Photovoltaic modules

TE190/220-54M

▶ **High efficiency, reduced area**

Tenesol manufactures its own photovoltaic modules in two facilities.

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Tenesol's modules **use the high-output technology of the monocrystalline cell**. Each cell is individually measured and sorted before the encapsulation stage.

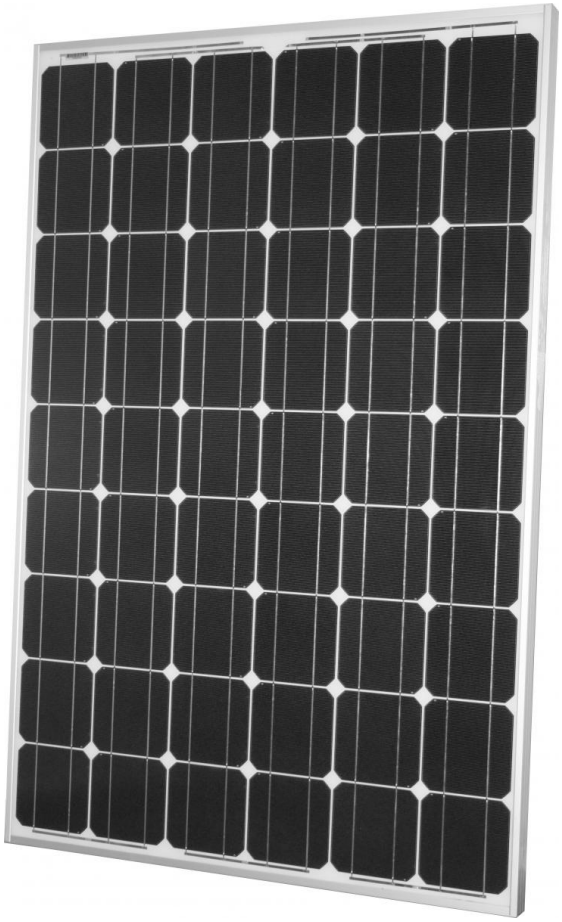
The combined use of **tempered glass, EVA and back sheet keeps its weight to a minimum**. The **laminate guarantees total watertightness** and long-term protection of the cells.

The **reinforced 50 mm aluminium** frame makes handling easy and allows for quick, easy and **highly resistant assembly**.

Each module is subject to an **individual quality control process**.

Product warranty: 10 years

Power warranty: 25 years*



The quality of TENESOL modules are CE certified.

Our production facilities are also certified according to ISO 9001 and ISO 14001 standards.

A rapidly expanding global player in the field of solar energy (with a turnover of €304 million in 2010, average 25% growth per year over last 3 years), Tenesol works on behalf of businesses, local authorities and private individuals.

For more than 28 years, Tenesol has been engineering, designing, manufacturing, installing and managing solar energy systems including production and consumption of supplied systems (Off-grid sites, general grid supply via direct connection, solar water heating) for its customers around the globe.

A benchmark player in its sector, Tenesol currently has a staff of more than 1.000 employees across 24 subsidiaries including 2 production facilities.

Sun access provider.

TENESOL
TOTAL & EDF GROUPS

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► TE190/220-54M

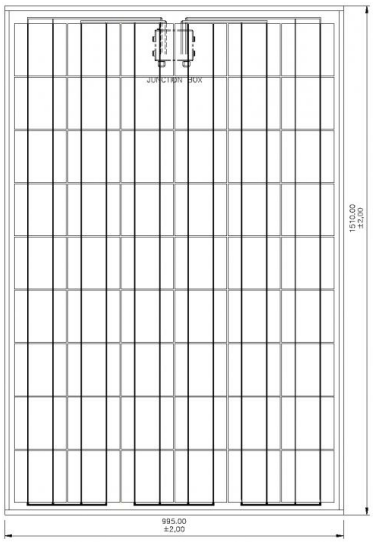
Electrical characteristics

Nominal Power	Wp	190[1]	200	210	220[1]
Minimum power		185	195	205	215
Maximum power		195	205	215	225
Sorting limits	Wp	-5 / +5			
Sorting limits	%	±2,6	±2,5	±2,4	±2,3
Voltage at max. power	(V)	25.0	25.65	26.25	26.8
Current at max. power	(A)	7,6	7,8	8.0	8.2
Open circuit voltage	(V)	32,1	32,5	32.9	33.3
Short circuit current	(A)	8.1	8.3	8.5	8.7

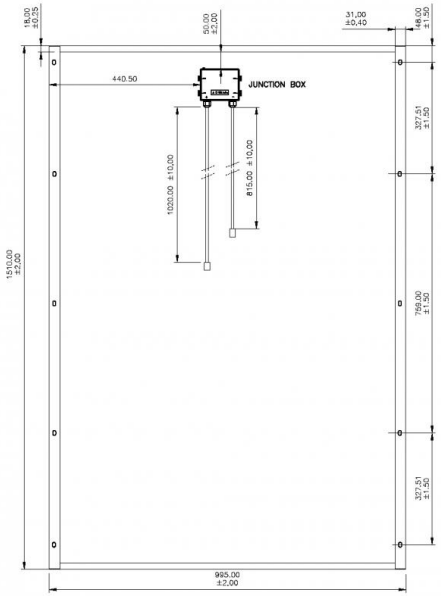
According to specifications at STC: Irradiation 1000 W/m²; AM 1.5; Cell at ambient Temperature T: 25°C.
(1) : Modules available open request

Nominal Power 45°C / 800W/m²	Wp	139.5	147.2	154.8	162.3
Voltage at max. power	(V)	22.7	23.3	23.9	24.5
Current at max. power	(A)	6.2	6.3	6.5	6.6
Open circuit voltage	(V)	29.7	30.1	30.5	30.9
Short circuit current	(A)	6.6	6.7	6.9	7.0

NOCT tests realized with a maximum power (in Wp), junction temperature 45 °C; irradiation 800 W/m²; Am 1,5 ; Ambient temperature 20 °C; Windspeed 1 m/sec.



Temperature coefficients	
Temperature Coefficient of Voltage	- 116,1 mV/°C
Temperature Coefficient of Current	+ 4,8 mA/°C
Temperature Coefficient of Power	- 0,43 %/°C
NOCT	45 °C



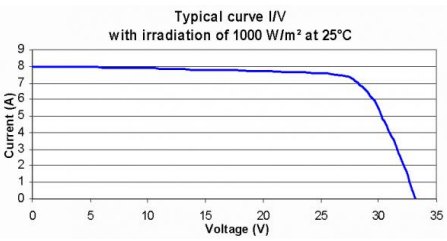
Cells	
Size	156 x 156 mm
Layout	54 cells / 6 x 9
Type	Monocrystalline

General information	
Maximum system voltage	1000 V
Maximum reverse current	17 A
Diodes	3 by-pass
Type of connection	Tyco connectors
Junction Box	IP55
Weight	18 kg
Operating ambient temperature	-40 / +85°C

Certifications	
	IEC61215 + IEC61730

Warranty	
Product warranty	10 years
Power warranty (*)	25 years - 80 % of minimal power 10 years - 90 % of minimal power

Irradient dependancy			
Irradiation (W/m²)	Pm	Vpm	Ipm
1000	1	1	1
800	0,799	0,999	0,8
500	0,497	0,994	0,5
400	0,394	0,986	0,4
300	0,291	0,970	0,3
200	0,187	0,936	0,2
100	0,086	0,862	0,1



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