



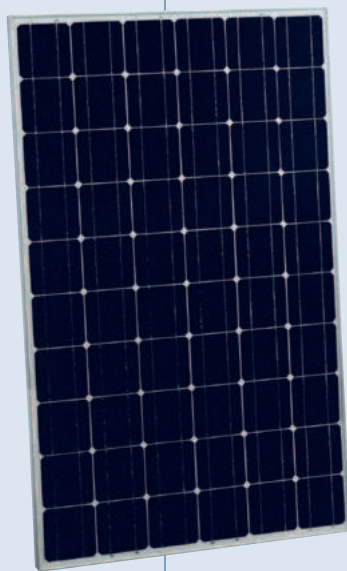
## Say yes to solar power! Because it protects the climate.

### Innovations from a photovoltaic pioneer

As a solar specialist with more than 50 years of experience in photovoltaics (PV), Sharp makes significant contributions to groundbreaking progress in solar technology.

Sharp photovoltaic modules in the NU series are designed for applications with high power requirements. These quality monocrystalline modules produce a continuous, reliable yield, even under demanding operational conditions.

All Sharp NU series modules offer system integration which is optimal both technically and economically, and are suitable for installations in on and off-grid PV systems.



### Product features

- High-performance photovoltaic modules made of monocrystalline (156.5 mm)<sup>2</sup> silicon solar cells with module efficiencies of up to 14.3%.
- Production controlled positive power tolerance from 0 to +5%. Only modules will be delivered that have the specified power or more for high energy yield.
- Delivery of modules in 5-watt intervals.
- Improved temperature coefficient to reduce power losses at higher temperatures.
- High power performance even at lower irradiances.

### Quality from Sharp

Benchmarks are set by the quality standards of Sharp Solar. Continual checks guarantee a consistently high level of quality. Every module undergoes visual, mechanical, and electrical inspection. This is recognisable by means of the original Sharp label, the serial number, and the Sharp guarantee:

- 5-year product guarantee
- 10-year performance guarantee on a power output of 90%
- 25-year performance guarantee on a power output of 80%

The detailed guarantee conditions and additional information can be found at [www.sharp.eu/solar](http://www.sharp.eu/solar).

### Certificates and approvals

All modules are tested and certified according to

- IEC/EN 61215 and IEC/EN 61730, Application class A
- Safety class II
- CE

Sharp is certified based on

- ISO 9001:2008 and ISO 14001:2004

## Electrical data (at STC)

		NU-235R1H	NU-230R1H	NU-225R1H	NU-220R1H	
Maximum power	$P_{max}$	235	230	225	220	$W_p$
Open-circuit voltage	$V_{oc}$	37.9	37.7	37.5	37.3	V
Short-circuit current	$I_{sc}$	8.49	8.43	8.37	8.31	A
Voltage at point of maximum power	$V_{mpp}$	30.3	30.0	29.7	29.4	V
Current at point of maximum power	$I_{mpp}$	7.76	7.67	7.58	7.49	A
Module efficiency	$\eta_m$	14.3	14.0	13.7	13.4	%

STC = Standard Test Conditions: irradiance 1,000 W/m<sup>2</sup>, AM 1.5, cell temperature 25 °C.

Rated electrical characteristics are within ±10% of the indicated values of  $I_{sc}$ ,  $V_{oc}$  and 0 to +5% of  $P_{max}$  (power measurement tolerance ±3%).

## Electrical data (at NOCT)

		NU-235R1H	NU-230R1H	NU-225R1H	NU-220R1H	
Maximum power	$P_{max}$	169.7	166.1	162.5	158.9	$W_p$
Open-circuit voltage	$V_{oc}$	37.1	37.0	36.8	36.6	V
Short-circuit current	$I_{sc}$	6.84	6.79	6.75	6.70	A
Voltage at point of maximum power	$V_{mpp}$	27.2	26.9	26.6	26.3	V
Nominal Operating Cell Temperature	NOCT	47.5	47.5	47.5	47.5	°C

NOCT: Module operating temperature at 800 W/m<sup>2</sup> irradiance, air temperature of 20 °C, wind speed of 1 m/s.

## Limit values

Maximum system voltage	1,000 V DC
Over-current protection	15 A
Temperature range	-40 to +90 °C
Maximum mechanical load	2,400 N/m <sup>2</sup>

## Mechanical data

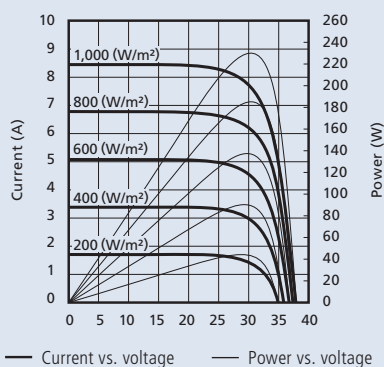
Length	1,652 mm (+/-3.0 mm)
Width	994 mm (+/-2.0 mm)
Depth	46 mm (+/-0.8 mm)
Weight	19 kg

## Temperature coefficient

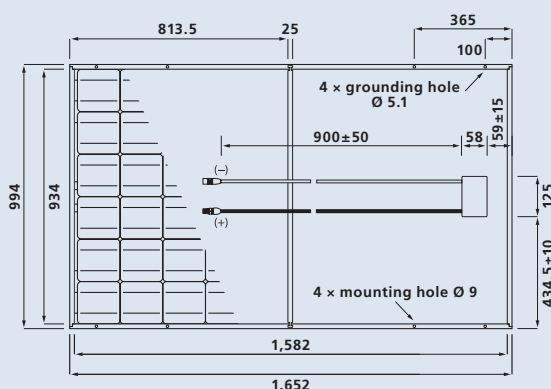
$P_{max}$	-0.457 % / °C
$V_{oc}$	-0.323 % / °C
$I_{sc}$	+0.020 % / °C

## Characteristic curves NU-230R1H

Characteristic curves: current/power vs. voltage  
(cell temperature: 25 °C)



## Rear view



## General data

Cells	monocrystalline, 156.5 mm × 156.5 mm, 60 cells in series
Front glass	low iron tempered glass, 3 mm
Frame	anodized aluminium alloy, silver
Connection box	PPE/PPO resin, IP65 rating, 58 × 125 × 15 mm, 3 bypass diodes
Cable	4 mm <sup>2</sup> , length 900 mm
Connector	SMK (MC4 compatible), Type CCT9901-2361F/2451F (Catalogue no. P51-7H/R51-7), IP67 rating
To extend the module connection leads, only use SMK connector from the same series or MultiContactAG MC4 connector (PV-KST04/PV-KBT04)	

## Registration

Sharp Solar guarantees the safety, quality and value of your product over many years – the only thing we ask you to do is to register your modules with the serial number, so that we can send you the guarantee certificate. Register your modules quickly and easily at [www.brandaddedvalue.net](http://www.brandaddedvalue.net).

Sharp Energy Solution Europe  
a division of Sharp Electronics (Europe) GmbH  
Sonninstrasse 3, 20097 Hamburg, Germany  
Tel: +49 (0) 40 / 23 76 - 0 · Fax: +49 (0) 40 / 23 76 - 21 93  
[www.sharp.eu/solar](http://www.sharp.eu/solar)

### Local responsibility:

**Austria**  
[SolarInfo.at@sharp.eu](mailto:SolarInfo.at@sharp.eu)  
**Benelux**  
[SolarInfo.seb@sharp.eu](mailto:SolarInfo.seb@sharp.eu)  
**Central & Eastern Europe**  
[SolarInfo.scee@sharp.eu](mailto:SolarInfo.scee@sharp.eu)

**Denmark**  
[SolarInfo.dk@sharp.eu](mailto:SolarInfo.dk@sharp.eu)  
**France**  
[SolarInfo.fr@sharp.eu](mailto:SolarInfo.fr@sharp.eu)  
**Germany**  
[SolarInfo.de@sharp.eu](mailto:SolarInfo.de@sharp.eu)

**Scandinavia**  
[SolarInfo.sen@sharp.eu](mailto:SolarInfo.sen@sharp.eu)  
**Spain & Portugal**  
[SolarInfo.es@sharp.eu](mailto:SolarInfo.es@sharp.eu)  
**Switzerland**  
[SolarInfo.ch@sharp.eu](mailto:SolarInfo.ch@sharp.eu)  
**United Kingdom**  
[SolarInfo.uk@sharp.eu](mailto:SolarInfo.uk@sharp.eu)

# SHARP

The reference image on the front page shows a 3.96 kWp system in Northern Germany.  
**Note:** Technical data is subject to change without prior notice. Before using Sharp products, please request the latest data sheets from Sharp. Sharp accepts no responsibility for damage to devices which have been equipped with Sharp products on the basis of unverified information. The specifications may deviate slightly and are not guaranteed. Installation and operating instructions are to be found in the corresponding handbooks, or can be downloaded from [www.sharp.eu/solar](http://www.sharp.eu/solar). This module should not be directly connected to a load.