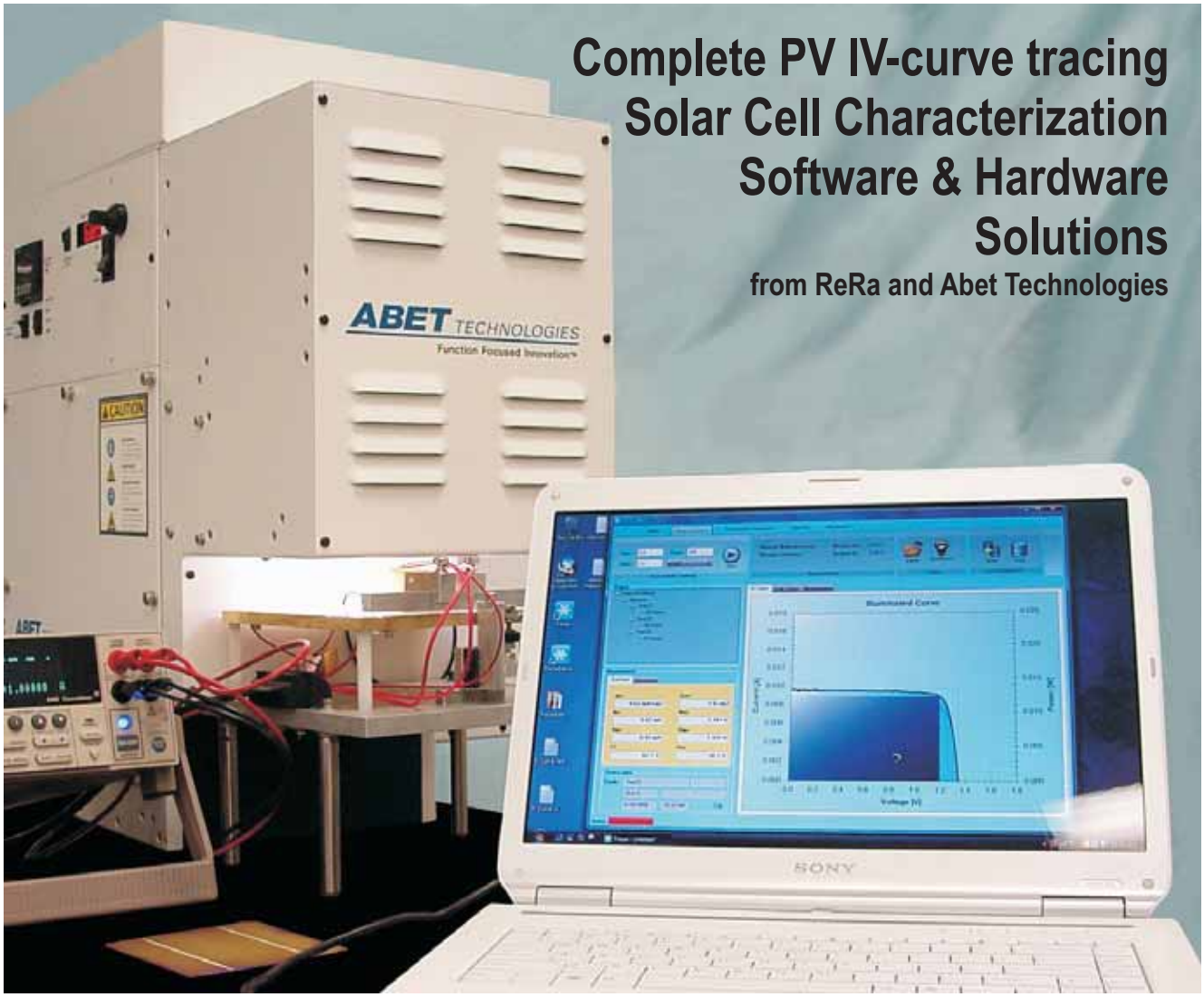
ABET TECHNOLOGIES

Function Focused Innovation

Complete PV IV-curve tracing Solar Cell Characterization Software & Hardware Solutions

from ReRa and Abet Technologies



Model 15501 IV curve test system. AM 1.5G solar simulator, all the necessary test hardware and electronics and the ReRa Tracer software included..

ReRa Tracer Software

- Complete solar cell IV-curve tracing and analysis
- IEC standards compliant
- Reference cell corrected metrology
- Correction to standard test conditions
- Wide range of solar simulators and Source-Meters® controlled
- Freely downloadable extension plug-ins add new instruments controlled and analysis techniques
- Dark curve and temperature dependence analysis
- Database connectors for SQL server and MySQL
- Numerous solar cell material specific models included

Test Stations

- Standard current ranges to 5 A (10 A on special order)
- Kelvin probe (four point measurements) methodology standard
- Low shadowing, spring loaded probes
- Probes spaced so as to equalize current density within the solar cell
- Simple solutions for small budgets
- Temperature controlled and vacuum chuck stations
- Pneumatic actuated stations for the manufacturing floor
- 1x1 mm to 156x156 mm stations standard

Abet Technologies, Inc. 168 Old Gate Lane, Milford CT 06460 Tel: 203-540-9990 Fax: 203-301-0059
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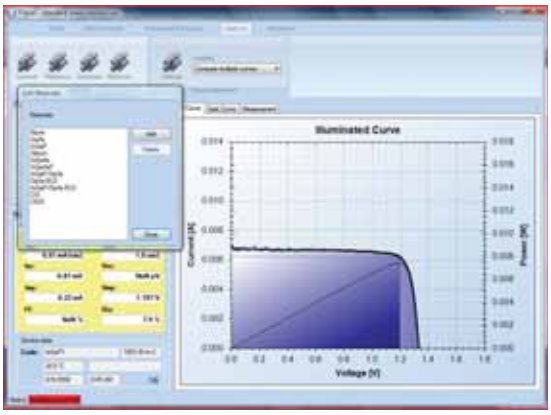
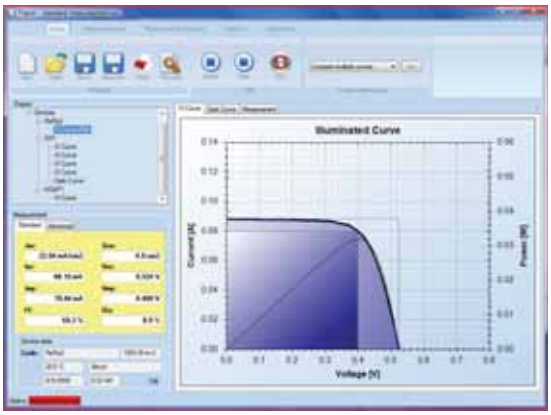
ReRa Tracer

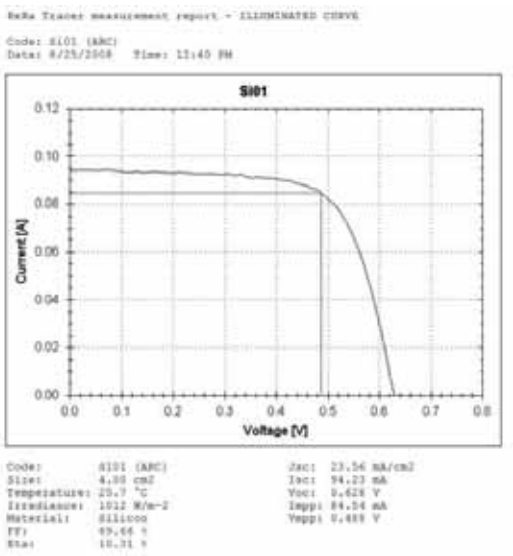
A solar cell IV metrology software solution, IEC standards compliant



Collects data using test conditions optimized for each solar cell material.



Analyzes the data using material specific models.



Standardized report generation for dark and illuminated IV curves.

Standard ReRa Tracer features and capabilities

Tracer's ease of use and Windows® (XP (SP2) and Vista 32 and 64) compatibility comes from the Microsoft.NET platform on which it is built. Full help file included. Minimum computer requirements: USB 2.0 connectivity.

Hardware controls for:

Abet Technologies and Newport Solar Simulators
Keithley 24xx series Source-Meters®
Kepco BOP bipolar power supplies for higher current systems
Temperature control and monitoring
Extensions plug-ins allow simple addition of additional hardware options

Measurements capabilities

Measurement of Illuminated Curve and Dark Curve
Direct measurement of V_{oc} & I_{sc}
Connection/Polarization check
Suns over V_{oc} measurement

Analysis capabilities

Basic parameter extraction: V_{oc}, I_{sc}, J_{sc}, V_{mpp}, I_{mpp}, FF, Eta, R_{shunt}, Slope near V_{oc} (R_s)
Extraction of Dark current and ideality factor from dark curve
Correction to STC (IEC standards)
Curve averaging
Additional selection of R_s extracting methods
Fitting to one and two diode models
V_{oc} @ 25°C method

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Graphical interface and data presentation

Visual representation of Fill Factor and Power curve
Logarithmic dark current curve display
Zoom capability
Multiple curves in one graph

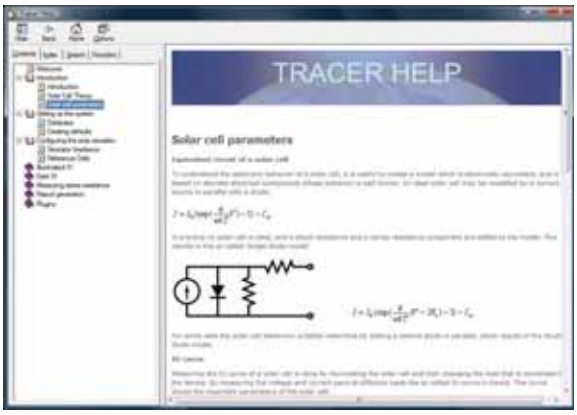
Data handling

Local Searchable Database
Saving/Loading measurement projects
MySQL and SQL Server database support
Oracle database support
Export Excel, ASCII and XML

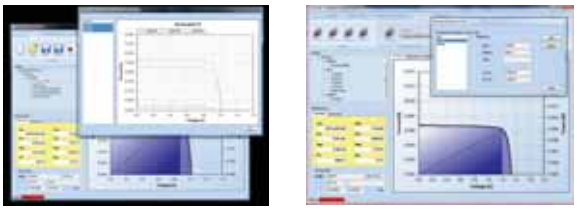
Get a hands-on feel for the functionality of this fully featured, extendable software with a Tracer demo version. Please contact Abet Technologies sales or your local Abet representative for a copy of this demo that includes the complete Help file.

About Us

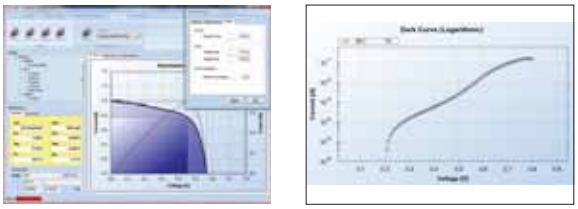
ReRa Tracer software, exclusively distributed worldwide by Abet Technologies, was developed at ReRa B.V., a Spin-off of Radboud University, Nijmegen, by ing. Erik Haverkamp. Erik, who was honored in 2007 with the Professor Jan Trooster prize for his metrology achievements, spent many years working at ESTI (European Solar Test Installation in Ispra, Italy) and in the solar cell group of Dr. John Schermer at the Radboud University, Nijmegen in The Netherlands.
The principals of Abet Technologies represent more than fifty years of experience in solar simulator design, manufacturing and service as well as in electronic and opto-mechanical instrument fields. Abet's extensive, experienced worldwide distributor network can locally assist customers with purchasing decisions and after sale support.



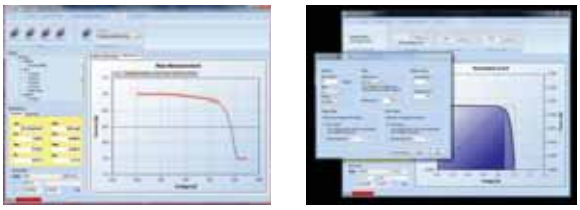
Comprehensive Help file and Tutorials.



Overlay multiple curves for quick comparison; manage reference cells.



Adjust fitting algorithms to improve data extraction; display and analyze dark current..



Display measurement data; adjust instrument setup.

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IV Test Stations

Standard & custom designs to suit your needs & budget

Cell metrology stations from as simple as: Keithley 2400 with four alligator clip leads to Pneumatically actuated, safety switches equipped, with temperature stabilized true four point metrology vacuum chucks, with cell metallization matched spring loaded probes, with 10 A capacity Source-Meters® and cell temperature monitoring.

Model 15220 Test Station.

Shown above, the model 15220 test station is the result of our partnership with leading electronic and automation designers, resulting in these features:
Vacuum chuck
Recirculating chiller temperature stabilized
Shuttle mounted for ease of sample loading
Pneumatic, three position probe height control
XY stage for optimized probe engagement
Safety interlock for the probe actuator including key protected lock-out
Built-in temperature monitoring

Solar Simulators

Standards compliant DC sources

One Sun Solar Simulators with uniform fields from 30 to over 350 mm millimeters
Concentrator cells illumination to over 500 suns, 4 to 10 mm field
AM 1.5G, AM 1.5D, AM 0 and many other spectral outputs matched for all your test and light soaking needs

Model 11044 8″ x 8″ 1000W Solar Simulator.

Please contact Abet Technologies sales or your local Abet representative for a copy the solar simulator brochure or for more detailed information on these instruments.

Ordering Information

15000	ReRa Tracer software
15100	Manual load test station, 156x156 max
15105	Raiser assembly for 2x2 simulator use
15111	Spring loaded probe, 1A
15112	Set of spring loaded probes, 3A
15113	Set of spring loaded probes, 5A
15114	Set of spring loaded probes, 10A
15150	Crystalline Si reference cell
15170	Temperature interface, thermocouple included
15200	Manual load test station, vacuum chuck, temperature stabilized, 156x156 max
15220	Pneumatic load test station, vacuum chuck, temperature stabilized, safety Interlocked
15501	IV curve test system. Includes AM 1.5G 2x2 solar simulator, Keithley 2400 Source-Meter®,15100 test station with 15105 raiser, 15111 probe (order GPIB adapter separately if needed)
15511	IV curve test system. Includes AM 1.5G 4x4 solar simulator, Keithley 2440 Source-Meter®, 15200 test station, 15114 probes, 15170 temperature interface (order GPIB adapter separately if needed)
2400	Keithley Source-Meter®, 1A
2420	Keithley Source-Meter®, 3A
2440	Keithley Source-Meter®, 5A
778927-01	National Instruments USB-GPIB Adapter for Windows Vista/2000/XP

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