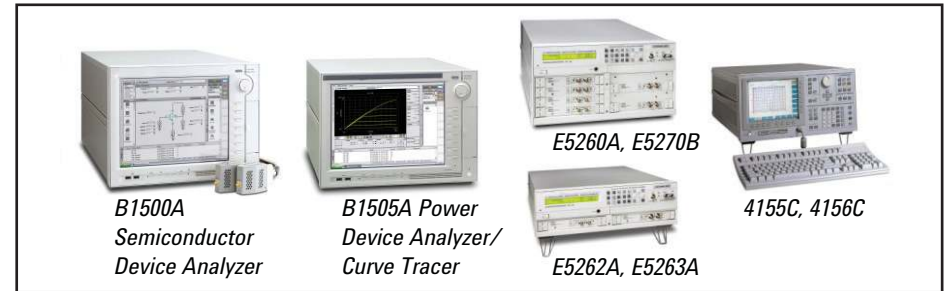# Top 5 Reasons to Use Keysight Precision SMU Products for Solar Cell Evaluation

Keysight Parameter & Device Analyzers can improve the yields and efficiencies of your solar cells

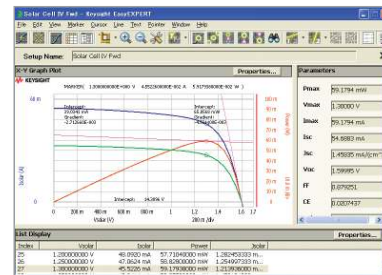### 1 Broad range of measurement capabilities facilitate device evaluation

We can help you:
- Evaluate solar cell IV characteristics using any of Keysight Technologies, Inc. precision SMU products. This gives you great flexibility to select a solution that meets your exact needs.
- Perform CV and Cf characterizations using the B1500A's and B1505A's MFCMU module. This allows you to determine important parameters such as carrier density, defect density and charge traps.
- Make high-speed time domain measurements using the B1500A's WGFMU module. This enables you to evaluate solar cell transient characteristics without the need for any other external instruments.
- Streamline your data analysis using EasyEXPERT's intuitive and easy-to-use test environment.

B1500A Semiconductor Device Analyzer

B1505A Power Device Analyzer/ Curve Tracer

E5260A, E5270B

E5262A, E5263A

4155C, 4156C

IV measurement

Symbol	Parameter name
I_{sc}	Short circuit current
J_{sc}	Short circuit current density
V_{oc}	Open circuit voltage
P_{max}	Maximum power point
I_{max}	Current at maximum power point
V_{max}	Voltage at maximum power point
FF	Fill factor
η	Conversion efficiency
R_{sh}	Shunt resistance
R_s	Series resistance

Capacitance measurement

Symbol	Parameter name
C_p	Parallel capacitance
N_c	Carrier density
N_{dl}	Drive-level density

Time domain measurement

Symbol	Parameter name
τ	Minority carrier lifetime
S	Surface recombination velocity
L_d	Minority carrier diffusion length
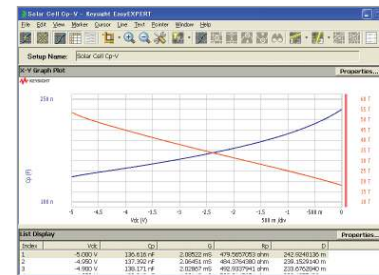
Device parameters for solar cells
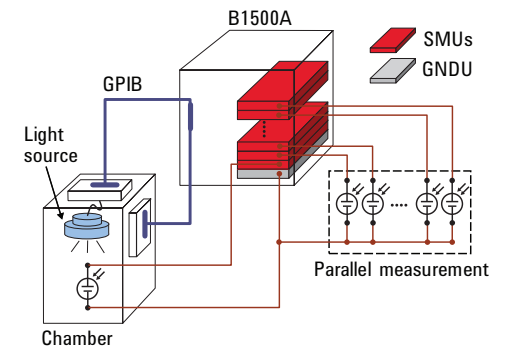
2 Easy integration with other equipment to create a complete measurement solution

We can help you:
- Control other instruments and equipment over GPIB or other interfaces using EasyEXPERT software.

IV characteristics

CV characteristics

Integration example

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3 Wide product portfolio covers applications from R&D through production
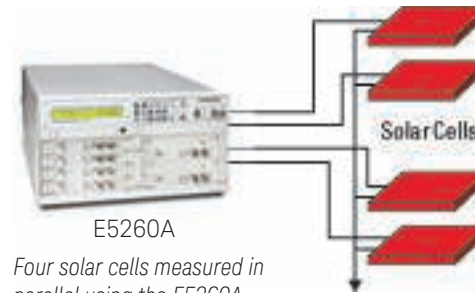
We can help you:
- Choose the most cost-effective solution based on your measurement needs. We have a wide variety of products, from 2-channel SMU instruments to all-in-one device analyzers.
- Configure a modular solution that is both flexible and expandable. The E5260A and E5270B are 8-slot modular SMU products; the B1500A and B1505A are 10-slot products and support a variety of modules in addition to standard SMUs.
- Solve your high current and high voltage testing needs. The B1505A can measure up to ±20 A and ±3000 V, which allows it to perform both solar cell and solar module measurement.

Product number	Product name	DC specifications	
		Min resolution	Max current/ voltage
B1500A	Semiconductor Device Analyzer	0.1 fA/0.5 µV	±1 A/±200 V
B1505A	Power Device Analyzer/ Curve Tracer	10 fA/2 µV	±20 A/±3,000 V
E5260A	8-slot High Speed Measurement Mainframe	5 pA/100 µV	±1 A/±200 V
E5262A	2-channel High Speed SMU (MPSMU X2)	5 pA/100 µV	±0.2 A/±100 V
E5263A	2-channel High Speed SMU (MPSMU, HPSMU)	5 pA/100 µV	±1 A/±200 V
E5270B	8-slot Precision Measurement Mainframe	0.1 fA/0.5 µV	±1 A/±200 V
4155C	Semiconductor Parameter Analyzer	10 fA/0.2 µV	±1 A/±200 V
4156C	Precision Semiconductor Parameter Analyzer	1 fA/0.2 µV	±1 A/±200 V

# 4 Fast, efficient and expandable parallel measurement

We can help you:
- Increase solar cell IV measurement throughput. The E5260A can measure in parallel on up to 8 channels.
- Improve test execution speed. The E5260A program memory feature greatly speeds up repetitive measurements.

E5260A

Four solar cells measured in parallel using the E5260A

B1500A

B1511A MPSMU

B1520A MFCMU

B1530A WGFMU
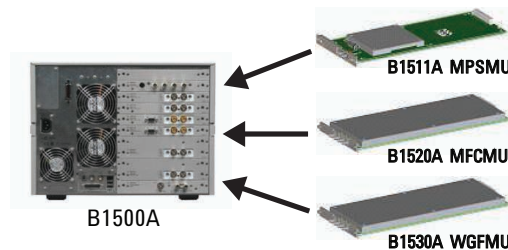
The B1500A and B1505A each have 10 slots for maximum flexibility.

5 Keysight EasyEXPERT software gets you up and running quickly

We can help you:
- Reduce your start-up costs. EasyEXPERT software meets the requirements of both beginning and experienced engineers.
- Improve your measurement efficiency. EasyEXPERT has built-in graphing and data analysis capabilities.
- Unify your test environment. Desktop EasyEXPERT is FREE and it supports all of the products shown in this flyer (measurement capabilities vary depending on product).

B1500A

EasyEXPERT

B1505A

E5260A/70B

E5262A/63A

4155B,C/56B,C
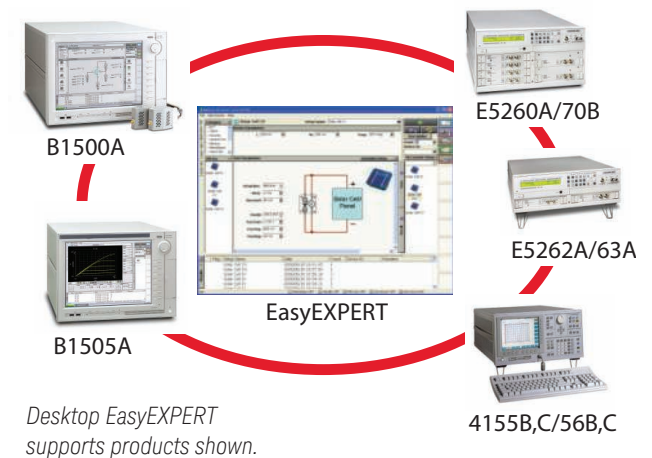
Desktop EasyEXPERT supports products shown.

To learn more...

Please visit our website below and download our application note on solar cell evaluation (literature number: 5990-4428EN). Sample programs are also available. For more information on the B1500A please go to:

www.keysight.com/find/b1500a

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