	mm	Dimensions Frameless	1128x1946x7.4	mm
Dimensions with Frame	1134x1764x30	mm	Dimensions with Frame	1134x1952x30	mm
Operating temperature	-40°C / +85	°C	Operating temperature	-40°C / +85	°C

Custom modules

Biosphere Solar also offers custom modules, which can have multiple cell types, a wide range of dimensions and various cell arrangements. Furthermore, custom prints can be attached to the front sheet, giving the module any conceivable pattern or colour, without affecting the performance significantly. Please reach out to us with your customisation needs so we can provide a tailored solution.

Lifetime and Warranty

Biosphere Solar warrants that for a period of 10 years since the warranty start date that the solar modules will be free of defects in material or workmanship which affects the normal installation or utilisation of the modules, provided that the modules are installed, utilised and maintained according to the installation manual provided. If, within the warranty Period, the solar modules fail to remain free of defects, Biosphere Solar will, repair the defective module(s) at no charge to the Customer; replace the defective module(s) with new or refurbished modules that have equal or greater power output; provide additional modules to compensate for the loss in power output; refund the purchase price of the defective module(s) prorated based on the remaining warranty Period.

Biosphere Solar warrants for a period of 30-year performance warranty: a power output of at least 80% of the minimum power output specified on the datasheet for a period of 30 years from the warranty Start Date.

If, within the warranty Period, the solar modules fail to meet the specified power output levels, the Biosphere Solar will, repair the defective module(s) at no charge to the customer; replace the defective module(s) with new or refurbished modules that have equal or greater power output; provide additional modules to compensate for the loss in power output; or refund the purchase price of the defective module(s) prorated based on the remaining warranty Period.

Manufacturing Facilities

The V1.4-108 and V1.4-120 modules are assembled in our fully-automated, open-door facilities in China. The facilities and operations have been awarded an AA rating for Supply Chain Traceability by European auditor TÜV Rheinland, which is the highest achievable mark. Biosphere Solar has an extensive code of conduct in place and will continue to audit and monitor its supply chain, while acknowledging its limited influence in demanding a fully slavery and coal-free supply chain.

Our facilities have more than 2GW yearly production capacity and over 20 years of experience. Biosphere Solar personally ensures the utmost care to production quality. Upon request, quality testing before customs can be performed to check for defects caused by transportation. Custom modules can be manufactured at the open-door semi-automated facilities in Belgium and the Netherlands. These manufacturing sites are highly specialised in custom BIPV modules with >20 years of manufacturing experience.

