

All-black design

For a uniform appearance

- Black frame
- Dark solar cells
- Dark back sheet

Thanks to our HIT solar cells

- Cell efficiency: 21.1 %
- Use of the latest technology from R&D

World's highest efficiency*

18.6%*
186 W/m²

Innovative

Implementing our latest module technology

- Anti-reflection glass
- New 3-tab design



* For black back sheet modules, model N235B, as of May 2012

HIT cell technology

The HIT (Heterojunction with Intrinsic Thin layer) solar cell is made of a thin monocrystalline silicon wafer surrounded by ultra-thin amorphous silicon layers. This product provides the industry's leading performance and value using state-of-the-art manufacturing techniques. The development of the HIT solar cell was supported in part by the New Energy and Industrial Technology Development Organization (NEDO).

Quality

Panasonic is truly committed to quality since it began developing and manufacturing solar PV modules in 1975. Our long track record is supported with our claim-rate of only 0.0023 % out of 3,121,519 solar modules produced in our European factory in Dorog, Hungary (as of April 2012).

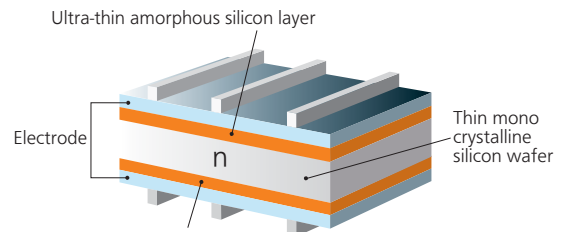
High performance at high temperatures

Even at high temperatures, the HIT solar cell can maintain higher efficiency than a conventional crystalline silicon solar cell. This is particularly relevant in all-black modules, where heat absorption is greater. Our black-backsheet modules minimise that effect, achieving a top-level temperature performance.

Special features

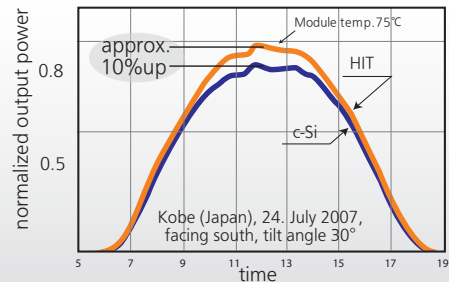
HIT solar modules are 100% emission free, have no moving parts and produce no noise. The dimensions of the HIT modules enable a space saving installation and the achievement of maximum output power possible on a given roof area.

HIT[®] solar cell structure



Ultra-thin amorphous silicon layer

Changes in generated power daytime



"HIT" is a registered trademark and an original technology of the Panasonic Group. It stands for "Heterojunction with intrinsic Thin-layer".

The HIT cell and module have very high conversion efficiency in mass production.

Model	Cell Efficiency	Module Efficiency	Output/m ²
N235B	21.1%	18.6%	186 W/m ²
N230B	20.7%	18.2%	182 W/m ²

Electrical data (at STC)

	VBHN235SE51	VBHN230SE51
Max. power (Pmax) [W]	235	230
Max. power voltage (Vmp) [V]	43.4	42.5
Max. power current (Imp) [A]	5.43	5.42
Open circuit voltage (Voc) [V]	52.4	52.1
Short circuit current (Isc) [A]	5.78	5.78
Maximum over current rating [A]	15	
Output power tolerance [%]	+10/-5*	
Maximum system voltage [V]	1000	

Note: Standard Test Conditions: Air mass 1.5, Irradiance = 1000W/m², cell temp. 25°C
 * All modules measured by Panasonic facilities have output with positive tolerance

Temperature characteristics

	VBHN235SE51	VBHN230SE51
Temperature (NOCT) [°C]	44.0	44.0
Temp. coefficient of Pmax [%/°C]	-0.30	-0.30
Temp. coefficient of Voc [V/°C]	-0.131	-0.130
Temp. coefficient of Isc [mA/°C]	1.734	1.734

At NOCT

	VBHN235SE51	VBHN230SE51
Maximum power (Pmax) [W]	178.6	174.6
Max. power voltage (Vmp) [V]	41.5	40.7
Max. power current (Imp) [A]	4.31	4.28
Open circuit voltage (Voc) [V]	49.4	49.1
Short circuit current (Isc) [A]	4.66	4.66

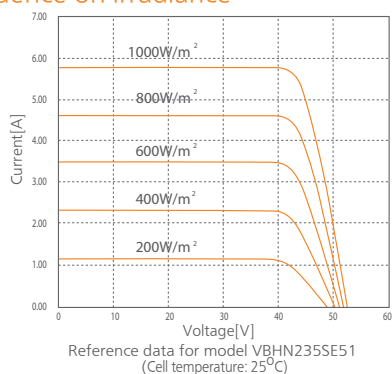
Note: Nominal Operating Cell Temperature: Air mass 1.5 spectrum, Irradiance = 800W/m², Air temperature = 20°C, wind speed 1 m/s

At low irradiance

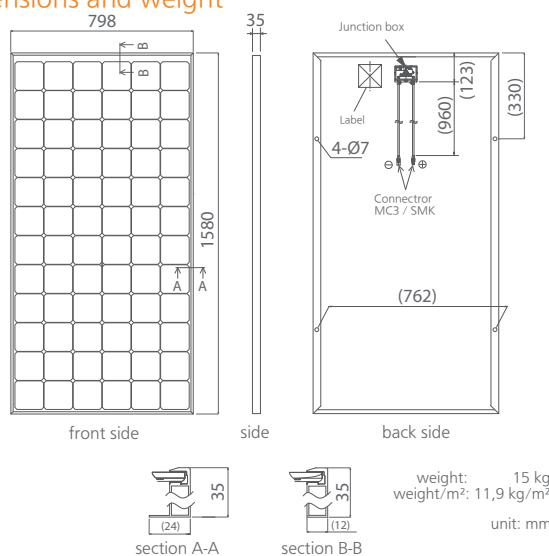
	VBHN235SE51	VBHN230SE51
Maximum power (Pmax) [W]	45.0	44.0
Max. power voltage (Vmp) [V]	42.1	41.5
Max. power current (Imp) [A]	1.07	1.06
Open circuit voltage (Voc) [V]	49.0	48.5
Short circuit current (Isc) [A]	1.16	1.16

Note: Low irradiance: Air mass 1.5 spectrum, Irradiance = 200W/m², cell temp. 25°C

Dependence on irradiance



Dimensions and weight



Guarantee

Power output: 10 years (90% of Pmin),
 25 years (80% of Pmin)
 Product workmanship: 10 years
 (Based on guarantee document)

Materials

Cell material: 5 inch HIT cells
 Glass material: AR coated tempered glass
 Frame materials: Black anodized aluminium
 Connectors type: MC3/SMK

Certificates



Member of



Please consult your local dealer for more information.

CAUTION! Please read the installation manual carefully before using the products.

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