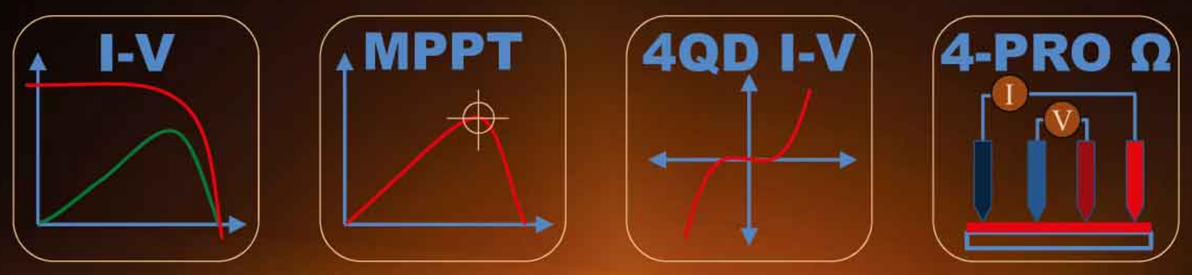
PV Power Analyzer

Type VK-PA-25

One Instrument for 4 Different Laboratory Applications:

- Solar cell I-V characterization (V_{oc}, J_{sc}, FF, η)
- Maximum Power Point Tracking with P_{max} vs. time plot
- Four quadrant I-V analysis (Dark I-V, Diode, Resistor)
- Four probe resistance measurements (Sheet resistance of TCO)



Specifications

Measurement Range (For details see page 3)	Voltage: -2500 to +2500 mV Current: -250 to +250 mA with 5½-digits resolution
Measuring Technique	Digital Source Meter Type
Inputs	Front: 4 probes for PV devise Back: 4 wire connector for reference cell (light intensity measurement)
A/D Converters	16 Bit (2 independent ADCs for V & I measurements)
User Interface and data collecting	Computer software is provided for control of all the functions and data logging. Measurement data can be saved as a text file and directly plotted on ®Microsoft Excel graph. (Windows based PC required)
Communication	USB (optional Bluetooth wireless communication)
Power Requirement	100 – 240 VAC (50-60 Hz)
Dimensions, Weight	88 mm x 210 mm x 230 mm, 2.5 kg

Features of Solar Cell I-V Characterization

User selectable START, END and STEP voltages. Plots current and power vs. voltage curves. Calculated results include V_{oc}, I_{sc}, J_{sc}, P_{max}, V_{mpp}, I_{mpp}, FF, $\eta_{activeA}$, and η_{geoA}

Features of Maximum Power Point Tracking (MPPT) Function

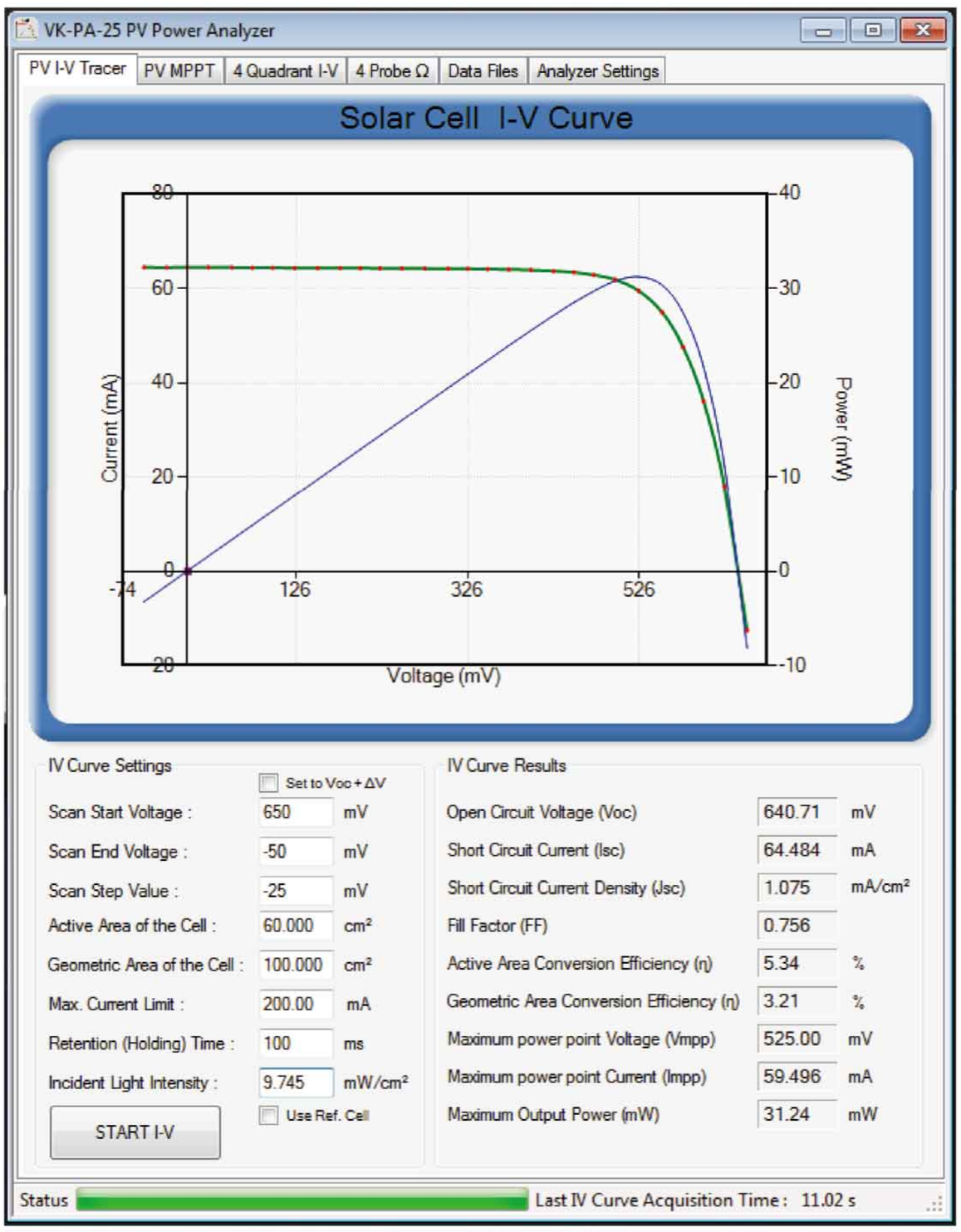
Analyzer acts like the best load for the cell to extract maximum power and keep tracking MPP when cell output change due to light or cell performance variation. Plots P_{max}, V_{mpp}, and I_{mpp} vs. time curves and display total energy produced by the cell (in mWH). In addition user can directly measure the open circuit voltage and short circuit current of the cell.

Features of Full Rang I-V Function

User selectable START, END and STEP voltages in the range -2500mV to +2500mV. Plot current vs. voltage curve. Can be used to plot dark I-V of the cell.

Four Probes Resistance Measurements

Three special functions included to easily measure **sheet resistance**, **resistivity**, and **resistance**. Geometric correction factors are automatically calculated according to size and measuring probe location on the sample which are entered as parameters. Measurement range 2.0×10^{-3} to 5.0×10^{6} Ω .



Screenshot of PV I-V tracer window

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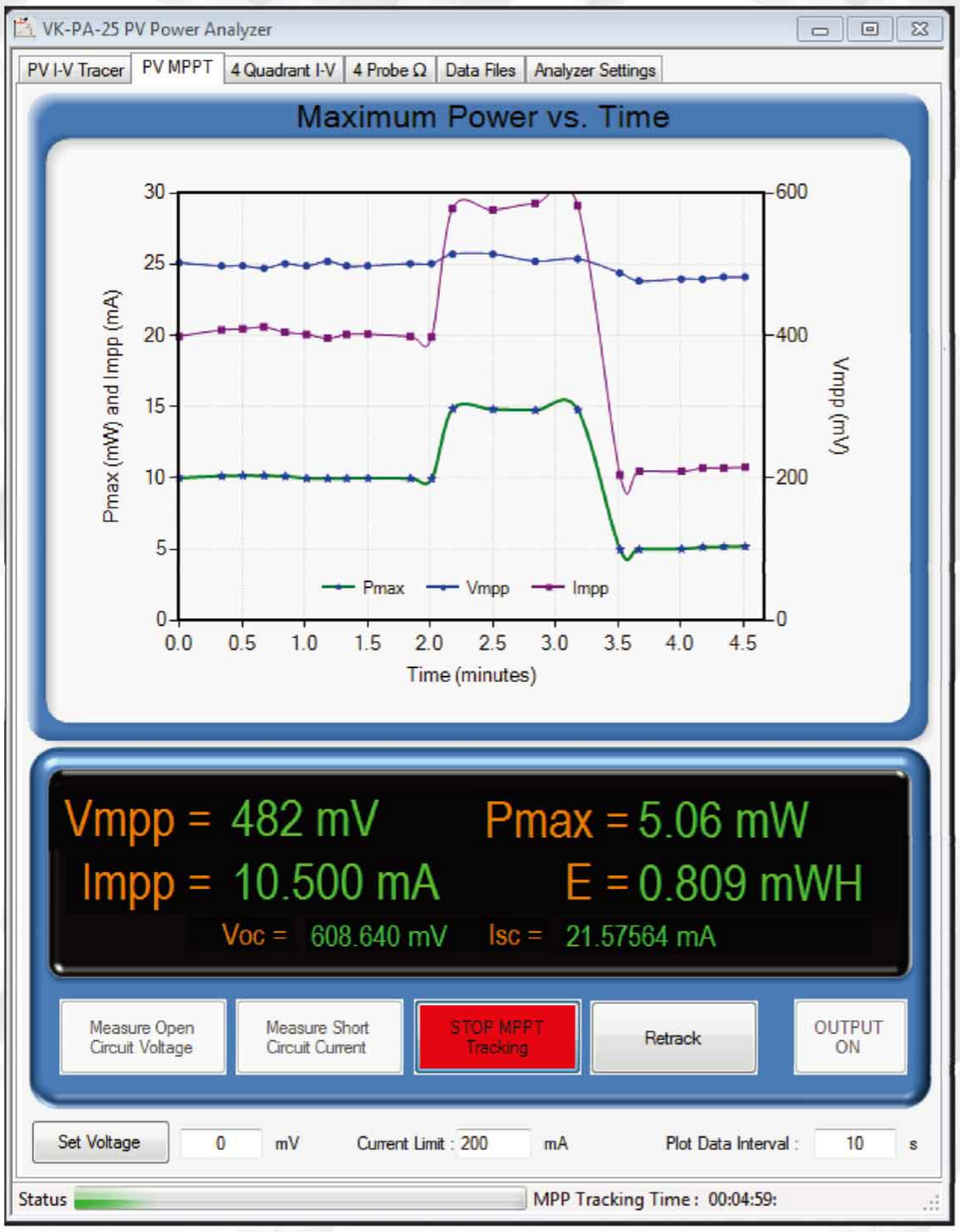
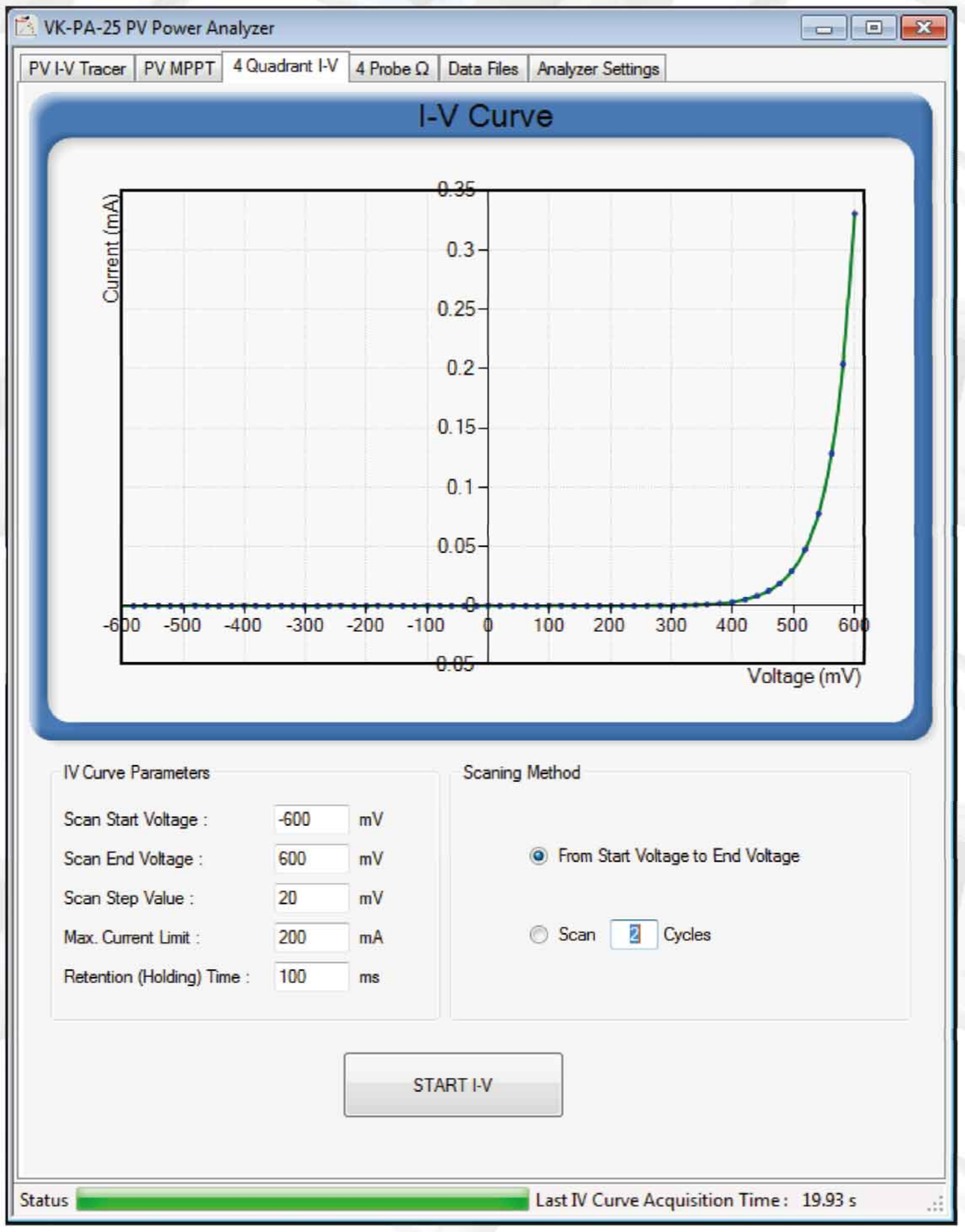
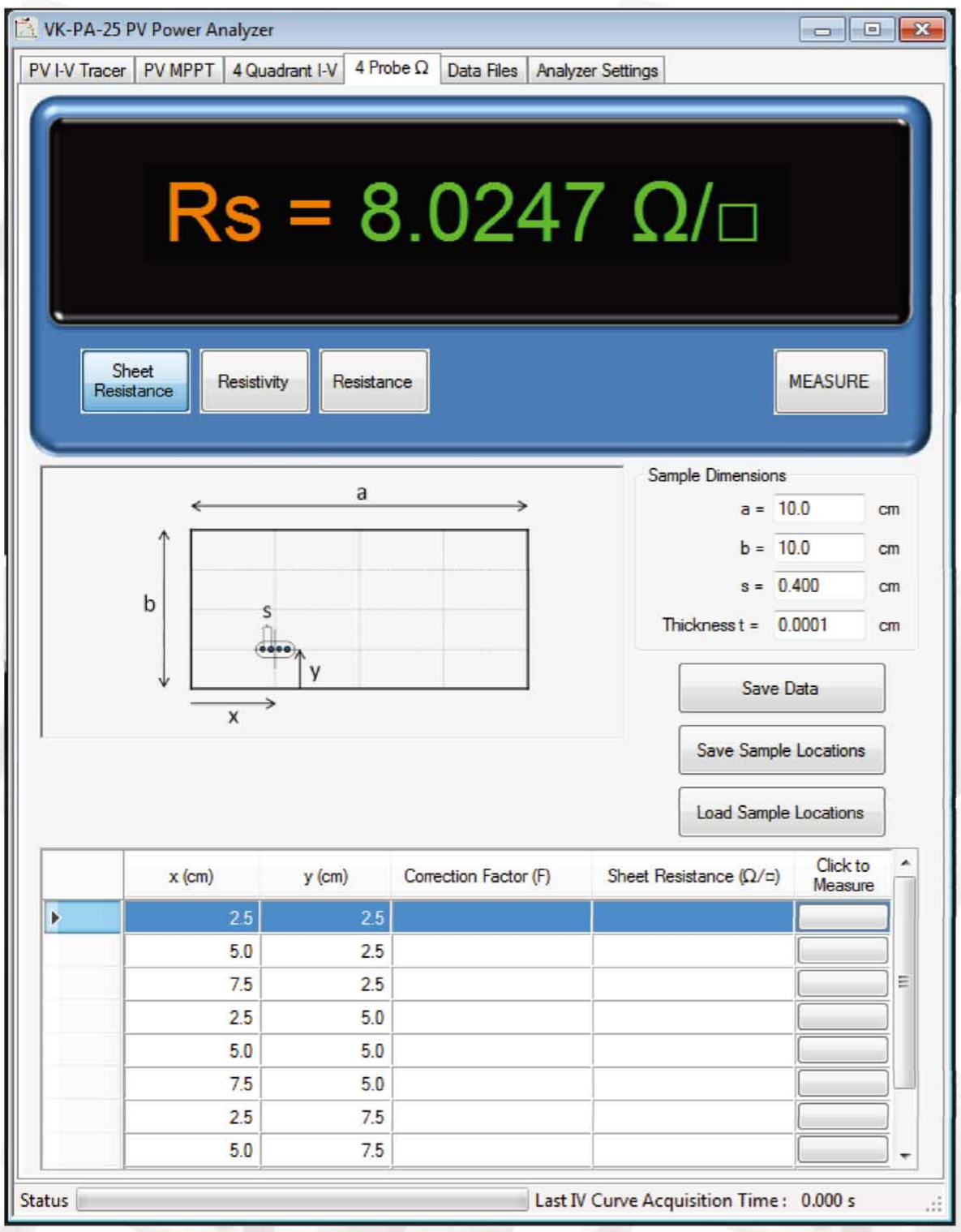
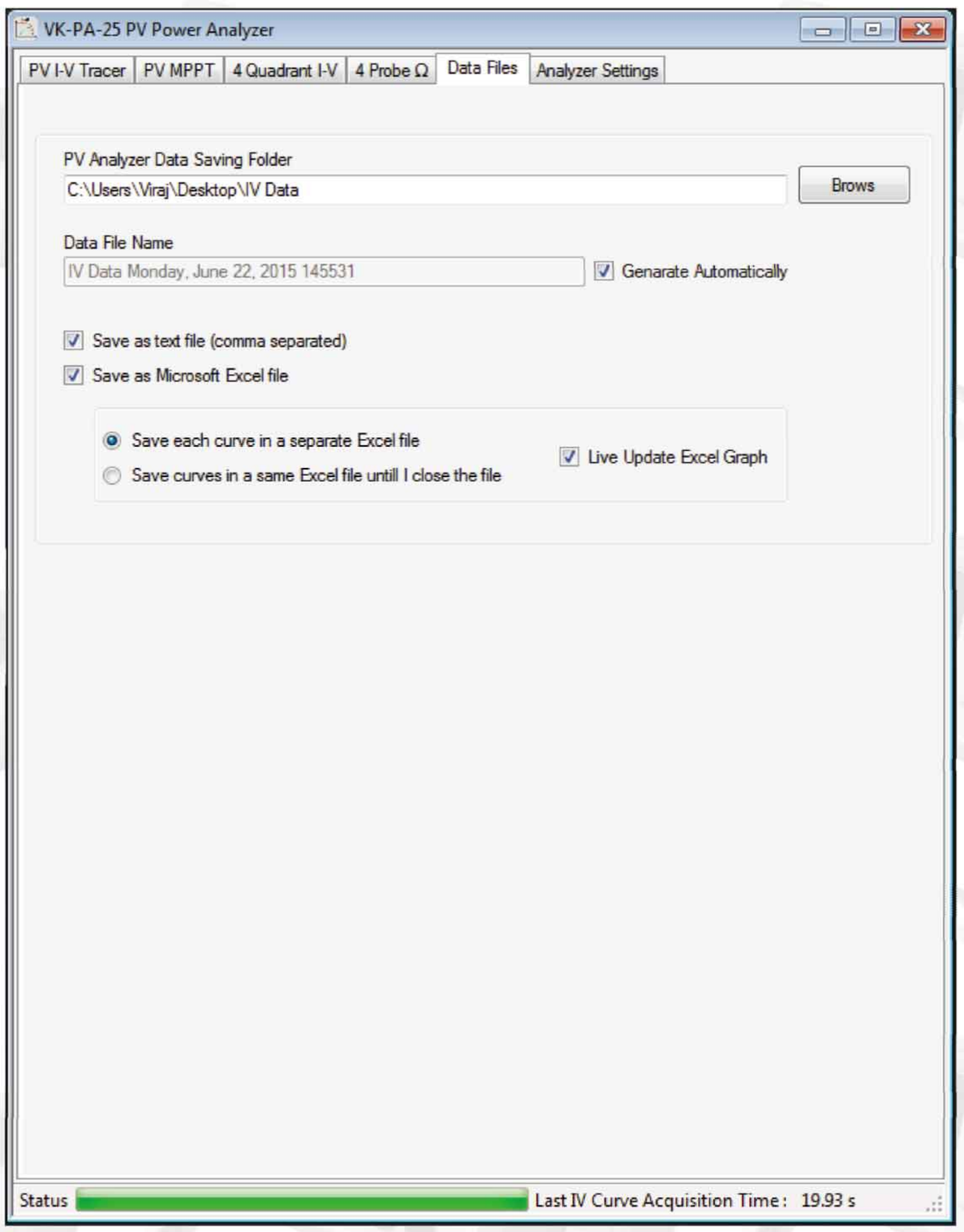
Screenshots of Control Software









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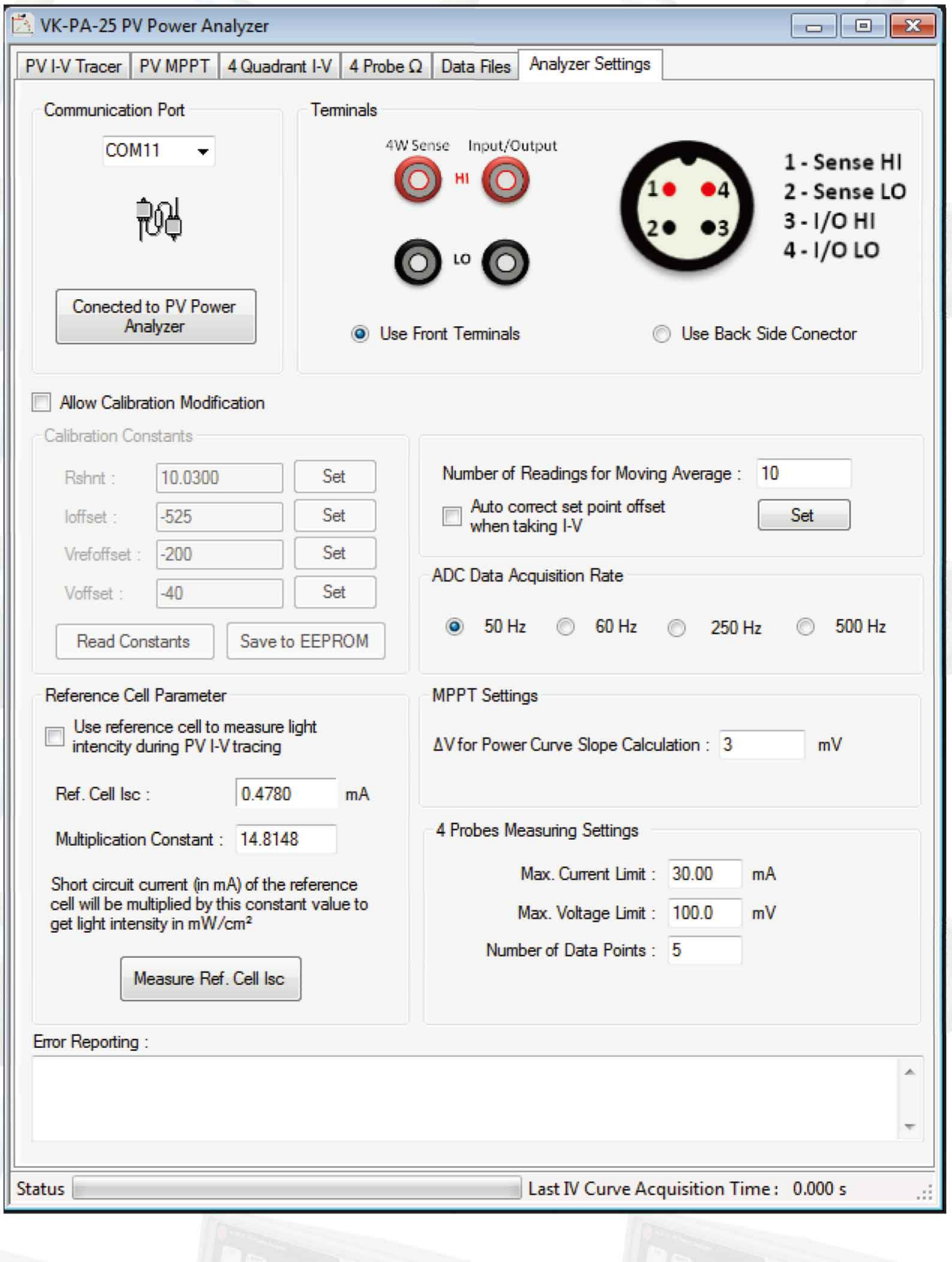

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VK-PA-25 Detailed Electrical Specifications	
Measuring Technique	Digital Source Meter with 4 probes connection to DUT. Controlled by a microcontroller working at 32 MHz system clock speed.
Measuring Range	Voltage: ±2500 mV Current: ±250 mA
Specifications of A/D Converters	Resolution: 16 Bit Integral Nonlinearity: ±0.0003% Utilize on-chip digital calibration to eliminate offset and gain errors. Data acquisition speed can be selected from 50Hz, 60 Hz, 250 Hz and 500Hz.
Built-in Voltage Reference Parameters	Output Voltage : 2.5 ± 0.001 V Output Voltage Drift : 3 ppm/°C (-40°C to +85°C) Output Noise : 100 nV/Hz½
Voltage Measurements Precision Resolution	 ±0.4 µV (5½-digit resolution) Measuring Range Resolution -20 to +20 mV 0.6 µV -40 to +40 mV 1 µV -80 to +80 mV 2 µV -150 to +150 mV 5 µV -300 to +300 mV 10 µV -600 to +600 mV 20 µV -1.25 to +1.25 V 40 µV -2.50 to +2.50 V 80 µV
Voltage Set Point Resolution	±1 mV (12 Bit)
Current Measurements Precision Resolution	 ±40 nA (5½-digit resolution) Measuring Range Resolution -2 to +2 mA 60 nA -4 to +4 mA 100 nA -8 to +8 mA 0.2 µA -15 to +15 mA 0.5 µA -30 to +30 mA 1 µA -60 to +60 mA 2 µA -125 to +125 mA 4 µA -250 to +250 mA 8 µA

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