Products Brochure
A leading global provider of smart PV energy solutions

Yingli Energy Development Co., Ltd.

Add.: 2599 North Xiangyang Avenue, Baoding, China
P.C.: 071051
Tel.: +86 312 8922 298 (International Sales Department)
+86 312 8922 176 (Chinese Sales Department)
+86 312 8929 170 (Photovoltaic Technology Laboratory)
Fax: +86 312 8931 990
E-mail: commerce@yingli.com
Web: www.yinglisolar.com
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Company Profile

The world’s leading provider of smart energy solutions for photovoltaics

Yingli Energy Development Co., Ltd., known as “Yingli Solar”, which is one of the earliest Chinese companies that involved in the photovoltaic industry, has now developed into a provider of smart photovoltaic energy solutions which focuses on R&D, smart manufacturing, and development and operations of power plants. Yingli Solar has always focused on high-efficiency photovoltaic modules and power plants business. Since entering the photovoltaic industry in 1998, Yingli Solar’s photovoltaic products have been sold to more than 100 countries and regions worldwide.

Quality Strength

High-Level Technology Innovation Platform

Relying on five Chinese national innovation platforms, academician workstation and post-doctoral workstation, Yingli Solar has made continuous efforts in independent innovation to improve its core competitiveness. Yingli Solar’s PV Technology Laboratory is qualified by the China National Accreditation Service for Conformity Assessment (CNAS). It can test more than 200 items related to the entire industry chain, including silicon wafers, cells, modules and power plants, while it can meets the requirements of many international standards such as IEC61215 and IEC61730.

Authoritative Quality Certification
Smart Manufacturing

Focus on High-Efficiency Modules

Yingli Solar is headquartered in Baoding City, Hebei Province, China, with four smart manufacturing bases in Tianjin City, Hengshui City, Li County and Mancheng District in Baoding City. Yingli Solar adopts advanced process equipment and technology to achieve a high level automation of manufacturing, quality control and energy management in order to create a “smart factory”. All these are for delivering higher quality products to customers with shorter delivery time and lower price.

Four smart manufacturing bases

Tianjin

Li County

Hengshui

Mancheng

Products Introduction
# Products overview

## Product Details

<table>
<thead>
<tr>
<th>Glass Backsheet</th>
<th>PANDA 3.0 series</th>
<th>YLM 3.0 series</th>
</tr>
</thead>
<tbody>
<tr>
<td>182 TOPCon module</td>
<td>182 PERC module</td>
<td>210 PERC module</td>
</tr>
<tr>
<td>108 cells: $P_{max} = 420-430$ W</td>
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<td>120 cells: $P_{max} = 590-605$ W</td>
</tr>
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</tr>
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## Our Products

- **Wide power range from 400 to 670 W.**

- **Suitable for residential, commercial and industrial, ground mounted plants, special applications.**

- **Authoritative third-party reliability certification for applications such as salt mist, ammonia, dust and sand.**
Series overview

The Leader of N-type Monocrystalline Products

PANDA 3.0 has been upgraded based on technological innovation.

<table>
<thead>
<tr>
<th></th>
<th>PANDA 1.0 N-type PERT</th>
<th>PANDA 2.0 N-type IIF</th>
<th>PANDA 3.0 N-type TOPCon</th>
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</thead>
<tbody>
<tr>
<td>Cell efficiency</td>
<td>20.5%</td>
<td>21.0%</td>
<td>25.0%</td>
</tr>
<tr>
<td>Module efficiency</td>
<td>17.3%</td>
<td>18.2%</td>
<td>22.2%</td>
</tr>
<tr>
<td>Bifaciality coefficients</td>
<td>78.0%</td>
<td>80.0%</td>
<td>85.0%</td>
</tr>
<tr>
<td>5-year degradation</td>
<td>2.0%</td>
<td>2.0%</td>
<td>1.0%</td>
</tr>
<tr>
<td>Annual degradation</td>
<td>0.8%</td>
<td>0.5%</td>
<td>0.4%</td>
</tr>
<tr>
<td>Module power</td>
<td>285 W</td>
<td>300 W</td>
<td>600 W+</td>
</tr>
</tbody>
</table>

Multi-dimensional innovative design of PANDA 3.0 series

- Optical design: Optical optimization of packaging materials
- Electrical design: Low-temperature anti-soldering cutting technology
- Customers-centered: Thoughtful service, lower LCOE
- Mechanical properties: High temperature anti-degradation
- Environmental adaptability: Higher reliability test sequence

Yinglisolar / 08
Yingli Solar has been researching and industrialising N-type monocrystalline silicon bifacial cells and modules since 2009, and is a pioneer in the development and mass production of N-type technology. Yingli Energy was awarded the right to develop the 50 MW ground-mounted power plant project in Datong, Shanxi, the first national advanced technology PV demonstration base under the National "Leader" Program. Yingli Energy’s self-developed Panda bifacial modules, which have the advantages of high power generation capacity, good weather resistance and wide range of applications, are the first bifacial power generation products in the world to be certified by CGC, UL and TÜV Rheinland.

**The Pioneer of N-type Monocrystal Technology**

Yingli Solar took the lead in publishing the "Test Methods for Electrical Parameters of Bifacial Power Generation PV Modules" standard, filling the gap of domestic bifacial power generation PV standards. Also, Yingli Solar took the lead in completing the "Key Technology Research and Production Line Demonstration for the Industrialization of High Efficiency Homogeneous Junction N-type Monocrystalline Silicon Bifacial Power Generation Solar Cells (TOPCon Cells)" project during the Chinese National 13th Five-Year Plan period, which improved technological progress of the PV industry and provided important guarantees and support for the industrialization of N-type TOPCon cells in the PV industry. The project has provided important support for the industrialization of N-type TOPCon cells in the photovoltaic industry.

Cooperated with ECN, Tempress and others to research and develop N-type high-efficiency cell technology, and established PANDA project team. Received the First-class Award of Science & Technology Progress Prize of China Renewable Energy Society in 2010.

Achieved mass production of PANDA cells.

Received the "2014 Innovative Technology Product of the Year" award.

Acquired the right to develop bifacial PV plant projects in the first batch of national "Top Runner" advanced technology demonstration base.

Received the "Dual Glass+" Bifacial Power Generation Technology Innovation Contribution Award at the 3rd "Top Runner" Innovation Forum.

Released two group standards for bifacial photovoltaic power generation product testing standards.

Launched PANDA 3.0 series.

Supply and support the Middle East region-Oman Iberia II bifacial PV plant project grid-connected.

Received the First-class Award of Science & Technology Progress Prize of China Renewable Energy Society the Second-class Award of Science & Technology Progress Prize of National Energy Administration The Third-class Award of Science & Technology Progress Prize of Hebei Province.

Received the industry’s first bifacial power generation product certification (China General Certification Center).

Both received the first international TÜV Rheinland and UL bifacial power generation product certification.

Released two group standards for bifacial power generation products.

Launched PANDA 3.0 series.
Product Strength

182 TOPCon Module

- All-black design
- Cutting-edge technology
- Superior low light performance
- Substantial backside power generation
- Excellent durability
- Wide applications

Product Advantages

Better Cell Performance
Multi composite films passivation technology on the front side and tunnel oxide passivation contacts technology on the rear side to enhance the Voc of the cell with bifaciality coefficient up to 90%.

Lower Temperature Coefficient
Temperature coefficient reaching -0.30%, more outstanding power generation in high temperature condition.

Higher Backside Power Generation in Typical Environments

Case Information: Hebei Baoding, 100 MW, Fixed Tilt 2P
Module Information: TOPCon Module
Product Classification

Yingli Solar focus on customers interests and needs. We launched PANDA 3.0 series products, which includes glass/glass modules and glass/backsheet modules. The performances of PANDA 3.0 series beyond the IEC standard test requirements, with the ability to resist risks such as salt mist, ammonia, dust and sand, and PID. PANDA 3.0 series products are suitable for residential, commercial and industrial, ground mounted plants, special applications.

Complete System and Product Certifications

ISO 9001: 2015 (Quality management systems)
ISO 14001: 2015 (Environmental management systems)
BS OHSAS 18001: 2007 (Occupational health and safety management systems)
IEC 62544: 2015 (Terrestrial photovoltaic (PV) modules-Quality system for PV module manufacturing)

PANDA 3.0 PRO Series (182 mm TOPCon cell)

<table>
<thead>
<tr>
<th>Model Type</th>
<th>Power (W)</th>
<th>Cell number (pcs)</th>
<th>Module dimensions (mm)</th>
<th>Weight (kg)</th>
<th>Bifacial Coefficients (%)</th>
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</thead>
<tbody>
<tr>
<td>Glass/Bulk module</td>
<td>YLxxxG-38-1500V 1/2</td>
<td>420-430</td>
<td>108</td>
<td>1722<em>1134</em>30</td>
<td>21.5</td>
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<tr>
<td></td>
<td>YLxxxG-50-1500V 1/2</td>
<td>560-575</td>
<td>144</td>
<td>2278<em>1134</em>36</td>
<td>28.0</td>
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<tr>
<td></td>
<td>YLxxxG-55-1500V 1/2</td>
<td>610-625</td>
<td>156</td>
<td>2485<em>1134</em>35</td>
<td>30.0</td>
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<tr>
<td>Glass/Glass module</td>
<td>YLxxxG54 w0</td>
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<td>1722<em>1134</em>30</td>
<td>24.6</td>
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<td></td>
<td>YLxxxG75 w2</td>
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<td>2278<em>1134</em>30</td>
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<td></td>
<td>YLxxxG78 w2</td>
<td>610-625</td>
<td>156</td>
<td>2485<em>1134</em>30</td>
<td>35.0</td>
</tr>
</tbody>
</table>

Note: The datasheets of the above products may be updated irregularly, and you can consult or download them through the contact information provided on the back cover of this brochure. In addition, our company can provide customized products for customers.
Product Strength

182PERC Module

- Black aesthetic design
- Lower losses
- Reliable mechanical performance
- Excellent durability
- Wide applications

YLM 3.0 PRO

Product Strength

210PERC Module

- Large size cell
- Reliable mechanical performance
- Excellent durability
- Wide applications

YLM 3.0 PLUS
Product Advantages

Low Temperature Non-destructive Cutting Technology
Non-destructive cutting, smooth cut surface, no silicon body cutting damage, no micro-cracks.

High Power and High Reliability Encapsulation Technology
MBB cell technology reduces micro-crack and broken grids risks effectively. The use of circular ribbon instead of flat ribbon for metal interconnection can increase the optical utilization rate of the ribbon area by more than 50%.

Product Classification

Complete Product Certification System
YLM 3.0 series includes glass/glass modules and glass/backsheet modules using high efficiency PERC cells. With high quality encapsulation materials, YLM 3.0 modules are perfectly suited to the harsh environment and provide you with high reliability and quality assurance.

YLM-J 3.0 PRO Series (182 mm PERC cell)

<table>
<thead>
<tr>
<th>YLM-J 3.0 PRO</th>
<th>Module Type</th>
<th>Power (W)</th>
<th>Cell Number (pcs)</th>
<th>Module Dimensions (mm)</th>
<th>Weight (kg)</th>
<th>Efficiency Coefficients (%)</th>
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</thead>
<tbody>
<tr>
<td>Glass/Backsheet module</td>
<td>YLMxxD-374 1500V 1/2</td>
<td>405-415</td>
<td>144</td>
<td>1722<em>1134</em>30</td>
<td>21.5</td>
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<tr>
<td>Glass/Glass module</td>
<td>YLMxxDFT4-415</td>
<td>108</td>
<td>1722<em>1134</em>30</td>
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<tr>
<td>Glass/Glass module</td>
<td>YLMxxFT42-420</td>
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<td>2218<em>1134</em>30</td>
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</table>

YLM 3.0 PLUS Series (210 mm PERC cell)

<table>
<thead>
<tr>
<th>YLM 3.0 PLUS</th>
<th>Module Type</th>
<th>Power (W)</th>
<th>Cell Number (pcs)</th>
<th>Module Dimensions (mm)</th>
<th>Weight (kg)</th>
<th>Efficiency Coefficients (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Glass/Backsheet module</td>
<td>YLMxxD-411 1500V 1/2</td>
<td>590-605</td>
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<td>2172<em>1083</em>35</td>
<td>31.0</td>
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<tr>
<td>Glass/Glass module</td>
<td>YLMxxD-690</td>
<td>132</td>
<td>2384<em>1083</em>35</td>
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<tr>
<td>Glass/Glass module</td>
<td>YLMxxDF4-690</td>
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<td>2384<em>1083</em>35</td>
<td>38.4</td>
<td>70±5</td>
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