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 5% 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 and IEC certified
• Rated for snow and wind loads up to 2,400 Pa
• Free of potential induced degradation (PID) effects
• Salt mist corrosion test certification
• Manufactured at an ISO 9001:2008, ISO 14001 and OHSAS 18001 certified facility

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

* This datasheet is for informational purposes only. No rights can be derived from the information contained herein. For detailed warranty information, please consult TSMC Solar’s module warranty, which is available upon request.

www.tsmc-solar.com
**Technical data**

**TS CIGS SERIES**

**HIGH-EFFICIENCY CIGS SOLAR MODULE**

**Electrical Characteristics**

**Standard Test Conditions (STC)**

<table>
<thead>
<tr>
<th>TS CIGS Series</th>
<th>TS-140C1</th>
<th>TS-145C1</th>
<th>TS-150C1</th>
<th>TS-155C1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum power</td>
<td>$P_{max}$</td>
<td>140</td>
<td>145</td>
<td>150</td>
</tr>
<tr>
<td>Factory binning</td>
<td>$+5/-0$</td>
<td>$+5/-0$</td>
<td>$+5/-0$</td>
<td>$+5/-0$</td>
</tr>
<tr>
<td>Open-circuit voltage</td>
<td>$V_{oc}$</td>
<td>60.6</td>
<td>61.5</td>
<td>62.5</td>
</tr>
<tr>
<td>Short-circuit current</td>
<td>$I_{sc}$</td>
<td>3.44</td>
<td>3.44</td>
<td>3.45</td>
</tr>
<tr>
<td>Maximum power voltage</td>
<td>$V_{mp}$</td>
<td>46.0</td>
<td>46.9</td>
<td>48.1</td>
</tr>
<tr>
<td>Maximum power current</td>
<td>$I_{mpp}$</td>
<td>3.05</td>
<td>3.09</td>
<td>3.12</td>
</tr>
<tr>
<td>Module efficiency</td>
<td>Eff%</td>
<td>12.9</td>
<td>13.3</td>
<td>13.8</td>
</tr>
</tbody>
</table>

Power tolerance¹ $+/-5\%$

Maximum reverse current $I_{r}$ 8 A

Maximum system voltage 1000 Vdc (IEC), 600 Vdc (UL)

Operating temperature $-40^\circ$C to $85^\circ$C

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

**Thermal Characteristics**

Normal Operating Cell Temperature Conditions (NOCT)

<table>
<thead>
<tr>
<th>Maximum power</th>
<th>$P_{max}$</th>
<th>106.3</th>
<th>110.1</th>
<th>113.9</th>
<th>117.7 W</th>
</tr>
</thead>
<tbody>
<tr>
<td>Open-circuit voltage</td>
<td>$V_{oc}$</td>
<td>56.5</td>
<td>57.3</td>
<td>58.1</td>
<td>58.9 V</td>
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<tr>
<td>Short-circuit current</td>
<td>$I_{sc}$</td>
<td>2.75</td>
<td>2.75</td>
<td>2.76</td>
<td>2.77 A</td>
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<tr>
<td>Maximum power voltage</td>
<td>$V_{mp}$</td>
<td>43.6</td>
<td>44.5</td>
<td>45.7</td>
<td>46.7 V</td>
</tr>
<tr>
<td>Maximum power current</td>
<td>$I_{mpp}$</td>
<td>2.44</td>
<td>2.47</td>
<td>2.50</td>
<td>2.52 A</td>
</tr>
</tbody>
</table>

Conditions at NOCT: 800 W/m², ambient temperature 20°C, AM 1.5

**Mechanical Characteristics**

Snow/wind load (IEC) 2,400 Pa

Dimensions in mm 1656 x 656 x 35

Weight in kg 16.6

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 mm², 1000 mm

Cell type 100 CIGS cells

Safety class II

Fire rating Class C

**Performance at Low Irradiance**

Typical relative efficiency reduction of maximum power from an irradiance of 1,000 W/m² to 200 W/m² at 25°C is 5%.

**Physical Specifications**

**I-V and P-V Curve**

(TS-145C1)

**Certifications**

UL, TÜV, ISO 9001:2008, Safety Class II