



PV module - TSM-465NEG9R.28

Manufacturer	Trina Solar	Commercial data	
Model	TSM-465NEG9R.28	Availability :	Prod. Since 2021
		Data source :	Trinasolar 2026.3
Pnom STC power (manufacturer)	465 W _p	Technology	Si-mono
Module size (W x L)	1.134 x 1.762 m ²	Rough module area (A _{module})	2.00 m ²
Number of cells	2 x 72	Sensitive area (cells) (A _{cells})	1.81 m ²

Specifications for the model (manufacturer or measurement data)

Reference temperature (T _{Ref})	25 °C	Reference irradiance (G _{Ref})	1000 W/m ²
Open circuit voltage (V _{oc})	54.2 V	Short-circuit current (I _{sc})	10.85 A
Max. power point voltage (V _{mpp})	45.8 V	Max. power point current (I _{mpp})	10.16 A
=> maximum power (P _{mpp})	465.3 W	Isc temperature coefficient (μI _{sc})	4.3 mA/°C

One-diode model parameters

Shunt resistance (R _{shunt})	400 Ω	Diode saturation current (I _{oRef})	0.011 nA
Series resistance (R _{serie})	0.26 Ω	Voc temp. coefficient (μV _{oc})	-129 mV/°C
Specified P _{max} temper. coeff. (μP _{MaxR})	-0.29 %/°C	Diode quality factor (Gamma)	1.06
		Diode factor temper. coeff. (μGamma)	0.000 1/°C

Reverse Bias Parameters, for use in behaviour of PV arrays under partial shadings or mismatch

Reverse characteristics (dark) (B _{Rev})	3.20 mA/V ²	(quadratic factor (per cell))	
Number of by-pass diodes per module	3	Direct voltage of by-pass diodes	-0.7V

Model results for standard conditions (STC: T=25 ° C, G=1000 W/m², AM=1.5)

Max. power point voltage (V _{mpp})	45.3 V	Max. power point current (I _{mpp})	10.32 A
Maximum power (P _{mpp})	465.8 W _p	Power temper. coefficient (μP _{mpp})	-0.29 %/°C
Efficiency(/ Module area) (Eff _{mod})	23.3 %	Fill factor (FF)	0.792
Efficiency(/ Cells area) (Eff _{cells})	25.8 %		

