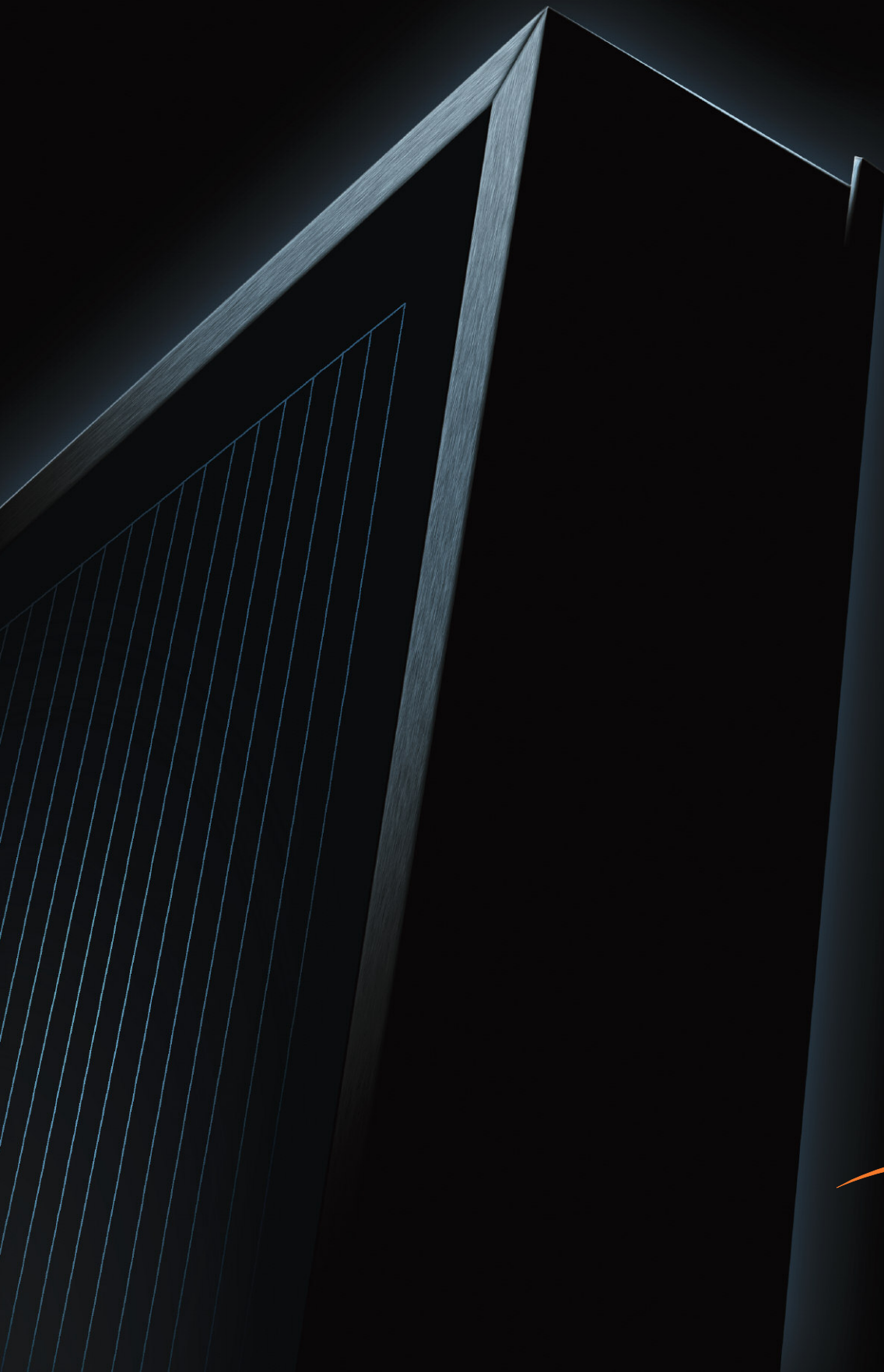


# POWERMAX<sup>®</sup>. PREMIUM CLASS PHOTOVOLTAICS.



  
**AVANCIS**  
ADVANCED SOLAR POWER

# AVANCIS. THE AVANT-GARDE OF PHOTOVOLTAICS.

AVANCIS is one of the pioneers of CIS thin-film technology and has been researching the field as far back as 1981. As a result, AVANCIS has the longest experience of CIS and is therefore regarded as a technological pioneer.

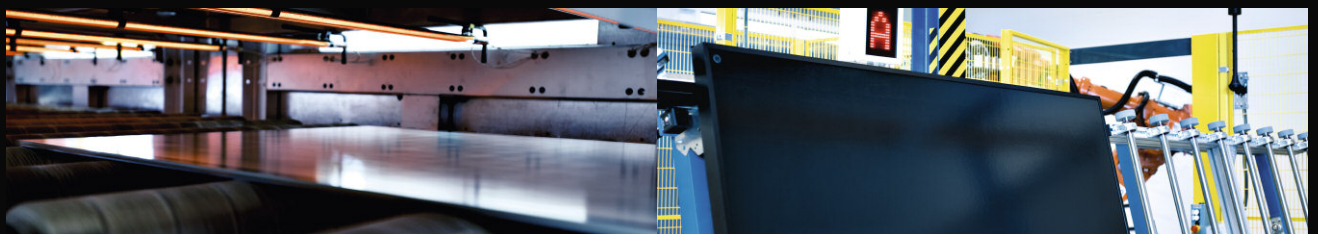
At the same time, our international specialists – in Torgau and in Munich – guarantee not only cutting-edge production “Made in Germany” but also high-end research.

The multiple efficiency records\* achieved by our cells and modules as well as numerous innovation prizes show we are on the right track.

It goes without saying that we insist on uncompromising quality assurance. For example, we have implemented 60 quality checks in our production – and 88 measuring points for the process data.

These factors are reflected in our PowerMax® module.

Another word about sustainability: AVANCIS is a founding member of PV CYCLE, an initiative of European photovoltaic manufacturers to voluntarily take back and recycle used solar modules.



\* 2003: Efficiency world record for a CIS module: 13.1 % (TÜV certified).  
2005: Achievement of a record efficiency level of 13.5 % for a CIS module, outdoor measurement by TÜV.  
2009: 15.1 % aperture efficiency on a 300 x 300 mm<sup>2</sup> module, confirmed by the National Renewable Energy Laboratory.

# POWERMAX®. EXTREMELY ECONOMICAL AND RELIABLE.

The PowerMax® CIS thin-film technology allows us to achieve efficiency values comparable to conventional multi-crystalline silicon technology, but with half the energy payback time. In addition, less material is used to build the cells, which as you would expect represents an environmental benefit.

## HIGHEST ECONOMIC EFFICIENCY

- CIS technology is proven to offer the highest efficiency of all thin-film technologies.
- The mechanical and electrical design of the module with 104 CIS cells is optimized for low system costs.
- The efficiency at a low irradiance level of 200 W/m<sup>2</sup> is typically 2 % lower compared to an irradiance of 1000 W/m<sup>2</sup>.
- Excellent shading tolerance and the bypass diode guarantee that the entire string continues to operate even when a module is shaded.

## BEST QUALITY "MADE IN GERMANY"

- Our production is certified to:
  - Industrial standard ISO 9001:2000
  - Environmental standard ISO 14001:2004
  - Health and safety standard OHSAS 18001:2007
- Our CE-compliant module is certified to:
  - IEC 61646 Ed.2 and IEC 61730 Class A
  - UL 1703
- We offer attractive warranty\* periods:
  - 5-year product warranty.
  - 20-year performance warranty.

## APPEALING DESIGN

- Uniform black look.
- The corner connection of the frame is designed as a mitre joint and is additionally strengthened from the inside.
- The mounting clamps of the modules are concealed in the shadow gap. This guarantees an aesthetically appealing installation.

## EXTREME DURABILITY

- The module has been developed for the highest snow load zones acc. to DIN 1055 and withstands loads of 551 kg/m<sup>2</sup>.
- The hollow-chamber aluminum frame is extremely resistant to torsion and corrosion.
- The glass is mounted with a highly elastic polymer glue: This means the glass is not exposed to any mechanical point loads.
- The module is laminated using PVB foil, a technology that has proven its effectiveness in the automotive industry. Additional stability is offered by the tempered front glass.
- A butyl seal protects the cells against moisture.

## STRAIGHTFORWARD INSTALLATION

- In addition to mounting using clamps and mounting lip in the shadow gap, four M6 holes are provided for mounting from the back.
- To facilitate installation, the junction boxes are equipped with cables and MC3 plugs.



- Qualified, IEC 61646
- Safety tested, IEC 61730
- Periodic inspection



\* See AVANCIS Limited Warranty for PV-Module(s).

## MECHANICAL SPECIFICATIONS

Parameter	Value
External dimensions	
incl. mounting lip	1595 x 684 mm <sup>2</sup>
excl. mounting lip	1595 x 672 mm <sup>2</sup>
Thickness	45 mm
Weight	19.6 kg
Junction box protection class	MC (IP65)
Dimensions of the junction boxes	80 x 80 x 23 mm <sup>3</sup>
Cable lengths (⊖ plug   ⊕ socket)	200   300 mm
Cable cross section	2.5 mm <sup>2</sup>
Connector type	MC3

## ELECTRICAL SPECIFICATIONS

Data measured under standard test conditions (STC)\*:

Parameter	PowerMax <sup>®</sup>	100	110	120	130
Nominal power $P_{nom}$		100 W	110 W	120 W	130 W
Tolerance of nominal power $\Delta P_{nom}$		± 5 %	± 5 %	± 5 %	± 5 %
Module efficiency $\eta^{**}$		9.3 %	10.3 %	11.2 %	12.1 %
Aperture efficiency $\eta$		10.6 %	11.6 %	12.7 %	13.7 %
Open-circuit voltage $V_{oc}$		56.0 V	56.6 V	57.4 V	58.1 V
Short-circuit current $I_{sc}$		3.10 A	3.11 A	3.13 A	3.19 A
Voltage at mpp $V_{mpp}$		39.5 V	42.3 V	44.9 V	47.8 V
Current at mpp $I_{mpp}$		2.54 A	2.61 A	2.68 A	2.72 A
Limiting reverse current $I_r$		5.0 A	5.0 A	5.0 A	5.0 A
Max. system voltage $V_{sys}$		1000 V	1000 V	1000 V	1000 V

\* Insolation intensity 1000 W/m<sup>2</sup> in the plane of the module, module temperature 25 °C and a spectral distribution of the sunlight according to the atmospheric mass (AM) 1.5.  
\*\* excl. mounting lip.

Data measured at nominal operating cell temperature (NOCT)\* and AM 1.5:

Parameter	PowerMax <sup>®</sup>	100	110	120	130
NOCT		48.3 °C	48.3 °C	48.3 °C	48.3 °C
Nominal power $P_{nom}$		69.7 W	74.7 W	82.3 W	87.6 W
Open-circuit voltage $V_{oc}$		48.3 V	48.8 V	49.5 V	50.1 V
Short-circuit current $I_{sc}$		2.50 A	2.50 A	2.50 A	2.50 A
Voltage in mpp $V_{mpp}$		34.5 V	36.9 V	39.2 V	41.7 V

\* Module operating temperature at 800 W/m<sup>2</sup> insolation intensity in the plane of the module, air temperature 20 °C, wind speed 1 m/s and open-circuit condition.

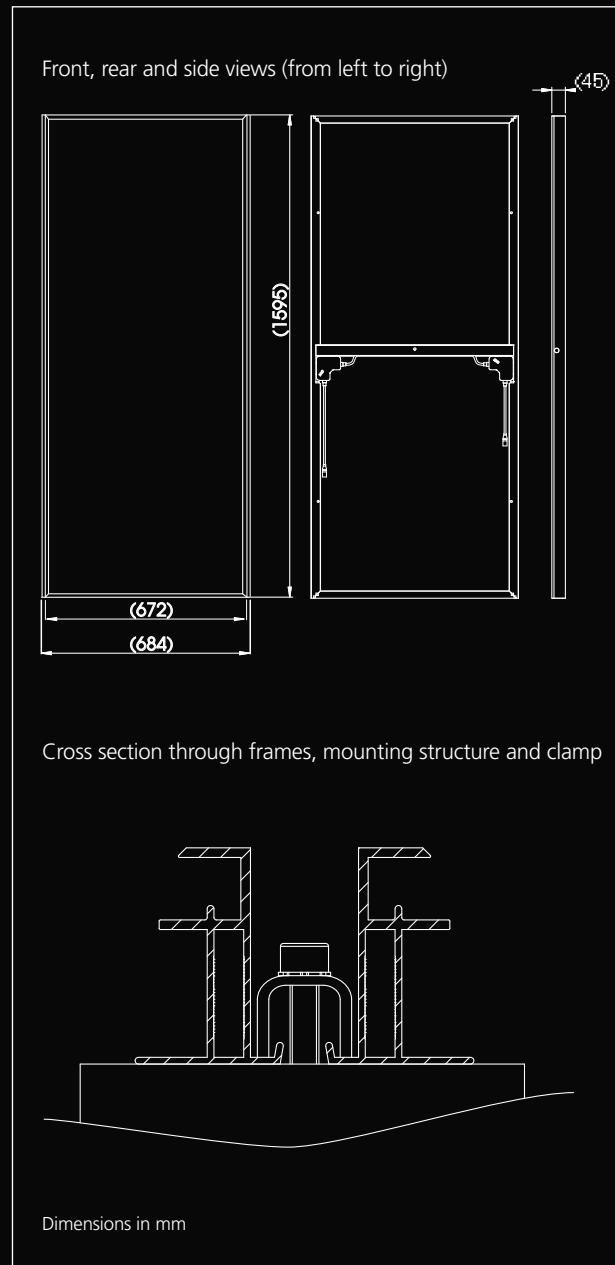
Temperature coefficients:

Parameter	Value
Temperature coefficient $P_{nom}$	-0.45 %/°C
Temperature coefficient $V_{oc}$	-205 mV/°C
Temperature coefficient $I_{sc}$	0.1 mA/°C
Temperature coefficient $V_{mpp}$	-122 mV/°C

Data measured at low light intensity:

The relative reduction in the module-efficiency at a light intensity of 200 W/m<sup>2</sup> relative to 1000 W/m<sup>2</sup> at 25 °C module temperature and spectrum AM 1.5 is typically 2 %.

## DIMENSIONS



## SAFETY, INSTALLATION AND OPERATION

For more information about handling, installation and operation of PowerMax<sup>®</sup> modules, refer to the installation, operating and safety manual for AVANCIS PowerMax<sup>®</sup> photovoltaic modules.

AVANCIS GmbH & Co. KG,  
Solarstrasse 3, 04860 Torgau, Germany  
Tel.: +49 (0) 3421 7388-0 Fax: +49 (0) 3421 7388-111  
E-Mail: info@avancis.de Web: www.avancis.de

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**SAT SOLAR AG**  
Lohstampfestr.11  
CH-8274 Tägerwilen  
Switzerland

Tel: +41 716693750  
Fax: +41 716693751  
info@sat-solar.ch  
www.sat-solar.ch

