A New Premium Generation
Technology

Mitsubishi Electric is constantly pursuing the latest in technological innovations and adapting the newest breakthroughs into our photovoltaic products.

Quality

Total quality from design to manufacturing ensures optimal performance and safety of our products in the real world.

Reliability

Building upon almost a century of manufacturing experience since our founding in 1921, we know how to make our products last. Rest assured that we will be there for our customers in the long term.
Mitsubishi Electric’s philosophy for manufacturing photovoltaic products comes from three unwavering basic principles: advanced technologies, the highest quality, and long-term reliability.

We understand that photovoltaic systems are a long-term investment; therefore, no compromises should be made when choosing the right products in order to avoid future problems. At Mitsubishi Electric, we integrate all of our photovoltaic product development and manufacturing operations at our own facilities in Japan. From cell research and module design to cell production and module assembly, we are able to take control in each step of the process.

We are fully confident and take great pride in each of our products, and we invite you to enjoy peace of mind for years to come with Mitsubishi Electric Photovoltaic Systems.
Mitsubishi Electric’s Monocrystalline Premium Module Line

The technology and design of our products incorporates our comprehensive experience and extensive know-how in creating photovoltaic modules. The Mitsubishi Electric difference lies in all of the small details that add up for outstanding performance, reliability, and safety.

High-efficiency 4 Busbar Monocrystalline Cells

New selective emitter and half-cut technologies boost cell efficiency

Flexible Cell Tab Wiring

Flexible tab material has been developed to reduce physical stress on the cells caused by thermal fluctuations

Excellent Durability and Protection

Our modules have an uncompromising design and are built to last. Installable even in areas with high salt concentrations in the air
Each module is tagged with a unique barcode which is used for greater product quality control and product traceability.

Improved Frame Design with New Protection Bar

A re-designed module frame with protection bar has improved overall module strength.

New Junction Box Design with 4-layer Protection

The new junction box has been redesigned for use with monocrystalline cells for high safety.
Selective Emitter

In a standard doping process, silicon wafers are doped with phosphorus to create a P/N junction. The level of doping concentration was a trade-off between conductivity with the cell electrodes and carrier charge recombination. Higher concentration levels lead to higher conductivity, but more carrier charge losses, and vice versa. As a solution, Mitsubishi Electric has introduced a new selective emitter process in which only the area in contact with the electrodes is doped with high concentrations to maintain both high conductivity and low carrier charge losses. This improvement has resulted in an increase in cell output of approximately 5%.

Half-cut Cell

By reducing the area of each cell and connecting them in a parallel formation, the amount of electrical current carried by each busbar is reduced by half. This results in the decreased of electrical resistance within the busbars and an increase in overall efficiency of about 2.5%.

Cells are cut with a special process using a high-precision laser to maintain the integrity of the cell.
4 Busbar Cell

Through an industry-leading innovation of integrating 4 busbars into each cell, internal electrical resistance is reduced, boosting cell output by 3%*. This is possible because the distances between the busbars are shorter and less current flows through each smaller electrode where resistance is the highest.

*Approximate improvement compared to a standard 2 busbar cell.

Newly Re-designed Junction Box

Our field-proven high safety junction box has been re-designed and optimized for use with monocrystalline cells. As one of the most critical parts of the module in terms of safety, our junction box features a waterproof, flame-resistant 4 layer barrier of protection. Combined with highly heat-resistant diodes, efficient heat-sink, and secured intertwining tab connections, our junction boxes boast a top-class level of safety.

Anti-reflective Glass

An anti-reflective coating has been added to the glass of our modules. It improves the light transmittance of the glass by reducing the amount of reflection on the surface. This improvement has led to a module output increase of 2%. Furthermore, Mitsubishi Electric modules use a non-porous type of anti-reflective coating, which is more resistant to the adhesion of dust than porous types.

Lead-free Solder

Mitsubishi Electric was the first Japanese manufacture to introduce (and still use) 100% lead-free solder in the inter-cell connections as another initiative contributing to environmental protection.
Quality

Taguchi Method
By integrating the quality control methods of Genichi Taguchi, a renowned engineer and statistician, we have been able to optimize our quality management processes and further expand the range of production quality controls. As a result, our products boast not only very high, but also a very stable level of production quality.

Production from the Cell to Module
Mitsubishi Electric takes pride in researching, designing, manufacturing and assembling all of our photovoltaic products from the cell to the module in our own facilities located in Japan. By taking total control, we can optimize each step of the production process to ensure the highest quality of our products.

Highly Automated Production Line
From assembly to inspections, our module lines are highly automated with our own factory automation equipment developed in-house. For example, using ccd camera imaging to align busbars for soldering or to detect mispositioned cells in an array, the high precision machines ensure an unsurpassed level of production uniformity and the ability to conduct greater quality inspections than traditional manual methods.
Cell ID Laser Marking
We have introduced a new cell tracking system in which each cell is marked with a unique dot matrix code. This makes each individual cell traceable throughout the cell production process, allowing us to make numerous manufacturing improvements. The dot matrix code is nearly impossible to see with the naked eye, and has absolutely no influence on output power.

Cell Uniformity
Every cell we produce is measured for electrical characteristics and undergoes a very strict selection process before being assembled into a module. This ensures that all cells in the module have uniform characteristics for optimal performance.

Module Barcode
Every individual module is marked with a unique identifiable barcode, which is used for tracking the module through all production steps as part of our quality control.

High Power in Actual Use
Each module’s electrical characteristics are measured and then paired together automatically by a sorting machine. Modules are matched together according to electrical data so that the average output of each carton is always greater than the nominal output power.
Reliability

Improved Frame

Our classic hollowless L-frame design has been improved with a smarter protection bar insert. As a result, the strength of the new frame has increased by approximately double that of the previous L-frame. In addition, modules can now be installed by clipping the shorter sides, simplifying system design and installation.

Double Corrosion-resistant Frame Coating

The highly durable aluminum frame is treated with two separate corrosion-resistant coatings for excellent durability and a beautiful finish. Even the individual screws have double anti-corrosive coatings for lasting protection.

4 Busbar Cell Strength

![Graph showing stress distribution](image)

The 4 busbar cell has a more uniform tab stress dispersion than cells with fewer busbars. Because the stress peaks of the cell are lower, it is less prone to cracking.

Internal Testing Standards

At Mitsubishi Electric, our philosophy is to make products that will last. As PV modules are no exception, we have tested our monocrystalline modules with very rigorous internal testing, using strict parameters that are well above those required by international standards. Only after we have confirmed the reliability of the module’s design is it allowed to be introduced into mass production.

![Graph showing internal testing standards](image)

Some examples of Mitsubishi Electric’s reliability standards

<table>
<thead>
<tr>
<th>Test Type</th>
<th>IEC 61215</th>
<th>Mitsubishi Electric</th>
</tr>
</thead>
<tbody>
<tr>
<td>Damp Heat Test</td>
<td>1000 hours</td>
<td>over 2000 hours</td>
</tr>
<tr>
<td>Thermal Cycling</td>
<td>200 cycles</td>
<td>over 1000 cycles</td>
</tr>
</tbody>
</table>
High Snow Load

Our modules have been designed to withstand harsh environmental conditions, such as in areas with high snowfall. The high structural strength of the modules has passed the IEC 61215 static loading test at 5400Pa.

Installable in Areas with High Salt Concentration

Normally, high salt content in the air (in areas such as next to the ocean) can do serious damage to the structural integrity of a PV module, and can also pose an electrical safety hazard by causing corrosion. However, due to the intelligent design and high quality of the materials used, our modules can be safely installed in such areas with high salt concentration in the air*.

*Excluding areas in which the module comes into direct contact with salt water.

Real-world Field Test

In addition to our accelerated testing in the laboratory, we have also been monitoring the performance of our products in real-world field testing. For example, we have installed our modules near the seaside in Okinawa, where the high salt content in the air poses a high threat of chemical corrosion to metal. Our modules have been working perfectly and safely as a testament to the true quality of the product.
Monocrystalline Product Line-up

PV-MLT Series
High-efficiency modules featuring half-cut monocrystalline cells
Specifications Sheet

<table>
<thead>
<tr>
<th>Manufacturer</th>
<th>MITSUBISHI ELECTRIC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model name</td>
<td>PV-MLT265HC</td>
</tr>
<tr>
<td>Cell type</td>
<td>Monocrystalline silicon, 78mm x 156mm</td>
</tr>
<tr>
<td>Number of cells</td>
<td>120</td>
</tr>
<tr>
<td>Performance at STC</td>
<td></td>
</tr>
<tr>
<td>Maximum power rating (Pmax)</td>
<td>265W</td>
</tr>
<tr>
<td>Warranted minimum Pmax</td>
<td>257.1W</td>
</tr>
<tr>
<td>Tolerance of Pmax</td>
<td>+/-3% (The average Pmax of each pair of modules has a positive tolerance)</td>
</tr>
<tr>
<td>Open circuit voltage (Voc)</td>
<td>38.2V</td>
</tr>
<tr>
<td>Short circuit current (Isc)</td>
<td>9.08A</td>
</tr>
<tr>
<td>Maximum power voltage (Vmp)</td>
<td>31.2V</td>
</tr>
<tr>
<td>Maximum power current (Imp)</td>
<td>8.38A</td>
</tr>
<tr>
<td>Normal operating cell temperature (NOCT)</td>
<td>47°C</td>
</tr>
<tr>
<td>Performance at NOCT *</td>
<td></td>
</tr>
<tr>
<td>Maximum power rating (Pmax)</td>
<td>191W</td>
</tr>
<tr>
<td>Open circuit voltage (Voc)</td>
<td>34.7V</td>
</tr>
<tr>
<td>Short circuit current (Isc)</td>
<td>7.35A</td>
</tr>
<tr>
<td>Maximum power voltage (Vmp)</td>
<td>28.5V</td>
</tr>
<tr>
<td>Maximum power current (Imp)</td>
<td>6.70A</td>
</tr>
<tr>
<td>Maximum system voltage</td>
<td>1000V</td>
</tr>
<tr>
<td>Fuse rating</td>
<td>15A</td>
</tr>
<tr>
<td>Dimensions</td>
<td>1625x1019x46mm (64.0x40.1x1.81 inches)</td>
</tr>
<tr>
<td>Weight</td>
<td>20kg (44lbs.)</td>
</tr>
<tr>
<td>Output terminal</td>
<td>(+) 800mm/(-) 1250mm with MC connector (PV-KTB4/6II-UR, PV-KST4/6II-UR)</td>
</tr>
<tr>
<td>Cable conforms with TÜV Specification 2 PfG 1169/08.2007</td>
<td></td>
</tr>
<tr>
<td>Module efficiency</td>
<td>16.0%</td>
</tr>
<tr>
<td>Packing condition</td>
<td>2 pcs / 1 carton</td>
</tr>
<tr>
<td>Certificates</td>
<td>IEC 61215 Second Edition, IEC 61730</td>
</tr>
<tr>
<td>Product Warranty</td>
<td>10 years</td>
</tr>
<tr>
<td>Output Warranty</td>
<td>90% of rated minimum Pmax for 10 years 80% of rated minimum Pmax for 25 years</td>
</tr>
</tbody>
</table>

*Measured at 800w/m², ambient temp. 20°C, wind speed 1m/s

Drawings and Dimensions

Electrical Characteristics

- Irradiance dependence of Isc, Voc and Pmax (Cell temperature: 25°C)
- Temperature dependence of Isc, Voc and Pmax
- Normalized Isc, Voc and Pmax (%)
- Electrical Performance (Cell temperature: 25°C)
Mitsubishi Electric photovoltaic cells, modules, and inverters are proudly designed and produced under strict quality standards at our own facilities located in Japan.

ISO 14001 Certified Factory
Our factories are managed using comprehensive water conservation and recycling measures in order to minimize the impact on the environment.
Europe
Holland (15kW system)
Office
Switzerland (23kW system)
School
Germany (500kW system)
Small Power Plant

Germany (30kW system)
Barn
Italy (14kW system)
School
Italy (420kW system)
Small power plant

Spain (75kW system)
Hotel
USA
USA (1.9MW system)
Agricultural farm
USA (1.3MW system)
Brewery

Southeast Asia
Cambodia (3.5kW system)
Junior High School
Thailand (3kW system)
Private residence

East Asia
Japan (200kW system)
Platform