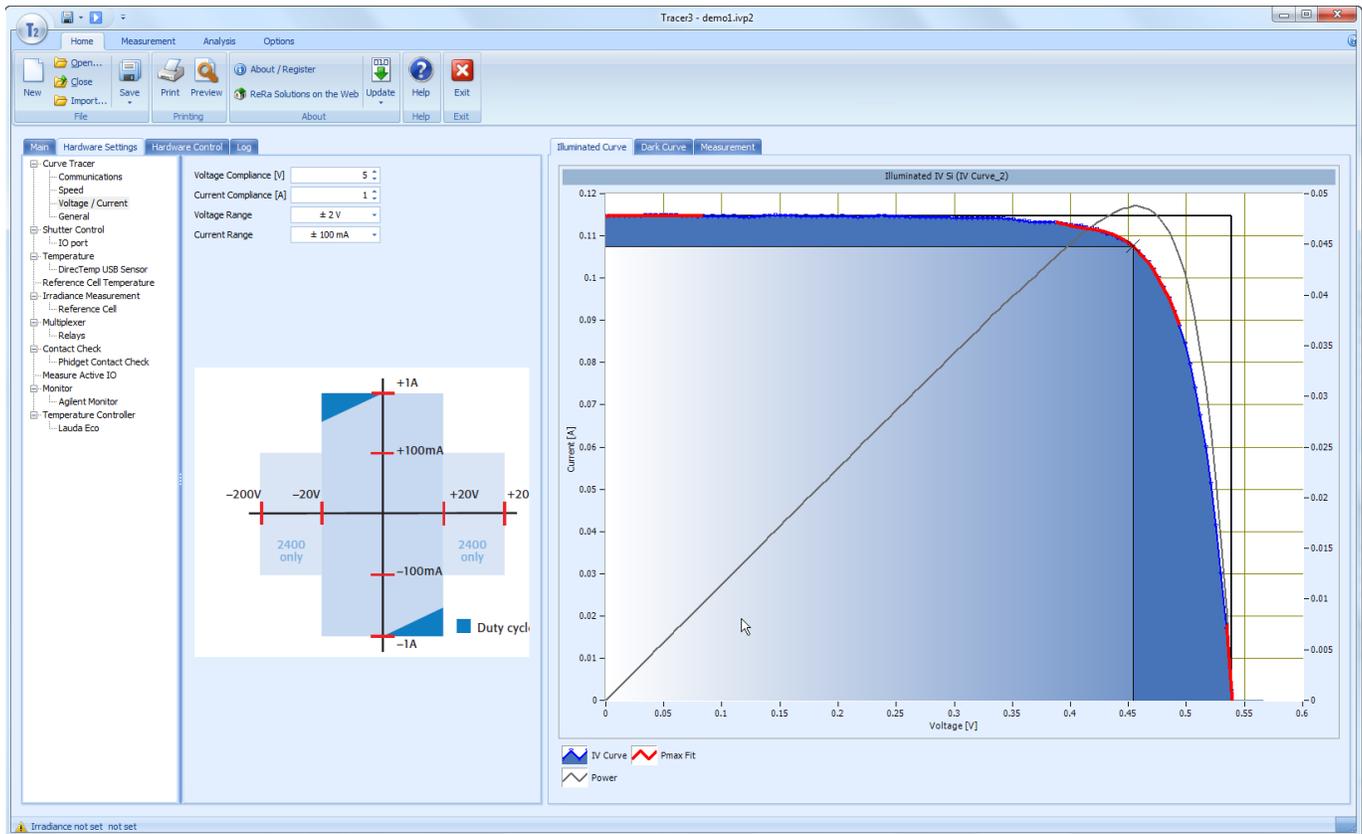


# Tracer™ PV IV Software

## Complete solar cell and module IV-curve tracing and analysis



### Tracer 3 – Power and Convenience

This third generation Tracer™ software package, Model 15000, builds on the field experience with the previous offerings and greatly simplifies hardware interaction while adding more data acquisition and analysis power.

In Tracer™ you will find your all-in-one solution for the measurement and elaboration of IV-curve measurements. Tracer™ natively supports all of the Abet offered electronic loads including the complete range of Keithley 24xx and 26xx SourceMeters™, Kepco bipolar amplifiers and Agilent DMMs.

Tracer™ was developed with the latest Microsoft.NET Technology, which resulted in a modern “Microsoft Office” look and feel and assures stable operation on the Microsoft Windows platform.

### Computer Requirements

- Microsoft Windows 7 or higher
- Support for both x86 and x64 bit.
- Minimum Intel Core i3 (or similar), 2Gb memory

### Elaboration algorithms

The algorithms used in Tracer meet the IEC-standards for Efficiency measurements. Different dedicated fitting algorithms to extract the two-diode model parameters are included. Spectral Mismatch correction is supported.

### Organic cells

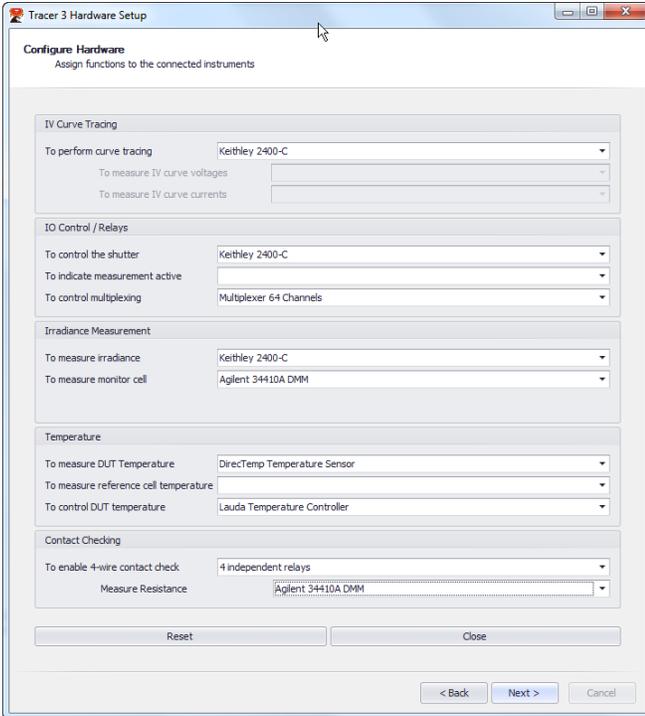
Since crystalline cell-based models may not represent organic materials quite as well Tracer™ supports import of additional fitting algorithms that may be better suited for analysis of these cells.

### Tracer Analyzer

If you need to analyze your data away from the lab a lower cost Tracer Analyzer software package is available with all the analysis power of the standard package but without its instrument control features.

## Hardware Configuration

The hardware configurator is a flexible tool which allows creation of a large number of different setups. The configuration can be a simple IV measurement system based on a Keithley Source-Meter™ and low-cost solar simulator. For the more expert user it is possible to configure Tracer to be used in a highly sophisticated setup, with contact checking, irradiance monitoring, multiplexing, motion control and temperature readout/control.



Tracer™ has the ability to control the following instruments:

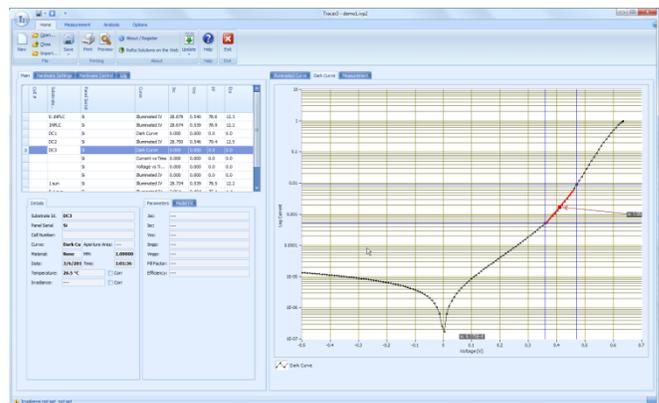
- Complete range of Keithley Source-Meters™ (both 2400 and 2600 series) and Keysight source measure units
- Kepco Bi-Polar power supplies
- Common models of Keithley and Agilent DMM's and multiplexers
- DirecTemp high precision temperature sensors
- Lauda ECO liquid chiller/heaters
- All of Abet's applicable instruments (Reference Cells, Loads, Read Out units, Shutter Controllers, Module measurement systems, Temperature measurements devices, XY positioning tables and multiplexers)

**Example:** you have a Keithley 2400 Source-Meter™ and Agilent 34410A DMM available. You can configure Tracer™ to measure the solar cell by the front input of the Keithley 2400, use the rear input to measure the reference cell. Use the Agilent DMM to measure a Pt100 that is connected to your solar cell and also use it, with the help of an Abet multiplexer, for a continuous monitor cell.

- **Measurements:  $V_{OC}$ ,  $I_{SC}$ ,  $J_{SC}$ ,  $V_{mpp}$ ,  $I_{mpp}$ , FF, Eta,  $R_{sh}$ ,  $R_s$ , n, Suns over  $V_{OC}$ , I vs. time, V vs. time and more**
- **IEC standards compliant correction to STC**
- **Wide range of Electronic Loads (Source-Meters) and Solar Simulators supported**
- **Single cell and module metrology**
- **Light and Dark curve measurement**
- **Long term measurements and light soaking**
- **Temperature dependency analysis**
- **Full database support (SQL, MySQL)**
- **Numerous solar cell material specific models included**
- **Integrated scripting engine**
- **Remote control (http) for simple integration in existing applications**

## Automatic Data Storage

All data is stored in native project files. Export to many different file formats is included (.txt, .csv, .xlsx, etc....). Tracer™ supports the usage of MySQL or SQL Server databases. Our experts can help you set up a database system where all measurements are automatically stored. A simple viewer that shows the results in the database is included with the software package.



Tracer™ 3 Dark curve data screen