



bp solar

This publication summarizes product warranty and specifications, which are subject to change without notice and should not be used as the definitive source of information for final system design. Additional warranty and technical information may be found on our website [www.bpsolar.com](http://www.bpsolar.com) or may be obtained from your local representative.



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The BP 980 photovoltaic module is the first product to use BP's Apollo® technology, which provides significant improvement in thin film PV performance. The process employs thin layers of cadmium telluride and cadmium sulfide, and has produced record-setting power and efficiency figures for photovoltaics of this type. Its high conversion efficiency (well over 10% has been confirmed by NREL) also minimizes manufacturing energy use, material use, and environmental impact.

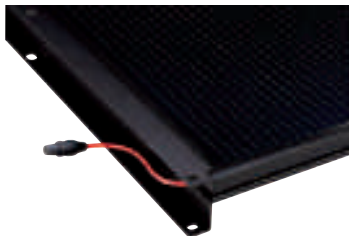
This module is especially suited to distributed generation and, with dark blue-black coloration and precise laser scribing, to applications where appearance is important. Its nominal maximum power is 80 watts, with 24-volt nominal electrical configuration. It is available in three mechanical configurations:

- The BP 980B: Frameless with rear mounting brackets and cables with polarized DC connectors;
- The BP 980I: Equipped with the Integra™ framing/mounting/wiring system for low-cost, fast installation and direct roof-mounting.
- The BP 980L: A frameless laminate without integral mounting provisions.

### Mounting Options

#### BP 980I

The BP 980I features BP Solar's patented Integra framing/mounting/wiring system, which facilitates quick, low-cost installation on most support structures and on sloped surfaces such as roofs. The system's polarized DC connectors allow electrical connections to be made without tools.



#### Integra™ Frame with DC Connectors

Once assembled, the DC connectors are concealed in channels in the bronze-anodized frame, providing smooth, uncluttered appearance yet easy access for troubleshooting. For U.S. NEC-compliant installation, additional components are required, and are available in the UL-listed installation kit.

#### BP 980B

BP 980B mounting system consists of four patented aluminum brackets bonded to the laminate back. The brackets are slotted, and accept the heads of 6 mm bolts or equivalent hardware. This bracket system has been field-proven at the PVUSA site in Davis, California, where 9600 laminates using the system have demonstrated excellent reliability since their installation in 1992.

Array esthetics are superb; the system produces a visually seamless array unbroken by frames or other mounting hardware.



#### BP 980B Bracket

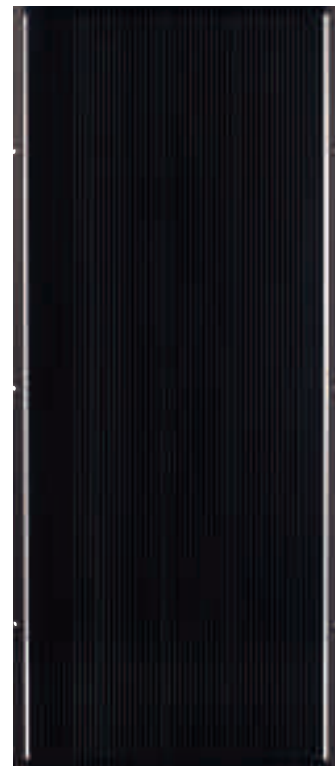
Mounted BP 980B laminates withstand loads up to 2400 Pa (50 lbs/ft².) Electrical output is via UL-listed cables with DC plug-and-socket connectors which provide reliable low-resistance connections and simplify wiring.

### Quality and Safety

- Manufactured in ISO 9001-certified factories;
- BP 980B and BP 980I listed by Underwriter's Laboratories for electrical and fire safety (Class C fire rating);
- Passed 40 CFR Part 261, Toxicity Characteristic Leaching Procedure (TCLP).

### Disposal and Recycling

Regulations governing disposal of photovoltaic modules vary from jurisdiction to jurisdiction, depend on the module design and material content, and are subject to change. Accordingly, BP Solar, as part of its product stewardship process, will accept back Apollo® modules at the end of their useful life at no cost to



#### BP 980I

the customer or end user except shipping to a BP Solar designated collecting point. BP Solar will undertake to ensure their disposal in an environmentally appropriate manner.

### Limited Warranties

- Power output for 10 years;
- Freedom from defects in materials and workmanship for 1 year.

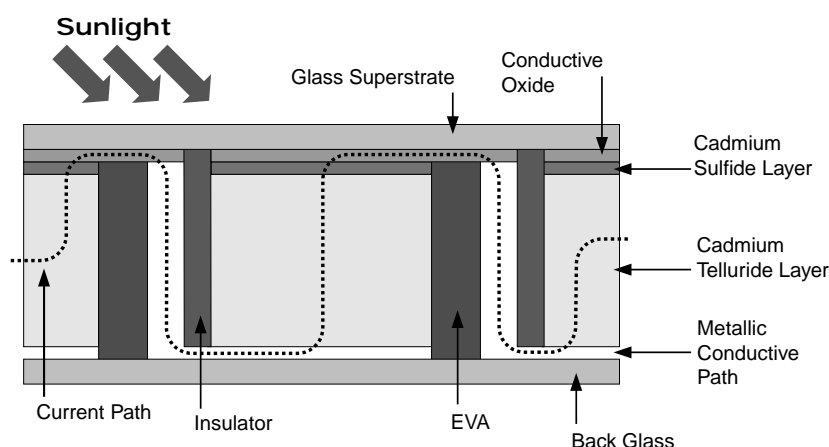
See our website or your local representative for full terms of these warranties.



## Laser-scribed monolithic structure

These modules are made in BP Solar's automated thin film manufacturing facility in Fairfield, California. Extremely thin layers of cadmium sulfide and cadmium telluride are electrodeposited on a glass superstrate, and a patented laser-scribing procedure forms the individual solar cells. All intercell electrical connections (shown at right) are internal to the module, an innately reliable monolithic structure. The module front and back are heat-strengthened (annealed) glass, forming a strong, durable envelope which protects module circuitry from environmental factors.

Cross-Section of BP 980 Module



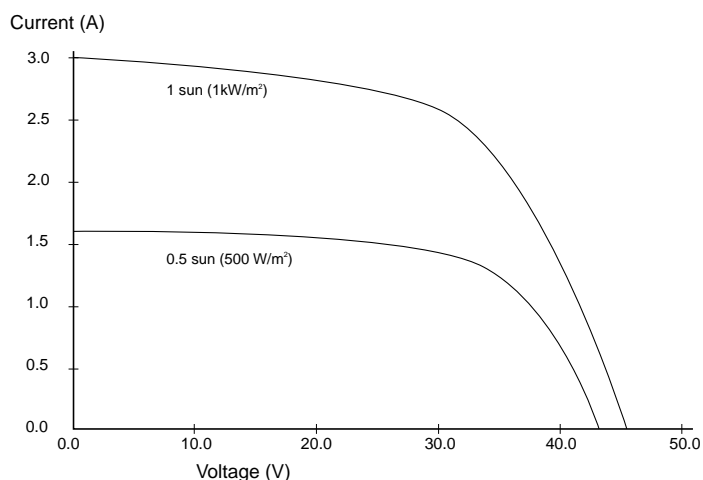
## Electrical Characteristics<sup>1,4</sup>

	BP 980	BP 990
Maximum power ( $P_{\max}$ ) <sup>4</sup>	80W	90W
Voltage at $P_{\max}$ ( $V_{\text{mp}}$ )	32.3V	34.8V
Current at $P_{\max}$ ( $I_{\text{mp}}$ )	2.48A	2.59A
Warranted minimum $P_{\max}$	75W	85W
Short-circuit current ( $I_{\text{sc}}$ )	3.0A	3.03A
Open-circuit voltage ( $V_{\text{oc}}$ )	45.2V	46.4V
Temperature coefficient of $I_{\text{sc}}$	$(0.033 \pm 0.005)\%/^{\circ}\text{C}$	
Temperature coefficient of $V_{\text{oc}}$	$-(150 \pm 20 \text{ mV})/^{\circ}\text{C}$	
Temperature coefficient of power	$-(0.36 \pm 0.05)\%/^{\circ}\text{C}$	
NOCT <sup>3</sup>	$51 \pm 2^{\circ}\text{C}$	
Maximum system voltage <sup>2</sup>	600V	

## Notes

- These data represent the performance of typical BP 980 and BP 990 modules as measured at their output terminals. The data are based on measurements made in accordance with ASTM E1036 corrected to SRC (Standard Reporting Conditions, also known as STC or Standard Test Conditions), which are:
  - illumination of  $1 \text{ kW/m}^2$  (1 sun) at spectral distribution of AM 1.5 (ASTM E892 global spectral irradiance);
  - cell temperature of  $25^{\circ}\text{C}$ .
- U.S. NEC rating.
- The cells in an illuminated module operate hotter than the ambient temperature. NOCT (Nominal Operating Cell Temperature) is an indicator of this temperature differential, and is the cell temperature under Standard Operating Conditions: ambient temperature of  $20^{\circ}\text{C}$ , solar irradiation of  $0.8 \text{ kW/m}^2$ , and wind speed of  $1 \text{ m/s}$ .
- At PVUSA test conditions—illumination of  $1 \text{ kW/m}^2$ ,  $20^{\circ}\text{C}$  ambient,  $1 \text{ m/sec}$  wind—the BP 980 is rated at 71.6 watts.

## BP 980 I-V Curves



## Mechanical Characteristics

### Weight

BP 980I	16.4 kg (36.2 pounds)
BP 980B	15.1 kg (33.3 pounds)
BP 980L	14.5 kg (32 pounds)

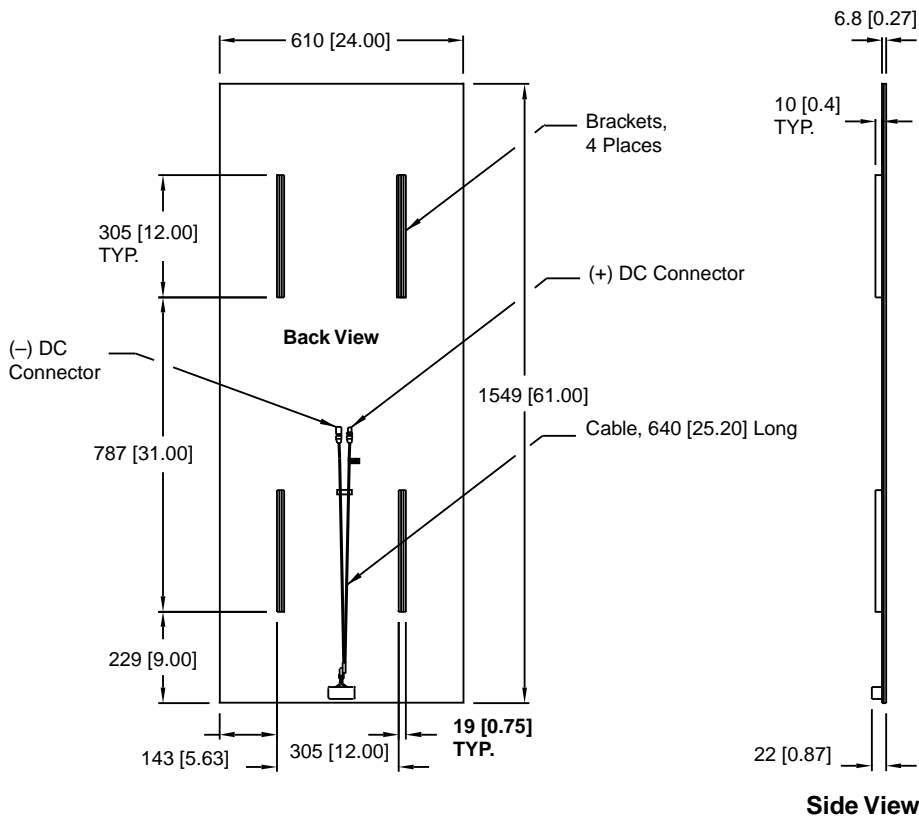
### Dimensions

Unbracketed dimensions are in millimeters

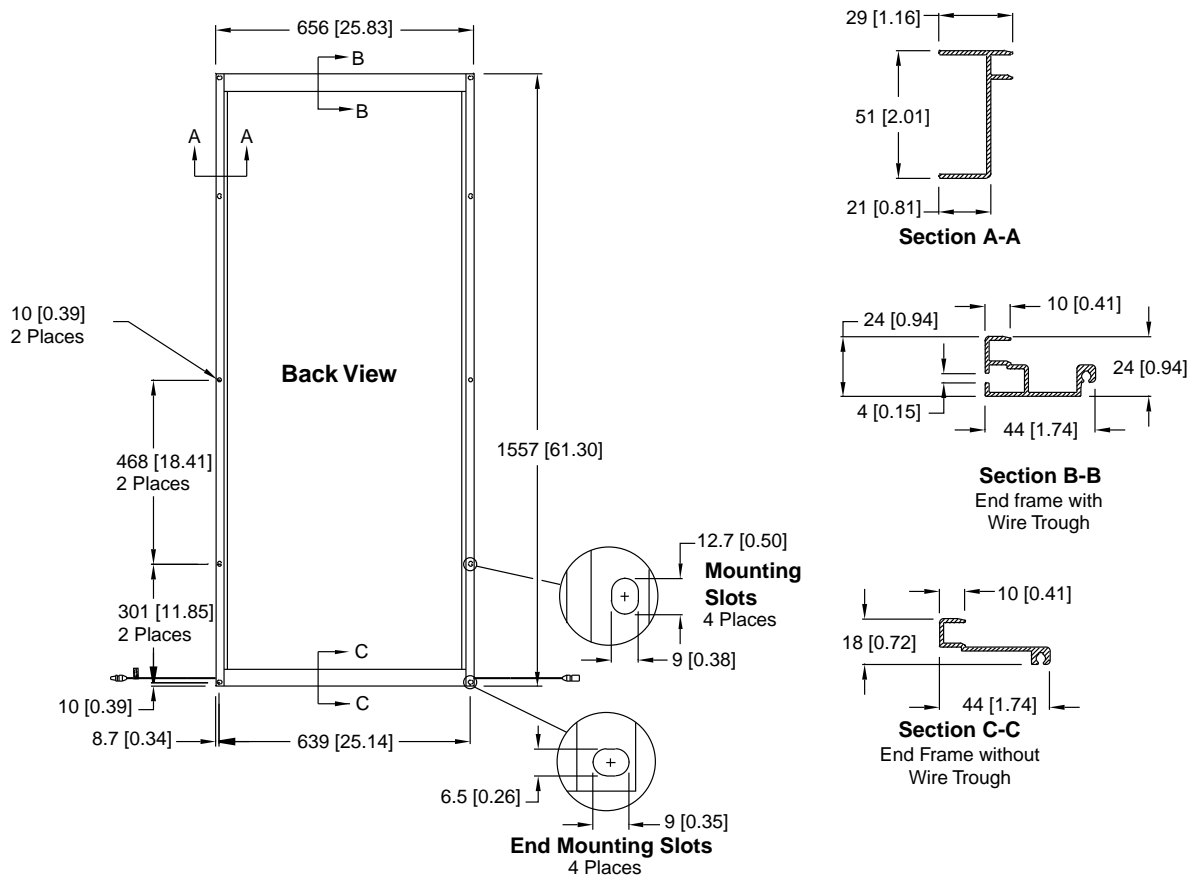
Dimensions in brackets are in inches.

Overall tolerances  $\pm 3\text{mm}$  (1/8")

BP 980L: 1549 (61.0) X 783 (30.8) X 19 (0.7)



**BP 980B & 990B**



**BP 980I & 990I**