## SANYO Company Outline

<table>
<thead>
<tr>
<th>Founded</th>
<th>February 1947</th>
</tr>
</thead>
<tbody>
<tr>
<td>Incorporated</td>
<td>April 1950</td>
</tr>
<tr>
<td>Net Sales</td>
<td>€ 12.8 Billion (Consolidated)</td>
</tr>
<tr>
<td>Operating Income</td>
<td>€ 258 Million (Consolidated)</td>
</tr>
<tr>
<td>No. of Employees</td>
<td>104,882 (Consolidated)</td>
</tr>
</tbody>
</table>

(As of March 31, 2010)
While fully exerting its comprehensive strength as a member of the Panasonic Group, SANYO Electric Group advances creation of products, businesses, and solutions that are friendly to the earth and enrich people’s lives in the three business domains it has an edge in: “Energy,” “Electronics,” and “Ecology,” with a central focus on “Smart Energy Systems” that combine products from these business domains.
Energy Business Domain

Photovoltaic System

Contributing to solving environment and energy-related problems with sophisticated technologies to effectively create energy resources from the blessing of the sun.

Hybrid - Type “HIT® Photovoltaic Module”

With its proprietary technologies, SANYO has realized the world’s highest-class conversion efficiency (power generation capacity)*. The photovoltaic system using “HIT® Photovoltaic Module,” which ensures high power generation in a small space and maintains high output in the heat of the summer with less property degradation, is used for conventional homes and various public/business facilities around the world.

Realized with a cell conversion efficiency of 20%. Data as of August 1, 2010 based on company survey for mass production model (residential photovoltaic system).

Power Conditioner

SANYO’s power conditioner effectively converts DC power from photovoltaic modules into AC power and sends it to power supply systems.

* HIT is a registered trademark of SANYO Electric Co., Ltd.
* The name “HIT” comes from “Heterojunction with intrinsic Thin-layer” which is an original technology of SANYO Electric Co., Ltd.
Energy Business Domain

Contributing to realizing a renewable energy-oriented society through development of eneloop®, rechargeable batteries for environmentally friendly automobiles, etc.

Rechargeable Battery

- **eneloop®**
  - Proposing an “environmentally conscious” lifestyle through life-changing battery “eneloop®” and “eneloop universe products”

  > *Since its release on Nov. 14, 2005, over 100 million units have been shipped to more than 60 countries.*
  > *“eneloop” is a registered trademark of SANYO Electric Co., Ltd.*

  [Image: eneloop products]

- **eneloop universe products**
  - Winner of “Good Design Grand Prize (Prime Minister’s Prize)” in 2007

Rechargeable Battery for Environmentally Friendly Automobiles

- Supplying nickel-metal hydride batteries to Honda, Ford of U.S., and Volkswagen of Germany
- Developing nickel-metal hydride battery system jointly with PSA Peugeot Citroen of France
- Developing lithium-ion battery system jointly with Volkswagen Group of Germany
- Supplying lithium-ion battery systems to Suzuki (For proving test cars)

Lithium-ion Battery

- SANYO’s rechargeable batteries hold a large share of the world market, offering high performance to meet the expectations of customers around the world.

[Image: Lithium-ion batteries]
Ecology Business Domain

Energy-saving and Eco-friendly

Commercial/Medical Equipment

CFC-free Freezer Showcase Refrigeration System

Japan’s first* refrigeration system using earth-friendly natural refrigerant (CO₂).

* As of May 2010

Store Equipment / Kitchen Equipment

With a view to realization of a low-carbon society, SANYO widely promotes energy-saving refrigeration equipment for the restaurant industry and retail stores, such as convenience stores.

Commercial Air Conditioning System

(All-in-one air conditioner, gas heat pump air conditioner, absorption chiller)

With abundant product lineups, SANYO offers optimum air conditioning for various spaces from public space to small store/office.

Total Air Conditioner Monitoring/Controlling System

Monitoring and controlling air conditioner operation enables significant energy saving and CO₂ emissions reduction for stores and buildings.

Medical Information System

SANYO Electric Group contributes to improving quality and efficiency of medical services through development of medical information systems.

Biomedical Equipment

A variety of SANYO biomedical equipment are actively used in cutting-edge medical fields, supporting studies to change the future of medical services.

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Ecology Business Domain

Offering eco-friendly products developed based on proprietary technologies and unique ideas to reduce power consumption and product weight by using fewer parts.

**White Goods/Navigation System**

**Bread Maker**
SANYO's new rice bread cooker turns rice at home into soft and fluffy bread. Perfectly-baked bread can be enjoyed every time.

**IH Pressure Rice Cooker**
Pure copper inner vessel and well-designed cooking program bring out the taste of rice.

**Drum-type Washer/Dryer**
Sterilizing and deodorizing with power of air (ozone), and recycling bathwater realizes water-saving laundry.

**Products with “virus washer” technology**
From cradle to movie theater, electrolyzed water technology suppresses viruses and other airborne bacteria.

**Air Purifying Cyclone Cleaner**
To realize a home life free of airborne house dust, SANYO has made a cyclone vacuum cleaner that can clean not only the floor but also air.

**Portable Navigation System**
Proposing eco-friendly driving with “eco-drive information system.”

Winner of The 22nd Nikkan Jidosha Shimbun Yohin Grand Prize in 2009

SSD portable navigation systems
## Digital Products

<table>
<thead>
<tr>
<th>Product</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Digital Video Camera</td>
<td>Sharing various life moments through movie shooting and photography in one camera from wide variety of lineups.</td>
</tr>
<tr>
<td>IC Recorder</td>
<td>From business scenes to music recording with high sound quality and longer recording hours.</td>
</tr>
<tr>
<td>Ultra-Short Focus Projector</td>
<td>Capable of 80-inch large screen projection from the world's shortest focal distance of 32 cm</td>
</tr>
<tr>
<td>Security Surveillance System</td>
<td>Clear surveillance image by high-performance camera and network compatibility for various applications.</td>
</tr>
</tbody>
</table>

---

**Electronics Business Domain**

Building ties among people and connecting home life and society with a variety of low-power-consumption eco-friendly products for homes, business sites, and various other places.

---

### Digital Video Camera

Sharing various life moments through movie shooting and photography in one camera from wide variety of lineups.

Honored as CES Best of Innovations 2008, U.S.A.

---

### IC Recorder

From business scenes to music recording with high sound quality and longer recording hours.

---

### Ultra-Short Focus Projector

Capable of 80-inch large screen projection from the world’s shortest focal distance of 32 cm

---

### Security Surveillance System

Clear surveillance image by high-performance camera and network compatibility for various applications.

---

**Digital Signage / Flat-screen TV**

SANYO offers user-friendly high image/sound quality products that are also energy efficient and eco friendly.

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SANYO’s Activity in the Photovoltaic Business

Expand HIT Solar Cell Production Capacity, SANYO can produce 340MW annually

2009

- Shiga factory started production.

2008

- Total HIT Cell Production Capacity becomes 260MW.

2007

- The production of the HIT cells begins in B building at Nishikinohama factory.
- Total HIT Cells Production Capacity becomes 160MW.

2005

- The new factory (A Building) at Nishikinohama completed.
- The brand-new HIT power cell and module produced.
- • HIT200W PV Modules released (The Cell efficiency 19.5%)
- • Monterrey Factory started production.

2003

- HIT PV modules marketed in North America and Europe.

2002

- The one of the world’s largest solar monument, “Solar Ark” completed

2001

- The World’s first double-side PV module, “HIT Double”, started on sale

2000

- HIT solar cells mass-produced and marketed

1997

- The Residential PV system started on sale.

1994

- The first installation of the grid-connected

1992

- R&D for HIT solar cells started.

1990

- The first successful industrialization of a-Si solar cells in the world.

1980

- R&D for amorphous silicon (a-Si) solar cells started.

1975

- HIT solar cells mass-produced and marketed
- The World’s first double-side PV module, “HIT Double”, started on sale

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We have established a structure for supplying HIT photovoltaic modules to the 3 main markets – Europe, Japan and North America.

Shimane SANYO Electric
(HIT Solar cell)
Capacity: 130MW
220MW in FY2010

Shiga factory
(HIT module)
Capacity: 100MW
200MW in FY2010

Nishikinohama factory
(HIT solar cell)
Capacity: 210MW
345MW in FY2010

Shiga factory
(HIT module)
Capacity: 100MW
200MW in FY2010

Sanyo Hungary Kft.
(Dorog, Hungary)
(HIT module)
Capacity: 165MW
315MW in FY2010

Sanyo Solar USA.
(California)
Wafer

SEC(Mexico)
Monterrey
(HIT module)
Capacity: 75MW
1. SANYO will expand its HIT production capacity.  
2. By March 2011, it will reach around 600MW level.

### HIT Solar Cell Production Capacity

<table>
<thead>
<tr>
<th></th>
<th>FY2008</th>
<th>FY2009</th>
<th>FY2010</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nishikinohama</td>
<td>210MW</td>
<td>210MW</td>
<td>345MW</td>
</tr>
<tr>
<td>Shimane</td>
<td>130MW</td>
<td>130MW</td>
<td>220MW</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>340MW</td>
<td>340MW</td>
<td>565MW</td>
</tr>
</tbody>
</table>

### HIT Solar Module Production Capacity

<table>
<thead>
<tr>
<th></th>
<th>FY2008</th>
<th>FY2009</th>
<th>FY2010</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nishikinohama</td>
<td>35MW</td>
<td>35MW</td>
<td>40MW</td>
</tr>
<tr>
<td>Shiga</td>
<td>100MW</td>
<td>100MW</td>
<td>250MW</td>
</tr>
<tr>
<td>Dorog (Hungary)</td>
<td>165MW</td>
<td>165MW</td>
<td>315MW</td>
</tr>
<tr>
<td>Monterey (Mexico)</td>
<td>50MW</td>
<td>75MW</td>
<td>75MW</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>350MW</td>
<td>375MW</td>
<td>680MW</td>
</tr>
</tbody>
</table>
Sanyo Hungary module plant

All modules for Europe are being fabricated at Sanyo Hungary.

Factory Outline
- Location: Dorog, Hungary
- Building Area: approx. 170,000m²
- Product: HIT Solar modules
- Production Capacity: 165MW (315MW FY2010)
- Commence production: June 2005
- Employees: 869 (as of May, 2009)
1- **Broad utilization of the sun light**
   Combination of N type silicone and thin a-Si makes it possible to utilize broader band of spectrum.

2- **Temperature coefficient**
   Performe better as temperature gets higher

3- **„n-typ“ Silicon**
   We use high quality „N“ type silicon which doesn‘t have light-soaking effect.

4- **Very good quality silicon**
   We use very good quality silicon with high purity so that there will be lower degradation.

5- **Bi-facial structure**
   HIT cells have bi-facial structure which enables it to produce electricity from both side.
Why HIT Cells Generate More Power?

*High output produced by minimizing power generation losses on the solar cell surface*

- Defective area ⇒ Power Loss
- Clean surface with minimal defective area ⇒ Fewer Power Loss

- Thin amorphous silicon layer

**Poly Crystalline Si (p-type)**

**Mono Crystalline Si (n-type)**

**Conventional p-Si solar cell**

**HIT solar cell**
Advantages: better low-light performance

SANYO modules have high voltage as soon as irradiation arrives.
SANYO efficiency is stable below 200 Wh/m$^2$ until 10 Wh/m$^2$.

If inverter supports low-current performance, SANYO brings more output power to the yearly performance, especially on rainy, cloudy locations.
Research & Development

We have achieved 23.0% cell efficiency at R&D level.

23.0%
(HIT: laboratory)

Conversion efficiency (%)

Year

19.7%
(HIT: mass production)

p-Si solar cell of other companies
(100cm² ~, mass production)
## HIT module new line-up in Europe

<table>
<thead>
<tr>
<th></th>
<th>HD Series</th>
<th>N series</th>
<th>HIT Double</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Pmax</strong></td>
<td>250W</td>
<td>245W</td>
<td>240W</td>
</tr>
<tr>
<td><strong>Voc(V)</strong></td>
<td>43.1</td>
<td>42.7</td>
<td>52.4</td>
</tr>
<tr>
<td><strong>Isc(A)</strong></td>
<td>7.74</td>
<td>7.73</td>
<td>5.85</td>
</tr>
<tr>
<td><strong>Vpm(V)</strong></td>
<td>34.9</td>
<td>34.4</td>
<td>43.7</td>
</tr>
<tr>
<td><strong>Ipm(A)</strong></td>
<td>7.18</td>
<td>7.14</td>
<td>5.51</td>
</tr>
<tr>
<td><strong>Cell size</strong></td>
<td>125 x 125mm (240cells, cut cells)</td>
<td>125 x 125mm (72cells)</td>
<td></td>
</tr>
<tr>
<td><strong>Module size</strong></td>
<td>1,610 x 861 x 35mm 1.39m²</td>
<td>1,580 x 798 x 35mm 1.26m²</td>
<td>1,630 x 862 x 35mm 1.41m²</td>
</tr>
<tr>
<td><strong>Weight</strong></td>
<td>16.5kg</td>
<td>15kg</td>
<td>26kg</td>
</tr>
<tr>
<td><strong>Connector</strong></td>
<td>MC3 or others</td>
<td>MC3 or others</td>
<td></td>
</tr>
<tr>
<td><strong>Module Eff.</strong></td>
<td>18.0%</td>
<td>17.7%</td>
<td>19.0%</td>
</tr>
<tr>
<td><strong>Cell Eff.</strong></td>
<td>20.8%</td>
<td>20.4%</td>
<td>21.6%</td>
</tr>
</tbody>
</table>
New product

Technology to improve solar cells
New tab design
Technology to improve light absorption

Module efficiency: 19.0%
Cell efficiency: 21.6%

* HIT® is a registered trademark and an original technology of SANYO Electric Co., Ltd.
New tab design

Less losses between cell-fingers and tabs

Thinner Tabs increase effective area

* HIT® is a registered trademark and an original technology of SANYO Electric Co., Ltd.
Technology for light absorption

Reduce the scattering and reflection losses

Increase the power especially in morning and evening

* HIT® is a registered trademark and an original technology of SANYO Electric Co., Ltd.
High Module Conversion Efficiency

HIT Modules have higher conversion Efficiency than others

Module Conversion Efficiency (%)

12.0  13.0  14.0  15.0  19.0

HIT-N240SE10  19.0%
Chinese A Company  14.6%
Japanese B Company  12.8%
Chinese C Company  12.1%
HIT Module = More Power

Obtaining more capacity in same area!

If you install PV modules in 1000m² area...

HIT 240W module
Module efficiency 19.0%

Poly-Si 167W module
Module efficiency 12.8%

190.3kW!
(793 panels)

128.4kW
(769 panels)

+62kW

You can have more capacity in limited area!
More advantage to create large system
Need Small Installation Area

HIT Modules Require More Small Roof Area

<table>
<thead>
<tr>
<th>Module installation Area (per 1.0 kw)</th>
<th>5m²</th>
<th>6m²</th>
<th>7m²</th>
<th>8m²</th>
<th>9m²</th>
</tr>
</thead>
<tbody>
<tr>
<td>HIT-N240SE10</td>
<td></td>
<td>5.3m²</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chinese A Company</td>
<td></td>
<td>6.9 m²</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Japanese B Company</td>
<td></td>
<td>7.8 m²</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chinese C Company</td>
<td></td>
<td>8.3m²</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Chinese ST: Suntech STP175S-24/Ad 175W, 1.20 ㎡, 15.5 kg
Chinese SF: Solarfun SF180-27-M 180W, 1.69 ㎡, 7.8 kg
Chinese A Company: SANYO HIT, SANYO HIP-205NKHB5 205W, 1.28 ㎡, 15 kg
Japanese SH: SharpNE-Q7E3E 167W, 1.30 ㎡, 6.9 kg
Chinese A Company: SANYO HIT, SANYO HIP-205NKHB5 205W, 1.28 ㎡, 15 kg
Japanese SH: SharpNE-Q7E3E 167W, 1.30 ㎡, 6.9 kg
Chinese C Company: SANYO HIT, SANYO HIP-205NKHB5 205W, 1.28 ㎡, 15 kg

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HIT Module = Space saving

Saving space in limited area!

If you install 10kW system on the roof…

HIT 240W module
Module efficiency 19.0%
Module area 1.26㎡

Poly-Si 167W module
Module efficiency 12.8%
Module area 1.30㎡

Saving space!

Installation Area
53.0㎡ (10.1kw) < 78.0 ㎡ (10.2kw)
Light Weight, Less Load To Roof

HIT Modules Are Lighter Than Other Modules.

<table>
<thead>
<tr>
<th>Modules weight (per 1kW)</th>
<th>60kg</th>
<th>70kg</th>
<th>80kg</th>
<th>90kg</th>
<th>100kg</th>
<th>110kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>HIT-N240SE10</td>
<td></td>
<td></td>
<td></td>
<td>63kg</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chinese A Company</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>88kg</td>
<td></td>
</tr>
<tr>
<td>Japanese B Company</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>101kg</td>
</tr>
<tr>
<td>Chinese C Company</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>100g</td>
</tr>
</tbody>
</table>
HIT solar panels are about 35% lighter per installed watt, than average solar panels.
HIT Modules Perform Good at High Temperature Conditions

Temperature Coefficient of Pmax (%/ °C)

- HIT
- 0.30
- A Company
- 0.48
- B Company
- 0.485
- C Company
- 0.40
High Efficiency at high temperature

Excellent feature of temperature dependence

- High efficiency at high temperatures
- Can get more output power even at high temperature in summertime

**Temperature VS. conversion efficiency**

- HIT
- p-Si

**Changes in generated power daytime**

- approx. 10% up!!
- Module temp. 75°C
- HIT
- Conventional c-Si

- Kobe 24. July '07
- Faced due South
- Tilt angle 30°
When installing modules…

Fixing on the long sides, 4 points

Respect fixing area

Junction box can be up, down, left or right

2400Pa load – in case of doubt calculate with DIN 1055

NSE, H series: clean glass with ethanol diluted in water after installing

Keep modules in SC during installation to avoid corrosion on terminals
When installing modules…

- Grounding is recommended but not mandatory
- Grounding with grounding holes or „scratching“ latches
- No space is mandatory between module rows
- Do not install directly under „hard“ shadows
- Clean wiring avoids problems in the future and repairs
Bypass diode configuration

**N type**
- Shadows on the long side
- Flat roof horizontal mounting

**HD type**
- Shadows on the short side
- Flat roof vertical mounting

Diode configuration
Mounting space of modules

Front view

Side view

Wrong mounting point

Bending of the module 6-8mm below →
When planning…

Always put the margin on voltage by 20-30% !!

Because…

1. Degradation results almost always in lower voltage
2. Shading may cause (via diode) voltage losses
3. Module temperature can reach 75 °C (-15% voltage)

When the voltage becomes lower due to the mixture of the above reasons, MPPT of inverter might not work correctly.

This could lead to the claim of lower output !
When simulating…

When you use PVSyst, which is one of the renowned simulation software, please modify the values according to the measured characteristic of modules. The change in the value makes the yield at lower irradiation higher.

<table>
<thead>
<tr>
<th>PV module</th>
<th>HIT-N225SE10</th>
<th>HIT-N230SE10</th>
<th>HIT-N235SE10</th>
<th>HIT-N240SE10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Base PV module registered in PVSYST database</td>
<td>HIT-N225SE10</td>
<td>HIT-N230SE10</td>
<td>HIT-N235SE10</td>
<td>-</td>
</tr>
<tr>
<td>Rs (Ω)</td>
<td>Sanyo's proposal</td>
<td>Default values</td>
<td>Sanyo's proposal</td>
<td>Default values</td>
</tr>
<tr>
<td>0.45</td>
<td>0.390</td>
<td>0.387</td>
<td>0.336</td>
<td>0.3</td>
</tr>
<tr>
<td>Rsh (Ω)</td>
<td>250</td>
<td>500</td>
<td>250</td>
<td>550</td>
</tr>
<tr>
<td>Rsh at Ginc = 0 (Ω) *1</td>
<td>1200</td>
<td>2000</td>
<td>1200</td>
<td>2000</td>
</tr>
<tr>
<td>Exponential parameter *2</td>
<td>2.5</td>
<td>5.5</td>
<td>1.5</td>
<td>5.5</td>
</tr>
</tbody>
</table>

*1, 2: PVSYT propose some exponential correction as default.
For example, values of Rsh at Ginc=0 and exponential parameter, 2000 and 5.5 are set as default values respectively.
Sanyo’s proposal needs to adjust both two parameters from default.
Instructions for transport

1. We recommend that the finger of forklift will not go beyond the pallet, in order to avoid the possible damage to the another pallet.
2. Set the forklift to the stable width
3. Do not shock or swing pallet
4. Do not place pallet on uneven surface
5. If repack pallet then use stable wrapping
6. Do not put additional load on the pallet
Customer claim

Glass breakage

Self-breakage
Glass is broken due to internal stress
→ Product guarantee applied

External impact
Glass is broken due to external impact
→ No guarantee applied
Output claim

We have so far no actual output claim, but receive the claim information about low output. When receiving the output claim from customer, please check:

1. If the modules are connected with correct polarizations.
   → when one module is connected with +/- or -/-, or heat generation in junction box
2. If the shadow is casting the modules when they’re operating
   → MPPT of the inverter might not work properly.
When the modules are connected properly, and there is no shadow cast on the module, please do the following.

Condition: Sunny weather without clouds

1. Check the voltage of each string together with the temperature (hourly data recommended)
2. If one string shows relatively lower voltage, check the voltage of each module
3. If one module shows low voltage (ex. 2/3 of nominal value), something might be wrong with that module
4. In case you cannot see any modules with lower voltages, it is likely that there is no failure in the module. Please also contact inverter manufacturer to see the problem since it might have something to do with the software of the inverter.
New Product “HIT Double®”

HIT Double® can generate electricity from not only its front side but also from its rear side because HIT cells have the symmetrical structure.

The back side of HIT Double can generate 70% of energy of the front side, while conventional module will produce 0% of energy.

<table>
<thead>
<tr>
<th></th>
<th>210W</th>
<th>205W</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pmax</td>
<td>210W</td>
<td>205W</td>
</tr>
<tr>
<td>Voc(V)</td>
<td>51.6</td>
<td>50.9</td>
</tr>
<tr>
<td>Isc(A)</td>
<td>5.50</td>
<td>5.43</td>
</tr>
<tr>
<td>Vpm(V)</td>
<td>41.8</td>
<td>41.3</td>
</tr>
<tr>
<td>Impm(A)</td>
<td>5.03</td>
<td>4.97</td>
</tr>
<tr>
<td>Cell size</td>
<td>125 x 125mm (72 cells)</td>
<td></td>
</tr>
<tr>
<td>Module size</td>
<td>1,630 x 862 x 35mm, 1.41m²</td>
<td></td>
</tr>
<tr>
<td>Weight</td>
<td>26kg</td>
<td></td>
</tr>
<tr>
<td>Connector</td>
<td>MC3</td>
<td></td>
</tr>
<tr>
<td>Module Eff.</td>
<td>14.9%</td>
<td>14.6%</td>
</tr>
</tbody>
</table>

*This value is reference at STC (1000W/m², 25℃, AM 1.5)
Field measurement test

The energy yield would increase by 24% compare to standard HIT module

Module type : HIP-210NHE1 (Standard HIT)
HIP-200DN2 (HIT Double, Japanese Market model)

System output : 2.10 kWp (Standard HIT)
2.00 kWp (HIT-Double)

Inverter : Sunny Boy 2100TL

Measured period : Nov. 08 ~ Oct. 09

Location : Geilenkirchen, Germany

Module angle : Tilt : 20 deg., Direction : South

Height of array : 30cm

Roof reflection rate : 64%

Measurement system : Supervised by Fraunhofer ISE

Installation : Pohlen Solar GmbH
HIT vs HIT Double – 1MW roof top PJ in Europe

In most of the European countries, HIT Double can generate more than 20% additional energy!!

Direction: South, Angle: 20°, Height of array: 30cm, roof reflection: 64% (as of 2010 July)
*Calculated by SANYO original simulation software “Solarpro”. SANYO will not guarantee the value.
# 100% Power Guarantee

The modules we ship out have been tested individually to have the nominal power or more.

## Sample of Actual Test Results

This batch had 504 panels of HIT modules
Each panel’s $P_{\text{max}}$ is rated 205 Watts

The results of all panels:
The batch’s average power = 209.9 Watts
The lowest panel was 206.8 Watts & the highest 213.1 Watts

Customer may get 2.4% output bonus!

<table>
<thead>
<tr>
<th>Panel</th>
<th>$P_{\text{max}}$ (Watts)</th>
<th>$V_{\text{oc}}$ (V)</th>
<th>$I_{\text{sc}}$ (A)</th>
</tr>
</thead>
<tbody>
<tr>
<td>405</td>
<td>202.0</td>
<td>50.0</td>
<td>2.40</td>
</tr>
<tr>
<td>406</td>
<td>209.7</td>
<td>50.03</td>
<td>5.501</td>
</tr>
<tr>
<td>407</td>
<td>211.2</td>
<td>50.40</td>
<td>5.503</td>
</tr>
<tr>
<td>408</td>
<td>210.1</td>
<td>50.16</td>
<td>5.518</td>
</tr>
<tr>
<td>409</td>
<td>210.0</td>
<td>50.17</td>
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</tr>
<tr>
<td>410</td>
<td>212.2</td>
<td>50.57</td>
<td>5.490</td>
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<tr>
<td>411</td>
<td>210.5</td>
<td>50.33</td>
<td>5.481</td>
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<tr>
<td>412</td>
<td>212.3</td>
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<tr>
<td>413</td>
<td>209.9</td>
<td>50.17</td>
<td>5.493</td>
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<tr>
<td>414</td>
<td>212.1</td>
<td>50.54</td>
<td>5.525</td>
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<td>415</td>
<td>209.8</td>
<td>50.05</td>
<td>5.512</td>
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<td>50.17</td>
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<td>50.24</td>
<td>5.501</td>
</tr>
<tr>
<td>504</td>
<td>211.5</td>
<td>50.26</td>
<td>5.519</td>
</tr>
</tbody>
</table>

Average of this sheet: 210.4 Watts, 50.30 V, 5.505 A

*Shipment shall be allowed only for the products which conform to all criteria*
Yearly Performance

Yearly data of generation for HIT PV system

System Size : 3.8kW
Location : Shizuoka-city, Japan
Angle : Tilt 20 deg, Direction South to East 15 deg.
Duration : 46 months

System Output Coefficient
= Inverter output / (Irradiation x Rated power)
HIT® panels have eco-packaging.

Eco-packaging protects panels during transit and is an environment-friendly way to package solar panels to reduce cardboard and waste.

- Sturdy & Protective Packaging
- Less Packaging Material
- Less Job Site Waste
- Less Warehouse Needed for Storage
- Less Transit Space Needed
- Reduces Freight, Oil, Transit, Disposal, and Storage Costs
SANYO Modules Comply World Standards

- Numerous factory certifications including:
  - ISO 9001 (quality), 14001 (environment), 18001 (safety)

- Numerous product certifications including:
  - cUL 1703, TUV, CE, IEC 61215, IEC 61730

- Product quality inspections beyond industry standards:
  - industry-leading visual, mechanical, electrical, environmental & quality inspections

- Individual panel power performance results provided for all panels.

- Solar panel promise to be equal to or higher than its rated power.
Thank you!