Solar Array Simulator

KEY FEATURES

- Voltage range : 0 ~600V&1000V
- 3U/15kW high power density module with easy master/slave parallel operation up to 150kW
- Fast transient response solar array simulation
- Simulation of multiple solar cell material's I-V characteristic (fill factor)
- Simulation of dynamic irradiation intensity and temperature level from clear day to cloud cover conditions
- Shadowed I-V curve output simulation
- Low leakage current (< 3mA)
- Precision V & I measurements
- Auto I-V program: 100 I-V curves & Dwell time 1-15,000s
- Static & dynamic MPPT efficiency test
- Data recorded via softpanel
- Standard USB / RS232 / RS485 interface
- Optional GPIB / Ethernet interface
- Real time analysis of PV inverter's MPPT tracking via softpanel
- Free graphic user interface - softpanel for operation

APG | RS-485 | RS-232 | Ethernet | GPIB | USB CE

The latest programmable solar array simulator power supply 62150H-600S&1000S released by Chroma provides simulation of Voc (open circuit voltage) up to 1000V and Isc (short circuit current) up to 25A. The 62150H provides an industry leading power density in a small 3U high package. The solar array simulator is highly stable and has a fast transient response design, which are both advantageos to MPPT performance evaluation on PV inverter devices.

The 62150H-600S/1000S has many unique advantages including high speed & precision digitizing measurement circuits with a 100kHz A/D, 25kHz D/A controlled I-V curve and a digital filter mechanism. It can simulate an I-V curve accurately and clear the mains ripple effect from the PV inverter. In addition, the built-in SAS I-V model in the standalone unit can easily program the Voc, Isc, Vmp, and Imp parameters for I-V curve simulation, without a PC controller.

The real solar array is influenced by various weather conditions such as irradiation, temperature, rain and shade by trees or clouds, which will affect the I-V curve output. The 62150H-600S/1000S is capable of storing up to 100 I-V curves into the simulator memory, with a programmed time interval range of 1-15,000 seconds. It can simulate the I-V curve from the early morning to nightfall for PV inverter testing or dynamic I-V curve transient testing.

The 62150H-600S/1000S has a built-in 16 bit digital control and precision voltage & current measurement circuits with a voltage accuracy of 0.05%+0.05%FS and a current accuracy of 0.1%+0.1%F.S. It is ideal for real time MPPT analysis and tracking monitoring for PV inverters through our softpanel. The user can also enable the data recording function on the softpanel during the static MPPT performance test.

When high power solar array simulation is required it is common to connect two or more power modules in parallel. The 62150H-600S/1000S with a current range up to 25A and a voltage range up to 1000V offers a high power density envelope maximum of 15KW in a 3U package. It can easily parallel up to ten units in a Master/Slave configuration to provide 150kW with current sharing and synchronized control signals for commercial PV inverter (10kW – 100kW) testing. The 62000H series supplies have a smart Master/Slave control mode that makes the parallel operation fast and simple. In this mode, the master scales values and downloads data to slave units so that the programming is as simple as using a standalone unit.

The 62000H series dc power supplies are very easy to operate from the front panel keypad or from the remote controller via USB / RS232/ RS485/APG (standard) and GPIB & Ethernet (optional). Its compact size (3U) makes it ideal for both benchtop and standard racking.

Master/Slave Parallel
Operation - 150kW

ORDERING INFORMATION

Power Rating	62000H Series Programmable DC Power Supply
5KW	*62050H-600S : Programmable DC Power Supply 600V/8.5A/5KW with Solar Array Simulation
10KW	*62100H-600S : Programmable DC Power Supply 600V/17A/10KW with Solar Array Simulation
15KW	62150H-600S : Programmable DC Power Supply 600V/25A/15KW with Solar Array Simulation
15KW	62150H-1000S : Programmable DC Power Supply 1000V/15A/15KW with Solar Array Simulation
Options	A620024 : GPIB Interface for 62000H series (Factory installed)
Options	A620025 : Ethernet Interface for 62000H series (Factory installed)
Options	A620026 : Rack Mounting kit for 62000H series

Note 1 : Please specify GPIB or Ethernet Interface (alternative) at time of order.
Note 2 : All models output power are available for 380/400Vac line voltage.
Note 3 : Call for more information on customization of high power system (>150KW)
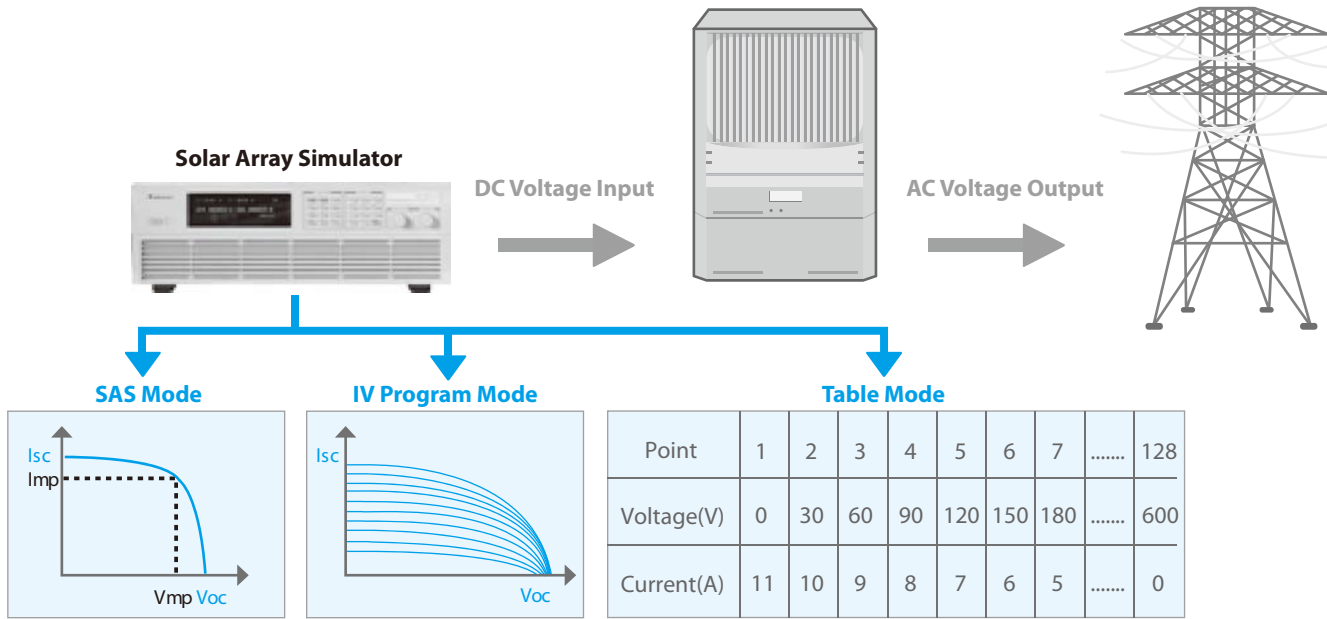***** Call for Availability.

Programmable DC Power Supply

Model 62150H-600S/1000S

Photovoltaic Test Equipment

Semiconductor/IC Test Equipment

LED Test Equipment

LCD/LCM Test Equipment

Video & Color Test Equipment

Optical Inspection Equipment

Power Electronics Test Equipment

Passive Component Test Instruments

Electrical Safety Test Instruments

General Purpose Test Instruments

PXI Instruments & Systems

Solar Array I-V Curve Simulation Power Supply

The Model 62150H-600S/1000S has a built in SAS model that can easily program the Voc, Isc, Vmp, Imp parameters to simulate different solar cell materials I-V characteristic outputs with fast response time. Moreover, the TABLE mode is capable of saving a 128 point array of user programmed voltages and currents via a remote interface. It can easily create a shadowed I-V curve and the I-V PROGRAM mode can save up to 100 I-V curves and dwell time intervals (1-15,000s) in memory. These advantages provide steady repetitive control conditions required for PV Inverter design as well as for verification testing. The solar array simulator is ideal for the following testing:

■ Design and verify the maximum power tracking circuit and algorithm of the PV inverter
■ Verify the high/low limit of operating input voltage allowed for the PV inverter.
■ Verify the high/low limit of operating input voltage allowed for the inverter's maximum power point
■ Verify the static maximum power point tracking efficiency of the PV inverter.
■ Measure and verify the overall efficiency & conversion efficiency of PV inverter. *
■ Verify the maximum power point tracking performance of the inverter for dynamic curves
■ Verify the maximum power point tracking performance of the inverter under different time period conditions spanning from morning to nightfall
■ Verify the maximum power point tracking mechanism of the inverter for the I-V curve when the solar array is shaded by clouds or trees
■ Simulate the I-V curve under the actual environmental temperatures within burn-in room to do inverter burn-in testing.

*Requires an extra power meter

Solar Array Simulator → **DC Voltage Input** → **AC Voltage Output**

SAS Mode   IV Program Mode   Table Mode

| Point	1	2	3	4	5	6	7	....	128
Voltage(V)	0	30	60	90	120	150	180	....	600
Current(A)	11	10	9	8	7	6	5	....	0

Solar Array I-V Curve Simulation Softpanel

The model 62150H-600S/1000S includes a graphical user Interface software through remote digital interface (USB / GPIB / Ethernet / RS232) control. The user can easily program the I-V curve of the62150H-600S/1000S as well as the I-V & P-V curve for real-time testing. In addition it will display the MPPT status for the PV inverter. Readings and the report function with real-time monitoring using the softpanel are shown below.

Simulates different solar cell materials I-V characteristic (Fill factor)

The purpose of the PV inverter is to convert the dc voltage (from solar array) to the ac power (utility). The better a PV inverter can adapt to the various irradiation & temperature conditions of sun, the more power that can be fed into the utility grid over time. So, the MPPT performance is a very important factor for PV generation system. The model 62150H-600S/1000S is capable of simulating different types of standard crystalline, multi-crystalline and thin-film fill factor* parameters to verify the MPPT tracking algorithm mechanism and efficiency.
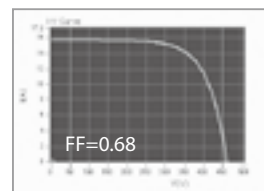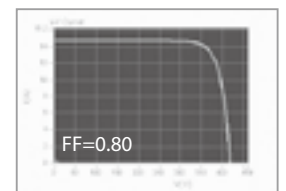
*Fill Factor = (Imp*Vmp)/(Isc*Voc)
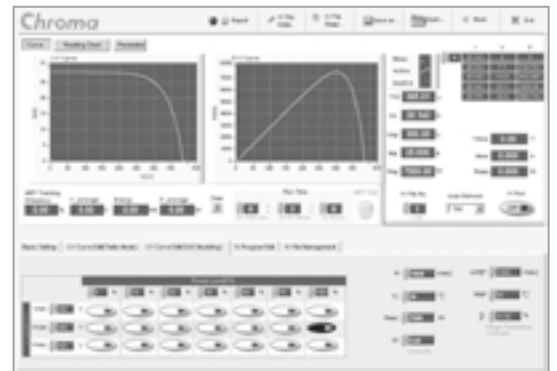
Solar Array Simulation SoftPanel
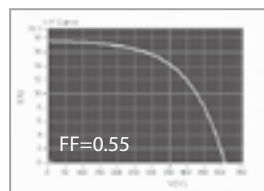
FF=0.55 Thin-Film   FF=0.68 Standard Crystalline Array   FF=0.80 High-efficiency Crystalline

ELECTRICAL SPECIFICATIONS-WITH SOLAR ARRAY SIMULATION				
MODEL	62050H-600S*1	62100H-600S*1	62150H-600S	62150H-1000S
Output Ratings				
Output Voltage	0-600V	0-600V	0-600V	0-1000V
Output Current	0-8.5A	0-17A	0-25A	0-15A
Output Power	5000W	10000W	15000W	15000W
Line Regulation				
Voltage	+/- 0.01% F.S.			
Current	+/- 0.05% F.S.			
Load Regulation				
Voltage	+/- 0.05% F.S.			
Current	+/- 0.1% F.S.			
Voltage Measurement				
Range	120V / 600V	120V / 600V	120V / 600V	200V / 1000V
Accuracy	0.05% + 0.05%F.S.			
Current Measurement				
Range	3.4A / 8.5A	6.8A / 17A	10A / 25A	6A / 15A
Accuracy	0.1% + 0.1%F.S.			
Output Noise&Ripple				
Voltage Noise(P-P)	1500 mV	1500 mV	1500 mV	2550 mV
Voltage Ripple(rms)	650 mV	650 mV	650 mV	1950 mV
Current Ripple(rms)	150 mA	300 mA	450 mA	270mA
OVP Adjustment Range				
Range	0-110% programmable from front panel, remote digital inputs.			
Accuracy	+/- 1% of full-scale output			
Programming Response Time				
Rise Time: 50%F.S. CC Load	30ms	30ms	30ms	25ms
Rise Time: No Load	30ms	30ms	30ms	25ms
Fall Time: 50%F.S. CC Load	30ms	30ms	30ms	25ms
Fall Time: 10%F.S. CC Load	100ms	100ms	100ms	80ms
Fall Time: No Load	1.2s	1.2s	1.2s	3s
Slew Rate Control				
Voltage Slew Rate Range	0.001V/ms - 20V/ms	0.001V/ms - 20V/ms	0.001V/ms - 20V/ms	0.001V/ms - 40V/ms
Current Slew Rate Range	0.001A/ms - 0.1A/ms, or INF	0.001A/ms - 0.1A/ms, or INF	0.001A/ms - 0.1A/ms, or INF	0.001A/ms - 0.1A/ms, or INF
Minimum Transition Time	0.5ms			
Transient response time	Recovers within 1ms to +/- 0.75% of steady-state output for a 50% to 100% or 100% to 50% load change(1A/us)			
Efficiency	0.87(Typical)			
Programming & Measurement Resolution				
Voltage (Front Panel)	10 mV	10 mV	10 mV	100mV
Current (Front Panel)	1mA	1mA	1mA	1mA
Voltage (Digital Interface)	0.002% of Vmax			
Current (Digital Interface)	0.002% of Imax			
Voltage (Analog Interface)	0.04% of Vmax			
Current (Analog Inteface)	0.04% of Imax			
Programming Accuracy				
Voltage (Front Panel and Digital Interface)	0.1% of Vmax			
Current (Front Panel and Digital Interface)	0.3% of Imax			
Voltage (Analog Interface)	0.2% of Vmax			
Current (Analog Interface)	0.3% of Imax			
Parallel Operation*2	Master / Slave control via CAN for 10 units up to 150KW. (Parallel: ten units)			
Auto Sequencing (I-V program)				
Number of program	10			
Number of sequence	100			
Dwell time Range	1s - 15,000S			
Trig. Source	Manual / Auto			

Note*1 : Call for Availability.
Note*2 : There is parallel mode for DC power supply when the I-V curve function is enabled.

GENERAL SPECIFICATIONS				
MODEL	**62050H-600S*1**	**62100H-600S*1**	**62150H-600S**	**62150H-1000S**
Remote Interface				
Analog programming	Standard			
USB	Standard			
RS232	Standard			
RS485	Standard			
GPIB	Optional			
Ethernet	Optional			
System bus(CAN)	Standard for master/slave control			
GPIB Command Response Time				
Vout setting	GPIB send command to DC source receiver <20ms			
Measure V&I	Under GPIB command using Measure <25ms			
Analog Interface (I/O)				
Voltage and Current Programming inputs (I/P)	0-10Vdc / 0-5Vdc / 0-5k ohm / 4-20 mA of F.S.			
Voltage and Current monitor output (O/P)	0-10Vdc / 0-5Vdc / 4-20mA of F.S.			
External ON/OFF (I/P)	TTL:Active Low or High(Selective)			
DC_ON Signal (O/P)	Level by user define. (Time delay = 1 ms at voltage slew rate of 10V/ms.)			
CV or CC mode Indicator (O/P)	TTL Level High=CV mode ; TTL Level Low= CC mode			
OTP Indicator (O/P)	TTL: Active Low			
System Fault indicator(O/P)	TTL: Active Low			
Auxiliary power supply(O/P)	Nominal supply voltage : 12Vdc / Maximum current sink capability: 10mA			
Safety interlock(I/P)	Time accuracy: <100ms			
Remote inhibit(I/P)	TTL: Active Low			
Auto Sequencing(List Mode)				
Number of program	10			
Number of sequence	100			
Dwell time Range	5ms - 15000S			
Trig. Source	Manual / Auto / External			
Auto Sequencing (Step Mode)				
Start voltage	0 to Full scale			
End voltage	0 to Full scale			
Run time	10ms - 99hours			
Input Specification				
AC Input Volatage 3Phase, 3Wire+Ground	380/400 Vac (Opevating Rang 342 - 440 Vac)			
AC Fequency range	47 ~ 63Hz			
Max Current (each phase) 380/400Vac	22A	37A	50A	50A
General Specification				
Maximum Remote Sense Line Drop Compensation	2% of full scale voltage per line (4% total)			
Operating Temperature Range	$0^0C \sim 40^0C$			
Storage Temperature Range	$-40^0C \sim +85^0C$			
Dimension (HxWxD)	132.8 mm x 428 mm x 610 mm / 5.23 x 16.85 x 24.02 inch			
Weight	Approx. 23 kg / 55.06 lbs	Approx. 29 kg / 63.88 lbs	Approx. 35 kg / 77.09 lbs	Approx. 35 kg / 77.09 lbs
Approval	CE	CE	CE	CE

Note*1 : Call for Availability

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