

# TS CIGS SERIES HIGH-EFFICIENCY CIGS SOLAR MODULE

140 W / 145 W / 150 W / 155 W

## Features

- Advanced proprietary CIGS thin-film technology
- Plus sorting at +5 W to -0 W
- Up to 3% additional energy yield due to light soaking effect
- Low temperature coefficient provides energy yield benefits
- Aesthetically appealing all-black appearance
- Framed module designed for easy use with industry-standard mounting systems
- Etched, unchangeable serial numbers for full traceability of each module

## Quality and Safety

- IEC, MCS and UL certified
- Rated for snow and wind loads up to 2,400 Pa
- Free of potential induced degradation (PID) effects
- Manufactured at an ISO 9001: 2008, ISO 14001 and OHSAS 18001 certified facility
- Certified for harsh environments: Salt mist corrosion (IEC 61701) and Blowing sand resistant (DIN EN 60068-2-68)

## Warranty

- Product warranty\*: 10 years for material and workmanship
- Power output warranty\*: 90% at 10 years and 80% at 25 years of minimum rated power output



A TSMC Company

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Technical data

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## Electrical Characteristics

Standard Test Conditions (STC)

TS CIGS Series		TS-140C1	TS-145C1	TS-150C1	TS-155C1	
Maximum power	$P_{max}$	140	145	150	155	$W_p$
Factory binning		+5/-0	+5/-0	+5/-0	+5/-0	W
Open-circuit voltage	$V_{oc}$	63.1	63.4	63.8	64.3	V
Short-circuit current	$I_{sc}$	3.50	3.51	3.52	3.52	A
Maximum power voltage	$V_{mpp}$	45.3	46.6	47.9	49.2	V
Maximum power current	$I_{mpp}$	3.09	3.11	3.13	3.15	A
Module efficiency	Eff%	12.9	13.3	13.8	14.3	%
Power tolerance <sup>1</sup>		+/-5%				
Maximum reverse current	$I_R$	8 A				
Maximum system voltage		1000 Vdc (IEC), 600 Vdc (UL)				
Operating temperature		-40°C to 85°C				

IV Parameters measured at STC: 1000 W/m<sup>2</sup>, module temperature 25°C, AM 1.5 after factory light soaking. All IV ratings are +/- 10%.

<sup>1</sup> Pre-binning power tolerance as certified by UL/TÜV-SÜD, TSMC Solar only delivers modules with greater than or equal to nameplate power.

## Normal Operating Cell Temperature Conditions (NOCT)

Maximum power	$P_{max}$	106.3	110.1	113.9	117.7	W
Open-circuit voltage	$V_{oc}$	59.2	59.4	59.8	60.3	V
Short-circuit current	$I_{sc}$	2.80	2.81	2.82	2.82	A
Maximum power voltage	$V_{mpp}$	43.0	44.2	45.5	46.7	V
Maximum power current	$I_{mpp}$	2.47	2.49	2.50	2.52	A

Conditions at NOCT: 800 W/m<sup>2</sup>, ambient temperature 20°C, AM 1.5

## Thermal Characteristics

NOCT	46.5 ± 1°C
Temperature Coefficient of $P_{max}$	-0.31% / °C
Temperature Coefficient of $V_{oc}$	-0.29% / °C
Temperature Coefficient of $I_{sc}$	0.01% / °C

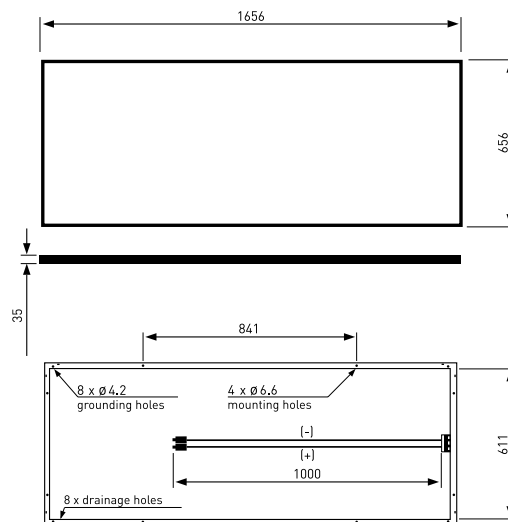
## Mechanical Characteristics

Snow/wind load (IEC)	2,400 Pa
Dimensions in mm	1656 x 656 x 35
Weight in kg	17.5
Frame	Black anodised aluminum
Front cover	Textured, white tempered front glass
Junction box, connector	IP 67, MC-4 compatible
Output cable cross section and length	2.5 mm <sup>2</sup> , 1000 mm
Cell type	100 CIGS cells
Safety class	II
Fire rating	Class C

The information contained herein is subject to change without notice.

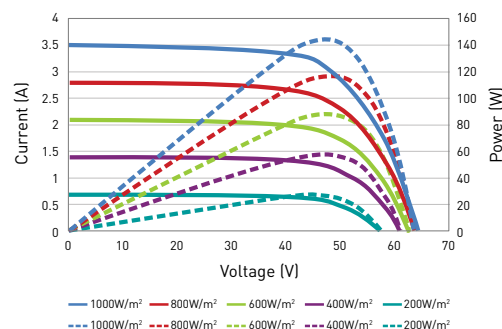
Caution: Read the installation guidelines before using, handling, installing or operating TSMC Solar modules.

## Physical Specifications



All measurements in mm

## I-V and P-V Curve (TS-145C1)



## Performance at Low Irradiance

Typical relative efficiency reduction of maximum power from an irradiance of 1,000 W/m<sup>2</sup> to 200 W/m<sup>2</sup> at 25°C is 5%.

## Certifications



**tsmc solar.**

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