Flexible photovoltaic laminates

General characteristics
- High temperature and low light performance
- Output cables with Multi-Contact connectors on top
- Bypass diodes for shadow tolerance
- Treadable surface due to complete absence of glass

Performance characteristics
Rated power \( (P_{\text{max}}) \): 242 W\(_p\), 229 W\(_p\), or 215 W\(_p\)
Production \( P_{\text{max}} \) tolerance: ±5%

DATI TECNICI

**Dimensions:**
- length: 9025 mm, width: 394 mm
- thickness: 4 mm, 16 mm including potted terminal housing assembly

**Weight:**
- 12 kg

**Output cables:**
- 4 mm\(^2\) - 560 mm length cables with MC® connectors pre-assembled on upper side of laminate

**Bypass diodes:**
- connected across every solar cell

**Encapsulation:**
- durable EFTE high light-transmissive polymer, UV-resistant, weather resistant

**Adhesive:**
- ethylene propylene copolymer adhesive sealant with microbial inhibitor

**Cell type:**
- 37 triple junction amorphous silicon solar cells, 356 mm x 239 mm connected in series

Electrical specifications STC
(Standard Test Conditions: 1000 W/m\(^2\), AM 1.5, 25 °C cell temperature)

<table>
<thead>
<tr>
<th>model</th>
<th>M PVL 242</th>
<th>M PVL 229</th>
<th>M PVL 215</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum power ( (P_{\text{max}}) ):</td>
<td>242 W(_p)</td>
<td>229 W(_p)</td>
<td>215 W(_p)</td>
</tr>
<tr>
<td>Voltage at ( P_{\text{max}} ) ( (V_{\text{mp}}) ):</td>
<td>55.5 V</td>
<td>55.5 V</td>
<td>55.5 V</td>
</tr>
<tr>
<td>Current at ( P_{\text{max}} ) ( (I_{\text{mp}}) ):</td>
<td>4.36 A</td>
<td>4.13 A</td>
<td>3.88 A</td>
</tr>
<tr>
<td>Short-circuit current ( (I_{\text{sc}}) ):</td>
<td>5.3 A</td>
<td>5.1 A</td>
<td>4.8 A</td>
</tr>
<tr>
<td>Open-circuit voltage ( (V_{\text{oc}}) ):</td>
<td>77.7 V</td>
<td>77.7 V</td>
<td>77.7 V</td>
</tr>
<tr>
<td>Maximum series fuse rating:</td>
<td>8 A</td>
<td>8 A</td>
<td>8 A</td>
</tr>
</tbody>
</table>

Electrical specifications NOCT
(Nominal Operating Cell Temperature: 800 W/m\(^2\), AM 1.5, 1 m/sec. wind)

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<thead>
<tr>
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<th>M PVL 229</th>
<th>M PVL 215</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum power ( (P_{\text{max}}) ):</td>
<td>186 W(_p)</td>
<td>177 W(_p)</td>
<td>168 W(_p)</td>
</tr>
<tr>
<td>Voltage at ( P_{\text{max}} ) ( (V_{\text{mp}}) ):</td>
<td>51.8 V</td>
<td>51.8 V</td>
<td>51.8 V</td>
</tr>
<tr>
<td>Current at ( P_{\text{max}} ) ( (I_{\text{mp}}) ):</td>
<td>3.60 A</td>
<td>3.42 A</td>
<td>3.24 A</td>
</tr>
<tr>
<td>Short-circuit current ( (I_{\text{sc}}) ):</td>
<td>4.3 A</td>
<td>4.1 A</td>
<td>3.9 A</td>
</tr>
<tr>
<td>Open-circuit voltage ( (V_{\text{oc}}) ):</td>
<td>71.0 V</td>
<td>71.0 V</td>
<td>71.0 V</td>
</tr>
<tr>
<td>NOCT:</td>
<td>46 °C</td>
<td>46 °C</td>
<td>46 °C</td>
</tr>
</tbody>
</table>

TRIPLE-JUNCTION SOLAR CELL SCHEME

1 - Transparent electrode
2 - Blue light absorbing cell
3 - Green light absorbing cell
4 - Red light absorbing cell
5 - Reflective metal layer
6 - Lower flexible layer (stainless steel)
7 - Thickness of a triple-junction cell ~ 1 µ
I-V curves at various levels of irradiance at AM 1.5 and 25°C cell temperature

**Temperature coefficients**

(at AM 1.5, 1000 W/m² irradiance)

- **Temperature coefficient (TC) \( I_{sc} \):** \(-0.001\degree K\) (0.10%/°C)
- **Temperature coefficient (TC) \( V_{oc} \):** \(-0.0038\degree K\) (-0.38%/°C)
- **Temperature coefficient (TC) \( P_{max} \):** \(-0.0021\degree K\) (-0.21%/°C)
- **Temperature coefficient (TC) \( I_{mp} \):** \(-0.001\degree K\) (0.10%/°C)
- **Temperature coefficient (TC) \( V_{mp} \):** \(-0.0031\degree K\) (-0.31%/°C)

\[ y = y_{reference} 
\times \left(1 + TC \times (T - T_{reference})\right) \]

**Certifications and Warranties**

- **Product warranty:** 10 years
- **Limited power output warranty:** 92% at 10 years; 84% at 20 years, 80% at 25 years (of initial nominal power)

**Laminate standard configuration**

Flexible photovoltaic laminates with potted terminal housing assembly with output cables and Multi-Contact (MC®) quick-connect terminals on top.

**Application criteria**

- **Maximum roof temperature:** 85 °C (185 °F)
- **Minimum slope:** 3° (1/2:12)
- **Maximum slope:** 60° (21:12)

**Note:**

1. During the first 8-10 weeks of operation, electrical output exceeds specified ratings. Power output may be higher by 15%, operating voltage may be higher by 11% and operating current may be higher by 4%.
2. Electrical specifications are based on measurements performed at standard test conditions (irradiance 1000 W/m², air mass 1.5, cell temperature 25°C) after stabilization.
3. Actual performance may vary up to 10% from rated power due to low temperature operation, spectral and other related effects. Maximum system open-circuit voltage not to exceed 1000 Vdc per IEC regulations, according to protection class II or IEC EN 61730-2.
4. Specifications subject to change without notice.