

## High-efficiency, waterproof, UV and scratch-resistant solar panel for industrial IoT

### Features

- ☞ IPX7 waterproof rated
- ☞ 10+ years UV exposure testing
- ☞ Third-party agency qualification
- ☞ 24% high-efficiency Sunpower solar cells
- ☞ Black matte appearance
- ☞ Low friction, anti-dust surface

### Applications

- Asset Tracking
- Agriculture
- Weather Stations
- LoRa Nodes
- Level monitoring
- Tank monitoring
- Pipeline sensors
- Smart Cities
- Smart Home
- Lighting

### Electrical Characteristics

Symbol	Parameter	Nominal	Expected <sup>1</sup>	Unit
$W_p$	Max power (mpp)	0.71	0.60	W
$V_p$	Voltage @ mpp	6.11	5.89	V
$I_p$	Current @ mpp	0.12	0.10	A
$V_{oc}$	Open-circuit voltage	7.25	7.04	V
$I_{sc}$	Short-circuit current	0.12	0.11	A
$\eta$	Cell efficiency	23.9	-	%

<sup>1</sup> — Expected values are adjusted for real-world losses that include cutting of cells, imperfect transmissivity of the EVA and ETFE encapsulation layers, and the tolerance of the lowest performing cell piece in the series.

### Key Links

- ☞ [Panel Technical Drawing](#)
- ☞ [Related Products Overview](#)
- ☞ [Testing Review of ETFE Material Stack](#)

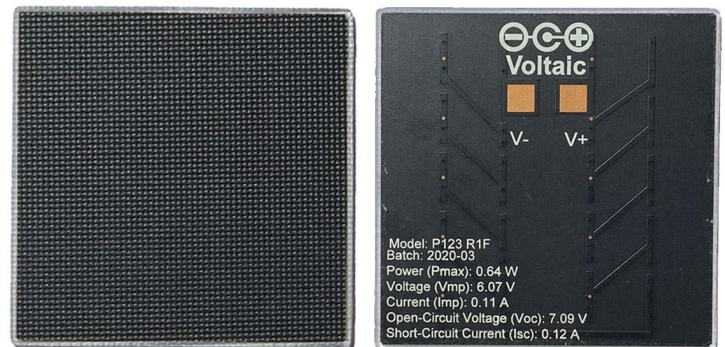
### Description

P123 is a durable, high-performance ETFE solar panel designed for industrial IoT applications. It is lightweight, efficient, and cost-effective. SMT ETFE panels are advantageous when size or weight is constrained, long lifetimes are desired, and strict quality and dimensional tolerances must be maintained.

Voltaic ETFE panels are manufactured using a strictly sourced and qualified material stack. They are third-party tested for the equivalent of 10+ years of UV exposure in addition to thermal cycling, vibration stresses, and exposure to chemicals and oils. They are used in a number of ATEX applications.

### Mechanical Characteristics

- ☞ **Dimensions:** 66 x 66 x 3.1 mm
- ☞ **Weight:** 14.4 g
- ☞ **Standard Tolerance:**  $\pm 0.5$  mm
- ☞ **Compliance:** RoHS and REACH
- ☞ **Testing:** relevant sections of IEC 61215, SAE J1455, and IEC 60529
- ☞ **Mounting:** G105 VHB gasket
- Operating Temperature:**  $-40^{\circ}\text{C}$  to  $85^{\circ}\text{C}$

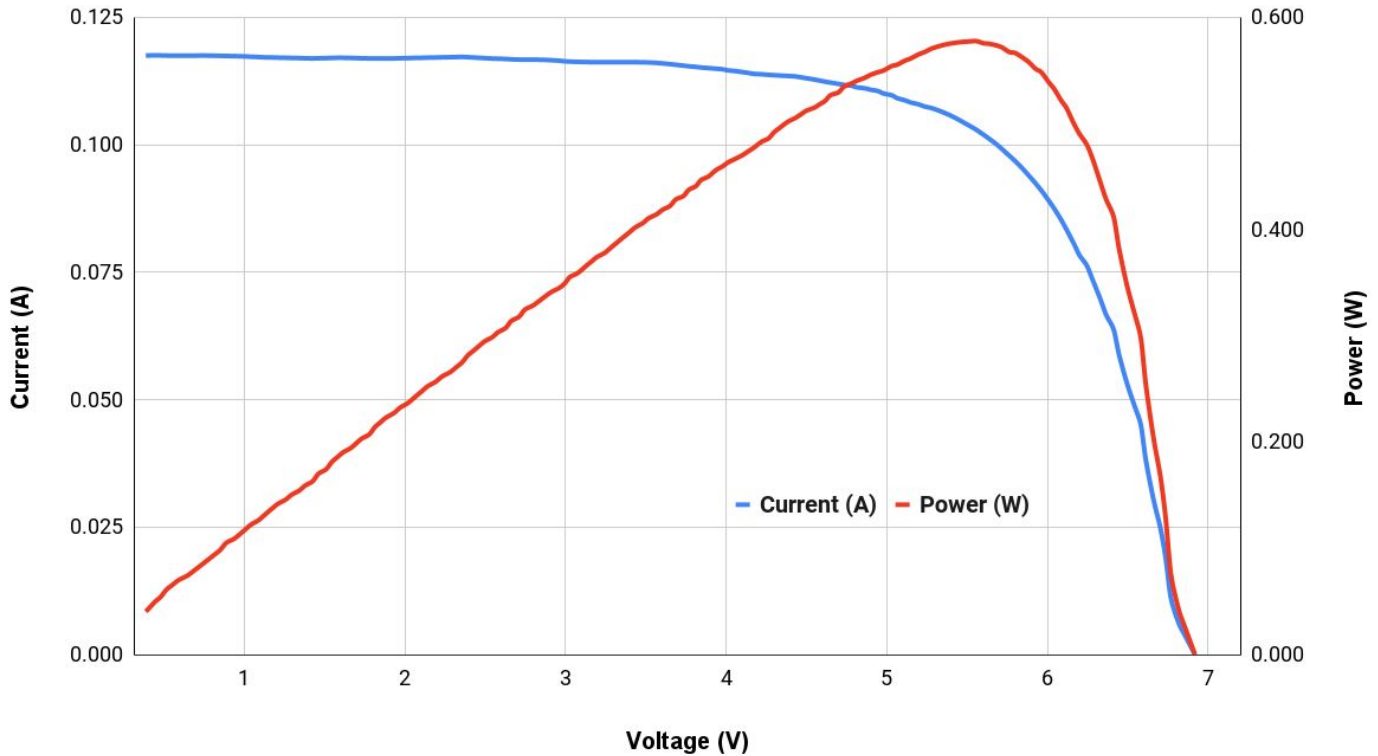


## Electrical Characteristics

### Current-Voltage Characteristics

1 — Data collected at STC (1,000 W/m<sup>2</sup>, 25°C)

The following graph is a representative, real-world IV curve of the P123 at STC<sup>1</sup>. IV Curves are taken outdoors using a calibrated light meter. Nominal values are calculated based on the theoretical efficiency of solar cells. Expected values account for real-world conditions seen after cell cutting and lamination.



### Revision History

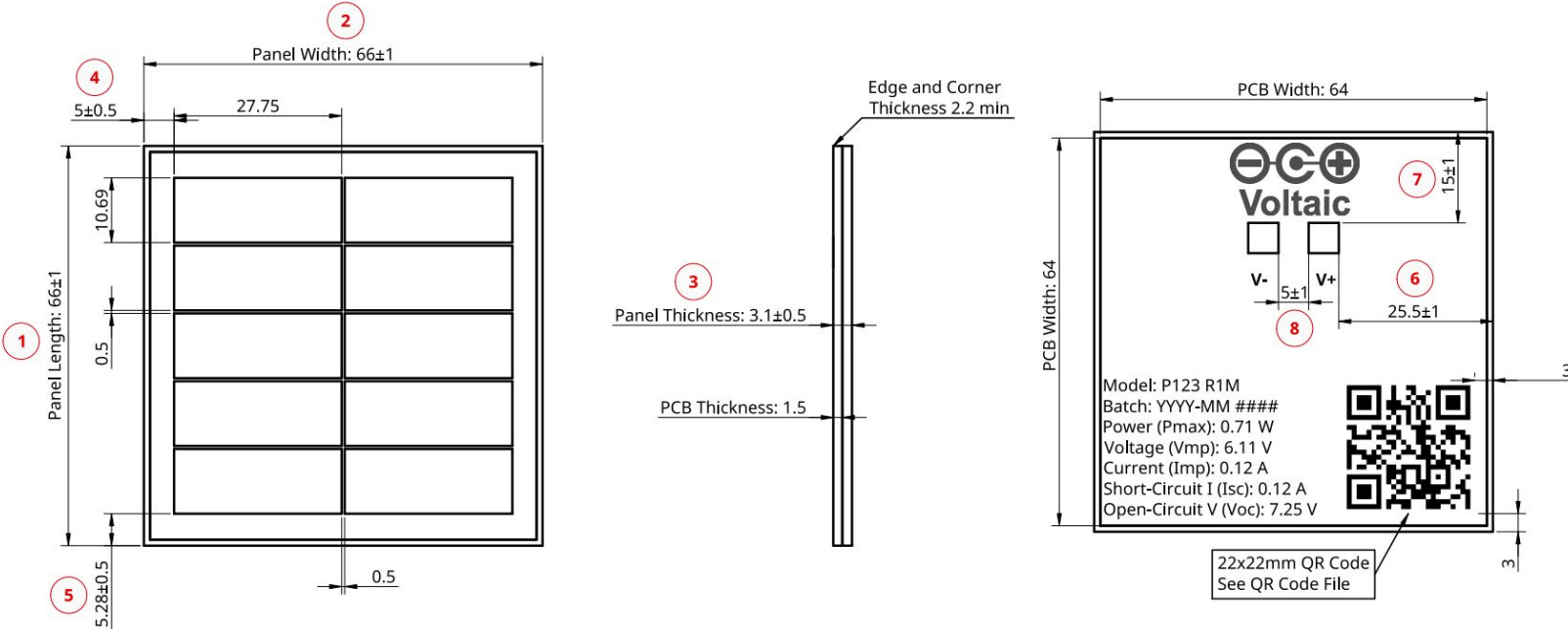
This panel is periodically revised to use the latest and most cost-effective solar cell technology. Nominal specifications of each revision are detailed here. Mechanical dimensions and electrical specifications are maintained across versions so that the panel remains as a stocked, drop-in solution for production devices.

Revision <sup>2</sup>	W <sub>p</sub> (W)	V <sub>p</sub> (V)	I <sub>p</sub> (A)	V <sub>oc</sub> (V)	I <sub>sc</sub> (A)	Solar Cell
R1M	0.71	6.11	0.12	7.25	0.12	SunPower 24% Maxeon Gen III Ø166 - Me3 (Avg)
R1L	0.71	6.15	0.12	7.16	0.13	SunPower 23.9% Maxeon Gen III Ø166 - Me3
R1J	0.65	5.91	0.11	7.30	0.12	SunPower 22.6% Maxeon Gen V Ø211 - Mn1
R1H	0.66	6.07	0.11	7.09	0.12	SunPower 22.7% Maxeon Gen III Ø166 - Je3A
R1G	0.64	6.07	0.11	7.09	0.12	SunPower 22.7% Maxeon Gen III Ø166 - Je3A (Avg)
R1F	1.2	6.1	0.20	7.09	0.22	SunPower 22.7% Maxeon Gen III Ø166 - Je3A (Avg)

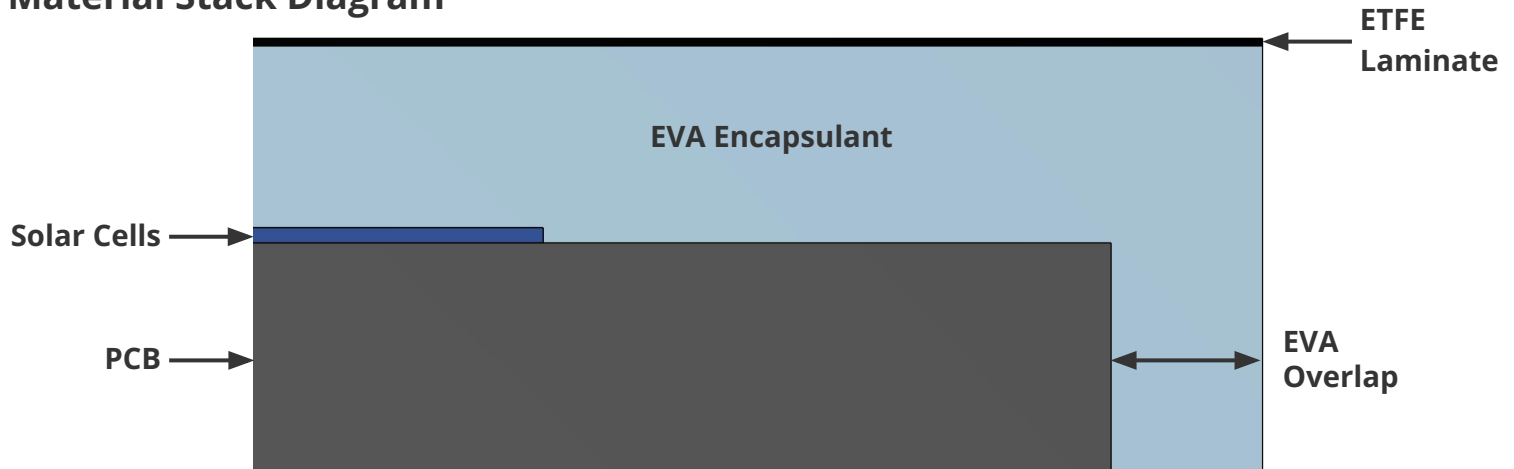
2 — Unreleased revisions have been omitted from the table

## Mechanical Characteristics

### Technical Drawing



### Material Stack Diagram



### Construction Specifications

SMT ETFE solar panels consist of laser-cut Sunpower solar cells surface-mounted onto a double-sided PCB. The cells are encapsulated with an EVA adhesive and laminated with a layer of textured ETFE. The gap between the cell edge and panel edges provides a buffer against moisture ingress and potential delamination.

Voltaic's ETFE material stack has passed mechanical stress tests referencing IEC 61215, SAE J1455, IEC 60529, MIL-STD 810H, AAR-S-9401, and IEC 62262 IK08/09. Performed by multiple third-party agencies, these tests include accelerated aging (UV exposure), temperature and humidity cycling, damp heat, thermal shock, mechanical shock, impact, vibration, ingress, and exposure to chemicals and oils.