Photo Emission Tech., Inc.
760 Calle Plano, Camarillo, CA 93012 USA
Tel: (805) 482-5200 Fax: (805) 482-5252
Email: pet@photoemission.com

CELL TESTER MODEL # CT300AAA

SS300AAA FEATURES

- **Light intensity feedback for stable output intensity**
- **External lamp alignment with lamp on**
- **Lamp life display**
- **Manual / automatic shutter control**
- **External/Remote shutter control**
- **Forced air cooling**
- **Lamp current meter**
- **Selectable and adjustable constant intensity or constant power mode**
- **Safety Interlock override LED**
- **Over Temperature Warning LED**
- **Shutter Status Indicator**
- **Lamp status indicator**
- **Two (2) year factory warranty**

Specifications are subject to change without notice.

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CELL TESTER MODEL # CT300AAA

SS300AAA TECHNICAL SPECIFICATIONS

FEATURE DESCRIPTION	SPECIFICATION
Type of lamp	Xenon Short Arc
Lamp Power	3,000 W
Max. Illuminated area	11.81" (300mm) X 11.81" (300mm)
Light Source	Steady State
Air Mass	AM1.5G Standard: AM1.5D or AM1 optional
Lamp lifetime	1,000 Hours
Adjustment Range of light intensity	100 mW/cm^2 +/- 15%
Simulator Class as per ASTM E927	**AAA**
Spectral Match to ASTM E927	±25% or better
Non-uniformity of irradiance as per ASTM E927	≤ 2% or better
Temporal Stability as per ASTM E927	≤ 2% or better
Dimensions (Height x Width x Depth)	121.5" (3,086mm) x 26.7" (678mm) x 32.7" (831mm)
Weight	400 Lbs. (157.5 Kg)
Optimum Working Distance	53.3" (881mm)
Phase/Voltage/Frequency	Single Phase/220VAC/50-60Hz
Max. Power Consumption (W)	4.0 KVA

CC SERIES IV SYSTEM TECHNICAL SPECIFICATIONS

Model	CC-1	CC-3	CC-5	CC-15	CC-20
Max. Current Range (A)	±1	±3	±5	±15	±20
Max. Voltage Range (V)	±20	±60	±40	±10	±10
Max. Power (W)	20	60	50	150	200
Measurement Resolution	16 Bit				
Measurement Accuracy	Better than 0.5%				
Measurement Mode	Fixed or Auto				
Measurement Time (Light)	<500ms for stable light (Up to 4s if filtering for light fluctuations required)				
Measurement Time (Dark)	100-1,000ms				
Maximum Points per Curve	100-1,000 (model specific)				
Maximum Data Acquisition Speed	100kHz			4,096	
Maximum Cell Throughput	1,200/Hour (With optional Robotics)				
Phase (Power)	Single Phase				
Voltage (Volts)/Frequency (Hz)	220VAC (115VAC Optional)/50-60Hz				
Max. Power Consumption (W)	40 W (Up to 600W With Peltier Cells)				
Curve Correction to STC	IEC 80891, JRC or Anderson				
Advance Fitting of I-V Curves	SEM, DEM and VDEM Models (17 Different Weight Functions)				
Thermal Coefficients of Voc and Pm	Standard on All Systems (With Optional Temperature Control)				
Irradiance Monitoring & Correction	Standard on All Systems				

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CC Series: I-V Curve Data Acquisition System Description and features

General System Description

The Solar Cell I-V Curve Data Acquisition System characterizes the current-voltage (I-V) characteristics of photovoltaic devices with currents up to 20.0 amperes. It calculates the solar cell parameters, generates printable test reports and saves test data in text files. Curves are measured using classic four probes (Kelvin) technique. The system includes electronics, software, rack-mount computer, chuck and cell testing fixture with irradiance monitoring and optional temperature control. It interfaces with the customers' Solar Simulator or a Solar Simulator can be supplied.

System Details

Test Fixture

The I-V Curve Data Acquisition includes a fixture for holding test devices. These fixtures range in sizes to accommodate cells from small to up to 300 mm x 300 mm, larger sizes are available. Adjustable cell stops, in the X & Y-axis, are provided to consistently locate the cells for testing. Two bus bars with multiple spring loaded contacting probes (20 per bus bar) are mounted on a frame. The frame can be manually raised to place the cell on the platen for testing. The cell is held down with vacuum during testing (customer needs to supply the vacuum source). After placing the cell in position, the frame can be manually lowered to make probe contact with the cell. Once in the down position, the frame is held down by clasps to maintain contact with the cell. Optional automatic cell contacting is available upon request.

Two back-side voltage contacts are embedded in the platen (galvanically isolated from the platen) and make good electrical contact when the cell is held down by vacuum to the platen. Both of the bottom voltage and current probes are gold-plated. Platen can be either cooled or heated in the temperature range of 5-75^{o} C using Peltier cells. Temperature of the platen is measured automatically with accuracy of <±0.5^{o} C and is monitored during cell measurement.

Options

Temperature Control

Temperature control of the platen that holds the cell during measurement is available. The standard temperature control range is 0-60^{O}C. Other temperature control ranges are available. Temperature control accuracy is < ±1^{O}C.

Setup and Training

System setup is easy when using the instructions provided in the manual. If desired, PET will provide system setup and training at the customer's facility.

The above specifications provide general information about this product. Actual product can be customized to meet the needs of individual customers.

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Software Features

- Easy to use MS Windows environment and user friendly software.
- Software handles measurement of both P type and N type cells without any cell connection changes.
- Advanced noise filtering feature to enable measurement of good quality I-V curves even under fluctuating intensity conditions.
- Light Intensity & Temperature monitoring and control, 0-60^{O}C Standard. Other ranges optional.
- Calculation of cell series resistance according to IEC 60891 standard.
- Procedures for fitting of measured I-V Curve to either equivalent diode models, i.e. SEM-Single Exponential, DEM-Double Exponential and VDEM-Variable Double Exponential with seventeen (17) weight functions.
- Procedures for curve correction to Standard Test Conditions (STC) to IEC60891, Anderson's and Blaessar's or user defined conditions. User has the ability to perform automatic correction of measured I-V curve to STC (Standard Test Conditions), i.e. light intensity and temperature or other conditions specified by the user.
- Computes solar cell parameters including I_{SC}, V_{OC}, F_F, I_{MAX}, V_{MAX}, P_{MAX}, E_{ff} , Rs and Rsh and saves them automatically on hard disk drive. In addition cell's temperature and irradiance level is measured and stored for future analysis.
- Thermal Coefficients of Voc & Pm
- Dark saturation current, R_S and R_{SH} determination
- Provides printable test reports and test data in text files for easy exchange between programs
- Software features include cell sorting in various categories. This cell sorting can be performed in production or in virtual binning modes specified by the user.
- Solar Simulator shutter control (Solar Simulator sold separately)

Majority of the features highlighted in yellow are usually not found in competitors' software

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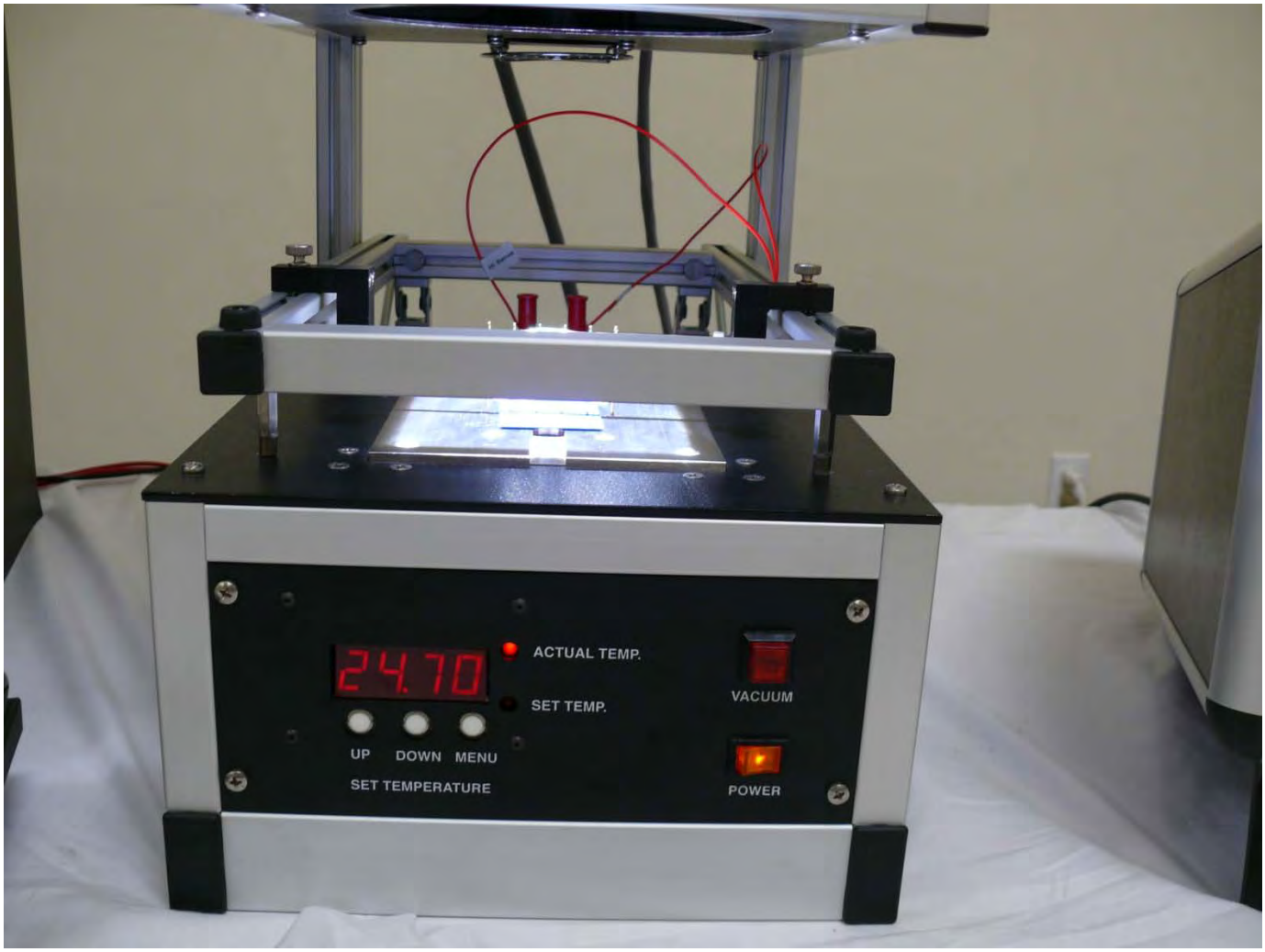

Figure 1: View of a typical cell measuring table with multiple probes solar cell contacting

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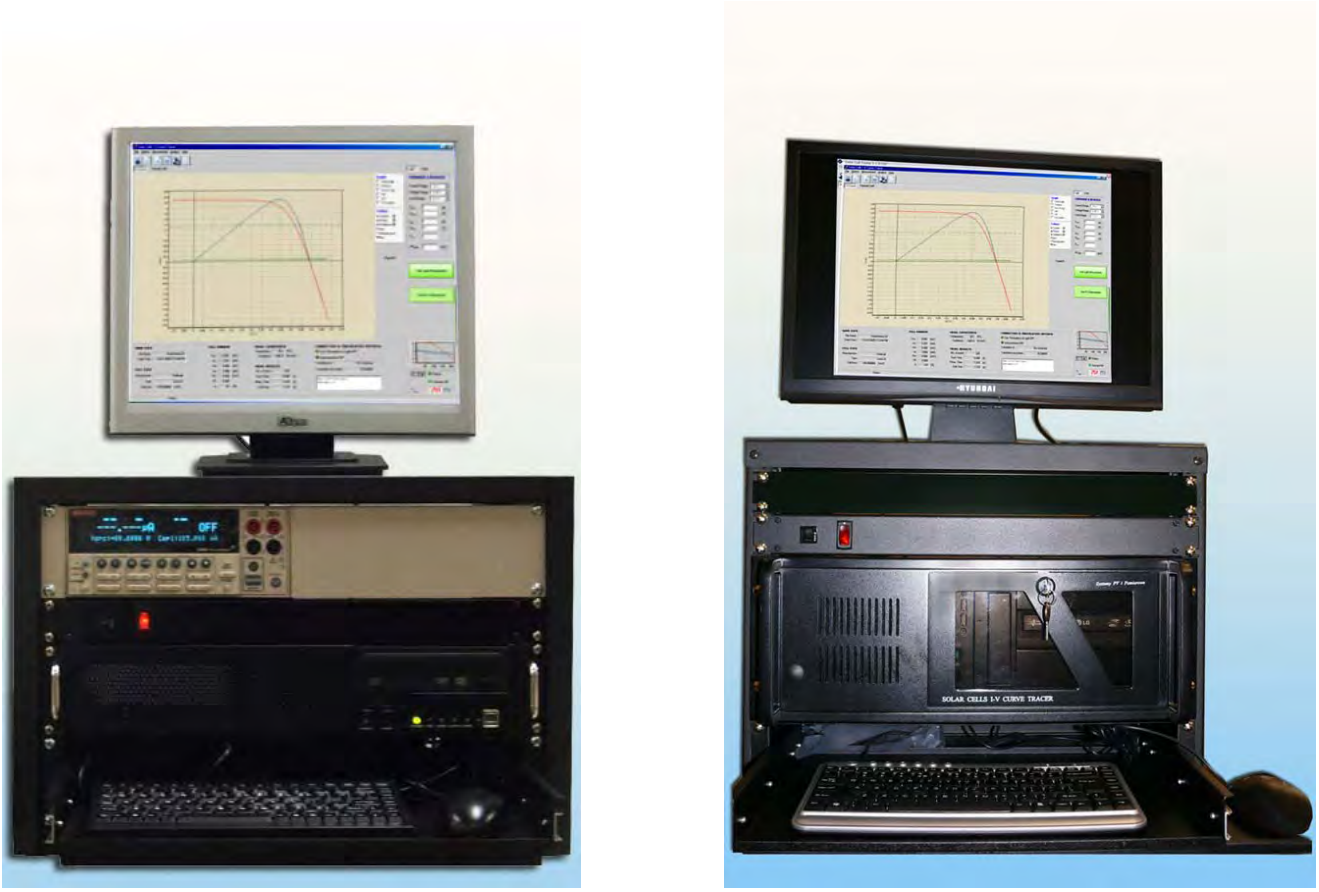

Figure 2: View of a Typical I-V System Console
(Left view Model #'s CC1/CC3/CC5: Right View Model #'s CC10/CC15/CC20)

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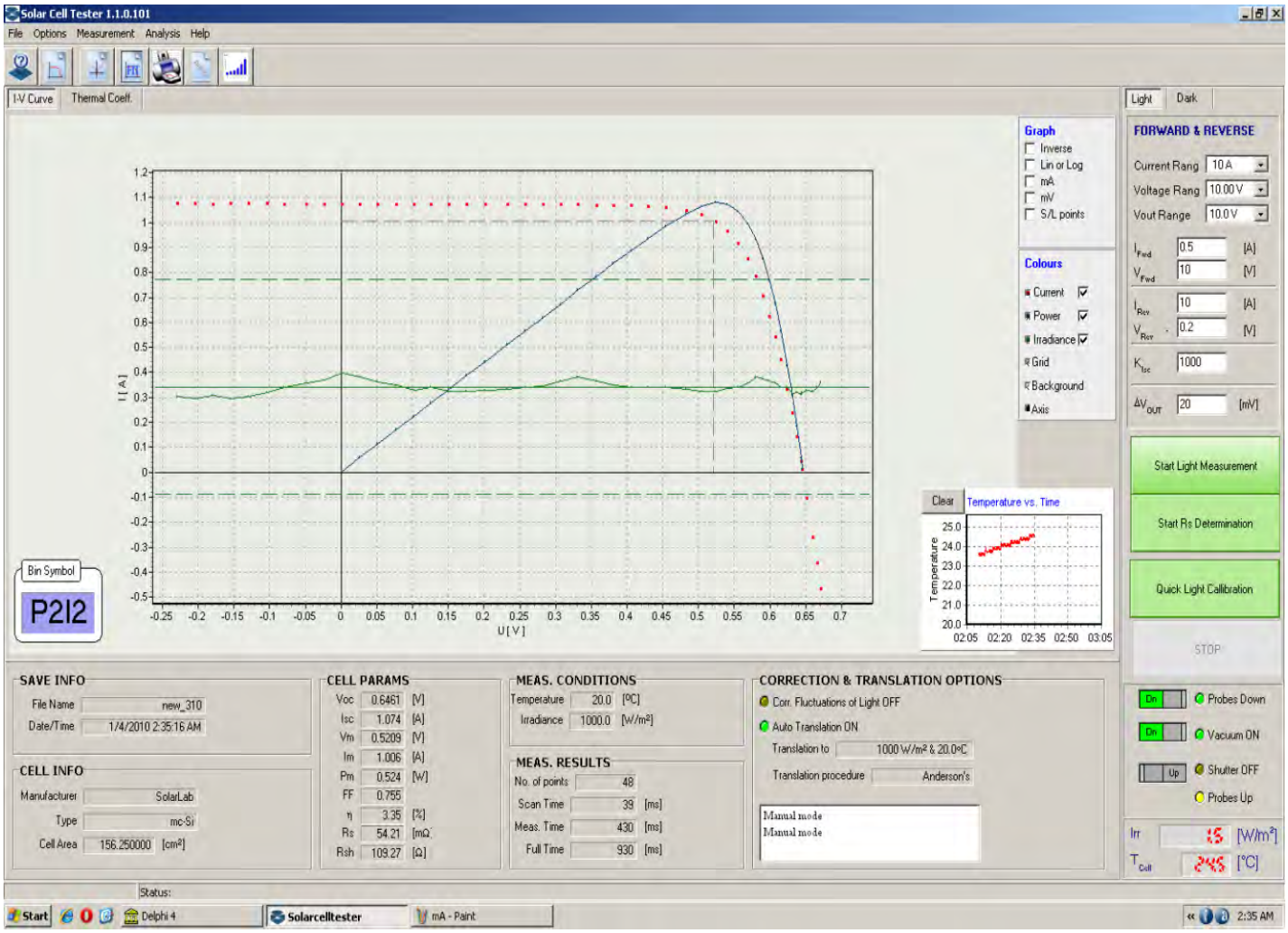

Figure 3: Example of “light” measurement

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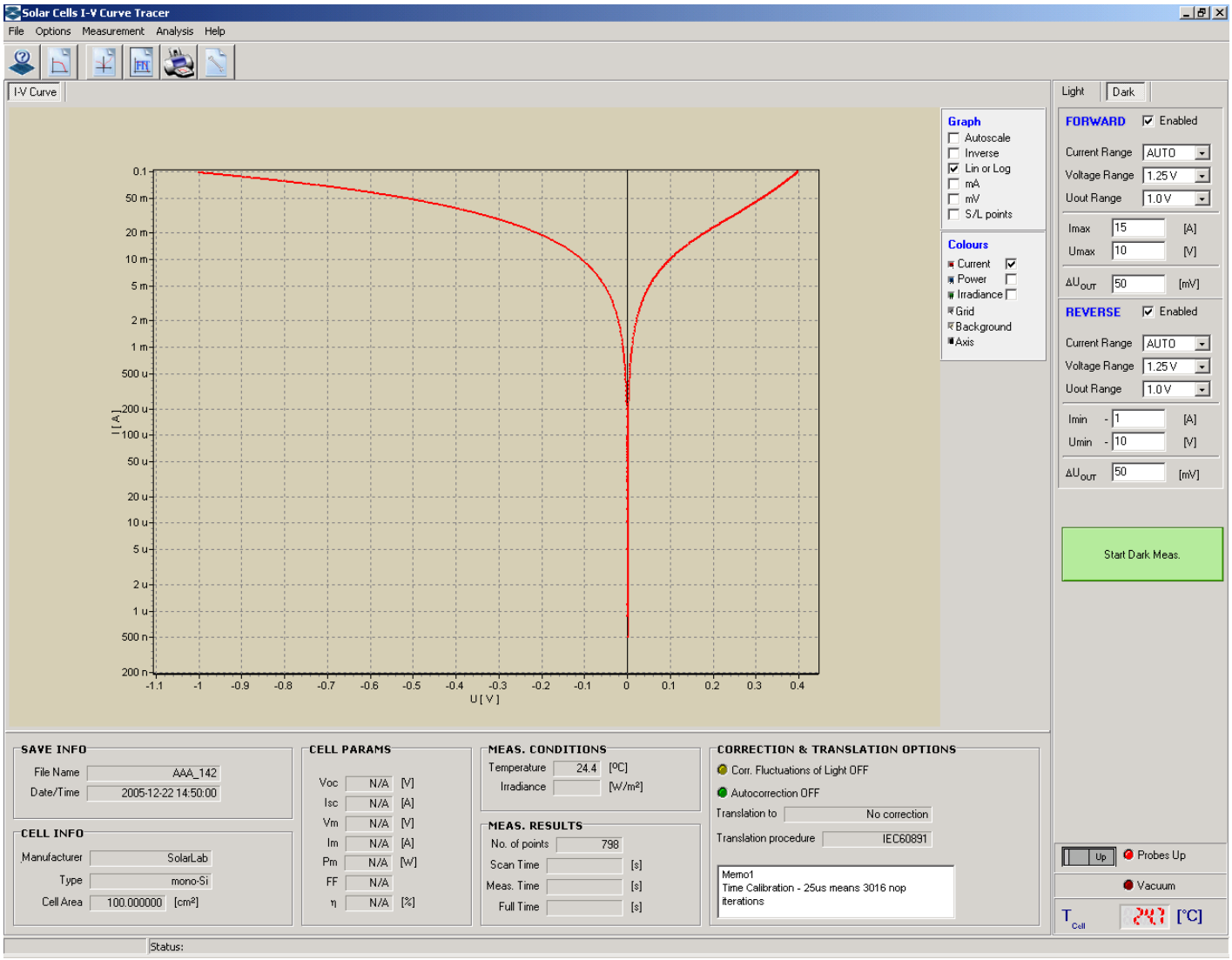

Figure 4: Example of “dark” measurement

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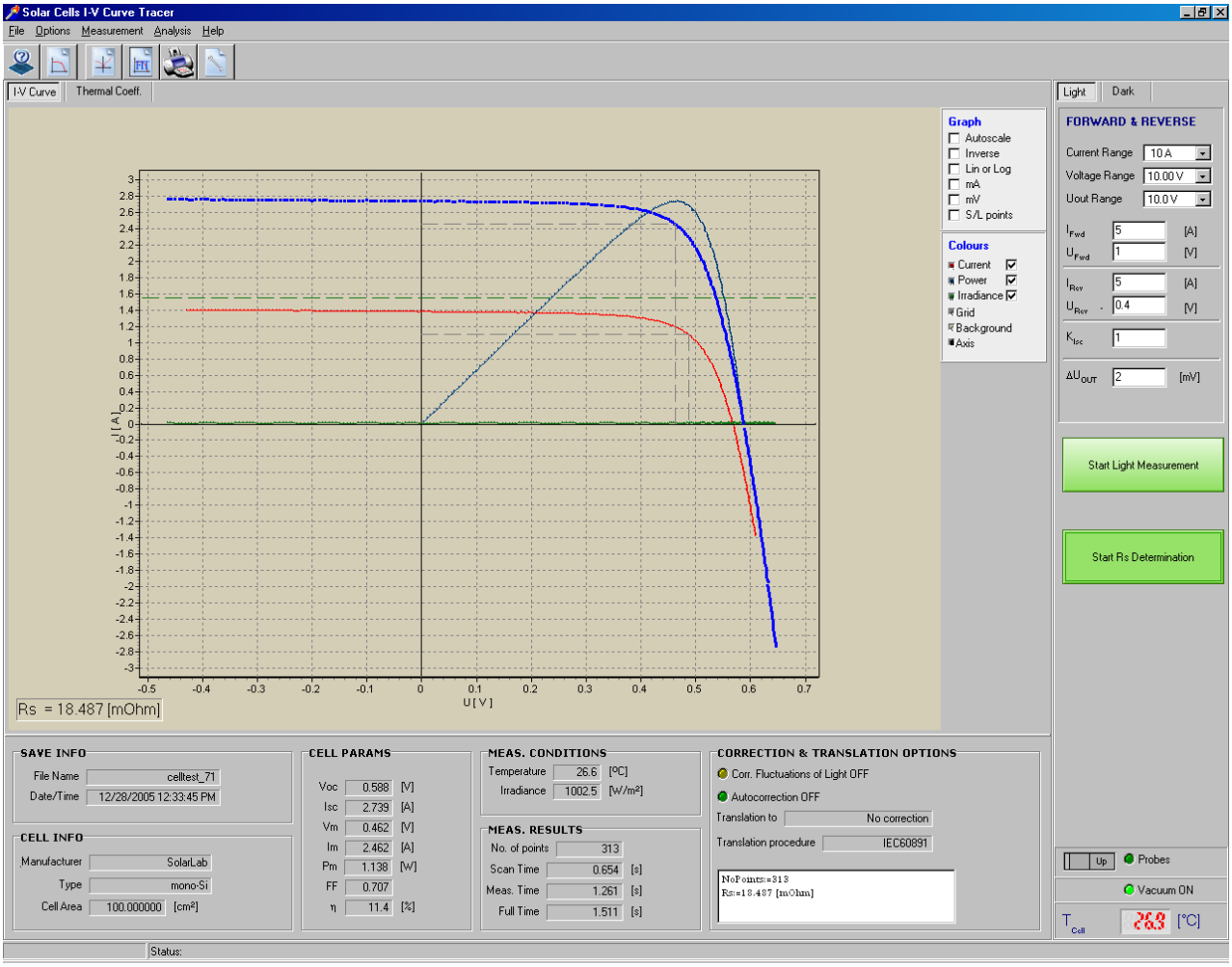

Figure 5: Example of cell's series resistance determination according to IEC 60891 Standard

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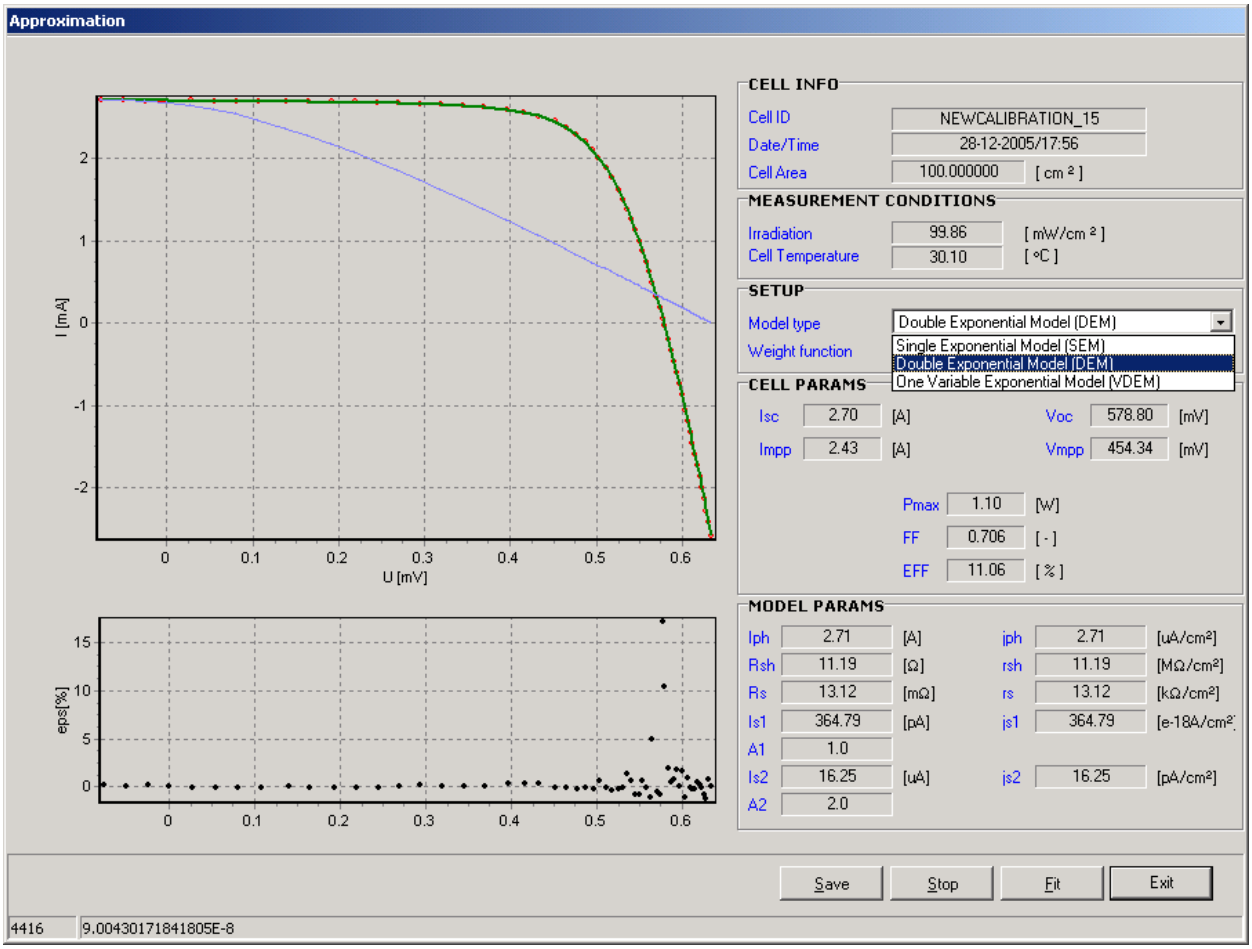

Figure 6: Example of cell's I-V curve fitting to Double Diode equivalent electrical model