How to Test The Photovoltaic Inverter using Solar Array Simulator

In the past few years, due to the large demands of solar energy, photovoltaic industry has embraced high speed development in China. However, it has presented slow increasing after booming at the very beginning with less and less demands. After the '5.31 new policy' has been enforced, it's urgent to alleviate the influences of decreased demands in a short time. So enterprises should work out how to obtain technology breakthrough or reduce costs.

ITECH always devotes to explore test technology in applications of photovoltaic industry. We work with photovoltaic corporations and help them to become stronger, more precise and finally reach up to top level. Lately, ITECH will bring to market new product series, IT6000B/C/D with high performance, high voltage, high power density. You'll find in this article how they are well applied to the test of photovoltaic inverters.

1. Solar array simulation power supply-- IT6000C/B + SAS1000

Photovoltaic inverter is a special inverter that is designed for photovoltaic power generation. Given that the utility rate of solar cell is not only affected by its natural features, but also influenced by climate, seasons, temperature, sunshine, cloud shadow, rain, snow and so on. It will show different I-V curve in different time. Therefore, a PV inverter must have solutions to deal with all these abnormal situations and keep the solar cell always working under the maximum power point. The efficiency of PV inverter is the key factor to whole PV generation system. Because it decides the long term profit of the system. Based on this, the simulator needs to simulate the output of different kinds of solar cells, simulate I-V curves in different temperatures and sunshine, generate new climate report flexibly and show irradiance changes with high resolution and speed.

Features:
1. Supported by SAS1000,it is fast responsive, controllable, repeatable, stable and precise.
2. With the built-in EN50530 & Sandia SAS template, it is simple and convenient to set the parameters, such as regulations compliance, materials, Vmp and Pmp, etc. Then the I-V curve can be generated.
3. Table mode enables you to choose 4096 points of curves or save 100 I-V curves generated under different temperatures and sunshine. The operation order and time of each curve can be set too.
4. Shadow mode enables you to edit any shadow I-V curves and get the dynamic shield effect.
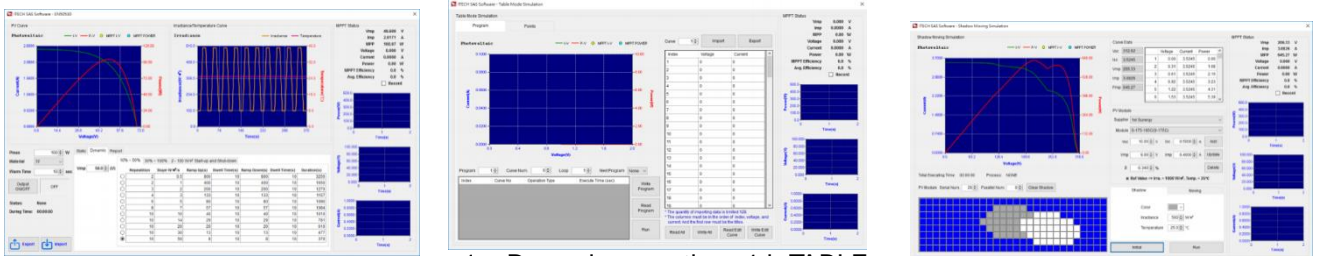
1.a Dynamic operation; 1.b TABLE mode table operation; 1.c SHADOW mode shadow operation

Applications:

1. Design and verify MPPT of PV inverter
2. Verify the max and min input voltage allowed
3. Verify the max and min input voltage allowed under MPP
4. Verify maximum power tracking under static situation
5. Verify the utility of maximum power tracking(with built-in EN50530,Sandia,NB/T32004,CGC/GF004, CGC/GF035 regulation compliance)
6. Verify the utility of maximum power tracking from morning to dusk
7. Verify the I-V curves of maximum power tracking when the solar cell is shield by cloud or trees

Lately, all the top PV inverter manufacturers in the world focus on research of high voltage, multi-channel inverters. And ITECH IT6000 B/C/D are just the products with high voltage, high power and in addition, they can be parallel connected by fiber. At present, the maximum output voltage is 2250 V, maximum output power is 1152 kW. The unique fiber parallel technology supports the test of multi-channel with low power or single channel with high power inverters.

1、 Battery simulator —— IT6000B/C

Thanks to the solar power and other distributed power, the grid power is not the only power source any more. However, when the load is small, we need energy storage device to save the power collected by solar panels. We need to save the energy and prepare back up for rush hours of energy consumption. There are many ways to store energy, e.g. physical energy storage, chemical energy storage, mechanical energy storage etc. The most common way is store energy in battery. Since it is not flexible or reliable enough to use real battery to test, so it's necessary for engineers to have a battery simulator. IT6000B is a high power, high power density DC power supply integrated with source and load functions. It can simulate the charging and discharging of battery efficiently and smartly. Meanwhile, it can feed energy back to the grid with the high efficiency up to 95%, which reduces energy consumption. Above all, it is a high efficient, energy saving and environmental friendly battery simulator.

Fig 2. Bi-directional, seamless switching