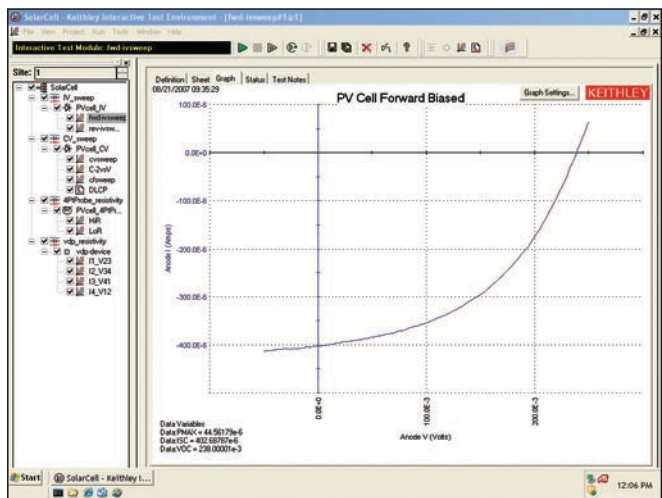


# Simplify Your Solar Cell Testing with Keithley's Precision Measurement Solutions



Keithley's solutions for solar cell I-V and C-V characterization provide the most accurate measurements available without the hassles of integrating separate instruments or writing complicated programs.

Electrical characterization of a variety of solar cell (Photovoltaic) technologies, including:

- Mono Crystalline Si
- Poly Crystalline Si
- Amorphous Si
- CIGS
- CdTe
- Polymer Organic

Measurement of key parameters including:

- Open circuit voltage ( $V_{oc}$ )
- Short circuit current ( $I_{sc}$ )
- Maximum power output ( $P_{max}$ )
- Voltage at  $P_{max}$  ( $V_{max}$ )
- Fill factor ( $ff$ )
- Series resistance ( $R_s$ )
- Shunt resistance ( $R_{sh}$ )
- Conversion efficiency ( $\eta$ )
- Doping density ( $N$ )
- Cell resistivity
- Defect density

## MODEL 4200-SCS SEMICONDUCTOR CHARACTERIZATION SYSTEM

- Fully integrated I-V and C-V turn key solution with intuitive graphical user interface
- Built-in libraries for extracting key cell parameters, and advanced analytical and formulation tools

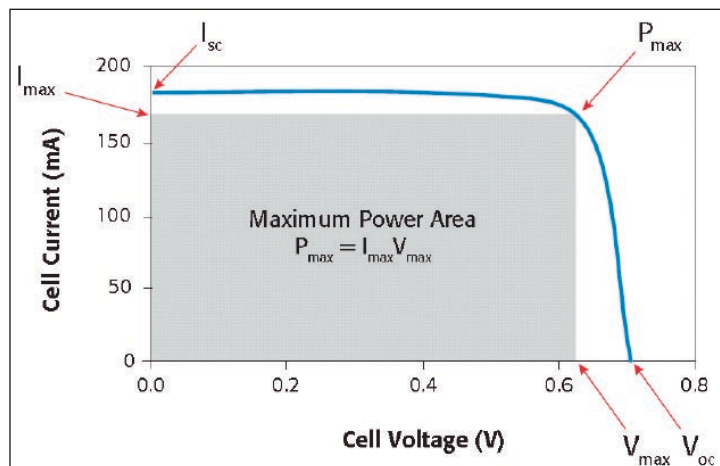
## SERIES 2400 OR 2600A SOURCEMETER® INSTRUMENTS

- 4-quadrant design provides both source and sink capability for complete I-V
- All-in-one solution for I-V characterization with the combined functionality of a precision power supply, high precision DMM, and electronic load

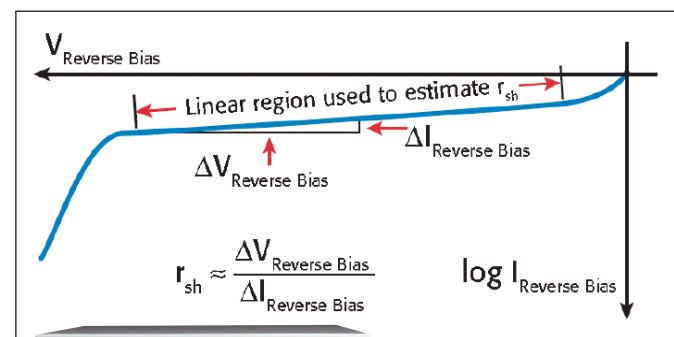
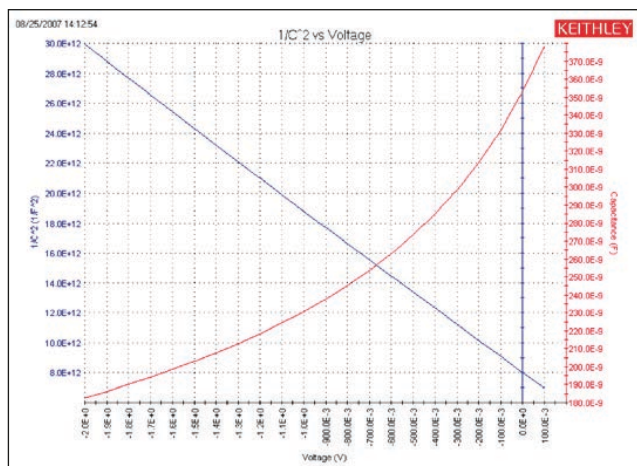
## KEY SOLAR CELL PARAMETERS AND MEASUREMENT TECHNIQUES

These measurements were made using Keithley's solutions for solar cell testing.

Doping Density (N) of a Crystalline-Si solar cell can be derived from capacitance-voltage sweep. (This feature is available on Model 4200-SCS with C-V option.)

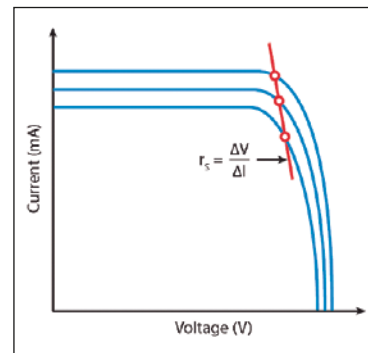


Typical forward biased I-V characteristic of a solar cell.



Series resistance ( $R_s$ ) can be determined from a forward I-V sweep of a solar cell at multiple light intensities.

Shunt resistance of a solar cell can be estimated from a reverse bias I-V sweep.



PARAMETER ANALYZER	SOURCE AND MEASURE INSTRUMENTS	
<b>Model 4200-SCS Semiconductor Characterization System</b> <ul style="list-style-type: none"> <li>4-quadrant operation (source/sink)</li> <li>1A at 20V</li> <li>100mA at 200V</li> <li>Capacitance-Voltage (C-V) option</li> <li>Turn key solution with built-in software for complete data analysis and cell parameter calculations</li> <li>Combine with Model 707A Switch Matrix for multi-cell testing.</li> </ul>	<b>Model 2602A SourceMeter Instrument</b> <ul style="list-style-type: none"> <li>4-quadrant operation (source/sink)</li> <li>Dual channel</li> <li>3A at 6V</li> <li>10A at 20V pulse</li> <li>1A at 20V</li> <li>Built-in TSP® Express software for quick and easy I-V test</li> <li>ACS Basic Edition software option with preconfigured solar project</li> <li>Combine with Series 3700 System Switch and Multimeter for multi-cell testing.</li> </ul>	<b>Model 2440 or 2425 SourceMeter Instruments</b> <ul style="list-style-type: none"> <li>4-quadrant operation (source/sink)</li> <li>5A at 10V (Model 2440)</li> <li>3A at 20V (Model 2425)</li> <li>1A at 100V (Model 2425)</li> <li>Built-in sweep functions for convenient I-V profiling</li> <li>6 different models available for a wide range of I-V requirements</li> <li>Combine with Models 7001 or 7002 Switch Mainframes for multi-cell testing.</li> </ul>

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A GREATER MEASURE OF CONFIDENCE

