



Capacitor and Battery Analyzer

Type: VK-CA-8000

- Specially designed for electric-double layer capacitors (EDLCs), battery, and solar cell research
- Source and measure up to 20V and 10A
- Versatile control software provides all necessary data analyzing tools with automated curve fitting to evaluate capacitance, power, energy of EDLCs, and capacity, cycles life testing of batteries.

Constant current charge-discharge test
 Cyclic voltammetry curve
 Self discharge analysis etc...

- Can be used as a potentiostat or a galvanostat with 4 probes



Specifications

| | |
|------------------------------------|--|
| Measurement Range | Max. Voltage: 20 V Max. Current: 10 A (pulse) 8 A (continuous) with 5½-digits measuring resolution |
| Measuring Technique | Digital Source/Measure Unit |
| Inputs | Front: 4 probes |
| A/D Converters | 24 Bit (2 independent ADCs for V & I readings) up to 30,000 SPS |
| User Interface and data collection | Computer software is provided for control of all 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 | Through a USB port |
| Power Requirement | 100 – 240 VAC (50-60 Hz) |
| Dimensions, Weight | 320 mm(W) x 450 mm(D) x 150 mm(H), 10 kg |

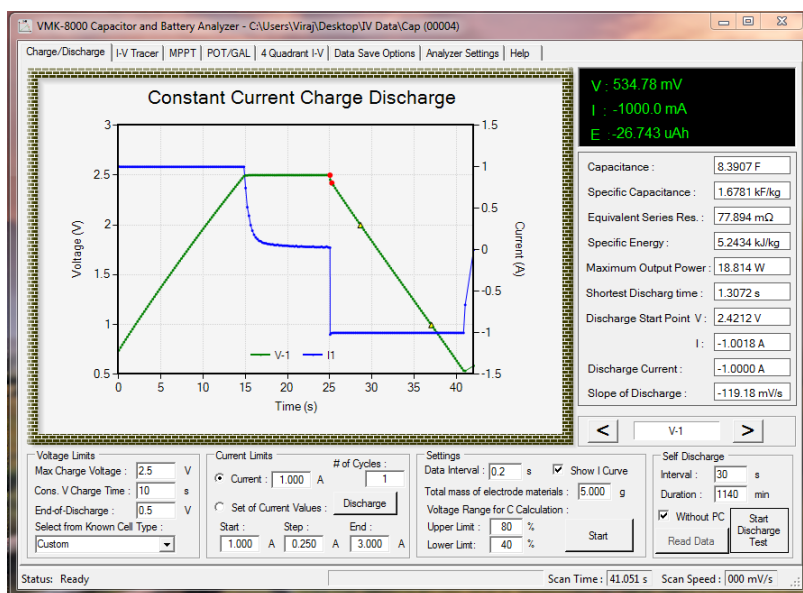
Built-in Software Features

For EDLCs Analysis:

- ✓ Measurement of constant current charge-discharge test with given voltage compliance.
- ✓ Plot cyclic voltammetry curve
- ✓ Curve fittings for ideal RC model and nonlinear real model R-CPE(Q, α).
- ✓ Calculation of energy vs. time plots
- ✓ Calculation of energy vs. power curve
- ✓ Self discharge analysis
- ✓ Cycle life testing

For Battery Analysis:

- ✓ Measurement of constant current charge-discharge curve with given voltage compliance.
- ✓ Analysis of both charge and discharge data
- ✓ Self discharge analysis
- ✓ Cycle life testing
- ✓ Limit based analyses (voltage, current, temperature, ohmic value)



Built-in Software Features

General capabilities:

- ✓ I-V tracing for solar cell
- ✓ Use as a potentiostat with 4 wires
- ✓ Use as a galvanostat
- ✓ 4-probe resistance measurement
- ✓ Use as lead-acid, Li-ion, Li polymer battery charger up to 8A and 20 V
- ✓ All data and graphs can be directly saved as Microsoft Excel files
- ✓ All measurement parameters can be saved and reloaded when needed to repeat at the same experiment.

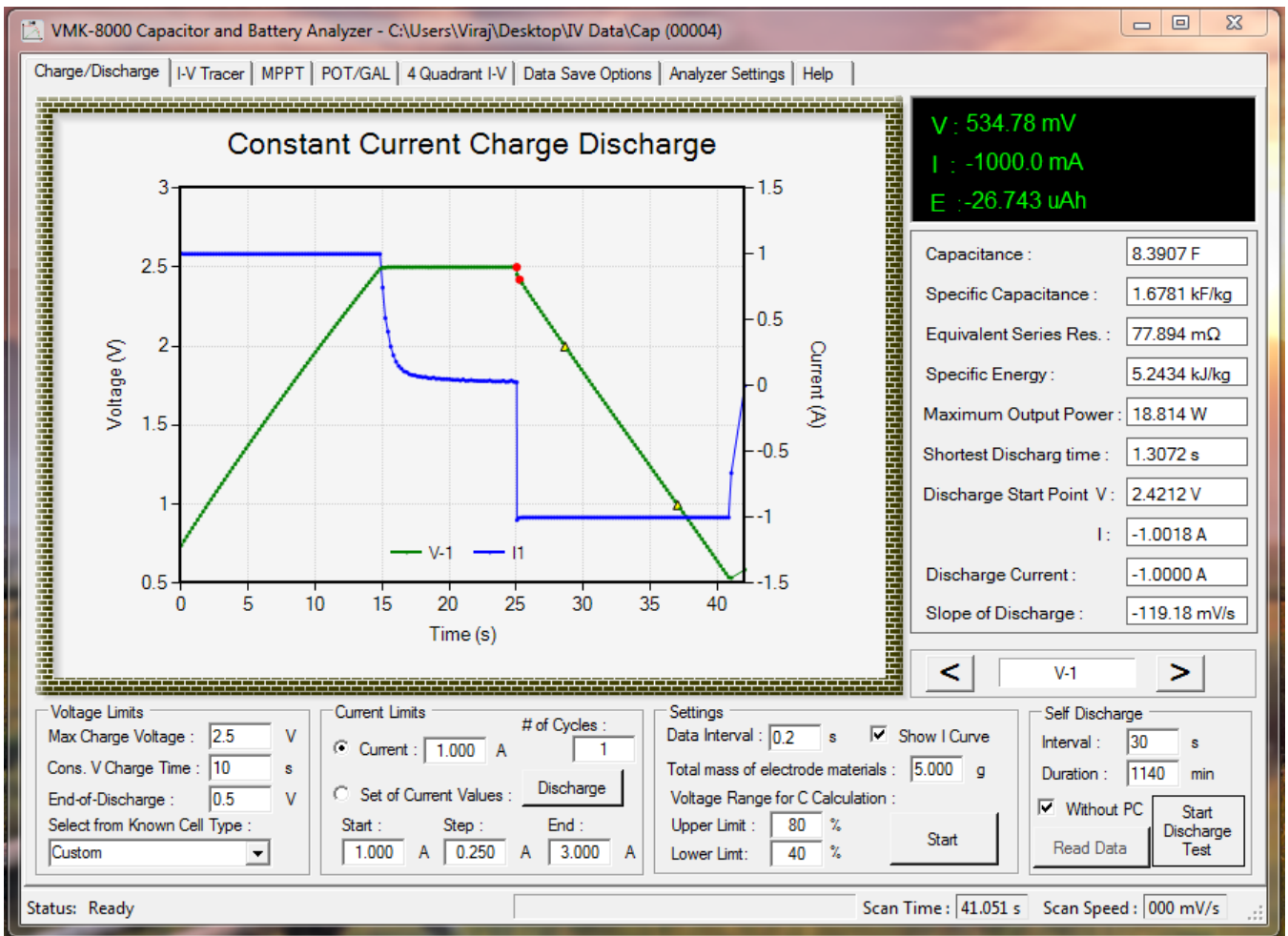
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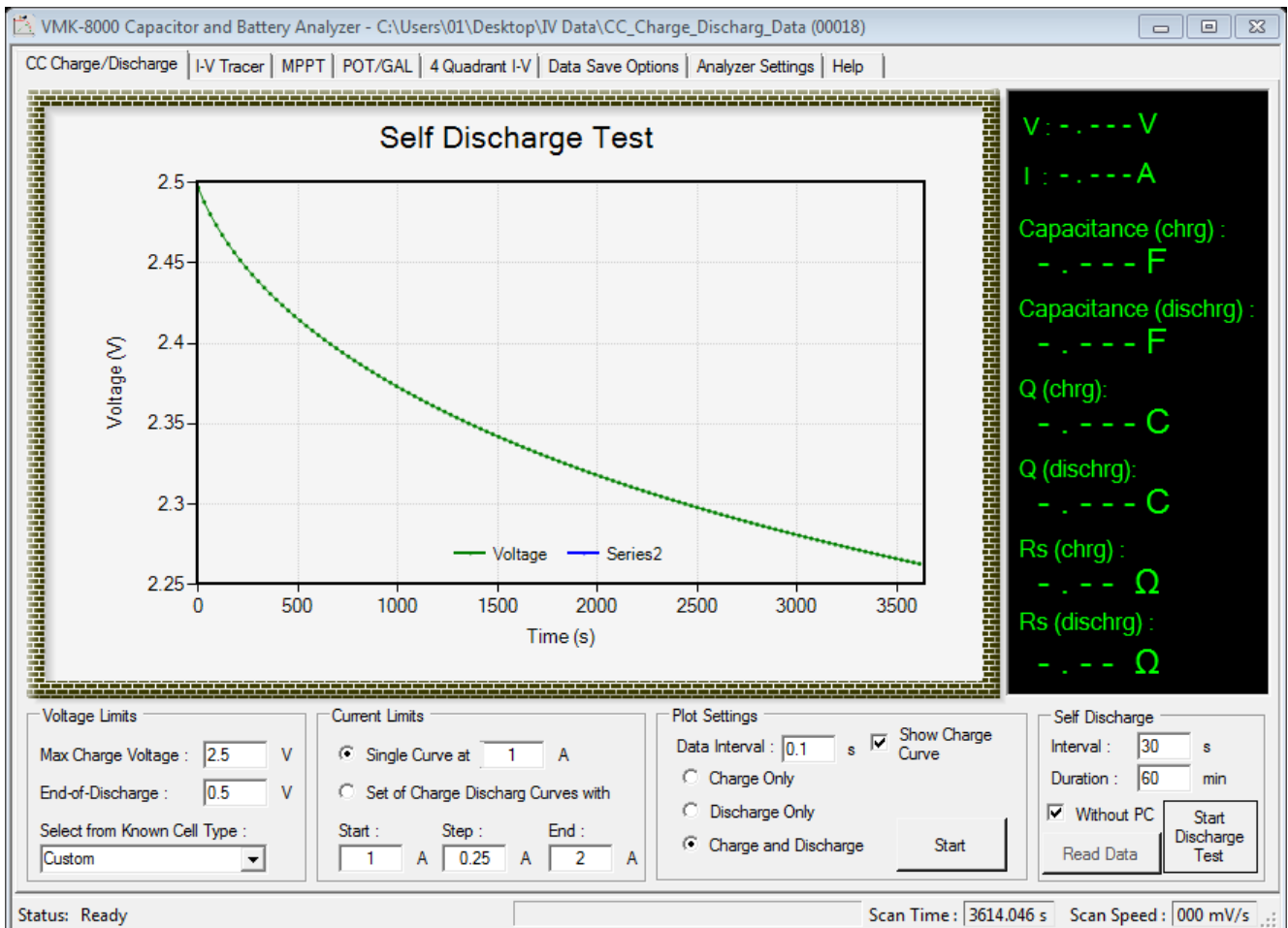
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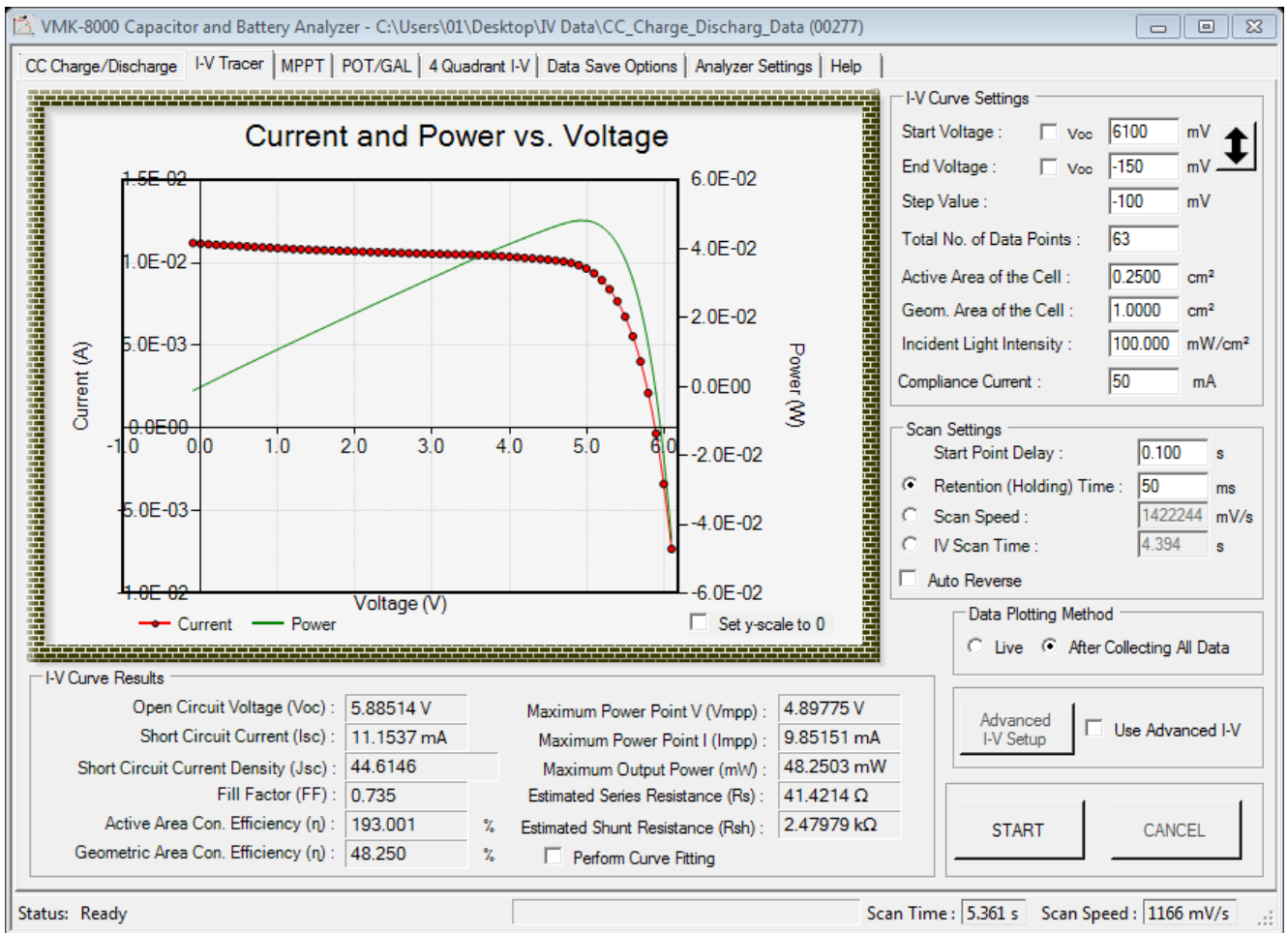
Web: <http://www.spdlab.com/English/VK-PA-25.html>



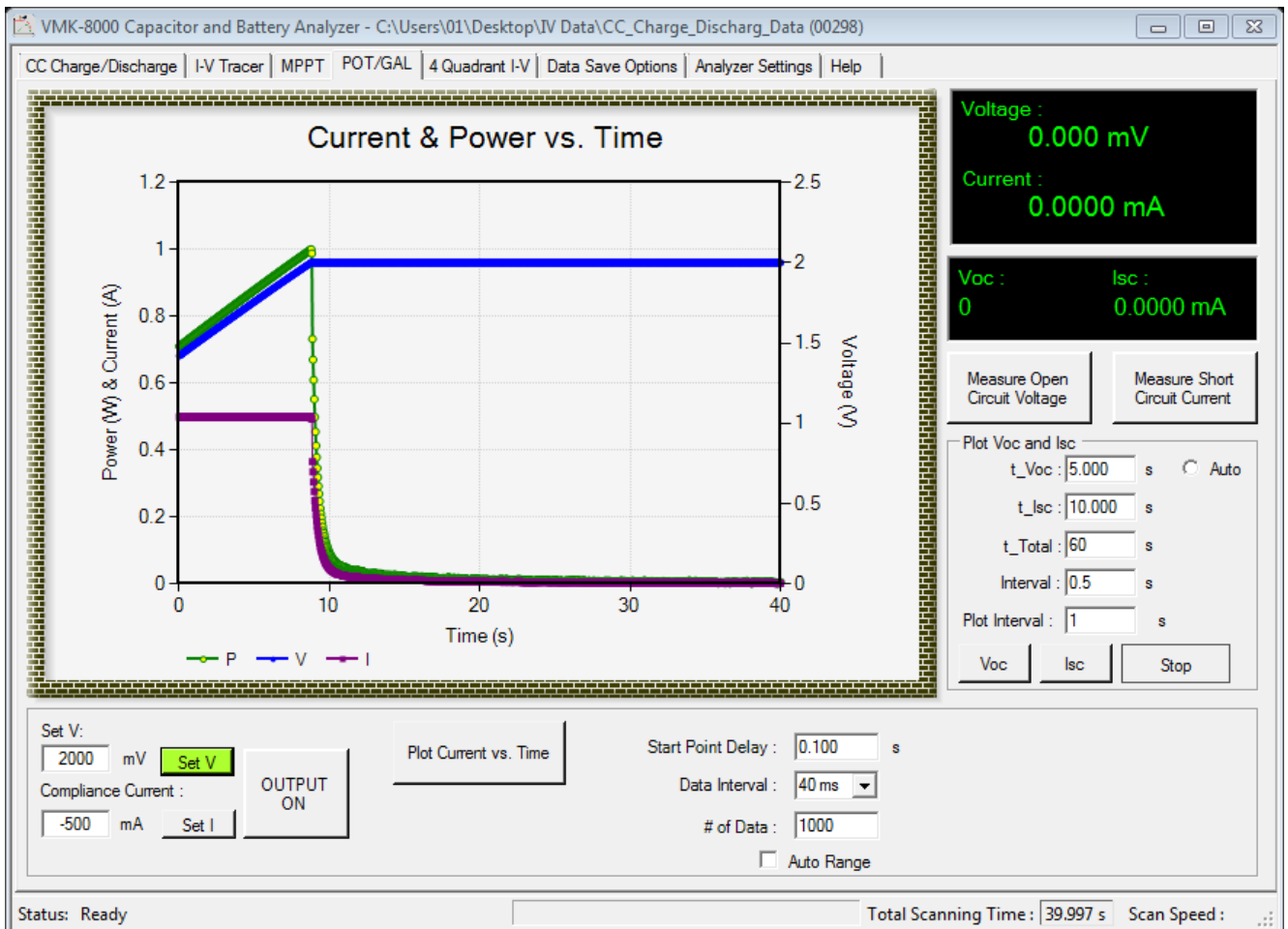
Screenshot of constant current charge discharge control panel



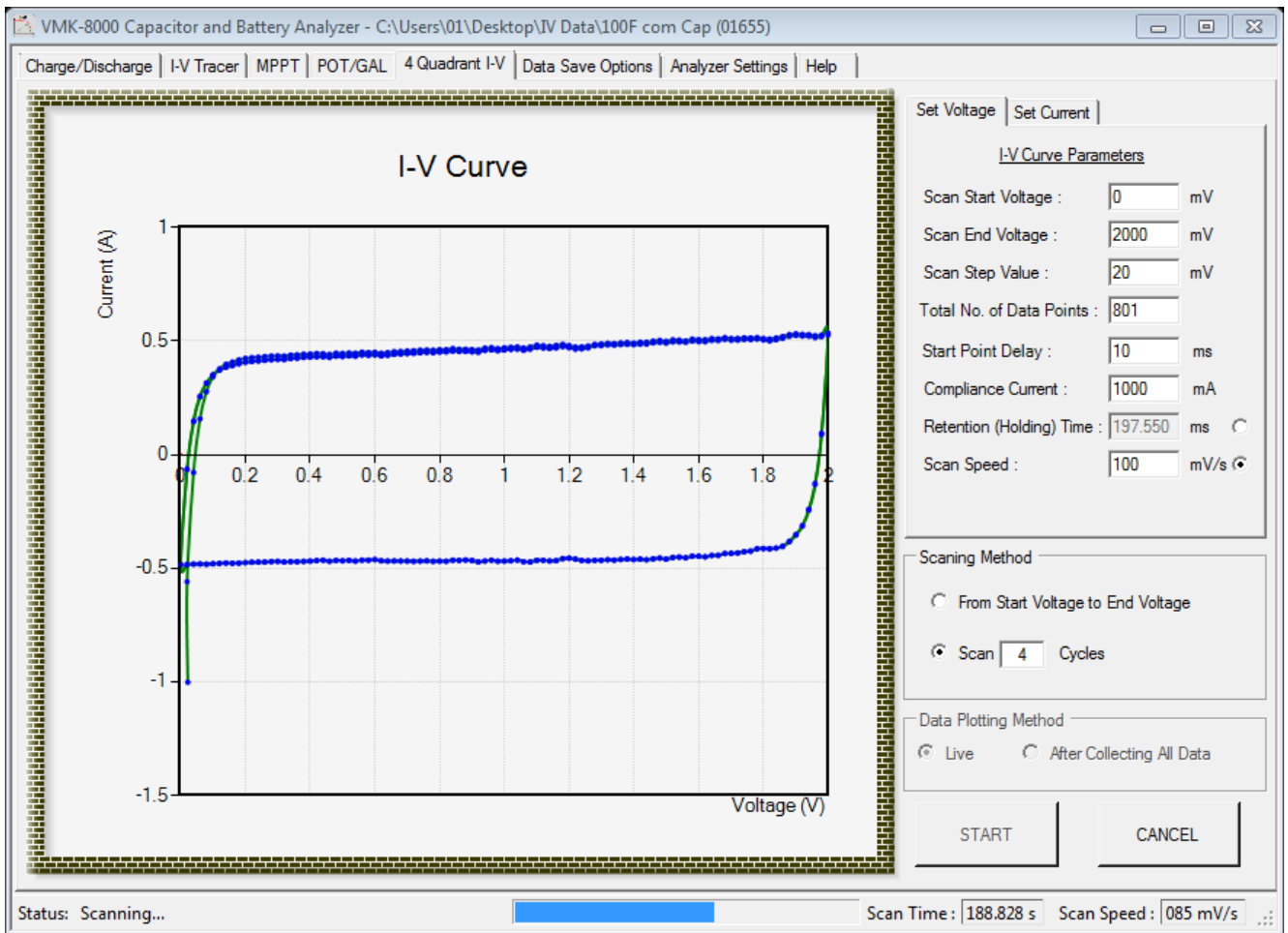
Screenshot of self discharge testing



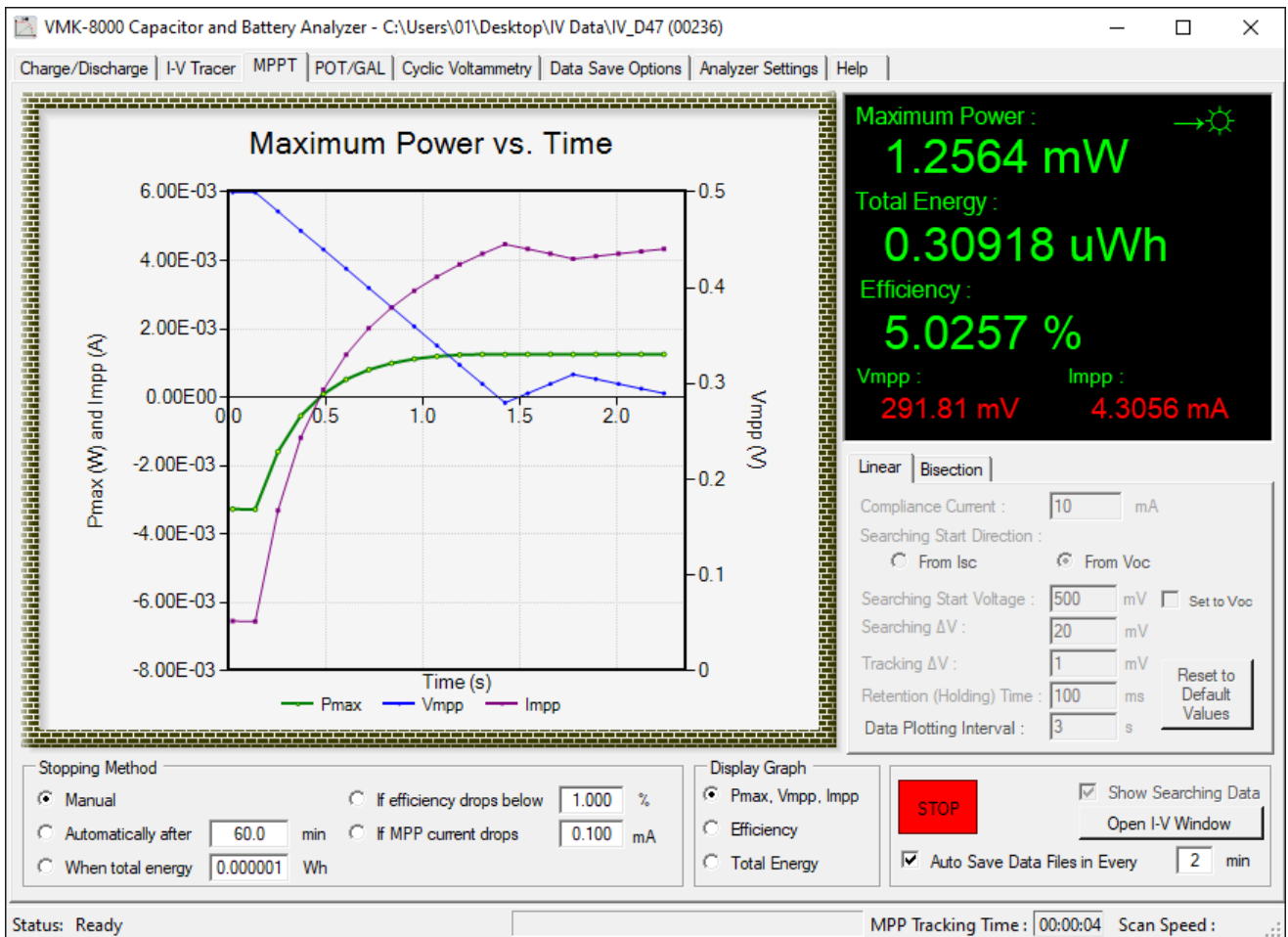
Screenshot of solar cell I-V tracing tab



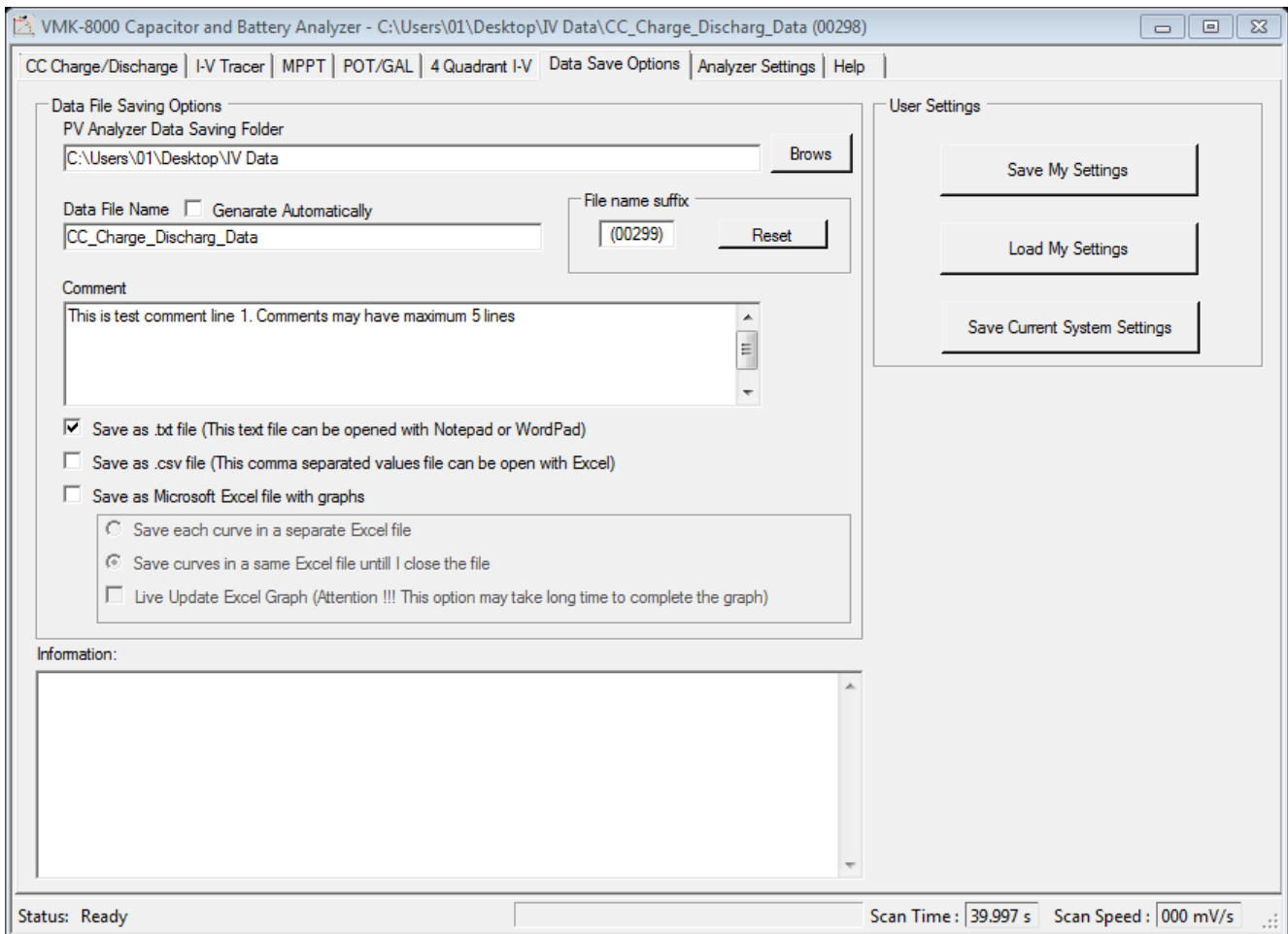
Screenshot of Galvanostat/Potentiostat tab



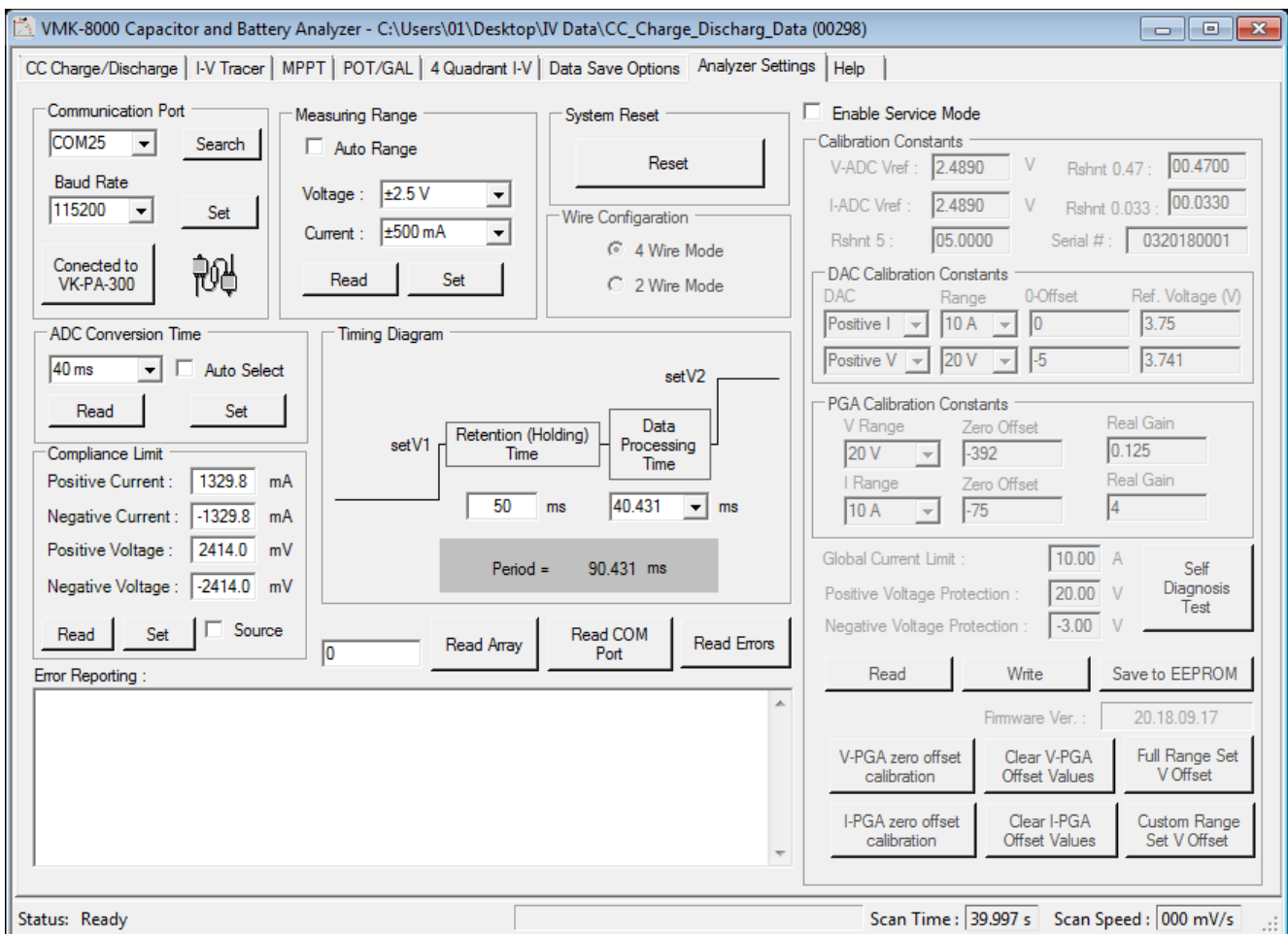
Screenshot of Cyclic Voltammetry tab



Screenshot of solar cell MPPT tab



Screenshot showing data saving options



Screenshot of "Analyzer Settings" tab



Capacitor and Battery Analyzer

VMK-8000

VMK-8000 Detailed Electrical Specifications

| | |
|---------------------------------------|--|
| Measuring Technique | Digital Source Meter with 4 probes connection to DUT. |
| Measuring Range | Voltage: -3 to +20 V Current: ± 8 A Continuous 10 A (pulse) |
| Specifications of A/D Converters | Resolution: 24 Bit Utilize on-chip digital calibration to eliminate offset and gain errors. ADC integration time can be selected from 16 different values from 400 ms to 33.3 μ s. |
| Built-in Voltage Reference Parameters | Output Voltage : 2.500 ± 0.001 V Output Voltage Drift : 3 ppm/ $^{\circ}$ C (-40 $^{\circ}$ C to +85 $^{\circ}$ C) Output Noise : 100 nV/Hz ^{1/2} |

Voltage measuring ranges and reading (24-bit ADC) resolution and voltage setting (16-bit DAC) resolutions

| Range | ± 250 mV | ± 500 mV | ± 1 V | ± 2 V | ± 4 V | ± 8 V | ± 18 V | ± 20 V |
|--------------------|--------------|--------------|--------------|--------------|--------------|-------------|-------------|--------------|
| Reading Resolution | 19 nV | 37 nV | 74 nV | 149 nV | 298 nV | 596 nV | 1.2 μ V | 2.4 μ V |
| Setting Resolution | 9.5 μ V | 9.5 μ V | 19.1 μ V | 38.1 μ V | 76.3 μ V | 153 μ V | 305 μ V | 6010 μ V |

Current measuring ranges and reading (24-bit ADC) resolution and current setting (16-bit DAC) resolutions

| Current Measuring Range | Current Reading Resolution (24-bit ADC) | Current Setting Resolution (16-bit DAC) |
|-------------------------|---|---|
| ± 15 μ A | 2 pA | 1 nA |
| ± 30 μ A | 5 pA | 1 nA |
| ± 60 μ A | 9 pA | 1 nA |
| ± 125 μ A | 18 pA | 1 nA |
| ± 250 μ A | 37 pA | 1 nA |
| ± 500 μ A | 74 pA | 19 nA |
| ± 1 mA | 148 pA | 38 nA |
| ± 2 mA | 295 pA | 76 nA |
| ± 7 mA | 887 pA | 0.9 μ A |
| ± 14 mA | 1.8 nA | 0.9 μ A |
| ± 25 mA | 3.5 nA | 0.9 μ A |
| ± 50 mA | 7.1 nA | 2 μ A |
| ± 100 mA | 14 nA | 4 μ A |
| ± 250 mA | 37 nA | 10 μ A |
| ± 500 mA | 74 nA | 19 μ A |
| ± 1 A | 148 nA | 38 μ A |
| ± 2 A | 282 nA | 144 μ A |
| ± 4 A | 564 nA | 289 μ A |
| ± 8 A | 1 μ A | 578 μ A |
| ± 18 A | 2 μ A | 1.1 mA |

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