Characteristics of a PV module

Manufacturer, model : **Trina Solar, TSM-400DE09**

Availability : Prod. Since 2021

Data source : UL 2021

STC power (manufacturer)	**Pnom**	**400**	**Wp**	**Technology**	**Si-mono**		
Module size (W x L)		1.096 x 1.754	m²	Rough module area	Amodule	1.92	m²
Number of cells		2 x 60		Sensitive area (cells)	Acells	1.76	m²

Specifications for the model (manufacturer or measurement data)

Reference temperature	TRef	25	° C	Reference irradiance	GRef	1000	W/m²
Open circuit voltage	Voc	41.2	V	Short-circuit current	Isc	12.28	A
Max. power point voltage	Vmpp	34.2	V	Max. power point current	Impp	11.70	A
=> maximum power	Pmpp	400.1	W	Isc temperature coefficient	muIsc	4.9	mA/° C

One-diode model parameters

Shunt resistance	Rshunt	160	ohm	Diode saturation current	IoRef	0.024	nA
Serie resistance	Rserie	0.14	ohm	Voc temp. coefficient	MuVoc	-131	mV/° C
				Diode quality factor	Gamma	0.99	
Specified Pmax temper. coeff.	muPMaxR	-0.38	%/° C	Diode factor temper. coeff.	muGamma	-0.001	1/° C

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

Reverse characteristics (dark)	BRev	3.20	mA/V²	(quadratic factor (per cell))			
Number of by-pass diodes per module		3		Direct voltage of by-pass diodes		-0.7	V

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

Max. power point voltage	Vmpp	34.7	V	Max. power point current	Impp	11.56	A
Maximum power	Pmpp	401.2	Wc	Power temper. coefficient	muPmpp	-0.37	%/° C
Efficiency(/ Module area)	Eff_mod	20.9	%	Fill factor	FF	0.793	
Efficiency(/ Cells area)	Eff_cells	22.7	%				

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