P122 Datasheet

0.3W 6V

April 2023

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
- 21.5% 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[1]	Unit
W_P	Max power (mpp)	0.32	0.27	W
V_P	Voltage @ mpp	5.91	5.70	V
I_P	Current @ mpp	0.050	0.048	A
V_{OC}	Open-circuit voltage	7.16	6.95	V
I_{SC}	Short-circuit current	0.060	0.055	A
η	Cell efficiency	21.5	-	%

1 — 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

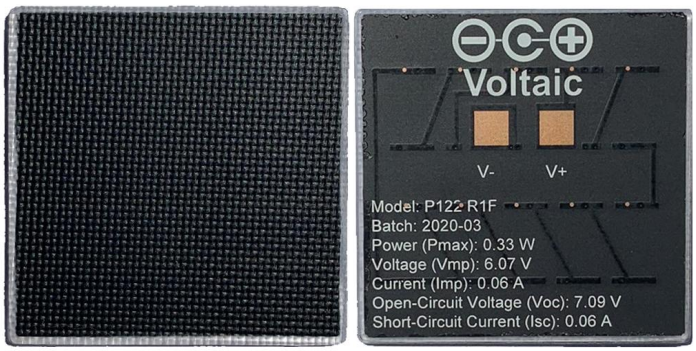
P122 is a durable, high-performance ETFE solar panel designed for industrial IoT applications. It is lightweight, efficient, and cost-effective. SMT ETFE panels are advantageous when size or weight is constrained, long lifetimes are desired, and strict quality and dimensional tolerances must be maintained.

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**: 52 x 52 x 3.1 mm
- **Weight:** 8.0 g
- **Standard Tolerance**: ± 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°C to 85°C

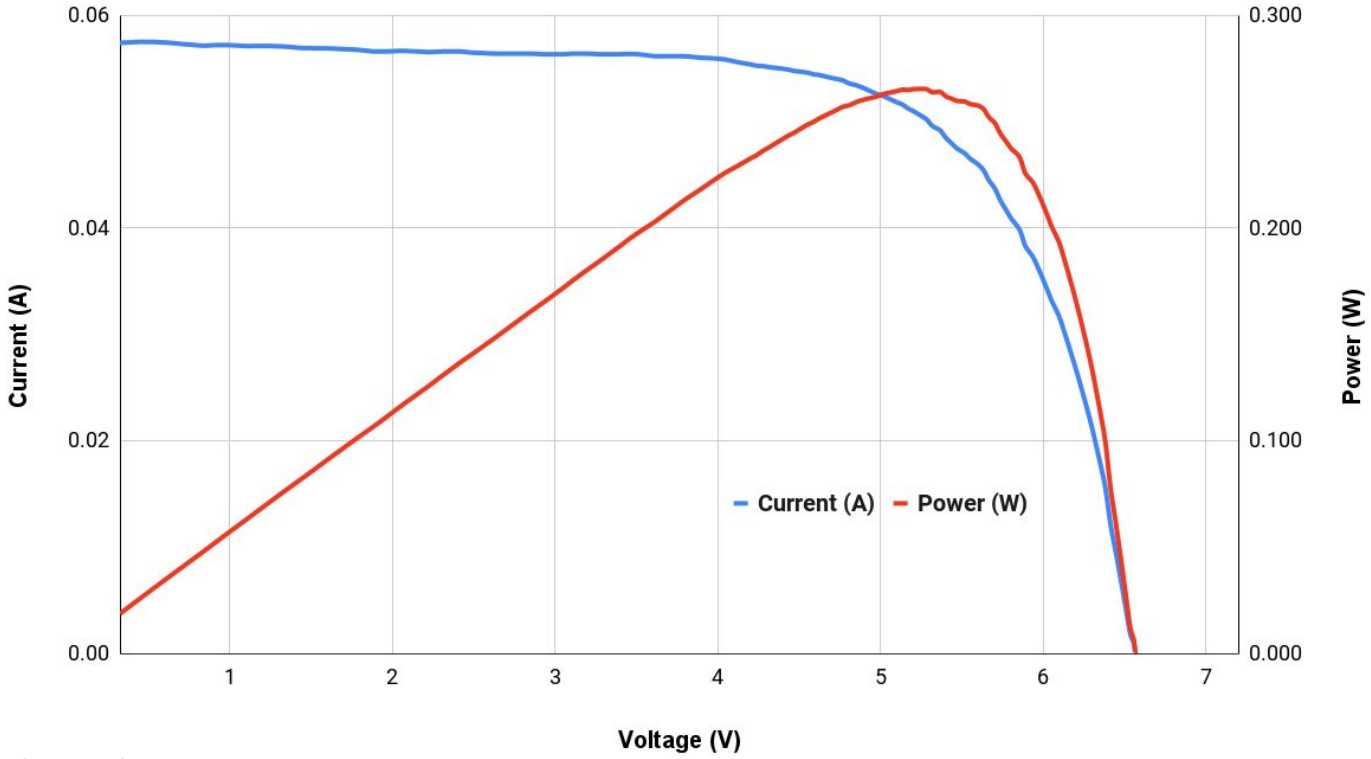


Electrical Characteristics

Current-Voltage Characteristics

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

The following graph is a representative, real-world IV curve of the P122 at STC[1]. 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

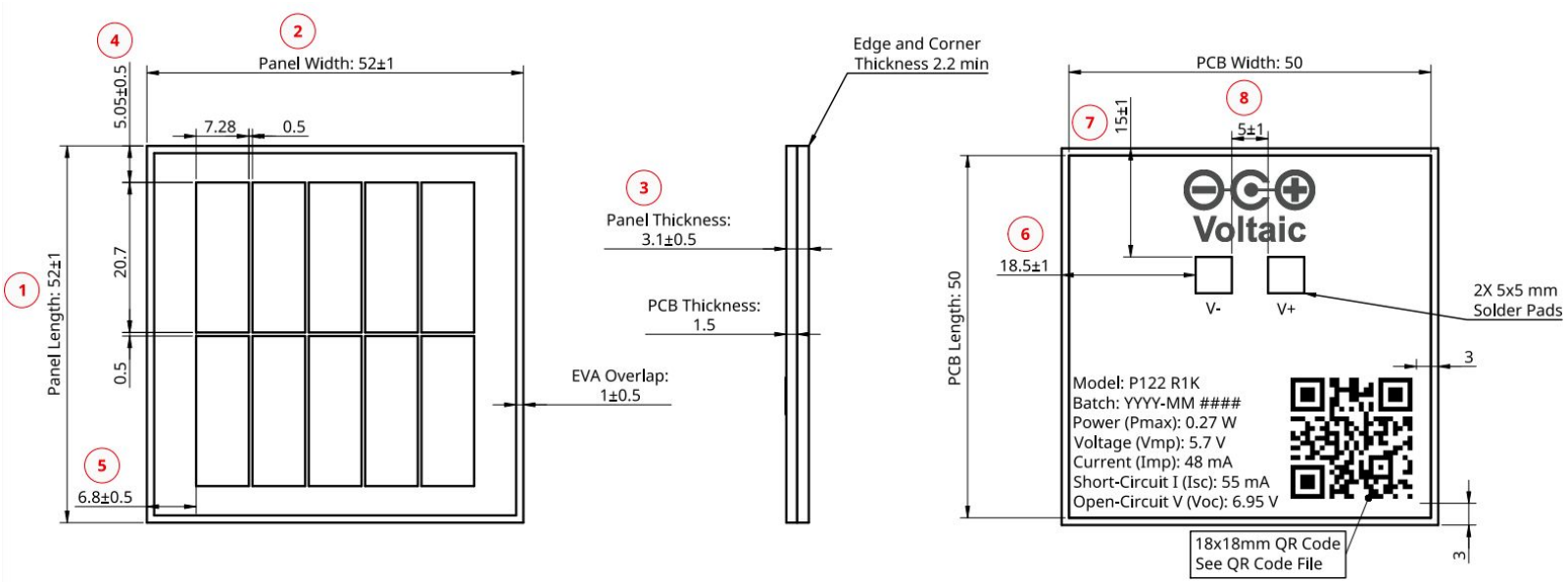
This panel is periodically revised to use the latest and most cost-effective solar cell technology. Nominal specifications of each revision are detailed here. Mechanical dimensions and electrical specifications are maintained across versions so that the panel remains as a stocked, drop-in solution for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

Revision[2]	W_P (W)	V_P (V)	I_P (A)	V_{OC} (V)	I_{SC} (A)	Solar Cell
R1K	0.32	5.91	0.05	7.16	0.06	SunPower 21.5% Maxeon Gen V Ø211 - Ln
R1J	0.34	5.91	0.06	7.30	0.06	SunPower 22.6% Maxeon Gen V Ø211 - Mn1
R1H	0.34	6.07	0.06	7.09	0.06	SunPower 22.7% Maxeon Gen III ⌀166 - Je3A
R1F	0.34	6.07	0.06	7.09	0.06	SunPower 22.7% Maxeon Gen III Ø166 - Je3A (Avg)

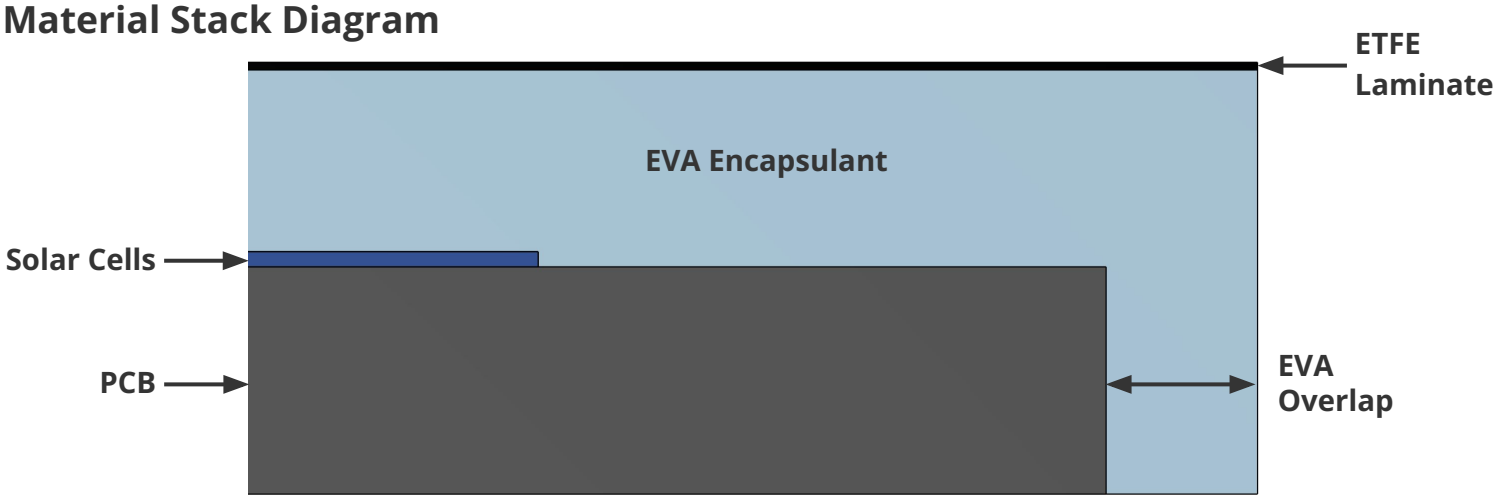
2 — Unreleased revisions have been omitted from the table

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.