Founded in 1997, Trina Solar has established a global network covering production, sales and service. The company processes upstream and downstream businesses across more than 100 countries and regions worldwide with 40 branches, and has overseas employees from over 30 countries and regions.

As of Q1 2020, the cumulative total module shipments of the company has reached 50GW, leading the industry. Based on the annual report of IHS, Trina Solar has been ranked among Top 3 in terms of global module shipment for the year of 2017, 2018 and 2019. Further, Trina Solar has been rated as a Tier 1 firm by Bloomberg, IHS and others for consecutive years. With its strong financials, Trina Solar is in leading the industry. In 2018, its asset-liability ratio was approximately 58%, and its sales revenue crossed 25 billion yuan.

A commitment to excellence in all aspects of the organization, a strong corporation with a solid balance sheet, and proven product quality and reliability are some of the key attributes of a bankable brand.

In 2019, Trina solar has been rated as fully bankable by 100% of the experts participating in the BNEF’s bankability research. This is the fourth time in a row that the company has been recognized by BNEF.
For the past two decades, Trina Solar has been at the forefront in solar innovation. Trina Solar owns two national-level innovation platforms, the State Key Laboratory of PV Science and Technology (SKL) and National Enterprise Technology Center, which gathers international top scientists from over ten countries. Till November 2019, Trina Solar’s R&D team has broken 20 world records in the field of cell efficiency and module output power.

**GROUND-BREAKING INNOVATIONS**

A TOTAL OF 20 WORLD RECORDS IN PV CELL EFFICIENCY & MODULE OUTPUT

![Image of innovation advancements]

- **Multi-Si Module** 284.7W May. 2012
- **Mono-Si Module** 326.3W April. 2014
- **Mono-Si Module** 335.2W Oct. 2014
- **Mono-Si PERC cell** 21.4% Nov. 2014
- **Multi-Si Module Ap.Eff.** 19.14% April 2015
- **156mm mono-Si cell** 22.16% Dec. 2015
- **Multi-Si Module Ap.Eff.** 19.14% April 2017
- **156mm IBC cell** 23.22% Nov. 2019
- **156mm IBC cell** 22.61% Apr. 2016
- **156mm Multi-Si cell** 21.25% Nov. 2015
- **156mm Multi-Si cell** 21.25% Nov. 2015
- **156mm IBC cell** 22.61% Dec. 2016
- **156mm IBC cell** 22.61% Dec. 2016
- **156mm IBC cell** 23.5% Apr. 2016
- **156mm IBC cell** 23.5% Apr. 2016
- **IBC module** 410.5W Dec. 2017
- **N-mono-TOPCon cell** 24.58% May. 2019
- **N-cast-mono-TOPCon cell** 23.22% Nov. 2019
- **Multi-Si Module** 274.3W Sept. 2011
- **2cm IBC cell** 22.94% Apr. 2014
- **156mm IBC cell** 22.94% Apr. 2014
- **156mm Multi-Si PERC cell** 20.76% Nov. 2014
- **Multi-Si Module** 324.5W Dec. 2014
- **156mm Multi-Si cell** 21.25% Nov. 2015
- **156mm IBC cell** 23.5% Apr. 2016
- **IBC module** 410.5W Dec. 2017
- **N-mono-TOPCon cell** 24.58% May. 2019
- **Multi-Si Module** 274.3W Sept. 2011
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- **N-mono-TOPCon cell** 24.58% May. 2019

![Image of innovation advancements]

- **1720 patents applied**
- **813 patents granted**
- **Over 60 government funded projects**
Trina Solar’s products have always maintained high reliability and solid performance based on our commitment to our quality first policy.

With over 200 in-house tests and a state of the art research and development lab, Trina Solar goes beyond requirements to deliver the highest quality products to customers. The company has been ranked as “Top performer” in the DNVGL scorecard for 5 consecutive years. Winners of the award are selected on the basis of the annual PV Module Reliability Scorecard report released by PVEL and DNV GL.

PRODUCTS YOU CAN RELY ON

Trina Solar Duomax Twin modules adopt bifacial PERC as the core technology, in which Trina Solar has the most sophisticated R&D and industrialization capabilities. With the integration of dual-glass, multi-busbar and half-cut cell technologies, Duomax Twin can achieve higher energy generation performance.

BIFACIAL PERC TECHNOLOGY

A typical PERC structure employs AI-BSF. Bifacial PERC is different from the typical PERC, with BSF replaced by AI grid, which can receive scattered solar radiation and thus achieve a bi-faciality of over 80%.

Reliability endorsed by third parties

- **2012**: Obtained UL’s Client Test Data Program certification
- **2017**: Received the first CQC’s witnessed Manufacturer’s Testing certification
- **2019**: Obtained the first UL’s Witness Testing Data Program Certification

- High power generation
- High reliability
- Low LCOE
- Wide application
**DUAL-GLASS TECHNOLOGY**

Dual-glass technology replaces the conventional glass-and-backsheet structure with a heat strengthened dual-glass structure. Trina Solar’s technical team carried out in-depth R&D in dual-glass technology in 2012 and dual-glass modules were put into mass production in 2013. Thus, Trina Solar became one of the first companies manufacturing efficient dual-glass modules and bringing them to market. Until now, Trina Solar has shipped dual-glass modules with a total output of more than 3GW, more than any other manufacturer.

**MULTI-BUSBAR TECHNOLOGY**

Compared to the conventional five busbar soldering process, the multi-busbar (MBB) technology can increase output power of PV modules by 2% with finer and narrower busbars. As the pioneer of MBB technology, Trina Solar has always been taking the lead in R&D and mass production of MBB in the industry.

As early as 2015, Trina Solar started its research on MBB and joined hands with other players to develop the first-generation round welding strip and first-generation MBB cell series welding equipment in China. Moreover, Trina Solar was also among the first to solve technical difficulties in the process.
HALF-CUT AND NON-DESTRUCTIVE CUTTING (NDC) TECHNOLOGY

In half-cut technology, the full cell is cut into two parts, which results in a reduction of electrical ribbon resistance and finally improves the overall module efficiency by more than 2%. Also, half-cut design allows the module to work at low operating temperatures, which can improve energy generation per watt. And Trina Solar has adopted a non-destructive cutting technology based on the principle of thermal expansion and contraction.

Under the heat stress the wafer separates by itself. The cutting surface is very smooth without any micro-cracks. A NDC cell has a similar strength and mechanical robustness as a full cell and greatly surpasses that of the traditionally cut ones. Trina Solar has integrated half-cut and non-destructive technology into its new generation module product series, which significantly improves the actual power generation, especially when combined with other outstanding technologies like multi-busbar and bifacial cell design.

Better power generation with reduced internal resistance losses
High reliability with strong resistance against hotspots
High power output with better shading tolerance

Traditional Cutting vs. NDC

Cutting process:
- Mechanical separation
- Laser melting
- Low Temperature
- Non-destructive Cutting (NDC) Process

Cross section microscope picture of cutting edge:
- Rough cutting surface with subtle lines
- Smooth cutting surface with no cracks

Comparison of mechanical properties:

HIGH-DENSITY INTERCONNECTION TECHNOLOGY

The cell spacing of the traditional module is 2mm with the restriction of ribbon strength.

High-density interconnection technology is developed to further reduce the cell spacing to the minimum to optimize power output and efficiency.

Currently there are two different processes of cell encapsulation:

- High-density interconnection:
  - By flattening cell connection areas of welding tape, the cell spacing is reduced to 0.5mm to achieve higher efficiency, which will leave a certain gap to reduce yield risk, micro-cracks and damage to the module.
  - Overlapping:
    - Cells are overlapped with overlapping area 0.2-0.5mm through connections of welding tapes, which could achieve an even higher efficiency than the first process. However, the cell breakage rate will increase during production and module deformation will appear, which will result in micro-cracks.

Trina Solar Vertex modules employ the high-density interconnection to achieve over 21% ultra-high efficiency.

<table>
<thead>
<tr>
<th>Module efficiency</th>
<th>Module yield</th>
</tr>
</thead>
<tbody>
<tr>
<td>Traditional modules</td>
<td>High-density modules</td>
</tr>
<tr>
<td>Traditional modules</td>
<td>High-density modules</td>
</tr>
</tbody>
</table>

Trina Solar Vertex modules employ the high-density interconnection to achieve over 21% ultra-high efficiency.
Trina Solar Vertex series modules, with a module conversion efficiency over 21%, boast a power output up to 600 W. Incorporating 210mm cells, the new Vertex series modules are designed for utility and large commercial & industrial projects and come in two versions - the bifacial double-glass modules and back sheet modules. Based on Trina Solar’s superior multi-busbar technology, the Vertex modules and incorporates an innovative design that integrates half-cut, non-destructive cutting and high-density interconnect technologies. By virtue of low-voltage and higher module string power output, the new Vertex series unlocks huge potential for further reducing balance-of-system costs.

<table>
<thead>
<tr>
<th>Maximum Power</th>
<th># of cells</th>
<th>Size/Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vertex 500W+</td>
<td>DE18M(II)</td>
<td>480-505 W</td>
</tr>
<tr>
<td></td>
<td>DEGL20MC(II)</td>
<td>480-505 W</td>
</tr>
<tr>
<td>Vertex 550W+</td>
<td>DE19</td>
<td>530-555 W</td>
</tr>
<tr>
<td></td>
<td>DE19C.20</td>
<td>530-555 W</td>
</tr>
<tr>
<td>Vertex 600W+</td>
<td>DE20</td>
<td>580-605 W</td>
</tr>
<tr>
<td></td>
<td>DE20C.20</td>
<td>580-605 W</td>
</tr>
</tbody>
</table>

600W+ ultra-high power with 21.4% high efficiency
Low voltage, high string power
12-year product warranty, 30-year power warranty

Mono-facial and bifacial options
Better temperature coefficient (-0.34%), lower working temperature result in more generated power
Up to 30% additional power gain from rear side in different installation environments

Excellent IAM (Incident Angle Modifier) and low light performance, validated by 3rd party certifications
Best cell bending strength and performance by adoption of non-destructive cutting technology
High-density interconnection and 12 busbar design
Trina Solar dual-glass series features high reliability in extreme conditions, an extended 30-year warranty and more power generation with the integration of half-cut, dual glass and multi-busbar technologies. We have gathered rich practical experiences from over 3GW Duomax module installations. Duomax is the most reliable module with the special feature of zero water penetration. The glass-glass structure isolates most of the natural ageing factors and water vapor from the rear side to eliminate EVA hydrolysis. Moreover, the new generation dual glass module adopts lighter 2+2 mm glasses and outer frames to achieve easier and safer transportation and installation.

**THE DUOMAX SERIES**

**Duomax 120**
- PEGSH.20
- Maximum Power: 285-300 W
- Number of cells: 120 cells (6 x 10 x 2)
- Size/Weight: 1700 x 1002 x 30 mm / 22 kg

**Duomax 144**
- PEG1SH.20
- Maximum Power: 340-355 W
- Number of cells: 144 cells (6 x 12 x 2)
- Size/Weight: 2024 x 1002 x 30 mm / 26 kg

**Duomax M 120**
- DEGSH.200(II)/ DEGSH.200(III)
- Maximum Power: 320-345 W
- Number of cells: 120 cells (6 x 10 x 2)
- Size/Weight: 1700 x 1002 x 30 mm / 22 kg

**Duomax M 144**
- DEG1SH.200(II)/ DEG1SM.200(II)
- Maximum Power: 380-415 W
- Number of cells: 144 cells (6 x 12 x 2)
- Size/Weight: 2024 x 1002 x 30 mm / 26 kg

**Duomax M 144**
- DEG1SM.200(II)
- Maximum Power: 430-460 W
- Number of cells: 144 cells (6 x 12 x 2)
- Size/Weight: 2111 x 1046 x 30 mm / 28.6 kg

- Over 3GW cumulative dual glass shipments globally
- First in the industry to obtain TUV standard certification and achieve mass production
- Half-cut and 9 busbar design
- 2.0+2.0mm glass-glass, lighter and easy to install
- Extended 30-year power warranty, <0.5% annual degradation
- Symmetric structures minimize micro-cracks and snail trails
- Fire class A certified

Designed for harsh environments, such as deserts, saline-alkali and tropical beaches.
The Duomax Twin module combines highly efficient bifacial cells with a dual glass structure. It can convert light that strikes both the front face and the rear face of the module into electricity. It also features an extended 30-year performance warranty with lower degradation, resulting in higher guaranteed lifetime power output.

**THE DUOMAX TWIN**

<table>
<thead>
<tr>
<th>Maximum Power</th>
<th># of cells</th>
<th>Size/Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>315-340 W</td>
<td>120 cells (6 x 10 x 2)</td>
<td>1700 x 1002 x 30 mm / 22 kg</td>
</tr>
<tr>
<td>350-370 W</td>
<td>144 cells (6 x 12 x 2)</td>
<td>1773 x 1046 x 30 mm / 25.0 kg</td>
</tr>
<tr>
<td>390-410 W</td>
<td>144 cells (6 x 12 x 2)</td>
<td>2024 x 1002 x 30 mm / 26 kg</td>
</tr>
<tr>
<td>430-445 W</td>
<td>144 cells (6 x 12 x 2)</td>
<td>2111 x 1046 x 30 mm / 28.6 kg</td>
</tr>
</tbody>
</table>

- Over 3GW cumulative dual glass shipments globally
- First in the industry to obtain TÜV standard certification and achieve mass production
- Over 80% bifaciality, 5%-30% additional power gain from back side
- Less than 1% power degradation in LeTID test by TÜV Rheinland
- Extended 30-year power warranty
- 2.0+2.0mm glass-glass, lighter and easy to install
- Resistant to environmental erosion from sand, acid, salt mist and alkali
- Best match for trackers
- 18 dual glass patents
THE TALLMAX SERIES

The Tallmax module is designed for commercial and utility-scale solar projects to achieve significant system savings. Tallmax modules are recognized by industry professionals for their proven performance in the field.

By integrating innovative technologies like half-cut cells and multi busbars, the maximum output of the 144-cell Tallmax module can reach 415W. The increase in output from 370W to 415W will help reduce the balance of system (BOS) cost by 4.5% to 9.5%, and reduce levelized cost of electricity (LCoE) by up to 4.6%.

<table>
<thead>
<tr>
<th>Model</th>
<th>Maximum Power</th>
<th># of cells</th>
<th>Size/Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tallmax</td>
<td>PE15H/PE15M</td>
<td>340-360 W</td>
<td>144 cells (6 x 12 x 2)</td>
</tr>
<tr>
<td>Tallmax M</td>
<td>DE15H(II)/DE15M(II)</td>
<td>380-415 W</td>
<td>144 cells (6 x 12 x 2)</td>
</tr>
<tr>
<td>Tallmax M</td>
<td>DE17M(II)</td>
<td>430-450 W</td>
<td>144 cells (6 x 12 x 2)</td>
</tr>
</tbody>
</table>

- Half-cut and 9 busbar design
- Fully certified for 1500V system
- Widely used in over 100 countries
- 35mm frame, front/back side maximum static load: 5400Pa/2400Pa
- High reliability with best manufacturing techniques
- Different BOM for different climates to ensure power generation for its entire lifetime

The Tallmax module is designed for C&I and utility projects to achieve significant system savings. Tallmax modules are recognized by industry professionals for their proven performance in the field.
The Honey series with 120 half-cut cells can generate maximum energy yield even in limited space. As one of the industry’s most trusted modules, the Honey series is the most sought-after option for residential and commercial customers because of its reliability, pleasing aesthetics and compatibility with all major balance of system components and module electronics.

HoneyBlack M, as the premium option of the Honey series, is equipped with a multi-busbar black cells, black backsheet and matte black frame making it the perfect aesthetic choice for high-end residential rooftops.

### Honey Series Specifications

<table>
<thead>
<tr>
<th>Model</th>
<th>Maximum Power</th>
<th># of cells</th>
<th>Size/Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Honey</td>
<td>285-300 W</td>
<td>120 cells (6 x 10 x 2)</td>
<td>1690 x 996 x 35 mm / 18 kg</td>
</tr>
<tr>
<td>Honey M</td>
<td>320-340 W</td>
<td>120 cells (6 x 10 x 2)</td>
<td>1690 x 996 x 35 mm / 18 kg</td>
</tr>
<tr>
<td>Honey M</td>
<td>355-375 W</td>
<td>120 cells (6 x 10 x 2)</td>
<td>1760 x 1040 x 35 mm / 20.0 kg</td>
</tr>
<tr>
<td>HoneyBlack M</td>
<td>315-335 W</td>
<td>120 cells (6 x 10 x 2)</td>
<td>1690 x 996 x 35 mm / 18 kg</td>
</tr>
</tbody>
</table>

- **Half-cut and 9 busbar design**
- **High reliability with best manufacturing techniques**
- **1st year degradation ≤2.5%**
- **Different BOM for different climates to ensure power generation throughout its lifetime**
- **35mm frame, front/back side maximum static load: 5400Pa/2400Pa**
- **Ensured PID resistance through cell process and module material optimization**

- **Matte black frame**
- **Black frame adhesive**
- **Black label**
- **String connectors covered in black**
- **Black cells with multi-busbar technology**

HoneyBlack M, as the premium option of the Honey series, is equipped with a multi-busbar black cells, black backsheet and matte black frame making it the perfect aesthetic choice for high-end residential rooftops.
PROJECT REFERENCES

Miyazaki City, Miyazaki Prefecture, Japan  96.2MW / Tallmax / 2018

Hidaka Gun, Hokkaido Prefecture, Japan  21MW / Honey / 2018

Golmud, Qinghai, China  20MW / Duomax N / 2019

Ha Tin, Vietnam  50.067MW / Tallmax / 2019

Clare, Australia  129MW / Duomax / 2018
PROJECT REFERENCES

Gotemba City, Shizuoka prefecture, Japan
2.64MW / Tallmax / 2018

Kasaoka City, Okayama Prefecture, Japan
4.4MW / Tallmax / 2018

Tami Nadu, India
30MW / Tallmax / 2017

Huaibei, Anhui, China
40MW / Tallmax / 2018

Baise, Guangxi, China
18MW / Tallmax & Honey / 2017

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