

# 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 product 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.

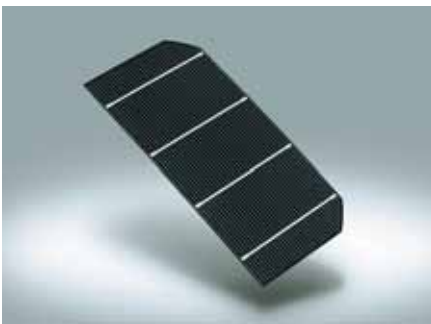


## Mitsubishi Electric's Monocrystalline Premium Module Line

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





### Mitsubishi Electric Logo and Traceable Barcode



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

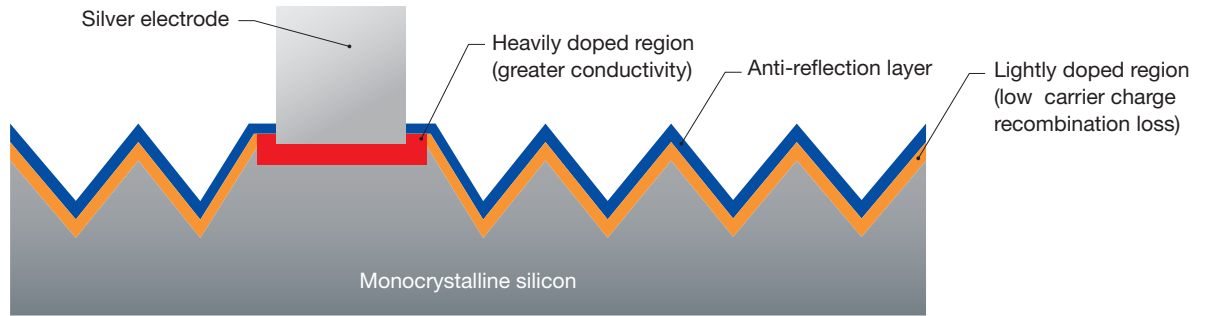


The new junction box has been redesigned for use with monocrystalline cells for high safety



# Technology

## Selective Emitter

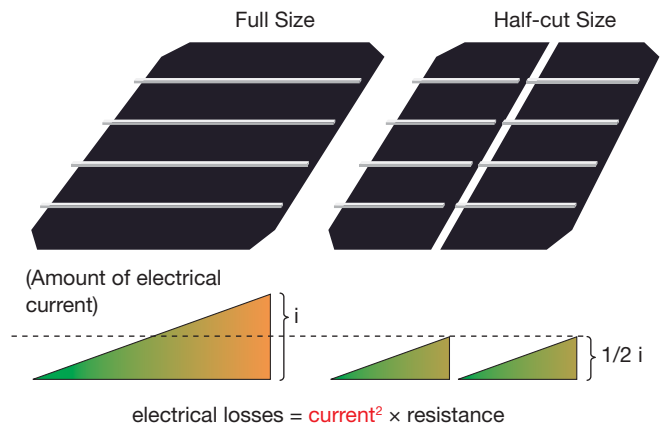


In a standard doping process, silicon wafers are doped with phosphorus to create a P/N junction. The level of doping concentration was a trade-off between conductivity with the cell electrodes and carrier charge recombination. Higher concentration levels leads to higher conductivity, but more carrier 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 %.

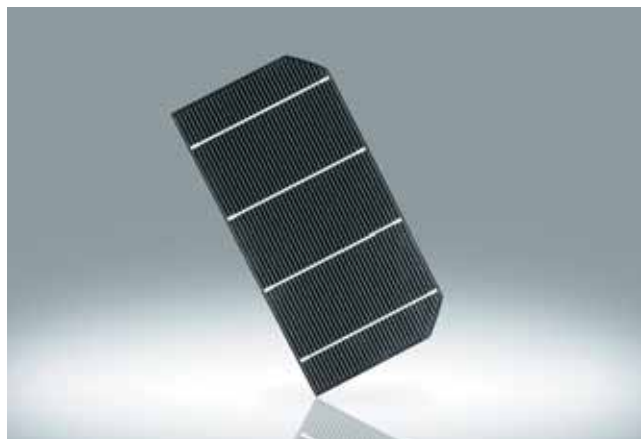
## Half-cut Cell

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 %.

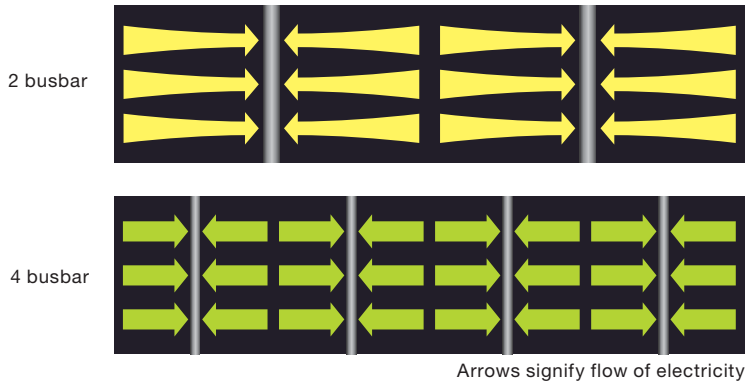
Cells are cut with a special process using a high-precision laser to maintain the integrity of the cell.



By using half-cut cells, the electrical current (i) flowing in each busbar is halved. Therefore, the amount of internal losses in a half-cut module is 1/4 of a full sized cell module.



## 4 Busbar Cell

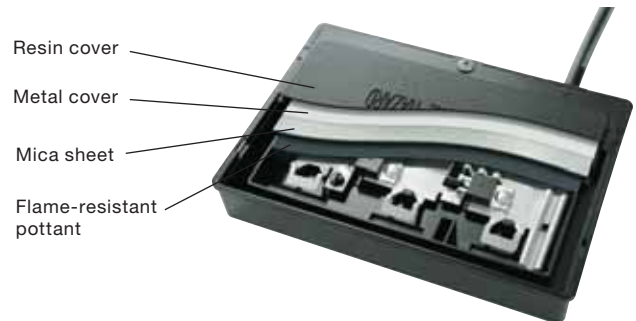


Through an industry-leading innovation of integrating 4 busbars into each cell, internal electrical resistance is reduced, boosting cell output by 3 %\*. This is possible because the distances between the busbars are shorter and less current flows through each smaller electrode where resistance is the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

\*Approximate improvement compared to a standard 2 busbar cell.

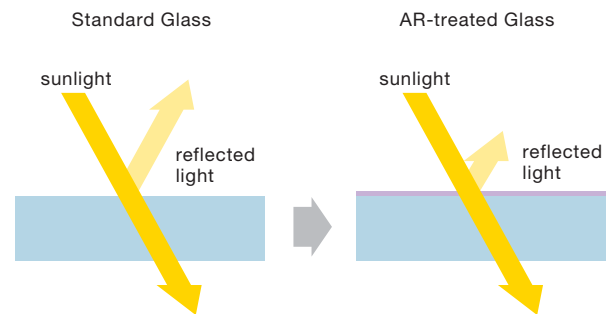
## Newly Re-designed Junction Box

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.

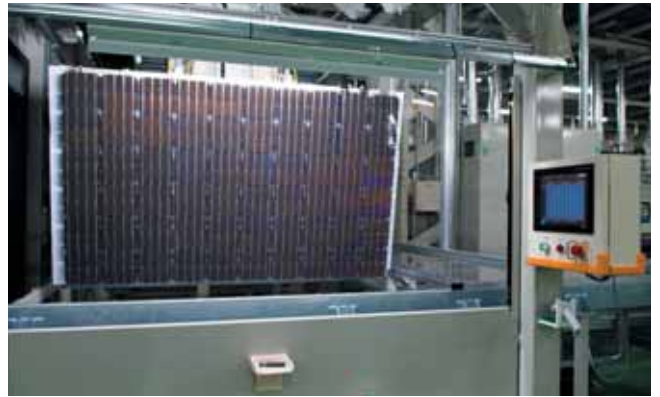
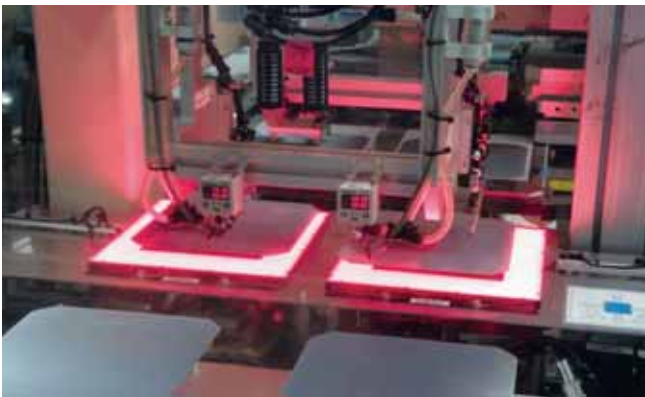


## Quality

### 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.

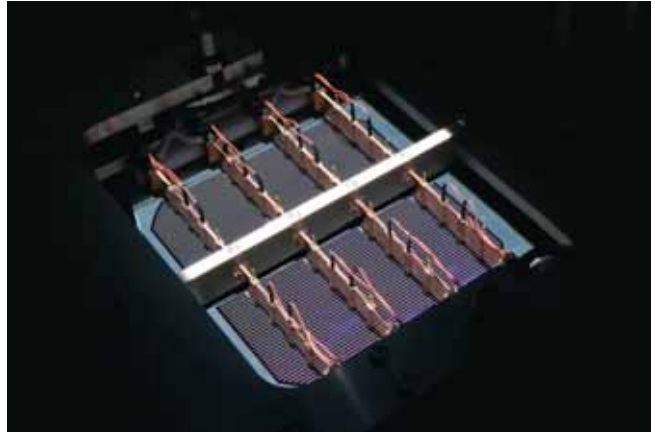
### Highly Automated Production Line



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.

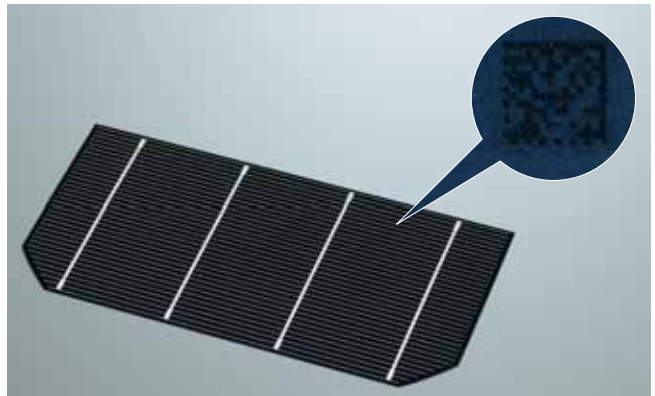
## Cell Uniformity

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.



## 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.



## 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

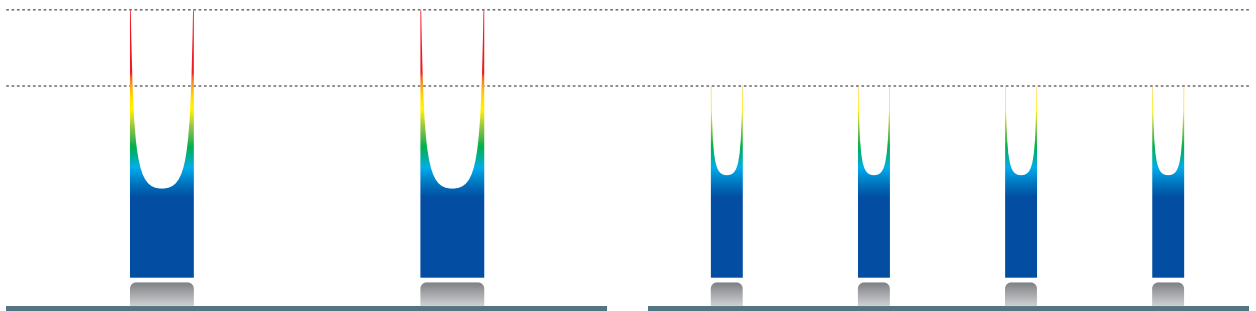
Our classic hollowless L-frame design has been improved with a smarter protection bar insert. As a result, the strength of the new frame has increased by approximately double that of the previous L-frame. In addition, modules can now be installed by clipping the shorter sides, simplifying system design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

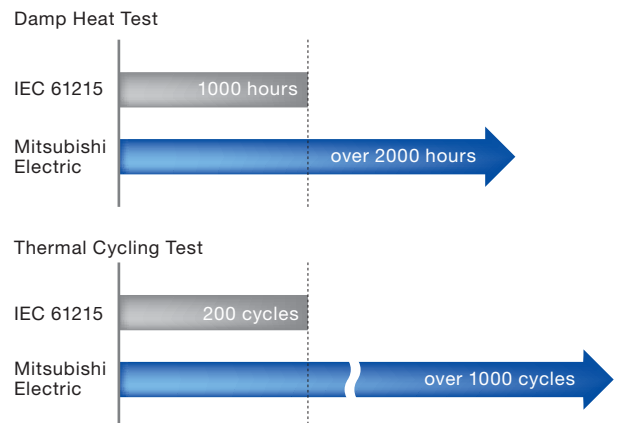


The 4 busbar cell has a more uniform tab stress dispersion than cells with fewer busbars. Because the stress peaks of the cell are lower, it is less prone to cracking.

## 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 than 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.

Some examples of Mitsubishi Electric's reliability standards



## 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.



The frame and laminate are designed so that a strong physical and electrical barrier is maintained even in harsh environments.

## 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.

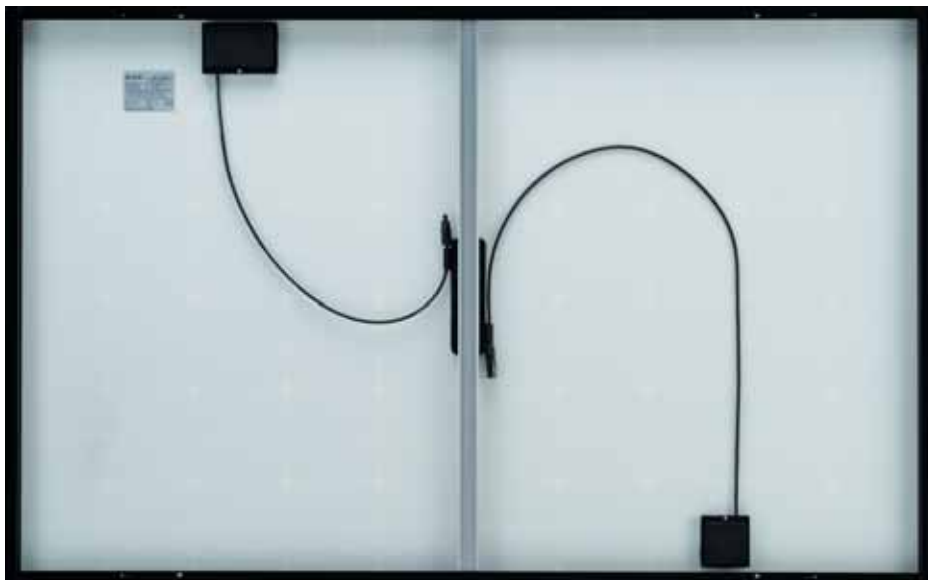
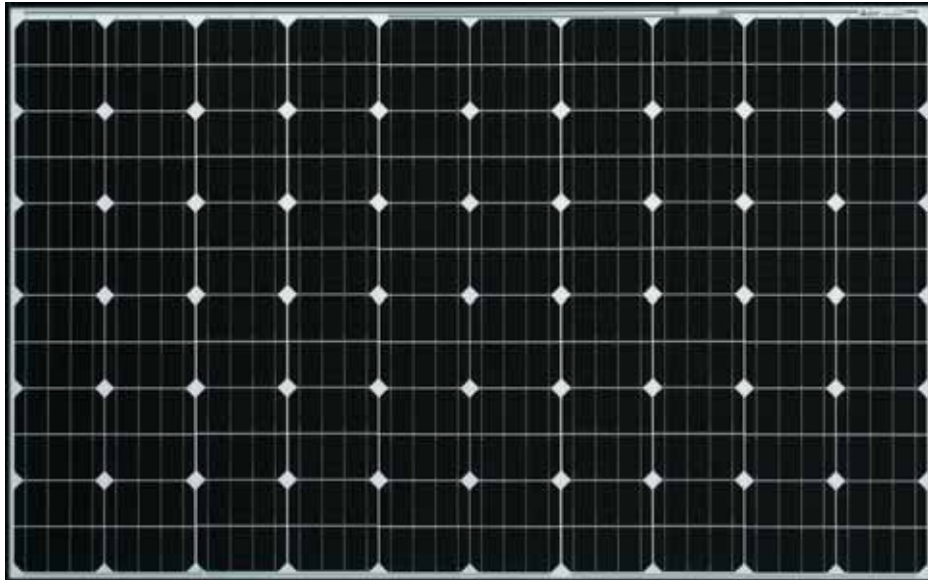




## Monocrystalline Product Line-up

### PV-MLT Series

High-efficiency modules featuring half-cut monocrystalline cells

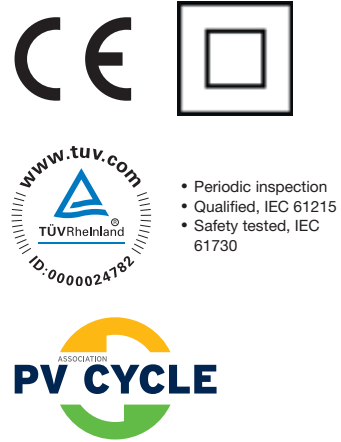
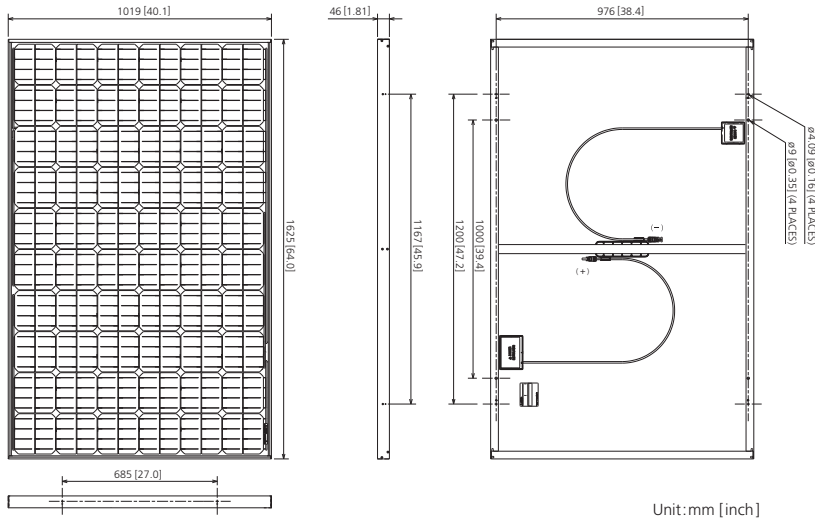


## SPECIFICATIONS SHEET

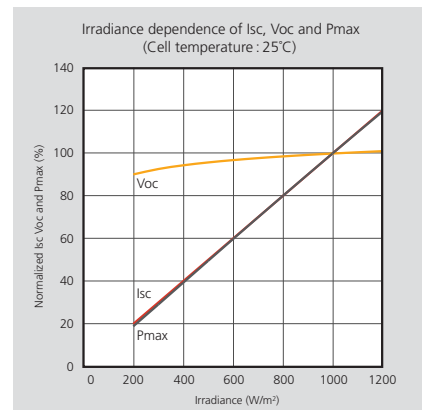
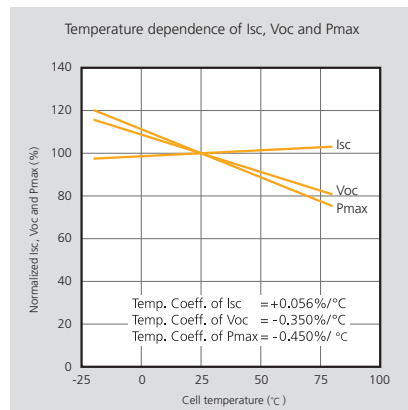
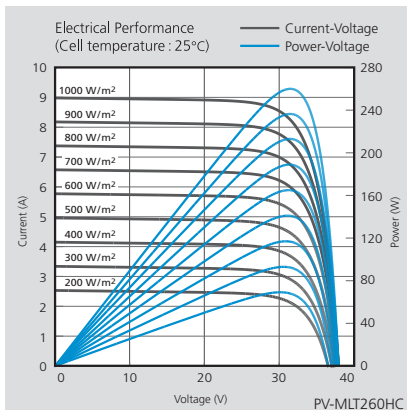
Manufacturer	MITSUBISHI ELECTRIC			
Model name	PV-MLT265HC	PV-MLT260HC	PV-MLT255HC	PV-MLT250HC
Cell type	Monocrystalline silicon, 78 mm × 156 mm			
Number of cells	120 cells			
Performance at STC				
Maximum power rating (Pmax)	265 W	260 W	255 W	250 W
Warranted minimum Pmax	257.1 W	252.2 W	247.4 W	242.5 W
Tolerance of Pmax	+/-3 % (The average Pmax of each pair of modules has a positive tolerance)			
Open circuit voltage (Voc)	38.2 V	38.0 V	37.8 V	37.6 V
Short circuit current (Isc)	9.08 A	8.98 A	8.89 A	8.79 A
Maximum power voltage (Vmp)	31.7 V	31.4 V	31.2 V	31.0 V
Maximum power current (Imp)	8.38 A	8.29 A	8.18 A	8.08 A
Performance at NOCT (at 800 W/m <sup>2</sup> )*				
Maximum power rating [Pmax]	191 W	187 W	184 W	180 W
Open circuit voltage [Voc]	34.7 V	34.5 V	34.4 V	34.2 V
Short circuit current [Isc]	7.35 A	7.27 A	7.20 A	7.12 A
Maximum power voltage [Vmp]	28.5 V	28.3 V	28.1 V	27.9 V
Maximum power current [Imp]	6.70 A	6.63 A	6.54 A	6.46 A
Normal operating cell temperature (NOCT)	47°C			
Maximum system voltage	1000 V			
Fuse rating	15 A			
Dimensions	1625 × 1019 × 46 mm (64.0 × 40.1 × 1.81 inches)			
Weight	20 kg (44 lbs.)			
Output terminal	(+) 800 mm/(-) 1250 mm with MC connector (PV-KTB4/6II-UR, PV-KST4/6II-UR) Cable conforms with TÜV Specification 2 Pfg 1169/08.2007			
Module efficiency	16.0 %	15.7 %	15.4 %	15.1 %
Packing condition	2 pcs / 1 carton			
Certificates	IEC 61215 Second Edition, IEC 61730			
Product Warranty	10 years			
Output Warranty	90 % of rated minimum Pmax for 10 years, 80 % of rated minimum Pmax for 25 years			

## DRAWINGS AND DIMENSIONS

\*Measured at 800W/m<sup>2</sup>, ambient temp. 20°C, wind speed 1m/s



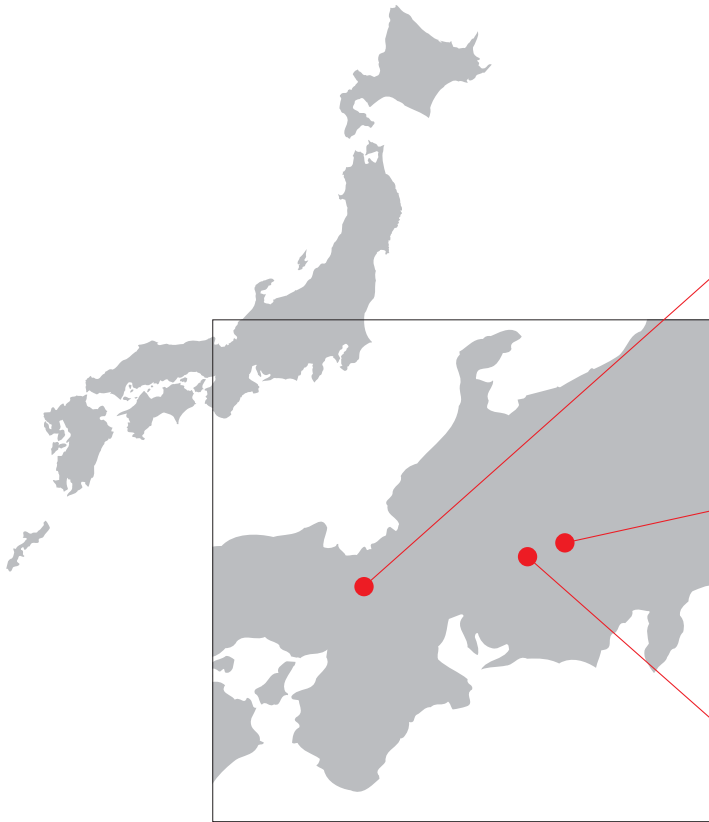
## ELECTRICAL CHARACTERISTICS





# About us

## Made in Japan



Kyoto Factory



Iida Factory



Nakatsugawa Works

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.



Factory facilities are equipped with our PV systems.



Waste paper and other materials are collected and separated for recycling.



Dozens of apple trees line the factory grounds, providing delicious apples in the fall.

## Europe

Holland (15 kW system)



Office

Switzerland (23 kW system)



School

Germany (500 kW system)



Small power plant

Germany (30 kW system)



School

Italy (14 kW system)



School

Italy (420 kW system)



Small power plant

Spain (75 kW system)



Hotel

## USA

USA (1.9 MW system)



Agricultural farm

USA (1.3 MW system)



Brewery

## Southeast Asia

Cambodia (3.5 kW system)



Junior High School

Thailand (3 kW system)



Private residence

## East Asia

Japan (200 kW system)



Platform

 **MITSUBISHI ELECTRIC CORPORATION**

**Mitsubishi Electric Europe B.V.**  
Photovoltaic Division  
Gothaer Str. 8  
D-40880 Ratingen  
Phone: +49 (0) 2102 486 1593  
Fax: +49 (0) 2102 486 1537  
E-Mail: info@mitsubishi-pv.de

Your dealer is: