

# TS CIGS SERIES HIGH-EFFICIENCY CIGS SOLAR MODULE

145 W / 150 W / 155 W / 160 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

- UL, IEC and MCS certified
- California Energy Commission (CEC) listed
- 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

[www.tsmc-solar.com](http://www.tsmc-solar.com)

Technical data

# TS CIGS SERIES HIGH-EFFICIENCY CIGS SOLAR MODULE

## Electrical Characteristics

Standard Test Conditions (STC)

TS CIGS Series		TS-145C2	TS-150C2	TS-155C2	TS-160C2	
Maximum power	$P_{max}$	145	150	155	160	$W_p$
Factory binning		+5/-0	+5/-0	+5/-0	+5/-0	W
Open-circuit voltage	$V_{oc}$	86.0	86.6	86.7	86.8	V
Short-circuit current	$I_{sc}$	2.62	2.62	2.62	2.62	A
Maximum power voltage	$V_{mpp}$	63.6	65.5	67.1	68.7	V
Maximum power current	$I_{mpp}$	2.28	2.29	2.31	2.33	A
Module efficiency	Eff%	13.3	13.8	14.3	14.7	%
Power tolerance <sup>1</sup>		+/-5%				
Maximum reverse current	$I_r$	6.5 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)

	$P_{max}$	109.4	113.2	116.9	120.7	W
Maximum power						
Open-circuit voltage	$V_{oc}$	78.9	79.4	79.5	79.6	V
Short-circuit current	$I_{sc}$	2.1	2.1	2.1	2.1	A
Maximum power voltage	$V_{mpp}$	60.0	61.8	63.3	64.8	V
Maximum power current	$I_{mpp}$	1.82	1.83	1.85	1.86	A

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

## Mechanical Characteristics

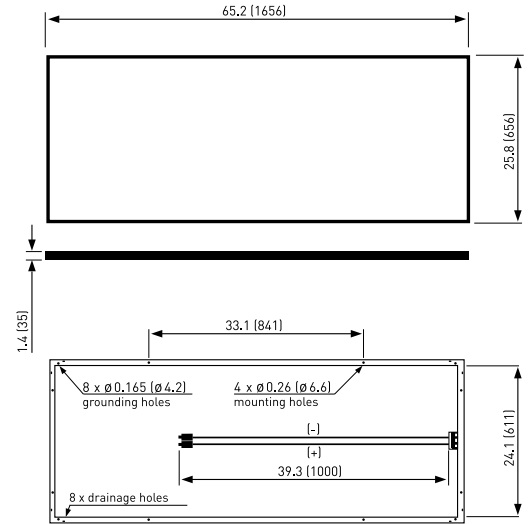
Snow/wind load (IEC)	50 lb/ft <sup>2</sup> (2,400 Pa)
Snow/wind load (UL)*	35 lb/ft <sup>2</sup> (1,695 Pa) design load
Dimensions in inches (mm)	65.2 (1656) x 25.8 (656) x 1.4 (35)
Weight in lbs (kg)	38.5 (17.5)
Frame	Black anodised aluminum
Front cover	Anti-reflective coated, textured white tempered glass
Junction box, connector	IP 67, MC-4 compatible
Output cable in inches (mm)	14 AWG (2.5 mm <sup>2</sup> ), 39.3 (1000)
Cell type	133 CIGS cells
Safety class	II
Fire rating	Class C

\*UL testing applies loading 50% above design load. i.e > 2,500 Pa was applied to achieve 1,695 Pa design load rating

The information contained herein is subject to change without notice.

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

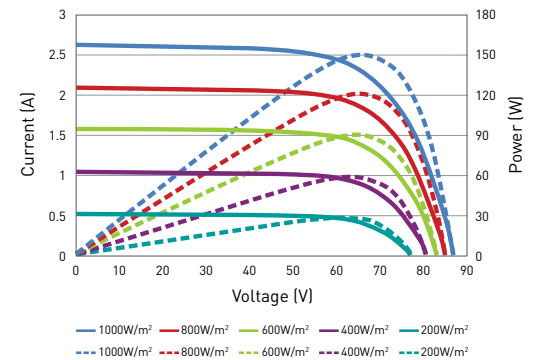
## Physical Specifications



All measurements in inches (mm)

## I-V and P-V Curve

(TS-150C2)



## Thermal Characteristics

NOCT	46.5 ± 1°C
Temperature Coefficient of $P_{max}$	-0.30% / °C
Temperature Coefficient of $V_{oc}$	-0.29% / °C
Temperature Coefficient of $I_{sc}$	0.01% / °C

## 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 7%.

## Certifications



**tsmc solar**

Get in contact with us!  
We look forward to your call or your e-mail!

**EUROPE**  
TSMC Solar Europe GmbH  
Am Kaiserkaai 1  
20457 Hamburg, Germany  
Tel.: +49 (0) 40 / 80 80 745 40  
SolarEU@tsmc.com

**NORTH AMERICA**  
TSMC Solar North America  
2595 Junction Avenue  
San Jose, CA 95134, USA  
Tel.: +1 408 678 2816  
SolarNA@tsmc.com

**ASIA/REST OF WORLD**  
TSMC Solar Ltd.  
5, Keya W. Rd., Daya Dist.  
Taichung, Taiwan 428-82  
Tel.: +886 4 27 03 66 88  
SolarAsia@tsmc.com

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