

Programmable Resistor Box and Power-Source Test System

VL-200 is a general purpose programmable resistor box. Its resistance value can be set between 0.1Ω and $33k\Omega$ with a resolution of 0.1Ω . The maximum power it can dissipate is 2W. Customized versions can be ordered with different resistance values and power handling. The VL-200 System is computer controlled through a USB2 cable. A fixed resistor value may be selected through the user interface, or a table of resistor values may be entered by the user for resistance value scanning.

An optional feature of the VL-200 system (Option S) allows it to be used for automated characterization of electrical **power sources** such as **batteries** and **solar cells**. Please note that the activation of this option restricts the direction of current flow through the system and does not allow the system to be used with AC signals.

Power-Source Characterization

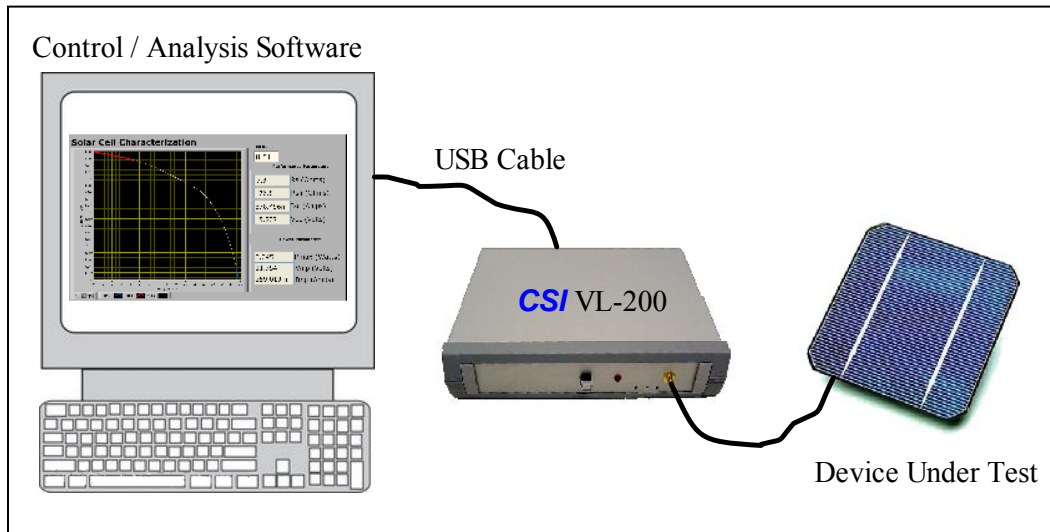
Developer or users of batteries or other power sources may be interested in knowing the amount of power that the source can deliver to the load as the load resistance varies. With this information one can determine the series resistance of the source, the resistance value of a matched load, and the maximum amount of power that the source can deliver to a matched load. Alternatively, one can plot the discharge characteristics of a

battery over time with the load resistance as the variable parameter.

Solar Cell Characterization

Current-Voltage or IV characteristics of a solar cell are typically measured by a parameter analyzer in a solar simulator test station. Many useful device parameters of the solar cell such as the **fill factor**, **efficiency**, **optimum load**, and equivalent **series and parallel resistances** are deduced from the IV curve.

CSI's patent pending VL-200 system with Option S, offers an alternative passive system that makes the same measurement and extracts the same parameters. The main difference is that the VL-200 is **very compact and inexpensive** and easily allows the user to test the solar cell in the field, under realistic **outdoor conditions**. VL-200 is not a solar simulator, it measures the current and voltage that the solar cell delivers to a load, as a function of load resistance. The user provides the illumination which may be either simulated solar radiation, a portion of the spectrum, or actual outdoor or concentrated sunlight. **Optimum load and maximum power** are measured directly. **Fill factor**, and **series and parallel resistances** are extracted analytically.



The variable load presented to the test device nominally ranges from zero to $1k\Omega$ which is sufficient to characterize most small to mid size solar cells.

California Scientific manufactures high-speed optoelectronic test equipment for the fiber optic community.

As an approximate rule, solar cells without concentrators that are smaller than $5,000 \text{ mm}^2$ in area, or solar cells that do not deliver more than 2W of maximum power to the load, can be tested by the standard VL-200 system. The system can be customized for testing at other power levels.