SWITCHING POWER SUPPLY AUTOMATIC TEST SYSTEM

The Chroma Automatic Power Supply Test system Model 8000 is the ultimate solution for power electronic testing. The system includes a wide range of hardware choice such as AC/DC Sources, Electronic Loads, DMM, Oscillate Scope, Noise Analyzer and OVP/Short Tester. This flexibility combined with its open architecture software platform -PowerPro III, gives users a flexible, powerful and cost effective test system for almost all types of power supply testing.

The C8000 test system uses a unique test command optimization technology to prevent repetitive control commands from being sent to the system hardware devices. This improve test speed dramatically and makes the Chroma 8000 an ideal choice for both high speed production applications as well as design verification.

The C8000 test system includes a sophisticated test executive which includes

pre-written test items covering almost all industry standard power supply tests. User may also create new test items by using a special test item editing function. This gives users the capability to expand the test library unlimitedly.

PowerPro III also includes powerful report, statistic and management functions, making the system capable to generate various test documents and performing system administration. Because the test and statistical reports are critically important in modern factories for R/D evaluation, QA verification and production tests, these functions are an integral part of the system.

Working under Window98/2000/XP the model 8000 provides test engineers with a dedicated power supply test system in an easy-to-learn Windows environment and allow access to resources provided by Windows.

MODEL 8000

Key Features :

- Open architecture software
  - Expandable hardware support
  - Support GPIB instruments & RS232/RS485/I2C interface
  - User editable test library
  - User editable test programs
  - User editable reports
  - Statistic report
  - On-Line Softpanel
  - User authority control
  - Release control
  - Activity log
  - Multi-UUT test capability for single-output PSU
  - Support Barcode reader
  - Support Web-cam for remote monitoring via Internet
- Capable of testing almost any power supply or related device
- Comprehensive hardware modules provide high accuracy and repetitive measurements
- High test throughput by system default test items
- Microsoft Word based evaluation report or UUT characterization
- Cost effective
- Other hardware expandable upon request
- Windows98/2000/XP based software

Chroma

Comprehensive Test Items

The Model 8000 automatic power supply test system comes standard with an off-the-shelf test item library covering most industry standard power supply tests. Unlike traditional ATE software, users do not need to have programming language background to create new test items. Instead the Model 8000 allow users to use pre-compiled test items and to simplify defining test conditions and specifications.

The comprehensive test items cover 7 categories of power supply testing requirements. OUTPUT PERFORMANCE checks the general performances of the UUT. INPUT CHARACTERISTIC verifies the input parameters of a power supply. REGULATION tests the stability of the UUT under varying line-in and loading changes. TIMING AND TRANSIENT measures the transient state during turn-on, turn-off or when events occurred. PROTECTION TESTS triggers the protection circuit of the power supply. Finally, the SPECIAL TEST and the SPECIAL FEATURES provides means to test the most sophisticated power supplies when unique test routines are needed.

OUTPUT PERFORMANCES
1. DC output voltage
2. DC output current
3. Peak-Peak noise
4. RMS noise
5. Current ripple
6. Efficiency
7. In-test adjustment
8. Power good signal
9. Power fail signal
10. P/ S ON signal
11. Extended measure
12. Waveform capture
13. Overshoot voltage

INPUT CHARACTERISTICS
14. Inrush current
15. Input RMS current
16. Input peak current
17. Input power
18. Current harmonics against regulations
19. Input power factor
20. Input voltage ramp (brownout)
21. Input freq. ramp
22. AC cycle drop out
23. PLD simulation

REGULATION TESTS
24. Current regulation
25. Voltage regulation
26. Combine regulation
27. Total regulation

TIMING AND TRANSIENT
28. Power on sequence
29. Power off sequence
30. Transient response time
31. Transient spike
32. Turn ON time
33. Rise time
34. Fall time
35. Hold-up time
36. Extra timing
37. Tracking
38. Swing check

PROTECTION TESTS
39. Short circuit
40. OV protection
41. UV protection
42. OL protection
43. OP protection

SPECIAL TESTS
44. Fan speed
45. Auto alignment test*
46. Correlation test
47. UUT measurement verification test*
48. High di/ dt loading test

SPECIAL FEATURE
49. Can bus read/ write
50. I^2 C read/ write
51. GPIB read/ write
52. RS-232 read/ write
53. RS-485 read/ write
54. TTL signal control
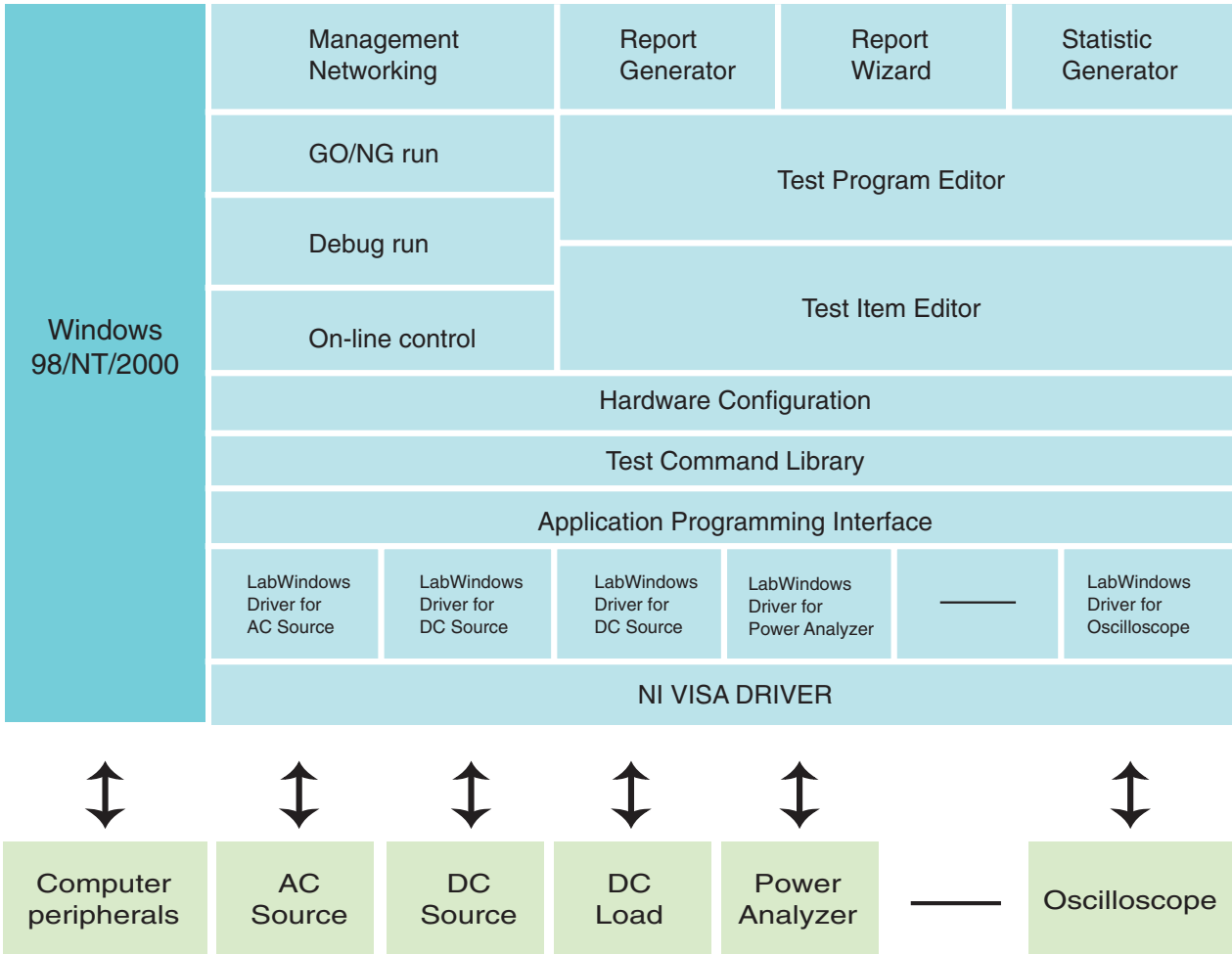55. Relay control
56. Bar code scan*
57. DMM measure

*These test items need to be created by users by using test item editor due to the variety of the UUTs.
And unlimited customized or user defined test items are allowed.
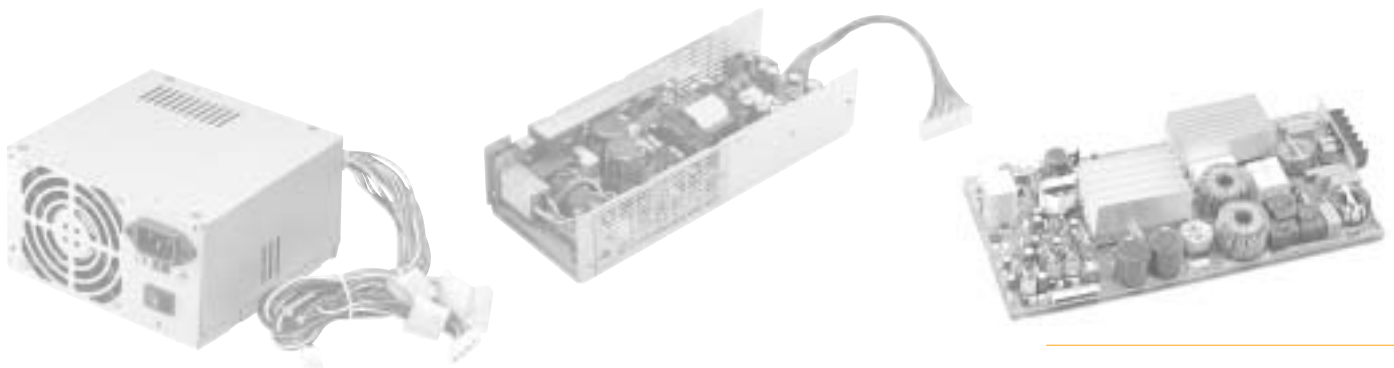
New Millennium ATS Software Platform

The Model 8000 Test Systems include the industries most sophisticated power supply testing software platform, PowerPro III. PowerPro III provides users with an open software architecture suited for a wide range of applications and devices.

Power Pro III is a windows 98/2000/XP environment which provides necessary computer peripherals.

Windows 98/NT/2000	Management Networking	Report Generator	Report Wizard	Statistic Generator
	GO/NG run	Test Program Editor		
	Debug run	Test Item Editor		
	On-line control			
	Hardware Configuration			
	Test Command Library			
	Application Programming Interface			
	LabWindows Driver for AC Source / LabWindows Driver for DC Source / LabWindows Driver for DC Source / LabWindows Driver for Power Analyzer / —— / LabWindows Driver for Oscilloscope			
	NI VISA DRIVER			

Computer peripherals ⇕ AC Source ⇕ DC Source ⇕ DC Load ⇕ Power Analyzer ⇕ —— Oscilloscope ⇕

Maximum flexibility and expendability

NI VISA Driver

National Instrument VISA driver are used by PowerPro III to allow support to almost any instrument which uses VXI/PXI/GPIB/RS-232/RS-485 interface protocols. As a result, users do not have yo concerned about which interface is provided by individual instrument that may want to intergrate into system. By using these standard instrument drivers PowerPro III can incoporated almost any modern test device.

Higher compatibility

Application Programming Interface

When users want to change the equipment from one brand to the others, for traditional ATS design, users are prohibited to do that. The main problem is caused by the different format of the remote commands. Chroma PowerPro III provides a unique application programming interface which interprets the different remote commands of various instrument to a standard format. Thus, if the functions of two equipment are identical, even manufactured by two different suppliers, they still can be replaced directly by adding a new application programming interface driver in Chroma ATS software, PowerPro III.

Model 8000

Off-the-shelf test commands

Test command library

For some special controls, it is not very easy for most of the users to figure out how to make relevant instrument work properly. Chroma PowerPro III collects most useful test commands for users in order to provide user-friendly editing environment. On the other hand, Chroma PowerPro III also provides some low level test commands, such as GPIB read/write, RS-232 read/write, RS-485 read/write, Can bus read/write and I²C read/ write... etc. That allow users to have the full access to all the equipment on Chroma Power Supply Auto Test System model 8000 directly.

Meanwhile, The test command library stops the repetitive test conditions from sending to hardware devices; Thus it can improve the test speed dramatically.

Add test command to the test procedure from test command library.

Flexible and easy to use

Test item editor

Following with the test command library, Chroma PowerPro III provides an editing environment for user to create new test items to fit new test requirements. In this test item editor, Chroma PowerPro III establishes a powerful tool which is similar to the C language, but much easier to learn and operate.
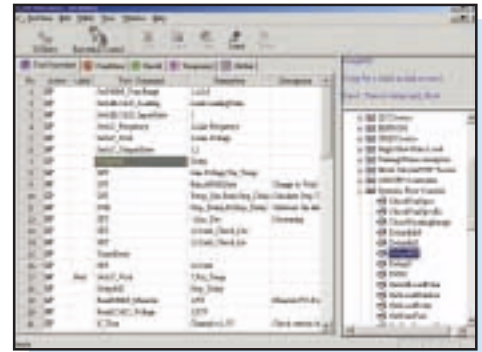
In the test item editor, it allows users to define test procedure, test condition variables, test result variables and temporary variables. Furthermore, Chroma PowerPro III test item editor also provides global variables for advanced control test requirement. For instance, it may be used for auto alignment system which need to pass the aligned value of the previous UUT as the next UUT's default value. In this way, it is very helpful to improve the align speed .

Enumerative items allow programmers define limited selections for low level users.
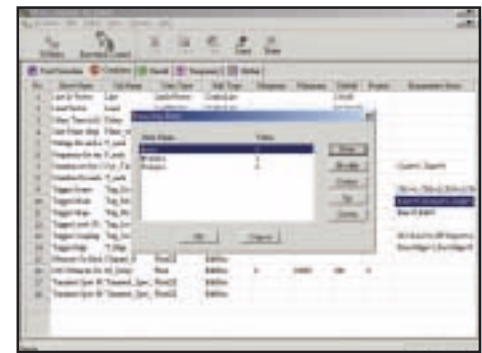
Sequential and Batch testing

The program editor

The test program editor provides a useful means to link several pre-defined test items for batch test. It also introduces pre-test and post-test functions which allow users to send the test commands that are not necessary to use all the time to the equipment on system but only when the execution just begin, or on the opposite, at the end of the test. This feature helps to optimize the test program and reduce test time. Meanwhile, its run-time control allows users to determine the process and the direction of the test program according to the individual test result of test items.
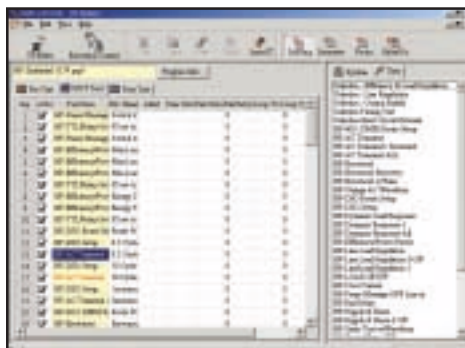
Test program editor can also open a M/S Excel file as the source of test program data. Users may first export test program as M/S Excel file. Then base on the external database. Users may creat new test programs by modifying the Excel database. Thus, only one database needs to maintain for multiple test programs.
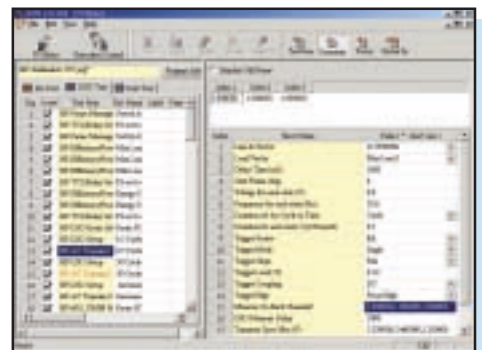

Test rogram can be created by stacking test items in test library.

Just fill the test conditions! The test procedure was defined in the test item library.

Versatile and powerful execution mode

Chroma PowerPro III software platform provides three execution modes. DEDUG RUN is used to verify the user-defined test items and test programs. For production line testing, GO/ NG RUN allows one key operation to perform Pass/ Fail test. And the On-LINE-CONTROL mode extends Chroma Power Supply Auto Test System model 8000 to control and monitor the hardware devices simultaneously. Thus, it is capable of simulating the manual test scenarios just like you did on the bench.

Debug run

The debug run provides a versatile and immediate tool for users to verify the test items and test programs created before releasing them to operators. All the essential debuging tools are provided here, such as step run, set break point(s), run to break and simultaneous variables display.Users may use this to control the process of execution and at the mean time, monitor the test results and verify them. As a result, there's no risk for users to put an uncheck test item or test program onto production line.
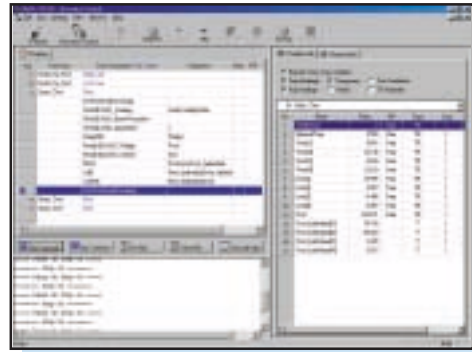
The selected variables will be updated simultaneously when the test item or test program is under going.

GO/ NG run

The GO/ NG run provides friendly and easy execution environment for production line and operators. All the test programs tested here need to be released in management function. This may minimize the risk of running a wrong or unchecked test program. The test results will be stored in hard drive of the system controller which may be used to create statistic and the test report. Plus the fail rate check, bar code scanner support, Pass/ Fail indication TTL signal. All these powerful features make it an ideal tool for mass production testing.
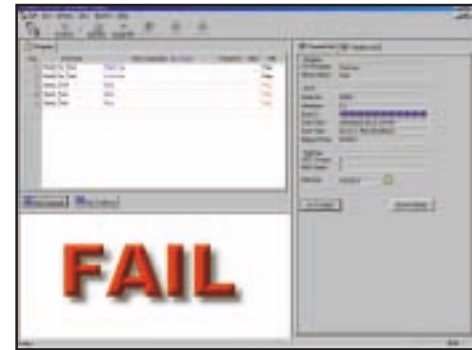
Failure rate check function is available in GO/NG execution mode.

On line control

The display tells it all. Users may achieve all the instrument on system to control them and get readings from them. The type of reading showing on display could be selected by user and user may even define specifications for them. Furthermore, user can also select them to show as a time graph in order to see the trends. And, the waveform measured by DSO can be merged onto the same display as well. The waveform can be downloaded as hard copy or digitizing waveform. Under digitizing mode. Users can select measurement parameters just like it provides in DSO. In a word, this execution mode is the implementation of virtual instrumentation.


Users allow to create their own softpanel layout and store it for recall later.

## Model 8000

2-7. Comprehensive analyzing tools

Report generator & wizard

Documentation and offering a readable report has been the weakest part of the traditional auto test system. Users usually need to spend a lot of effort to modify the data stored by the auto test system to make it more recognizable to their customer.During the process, it has great chance to get an incorrect result due to typing error.

Now, Chroma PowerPro III, its outstanding report wizard and generator provide the total solution for any documentation requirement. From tabular test data , DSO waveform to correlation chart, it allows users to integrate different types of presentation in the same report. Users may also edit and store report format for next use, thus it saves a lot of precious time in creating test report. Meanwhile, to make the test report more portable, the output of the report wizard is already a standard M/S Word file.
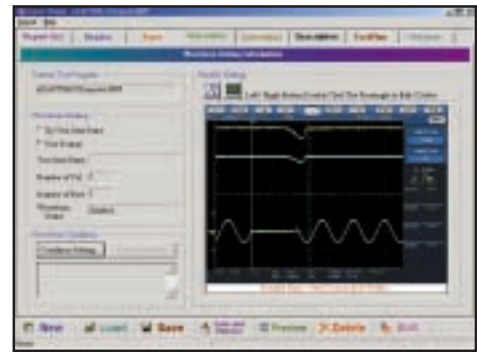

Define parameters and waveform preview n Report Wizard.
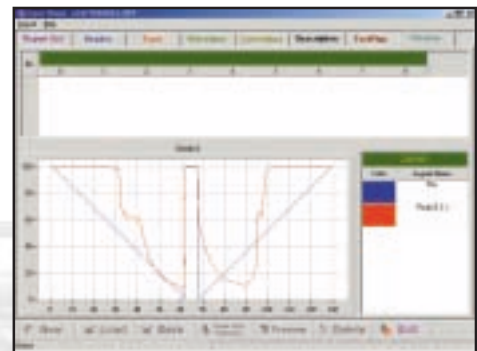
Preview the corrlation chart in Report Wizard before converting it to M/S Word file.
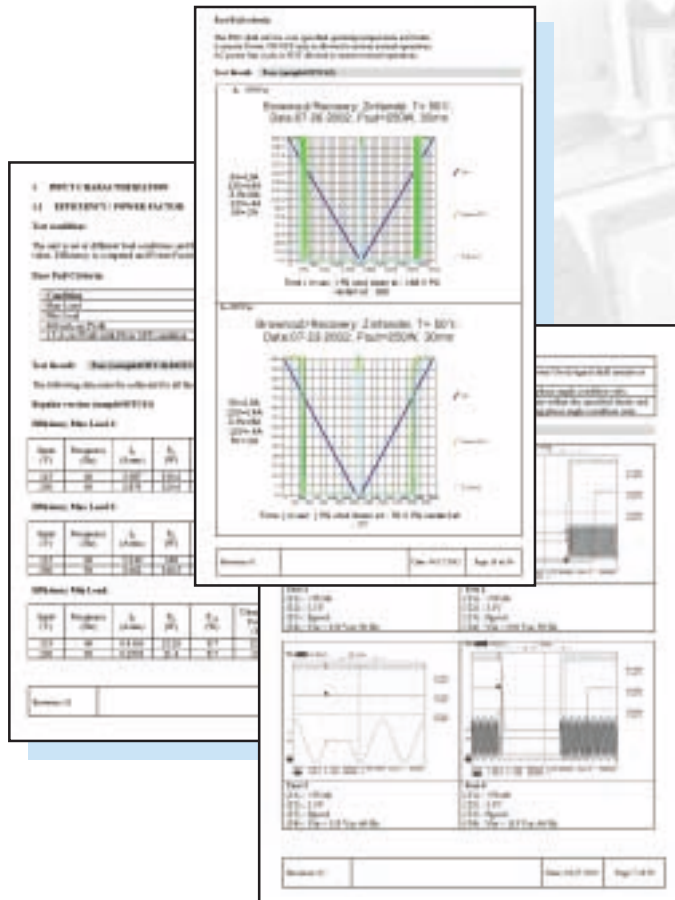
Statistical report

Chroma PowerPro III software provides off-the-shelf statistic report function. All the test conditions defined in the test program and the test readings can be stored and analyzed by statistic report function. In statistic report function, it provides process capability, Pareto, Xbar-R chart, Xbar-S chart, nP chart, P chart, U chart and C chart. Users may select test program, test date period and even include test data from remote computer via network connections. Then choose any one of the control chart to generate statistical report. The report may be printed out or stored in file. Or users may store the raw data as a text file directly which is able to be imported by Excel or similar word processor software package for further analysis.
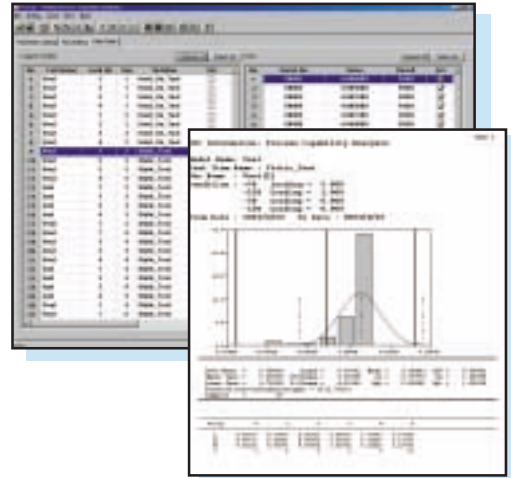
Example of statistic report process capability

2-8. Complete system administration

Management function

| **Management**	Chroma PowerPro III provides a series of management functions for advance system control and management.
User Function	User function allows users to define authorized person list and their authorized level.
Activity log	Activity log records the historical log-in, log-out time and activated functions of the system users.
Release	Users are allowed to define the release flags of test programs and test items. These flags will be used to check if the test program can be executed by GO/ NG run. Or if the test item can be shown in user test item library.
Instrument	Instrument function is used to import and export H/ W instrument drivers.
Network	Network function provides interface for PowerPro III to communicate with external software package or system. For example, Shop-Floor or Product-Data-Management system. It is also used to define the source location of the test programs when users want to centralize them.

Hardware configuration

The hardware configuration function allows users to define the system configuration by selecting devices from the instrument list defined in the "Instrument" section of Management function.

Shop-Floor control system

For modern mass production line, it is a big challenge to have the full control of the scenarios happened on production line. Therefore, Shop-Floor control system is wildly used to improve fabrication process.

To satisfy customers' requirement, Chroma also provides customized Shop-Floor control system. For details, please contact your local representative of Chroma ATE INC.
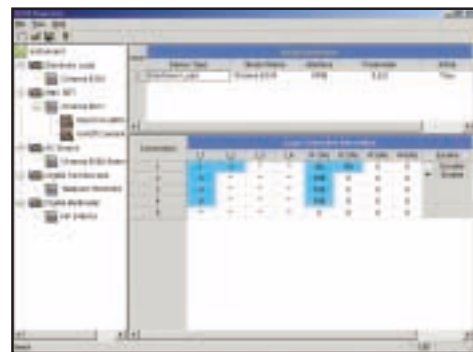
Parallel setting for E-loads allow users to control multiple load channels as one.

Model 8000

High Performance Hardware Devices
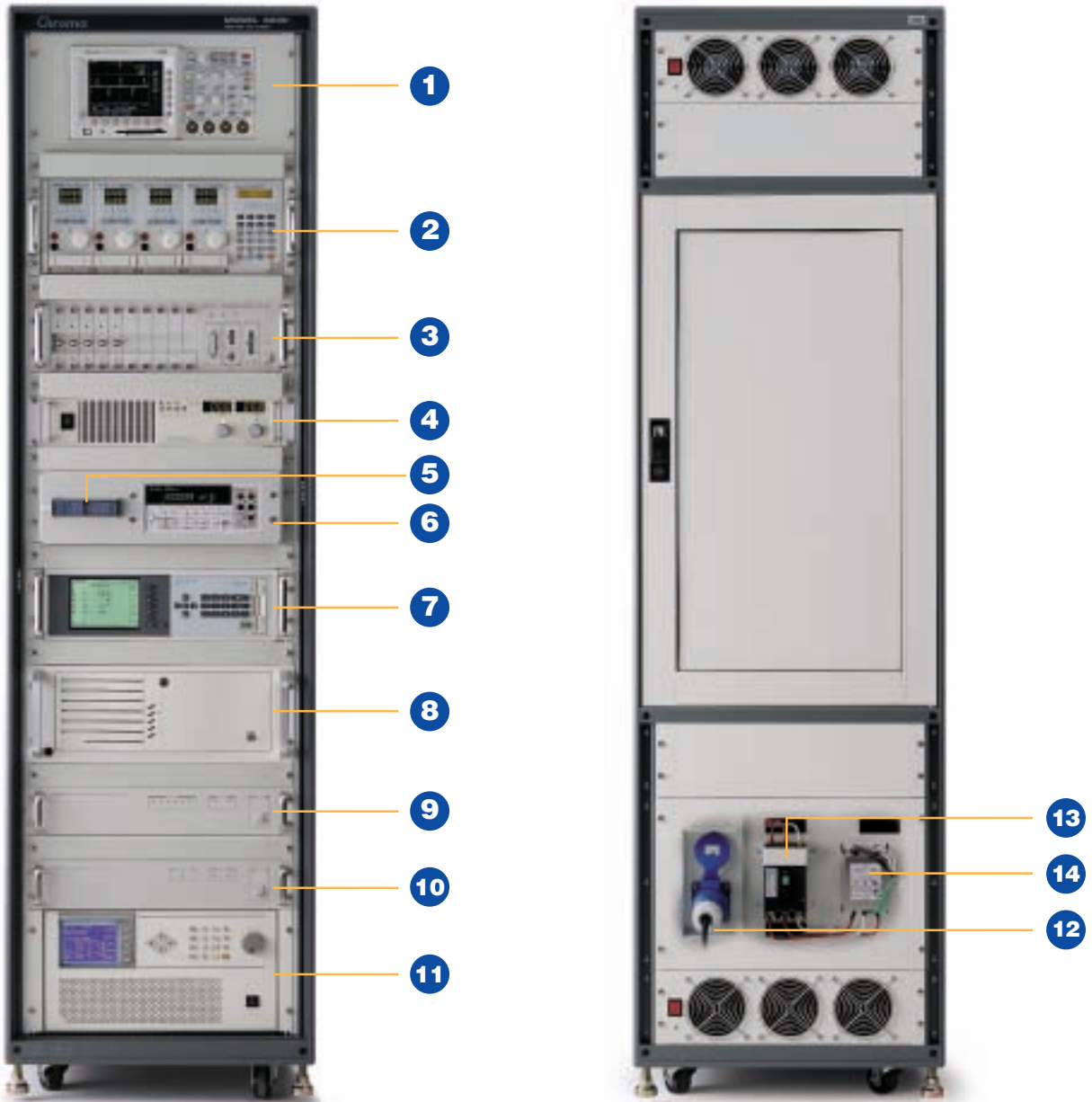
1. **Digital Storage Oscilloscope :** TDS-220/ TDS-3000 series; other types or brands of DSO supported upon request
2. **Electronic Load :** Model 6300 / 6310 / 63200 / 6340 series Electronic Load
3. **Timing / Noise Analyzer :** Model 6011
4. **DC Source :** Model 6200 / 6200K / 6200F
5. **Connection Panel :** Interface to UUT
6. **Digital Multi-Meter :** HP-34401A; Other types or brand of DMM supported upon request
7. **Power Analyzer :** Model 6630 / 6632 series Power Analyzer
8. **System Controller :** Industrial PC
9. **OVP / Short Circuit Tester :** Model 6012 / 80612
10. **ON / OFF Controller :** Model 6013 / 80613
11. **AC Source :** Model 6100 / 6400 / 6500 / 61500 / 61600 series AC Source
12. **System Power Inlet :** 1Ø 3W / 30A, 60A selectable
13. **Breaker :** 30A / 60A selectable with emergency stop control
14. **EMI Filter :** 30A

* Other devices supported upon request

AC power source

Chroma power supply auto test system model 8000 supports all Chroma Model 6100, 6400, 6500, 61500 and 61600 series AC power supplies. They provide stable and clean AC or DC (Model 61500/61600 series) output and power line disturbance simulation for advanced power supply input characteristic testing.

MODEL	6100 series	6400 series	6500 series	61500 series	61600 series	61700 series
Power rating	600-2000VA	375-9000VA	1200-9000VA	500-4000VA	500-4000VA	1500-12000VA
Voltage range	0-300V	0-300V	0-300V	0-300V	0-300V	0-300V
Output phase	1 phase	1 or 3 phases	1 or 3 phases	1 or 3 phases	1 or 3 phases	3 phases
DC output	No	No	No	Yes	Yes	Yes
Output measurement	Yes	Yes	Yes	Yes	Yes	Yes
Harmonic measurement	No	No	No	Yes	No	No
Waveform simulation	No	No	Yes	Yes	No	No
Programmable impedance	No	No	No	Yes	No	No
Harmonic synthesis	No	No	Yes	Yes	No	No
Inter-harmonic synthesis	No	No	No	Yes	No	No

DC power source

Chroma power supply auto test system model 8000 supports all Chroma Model 6200, 6200K and 6200F series DC power sources which may be used as line-in or OVP sources.

MODEL	6200 series	6200K series	6200F series
Power rating	60-1000W	1000-3000W	1200-12000W
Voltage range	0-5V/ 150V	0-5V/ 600V	0-5V/ 600V
Programmable current limit	Yes	Yes	Yes
Programmable OV point	Yes	Yes	Yes
Analog programming	Yes	Yes	Yes
Remote sensing	Yes	Yes	Yes
Line-drop compensation	5V	1V	5V

Power analyzer

Chroma power supply auto test system model 8000 can also support all Chroma Model 6630 and 6632 series Power Analyzer. They do not only provide traditional high precision power measurement, but also the voltage/current harmonics measurements defined in IEC and EN regulation.

MODEL	6630 series	6632 series
NO. of input module	1 to 3	1 to 3
Power measurement range	48 ranges	48 ranges
Voltage measurement range	6 ranges	6 ranges
Current measurement range	8 ranges	8 ranges
Front panel display	Yes	No
Front panel editable	Yes	No
Harmonics measurement	Yes	Yes
Flicker measurement	Yes	No
Waveform measurement	Yes	Yes
Build-in regulation limit	Yes	Yes

Model 8000

DC Electronic Load

Chroma power supply auto test system model 8000 can support all Chroma Model 6300, 6310, 6330, 63200 and 6340 series DC electronic load. They come with different powers, load modes, slew rates and features. This provides users maximum selection opportunities for different test application requirements.

MODEL	6300 series	6310 series	6330 series	63200 series	6340 series	63472
Load mode	CC/ CR/ CV/ CP	CC/ CR/ CV	CC/ CR/ CV	CC/ CR/ CV/ CP	CC	CC
Power rating	60-300W	30-1200W	30-1200W	2000-12000W	625W	200W
Voltage range	1-254V	1-500V	1-500V	1-500V	0.8-50V	0.5-2V
Current range	Up to 60A	Up to 240A	Up to 240A	Up to 600A	Up to 300A	150A
Slew rate	Up to 2.5A/ µS	Up to 10A/ µS	Up to 10A/ µS	Up to 25A/ µS	Up to 300A/ µS	10A/ µS
Measurements	Voltage/ Current/ Power	Voltage/ Current	Voltage/ Current	Voltage/ Current/ Power	Voltage/ Current	Voltage/ Current
Monitoring output	Current	No	No	Current	Voltage/ Current	Voltage/ Current
Current share measurement	No	No	No	No	Yes	No
Noise measurement	Optional	No	No	No	No	No
Voltage sense input	Yes	Yes	Yes	Yes	Yes	Yes
Sync Signal	No	No	Yes	Yes	No	No
High Speed	No	No	Yes	No	No	No

Timing / Noise Analyzer

Chroma power supply auto test system model 8000 provides an unique timing / noise analyzer, Chroma Model 6011. Its modular design allows users to expand up to 10 input measurement modules. Each module is capable of measuring timing period and noise level. Furthermore, it also provides 16 bits TTL signals and 6 pairs of floating relays for external control. Meanwhile, the 10 multiplexer inputs and 2 DMM and 2 DSO outputs further extend the Chroma Model 6011 for advanced measurement requirements.

MODEL	6011
NO. of input module	Up to 10
Noise measurement range	2V/ 0.4V
Low Pass Filter	Up to 20MHz
Input circuit	Differential input
Timing range	0-16/ 0-64 second
NO. of trigger input	4
NO. of comparator	2 / Input module
Controllable TTL bits	16
Controllable floating relay	6
NO. of multiplex input	10
NO. of multiplex output	2 for DMM &. 2 for DSO

OVP/ Short Circuit Tester

Chroma OVP/ Short circuit tester provides model 6012 and 80612 versatile tool for OVP/ UVP/ Short circuit. Its unique programmable impedance makes it ideal to simulate OV / UV situation for all types of power supplies.

MODEL	6012	80612
NO. of input terminal	Up to 6	Up to 6
Short circuit impedance	< 0.1 ohm	< 0.05 ohm
Sync. Signal for short circuit	6 relay signal	6 relay signal
OVP/UVP testing	Internal/ External	Internal/ External
Internal impedance range	1K-1M ohm	100-1M ohm
External OVP/UVP source	DC source	DC source
Measurement Capability	By external DMM	Internal
Control Interface	Via Chroma 6011	RS 485

ON/ OFF Controller

Chroma ON / OFF controller Model 6013 and 80613 are used to control AC and DC inputs simultaneously. Meanwhile, it can control AC to turn on and off at any phase angle and measure the input inrush current of the UUT.

MODEL	6013	80613
Input	AC/ DC	AC/ DC
ON/OFF angle - AC	0-360°	0-360°
Voltage range - AC	250V	270V
Current range - AC	30A	30A
Voltage range - DC	200V	200V
Current range - DC	40A	60A
Measurement Capability	By external DMM	Internal
Control Interface	Via Chroma 6011	RS 485

Digital Multi-Meter & Storage Oscilloscope

Chroma power supply auto test system model 8000 is capable to support HP34401A / 34970A and Keithley 2700 series DMM and most of Tektronix scopes . Other DMM and DSO are supported upon request.

Application & selection guide

Equipment Model / Applications	AC Source	DC Source	Power Analyzer	Electronic Load	Timing Noise Analyzer	OVP/ Short Tester	ON/ OFF Controller	DSO	DMM	Other Instrument	GPIB Card	Other Interface Card	Rack	Software
PC Power Supply	61500;61600 6400 ;6500	6218	6630 6632	6300 6310	6011	6012 80612	6013 80613	User Selectable	——	——	NI- GPIB	——	35U	Power Pro III
Server Power Supply	61500;61600 6400 ;6500	6218 6290 K	6630 6632	6300;6310 63290	6011	6012 80612	6013 80613	User Selectable	User Selectable	——	NI- GPIB	I²C	41U	Power Pro III
Adapter	61500;61600 6430	6218	6630 6632	6300 6310	6011	6012 80612	6013 80613	User Selectable	——	——	NI- GPIB	——	25U	Power Pro III
Telecom Power Supply	61500;61600 6400 ;6500	6218	6630 6632	63290	6011	6012 80612	6013 80613	User Selectable	User Selectable	Voice Band /RF Noise meter	NI- GPIB	I²C/ CAN BUS/ RS-485	41U	Power Pro III
Battery Charger	61500;61600 6430	6218	6630 6632	6300 6310	6011	6012 80612	6013 80613	User Selectable	——	——	NI- GPIB	——	25U	Power Pro III
DC-DC Converter	——	6200;6200 K 6200 F	6630 6632	6300;6310 63290	6011	6012 80612	6013 80613	User Selectable	——	——	NI- GPIB	——	35U	Power Pro III
VRM	——	6200;6200 K 6200 F	6630 6632	6340	6011	6012 80612	6013 80613	User Selectable	——	——	NI- GPIB	——	25U	Power Pro III
Industrial Power Supply	61500;61600 6400 ;6500	6200;6200 K 6200 F	6630 6632	6300;6310 63290	6011	6012 80612	6013 80613	User Selectable	User Selectable	——	NI- GPIB	I²C/ CAN BUS/ RS-485	41U	Power Pro III

Ordering information

8000 : Switching Power Supply ATS

6011/ 80611 : Timing/ Noise Analyzer

6011n/ 6012n : Timing/ Noise module

6012/ 80612 : OVP/ Short Circuit Tester

6013/ 80613 : ON/ OFF Controller

5004ATM : System Controller

A600009 : GPIB Cable (200 cm)

A600010 : GPIB Cable (60 cm)

A800004 : 19" Rack for Model 8000

A800005 : PCI Bus GPIB Card (National Instrument)

A800006 : Test Fixture for Model 8000

A800010 : 8000 Software Package - Basic version (Including Test Program Editor, Test Report Editor, GO/ NOGO run, Test Report Generator, Hardware Configuration, Management Function)

A800011 : 8000 Software Module - Statistics

A800012 : 8000 Software Module - Test Item Editor

A800013 : 8000 Software Module - Report Wizard

A800014 : 8000 Software Module - On-Line Control

A630002 : GPIB Interface for Model 6312/ 6314/ 6304

DC Load Module : Refer to Model 6300 , 6310 , 6320 , 6340 Series

Power Analyzer : Refer to Model 6630 , 6632 Series

AC Source : Refer to Model 6400 , 6500 , 61500 , 61600 Series

DC Source : Refer to Model 6200 , 6200K , 6200F Series

Model 8000