



# **Crystalline Silicon PV Modules**



**State-of-the-art Technology  
Highly Skilled Personnel  
HIGHEST QUALITY**



**PHOTOVOLTAIC MODULES** manufactured by **BISOL** are a result of intensive research and development efforts of highly skilled **BISOL's** personnel possessing comprehensive professional know-how. The modules are engineered and manufactured under state-of-the-art automated production environment delivering the highest power output and energy yield. Beginning of 2009, production capacity of **BISOL** was 40 MW equaling to 170,000 modules of peak power between 230 and 240 Wp produced every year.

## Highest Quality Worldwide



### BISOL PRODUCTS

**BISOL** produces high quality mono- and multicrystalline silicon photovoltaic modules designed for both commercial and residential applications suitable for grid connected and stand alone systems. High output power modules consist of high quality, proven, and certified materials. In addition to delivering high power density with high module efficiency, **BISOL** modules are designed for the highest solar power plant system voltages of 1000 V<sub>dc</sub>. Relying on the extremely high quality level of **BISOL** products being based on strict criteria of quality control at each step of the production process, **BISOL** modules are well accepted for their excellent long-term electric stability. In addition, **BISOL** would like to underline that all modules are produced in disabled people friendly manufacturing environment and labeled “**Made in Europe, Slovenia**”.

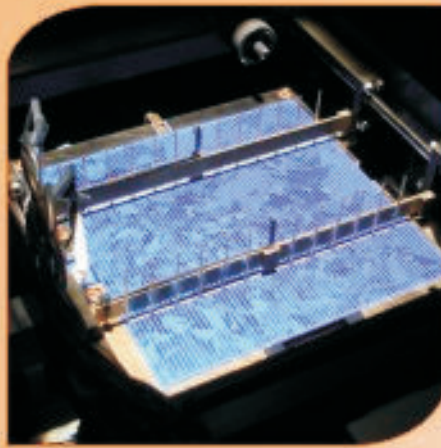




## NATURE OF BISOL's TECHNOLOGY PERCEPTION

Permanent investments into research and development dictate the future of the photovoltaic industry. In aspiration for sustainable energy supply, **BISOL** accelerates technological innovations by industry-led research and development of the photovoltaic technology offering outstanding long-term performance. At **BISOL** we try to propose solutions that demonstrate their cost-effectiveness, added value, and go beyond the business-as-usual scenario.

To the above aim, **BISOL** is able to process ever thinner solar cells and is one of the first companies worldwide successfully implementing three bus-bar and back-contact solar cells. In the beginning of 2008, **BISOL** has launched new Glass-Glass collection of photovoltaic modules named **BISOL VISTA**. The first **VISTA** project was the facade of **BISOL's** new headquarters in Latkova vas, Slovenia.



## Main Features & Benefits

- High-power, high-quality, and high efficiency
- Outstanding long-term performance
- Withstanding rigorous operating conditions
- Proven, highest quality, and certified materials
- Excellent long-term stability
- High voltage operation (1,000 V<sub>DC</sub>)
- 5 years product warranty
- 12 years warranty on 90 % power output
- 25 years warranty on 80 % power output
- IEC 61215:2005 Ed. 2 certified
- IEC 61730
- Heavy load 5,400 Pa approved
- 44°C NOCT
- Pre-sorting according to  $P_{MPP}$  and  $I_{MPP}$

### Quality approval:

CERTIFIED  
**IEC**  
61215 Ed.2

CERTIFIED  
**IEC**  
61730 Ed.1



**TÜVRheinland®**  
Precisely Right.



AUSTRIAN RESEARCH CENTERS

### Member of:



**SET plan**

### Partnering at:



**Other R&D projects**

All-inorganic nano-rod thin-film c-Si solar cells



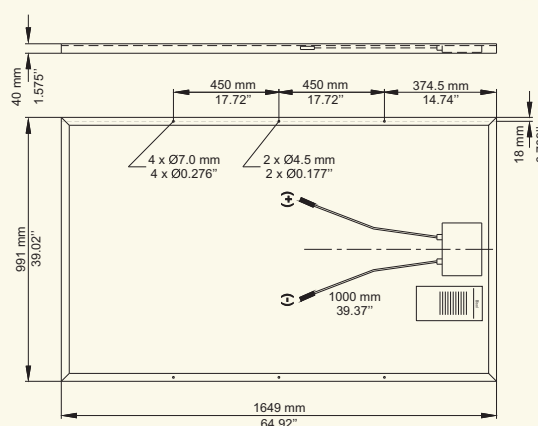
## BUSINESS EXCELLENCE OF HONEST INTERESTS

BISOL's photovoltaic modules find their place predominantly in diverse international markets where **BISOL** has proven to be a well established trade mark. The latter applies especially to adherents of high-quality products among which **BISOL** products bear the label of "PREMIUM QUALITY".

### Common Characteristics

Solar Cell Type	Multicrystalline silicon
Solar Cell Dimensions	156 x 156 mm (6+)"
No. of Cells and Connection	60 in series
Power Output Tolerance	± 3 %
Current Temperature Coefficient $\alpha$	+ 5.5 mA/K
Voltage Temperature Coefficient $\beta$	- 120 mV/K
Power Temperature Coefficient $\gamma$	- 0.40 %/K
NOCT	44° C
Maximum System Voltage	1,000 V <sub>DC</sub> (IEC)
Length x Width x Thickness	1,649 x 991 x 40 mm
Weight	18.5 kg
Solar Cell Efficiency $\eta_c$	14.7 % - 16.8 %
Module Efficiency $\eta_M$	13.1 % - 15.0 %

### Dimensions



### Power Classes

Maximum Power	$P_{MPP}$	214 W <sub>p</sub>	221 W <sub>p</sub>	227 W <sub>p</sub>	233 W <sub>p</sub>	245 W <sub>p</sub>
MPP Voltage	$V_{MPP}$	28.5 V	28.7 V	29.1 V	29.3 V	29.9 V
MPP Current	$I_{MPP}$	7.50 A	7.70 A	7.80 A	7.95 A	8.20 A
Open Circuit Voltage	$V_{OC}$	36.6 V	36.8 V	36.9 V	37.0 V	37.3 V
Short Circuit Current	$I_{SC}$	8.20 A	8.30 A	8.40 A	8.50 A	8.70 A

All electrical characteristics are at Standard Test Conditions (AM 1.5; 1,000 W/m<sup>2</sup>; 25° C).

## BISOL HAS SUNSHINE ALREADY IN THE NAME

BISOL photovoltaic modules are built according to the highest quality standards to last a lifetime and continue to give years of faithful service with excellent energy yield. The goal of **BISOL** is to offer the mankind the prime-class elementary benefits – the green electricity!

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