



## Five Key Features

- 1 Guaranteed quality: 12 year product warranty, 25 year linear performance warranty \*
- 2 Predictable output: Positive power sorting of 0 to + 5 W
- 3 Innovation solutions: UL certified to 1000V for optimized system designs
- 4 Robust design: Module certified to withstand high snow loads, up to 5400 Pa \*\*
- 5 Tariff free: High performance Taiwan cells

\* Please refer to Hanwha Solar Product Warranty for details.

\*\* Please refer to Hanwha Solar module Installation Guide.

## Quality and Environmental Certificates

- ISO 9001 quality standards and ISO 14001 environmental standards
- OHSAS 18001 occupational health and safety standards
- UL 1703 1000V certification
- CEC listing



## About Hanwha Solar

Hanwha Solar is a vertically integrated manufacturer of photovoltaic modules designed to meet the needs of the global energy consumer.

- High reliability, guaranteed quality, and excellent cost-efficiency due to vertically integrated production and control of the supply chain;
- Optimization of product performance and manufacturing processes through a strong commitment to research and development;
- Global presence throughout Europe, North America, and Asia, offering regional technical and sales support.

# Electrical Characteristics

## Electrical Characteristics at Standard Test Conditions (STC)

| Power Class                                  | 230 W  | 235 W  | 240 W  | 245 W  | 250 W  | 255 W  |
|--|--------|--------|--------|--------|--------|--------|
| Maximum Power (P <sub>max</sub> )            | 230 W  | 235 W  | 240 W  | 245 W  | 250 W  | 255 W  |
| Open Circuit Voltage (V <sub>oc</sub> )      | 36.7 V | 36.8 V | 37.1 V | 37.2 V | 37.4 V | 37.5 V |
| Short Circuit Current (I <sub>sc</sub> )     | 8.56 A | 8.65 A | 8.75 A | 8.8 A  | 8.89 A | 8.95 A |
| Voltage at Maximum Power (V <sub>mpp</sub> ) | 29 V   | 29.1 V | 29.5 V | 29.7 V | 30 V   | 30.1 V |
| Current at Maximum Power (I <sub>mpp</sub> ) | 7.91 A | 8.05 A | 8.13 A | 8.25 A | 8.33 A | 8.47 A |
| Module Efficiency (%)                        | 13.9 % | 14.2 % | 14.5 % | 14.8 % | 15.1 % | 15.4 % |

P<sub>max</sub>, V<sub>oc</sub>, I<sub>sc</sub>, V<sub>mpp</sub> and I<sub>mpp</sub> tested at STC defined as irradiance of 1000 W/m<sup>2</sup> at AM 1.5 solar spectrum and temperature 25 ± 2 °C.  
Electrical Characteristics: measurement tolerance of ± 3 %.

## Electrical Characteristics at Normal Operating Cell Temperature (NOCT)

| Power Class                                  | 230W  | 235W  | 240W  | 245W  | 250W  | 255W  |
|--|-------|-------|-------|-------|-------|-------|
| Maximum Power (P <sub>max</sub> )            | 172W  | 176W  | 180W  | 184W  | 188W  | 192W  |
| Open Circuit Voltage (V <sub>oc</sub> )      | 34.2V | 34.3V | 34.6V | 34.7V | 34.9V | 35.0V |
| Short Circuit Current (I <sub>sc</sub> )     | 6.93A | 7.00A | 7.08A | 7.12A | 7.19A | 7.24A |
| Voltage at Maximum Power (V <sub>mpp</sub> ) | 27.0V | 27.1V | 27.5V | 27.7V | 28.0V | 28.1V |
| Current at Maximum Power (I <sub>mpp</sub> ) | 6.40A | 6.51A | 6.58A | 6.67A | 6.74A | 6.85A |
| Module Efficiency (%)                        | 13.9% | 14.2% | 14.5% | 14.8% | 15.1% | 15.4% |

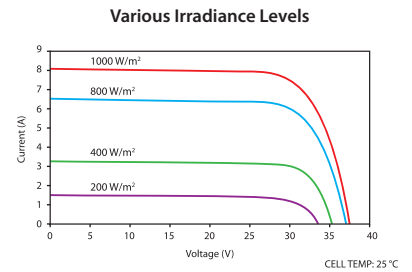
P<sub>max</sub>, V<sub>oc</sub>, I<sub>sc</sub>, V<sub>mpp</sub> and I<sub>mpp</sub> tested at NOCT defined as irradiance of 800 W/m<sup>2</sup>; wind speed 1 m/s.  
Electrical Characteristics: measurement tolerance of ± 3 %.

## Nomenclature

Full product name:  
HSL60P6-PA-4-xxxT, Color  
xxx represents the power class  
For Color, indicate 'Silver Frame' or  
'Black Frame'

## Performance at Low Irradiance:

The typical relative change in module efficiency at an irradiance of 200 W/m<sup>2</sup> in relation to 1000 W/m<sup>2</sup> (both at 25 °C and AM 1.5 spectrum) is less than 5 %.



## Temperature Characteristics

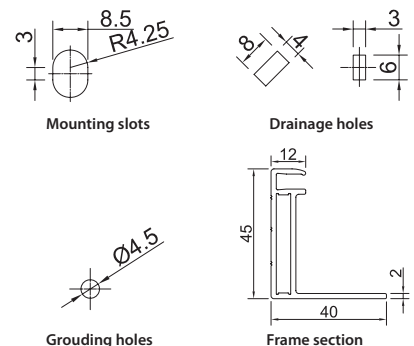
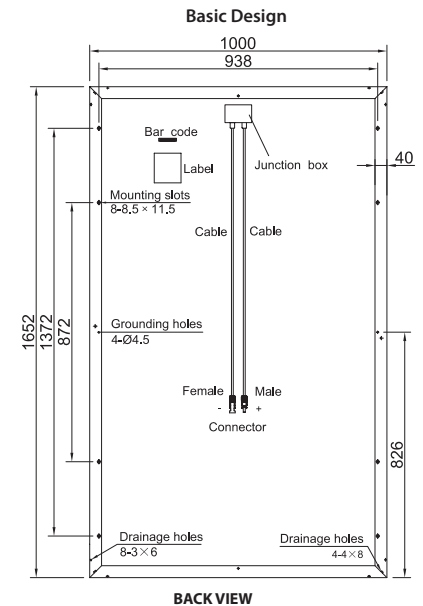
|  |                |
|--|----------------|
| Normal Operating Cell Temperature (NOCT) | 45°C + / - 3°C |
| Temperature Coefficients of P            | - 0.48 % / °C  |
| Temperature Coefficients of V            | - 0.35 % / °C  |
| Temperature Coefficients of I            | + 0.05% / °C   |

## Maximum Ratings

|                         |                                       |
|-------------------------|---------------------------------------|
| Maximum System Voltage  | 1000 V (UL)                           |
| Series Fuse Rating      | 15 A                                  |
| Maximum Reverse Current | Series fuse rating multiplied by 1.35 |

# Mechanical Characteristics

|                          |   |
|--------------------------|---|
| Dimensions               | 1652 mm × 1000 mm × 45 mm                           |
| Weight                   | 21 kg   |
| Frame                    | Aluminum alloy, available in silver or black finish |
| Front                    | Tempered glass                                      |
| Encapsulant              | EVA   |
| Back Cover               | White back sheet                                    |
| Cell Technology          | Polycrystalline (Taiwan)                            |
| Cell Size                | 156 mm × 156 mm                                     |
| Number of Cells (Pieces) | 60 (6 × 10)   |
| Junction Box             | Protection class IP67 with bypass-diode             |
| Output Cables            | Solar cable: 4 mm <sup>2</sup> ; length 900 mm      |
| Connector                | Amphenol H4   |



## System Design

|  |                   |
|--|-------------------|
| Operating Temperature                  | - 40 °C to 85 °C  |
| Hail Safety Impact Velocity            | 25 mm at 23 m/s   |
| Fire Safety Classification (IEC 61730) | Class C           |
| Static Load Wind / Snow                | 2400 Pa / 5400 Pa |

## Packaging and Storage

|  |                      |
|--|----------------------|
| Storage Temperature                    | - 40 °C to 85 °C     |
| Packaging Configuration                | 22 pieces per pallet |
| Loading Capacity (40 ft. HQ Container) | 572 pieces           |