

# How to use SAS mode to test the static MPPT efficiency and conversion efficiency of PV Inverter

Louis Wu

Feb. 17, 2012

## 1. Objective:

Chroma Solar Array Simulator is able to simulate the I-V curve of Solar Array that enables the user to test PV Inverter using this DC Source. In PV Inverter testing, Conversion Efficiency is one of the important tests. Regardless of Sandia or EN50530 standard, individual Conversion Efficiency of PV Inverter is specified to be tested under different input conditions.

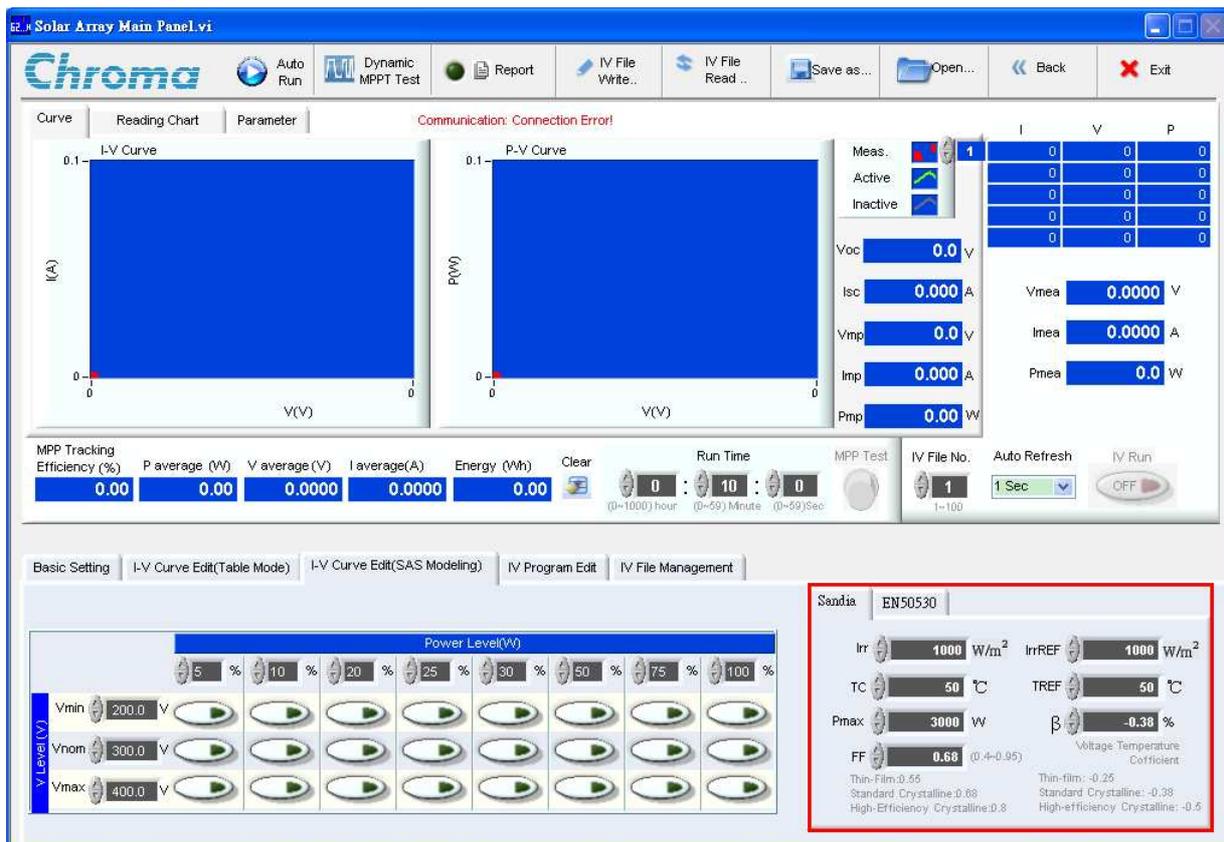
Chroma Solar Array Simulation Soft Panel has two ways to set the I-V curve for simulation, one is SAS modeling and the other is Table mode. In SAS modeling function, the user can select to follow Sandia or EN50530 standard and change difference curve for testing rapidly without stopping the output.

This document tells how to use the SAS modeling function built-in Chroma Solar Array Simulation Soft Panel.

## 2. Description:

SAS modeling will follow the selected standard to simulate I-V curve via suggested Mathematical formulas and associate parameters. Please refer to the 6 steps listed before for usage.

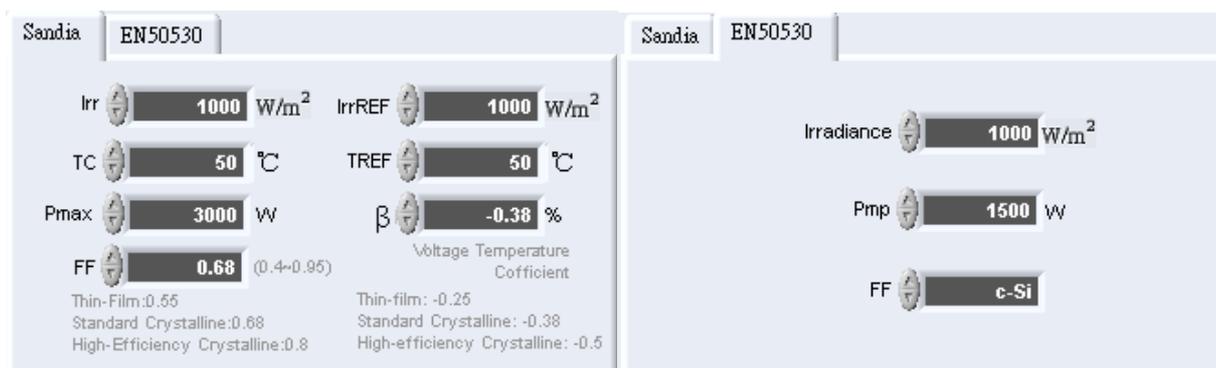
Step 1: In SAS modeling page, select Sandia or EN 50530 standard for testing.



Step 2: In Sandia standard, it needs to set Irr (Irrandance), TC (temperature), Pmax (maximum power of solar array to simulate) and FF (Fill Factor). As to IrrREF and TREF, it can use the value suggested by standard without any change.  $\beta$  can follow different FF for setting (see the table below.)

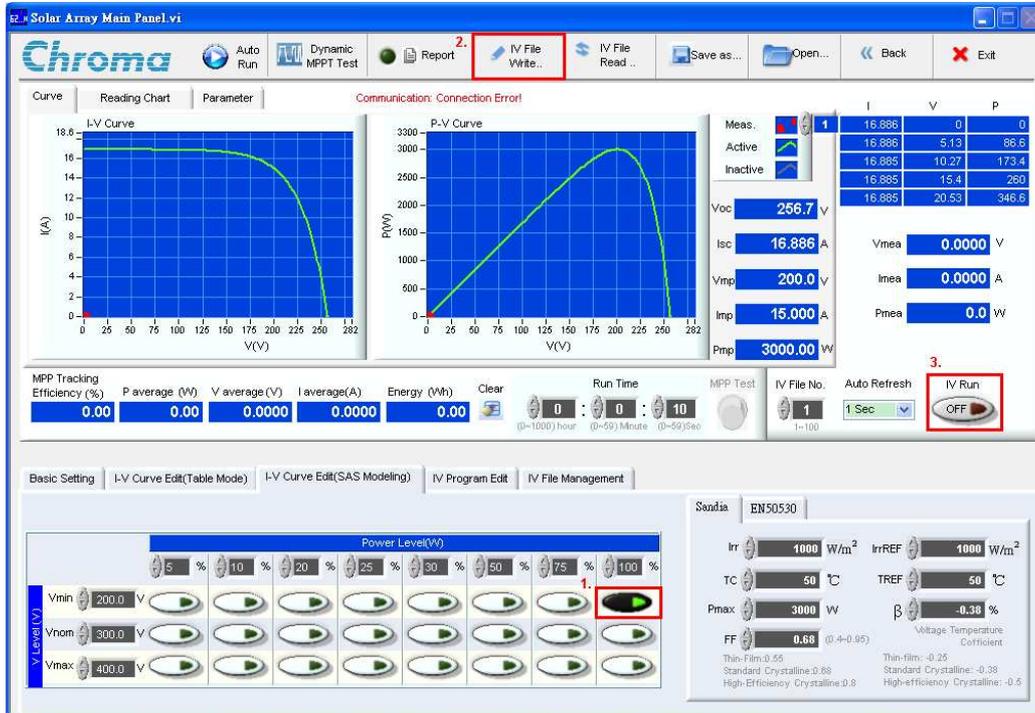
Array #	Array Type	Nominal Fill Factor* (FF)	Temperature Coefficient ( $\beta$ , %/°C)
1	Thin-film	0.55	-0.25
2	Standard Crystalline or Multi-crystalline	0.68	-0.38
3	High-efficiency Crystalline	0.80	-0.50

In EN50530 standard, only Irradiance, Pmp (max. power of solar array to simulate) and FF (Fill Factor) are required.



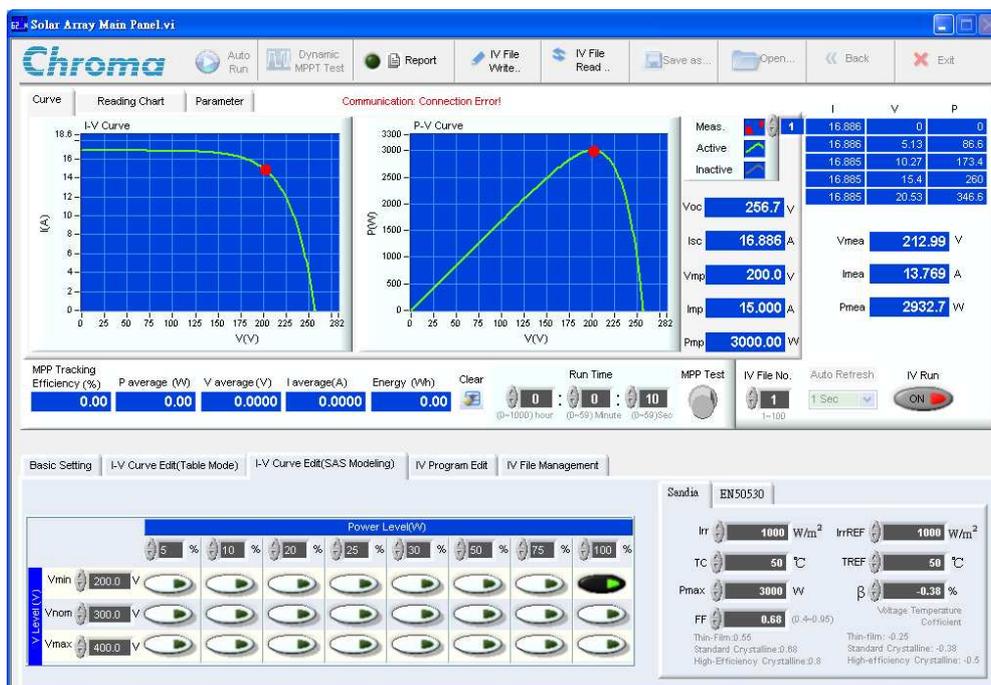
### Step 3:

1. First determine the point to be test in the V Level and Power Level table below and click the button. The upper screen will show the composed I-V Curve and P-V Curve. PS. The user can set the Power Level and V Level as desired.
2. Click "IV File Write".
3. Click "IV Run".



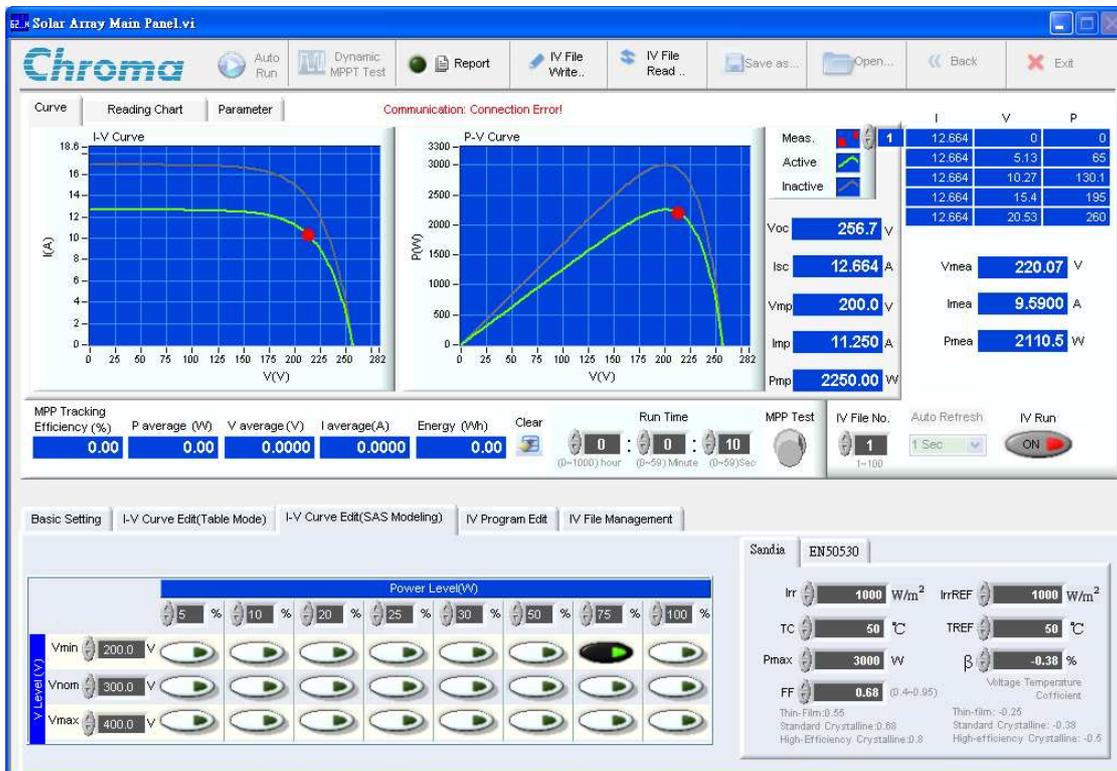
In this test step, the user can also measure the MPPT Efficiency of the point when calculating the Conversion Efficiency as long as Run Time is set. Click MPP Test and the software will calculate the MPPT Efficiency of designate point.

Step 4: The read back voltage and current will show on the I-V Curve and P-V Curve in red dot.



Step 5: Click the next test point and IV File Write, the DC Source will switch to next curve immediately.

PS. The I-V Curve and P-V Curve graphs will show two curves, one in green indicating the current output and the other is in grey to indicate the previous output.



Step 6: Later, change the point for testing as Step 5 described.

### 3. Conclusion:

The power-on time of PV Inverter often requires about 60 seconds. Both Sandia and EN50530 standard specified around 20 or more test points, and if each test point required reboot every time, the user will be wasting a lot of time waiting for power on. The value of Chroma Solar Array Simulator is that it can switch the curve online to save the testing time significantly

Chroma Solar Array Simulation Soft Panel can output I-V curve only and measure the input power and MPPT Efficiency of PV Inverter. To calculate the conversion efficiency, it needs to work with Power Meter to measure the output power of PV Inverter and dividing both can get the conversion efficiency of the test point.

Besides calculating manually, the user can also refer to Chroma 8000 PV Inverter ATS which has a platform providing flexible and powerful test functions with optimal economic benefits. In addition the supported powerful report editing, statistics analysis and management functions can form a complete tool to generate the test documents and run system management. See the follow website for detail information:

[http://www.chroma.com.tw/product/8000\\_\\_PV\\_Inverter\\_Automatic\\_Test\\_Application.htm](http://www.chroma.com.tw/product/8000__PV_Inverter_Automatic_Test_Application.htm)

The information in this document is subject to change without notice, for more Information please visit our website [www.chromaate.com](http://www.chromaate.com). Copyright 2009 Chroma ATE Inc. -All rights reserved.