Chroma

DC Electronic Load
Soft Panel
6310/6330 Series
User's Manual

Version 1.1
January 2007

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Revision History

The following lists the additions, deletions and modifications in this manual at each revision.

Date	Version	Revised Sections
Nov. 2005	1.0	Complete this manual
Jan. 2007	1.1	Modify the following: – "*Save to Firmware*" section in the chapters of "*Static Test*" and "*Dynamic Test*". – The contents of chapters "Configuration", "*Program Test*" and "*Battery Test*". Add the following: – "*Static SPEC*" section in the chapter of "*Configuration*". – "*Reading Waveform*" section in the chapter of "*Program Test*". – "*Program Mode*" section in the chapter of "*Battery Test*". Delete "*Reading Display*" section in the chapter of "*Promgram Test*".

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1. System Structure

This chapter explains the structure and functions of Chroma DC Load 6310_30 Series Soft Panel application. The supported instruments and communication interfaces are listed below for users to identify the required environment easily.

1.1 Introduction

This software is applicable to Chroma DC Load 6310_30 Series instruments only. The remote transmission between PC and DC Load must be active before using the software in order to communicate by commands.

The software application can perform internal parameter settings for DC Load and monitor the output measurement. In addition the software is able to save the parameter settings so that users can open an existing file for execution from hard disk easily.

1.2 Supported Hardware

Chroma 6310_30 Series Programmable DC Electronic Load contain the following models:

A. Frame
   a. 6314 or 6334
   b. 6312 or 6332

B. Module
   a. 63101 or 63301
   b. 63102 or 63302
   c. 63103 or 63303
   d. 63105 or 63305
   e. 63106 or 63306
   f. 63107 or 63307
   g. 63108 or 63308
   h. 63112 or 633112

1.3 Communication Interface

There are two types of communication interfaces between PC and DC Loads:

A. GPIB
B. RS232 (Cross)

1.4 Operation

It is recommended to work through the Soft Panel by clicking the mouse for operation.

1.5 Software and Hardware Requirements

The soft panel program is quite large; therefore, the following PC software and hardware environments are suggested.

- Intel CPU 500MHz or above
- Microsoft Windows 2000 or XP
- 400 MB hard disk space at least
- 64 MB memory at least
- VGA or SVGA color monitor
- PS2 mouse

2. Installation

First install the Chroma DC Load 6310_30 Soft Panel to the hard disk on PC before using it. This chapter describes how to install the software on Windows step by step.

- Ensure there is at least 40 MB or above hard disk space on PC.
- Insert the first floppy disk of Chroma DC Load 6310_30 Soft Panel to the 3.5” disk drive, or place the software CD into the CD drive.

2.1 Files in CD

The CD contains the files shown in Figure 2-1.

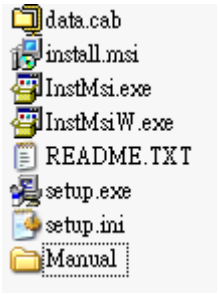


Figure 2-1 Files in CD

2.2 Installing Chroma 6310_30 Soft Panel

Execute “Setup.exe” in the CD to start installing Chroma 6310_30 Soft Panel following the steps described below.

Step 1

Double-click “Setup.exe” and it will prompt a window as Figure 2-2 shows. Click **Next** to carry on the installation.

Figure 2-2 Chroma 6310_30 Soft Panel Installation Screen

Step 2

The program is default installed in `C:\Program Files` directory as Figure 2-3 shows. To change it, click **Browse** and specify the path for installation. Click **Next** to proceed.

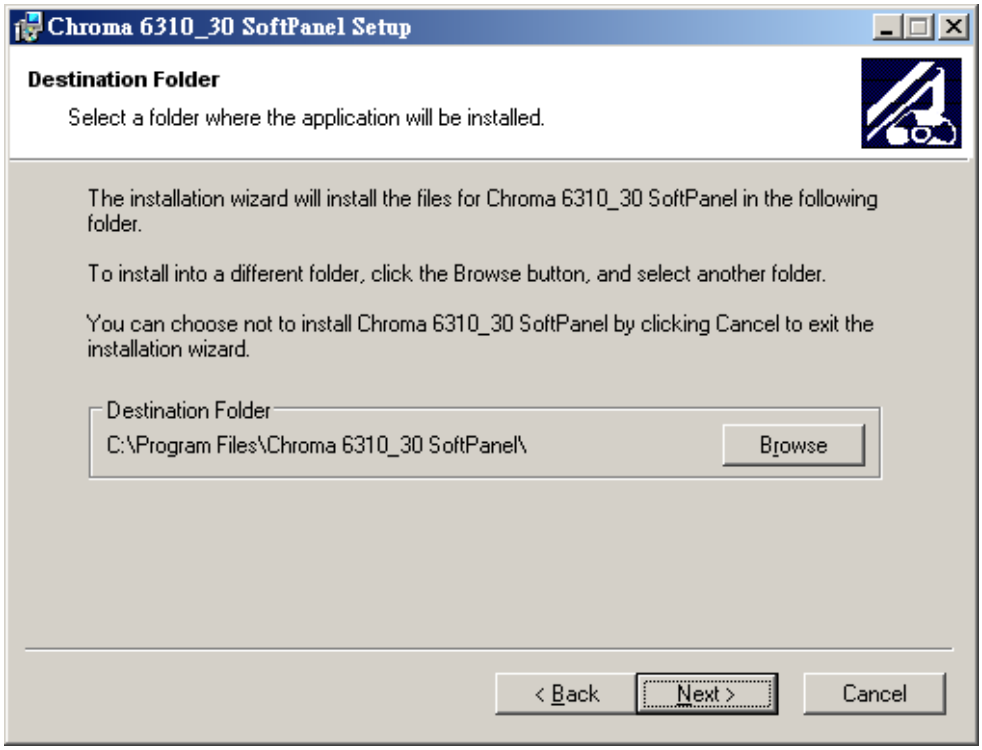


Figure 2-3 Selecting Chroma 6310_30 Soft Panel Installation Path

Ready to begin the installation. Click **Next** to go on.

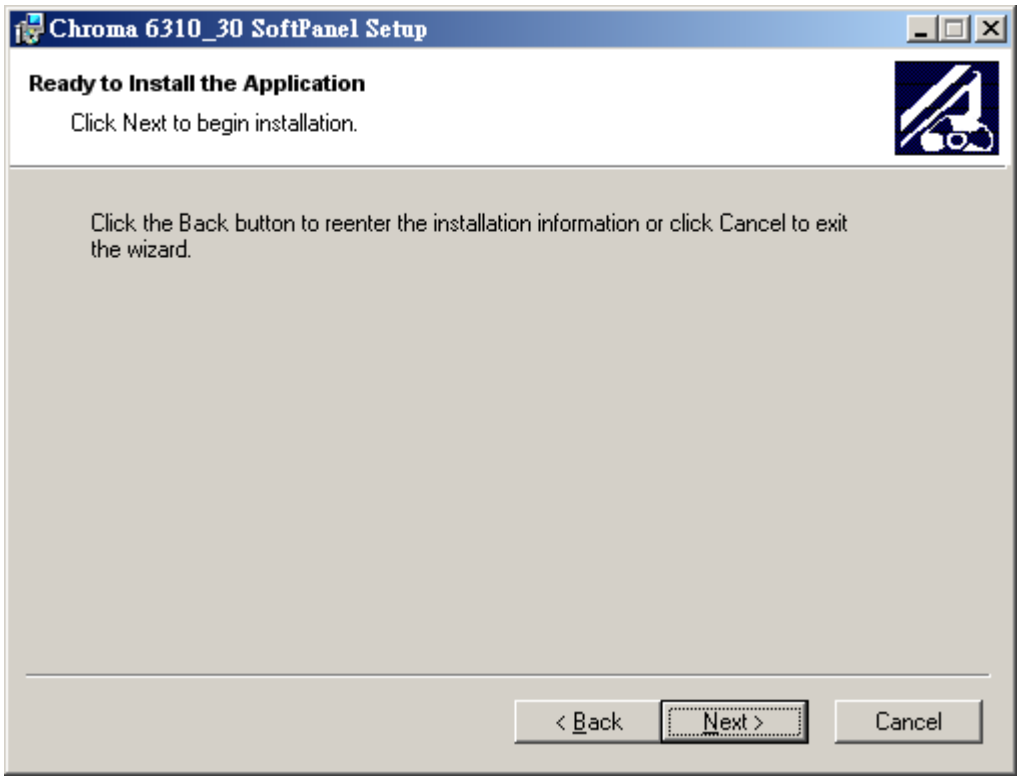


Figure 2-4 Screen of Ready to Install the Application

Click **Cancel** to stop the installation is any mistakes are found during installation.

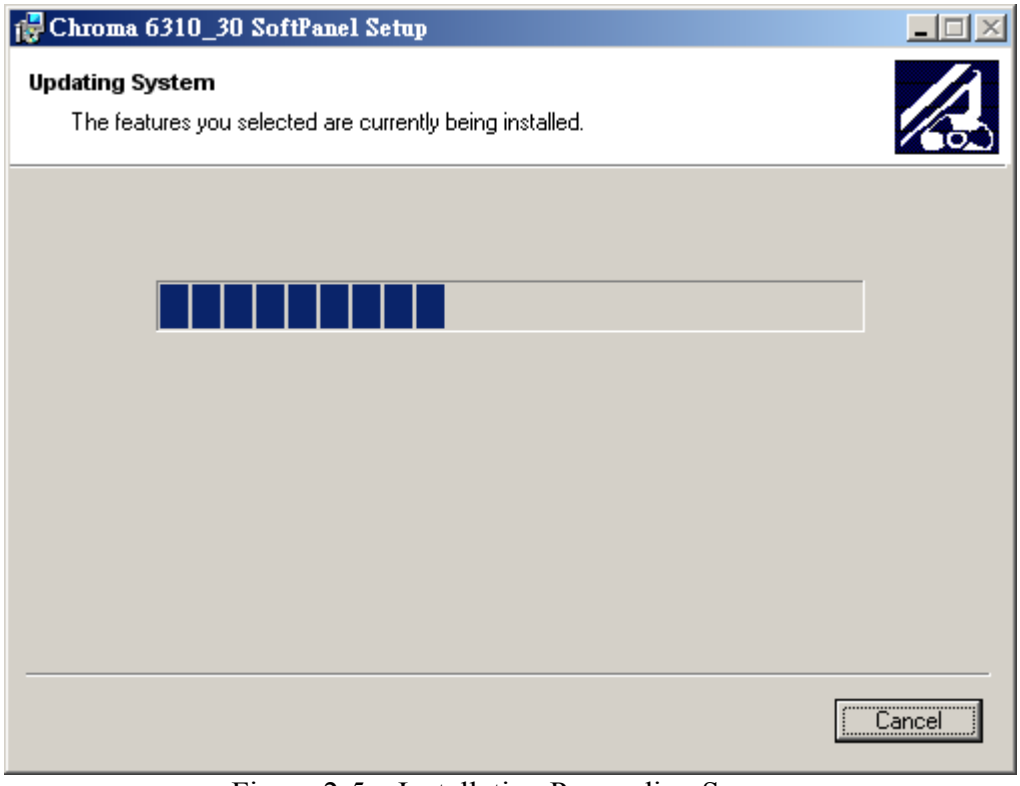


Figure 2-5 Installation Proceeding Screen

Figure 2-6 prompts once the installation is completed. Click **Finish** to end the program without restart the PC.

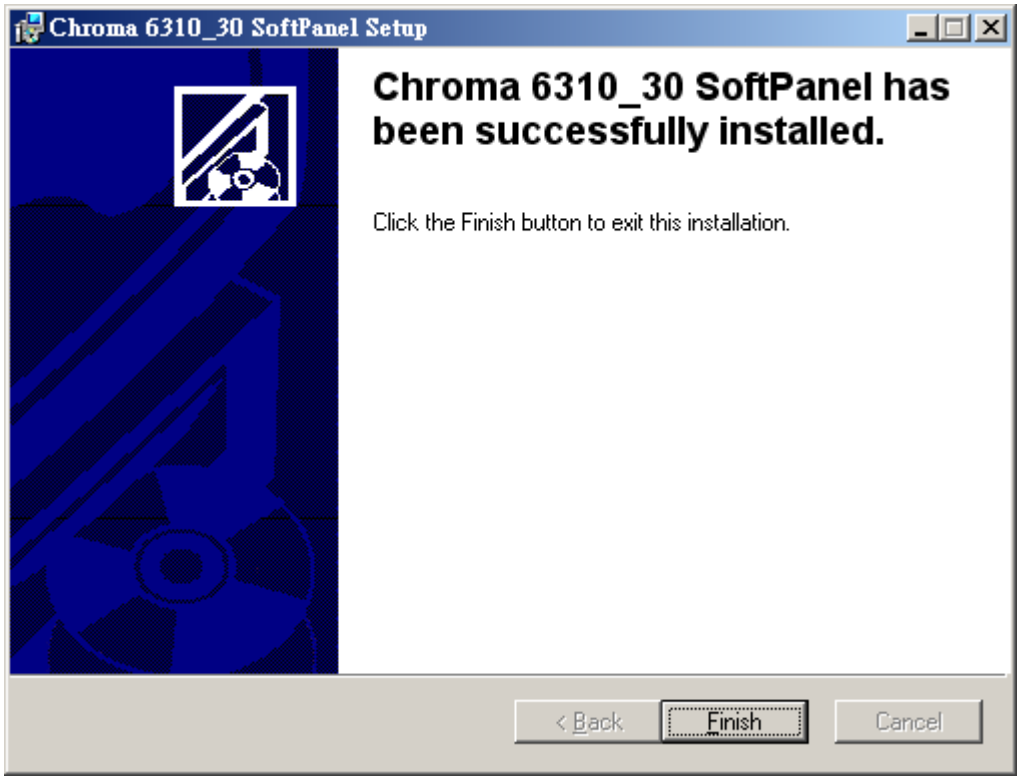


Figure 2-6 Installation Complete Screen

2.3 Installing NI VISA Runtime

It is a must to install NI VISA Runtime. The version suggested for use is 3.0 or above. Following are the steps based on version 3.0.1.

Step 1

Double-click "visa301runtime.exe" it will prompt a window as Figure 2-7 shows to begin decompressing process. Click **Setup** to continue.

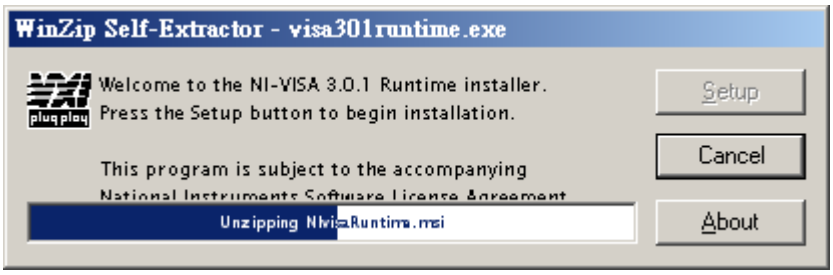


Figure 2-7 NI VISA Installation Screen

Step 2

The following window shows the decompressed NI VISA file. Click **Setup** to carry on the installation.

Figure 2-8 The Decompressed NI VISA

Step 3

The License Agreement Window of NI VISA prompts. Click "I accept the License Agreement" and **Setup** to continue.

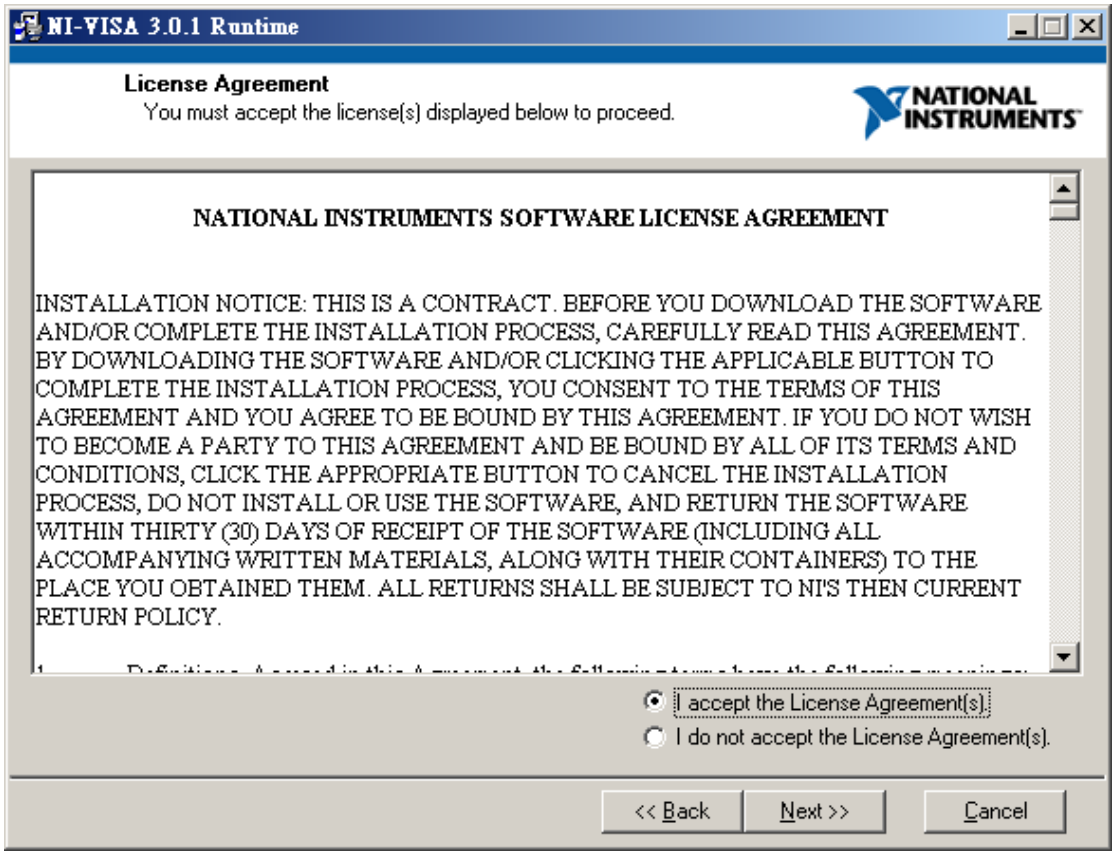


Figure 2-9 The License Agreement of NI VISA

Step 4

The window shows the installation path for NI VISA. The program is default installed in `C:\Program Files` directory as Figure 2-10 shows. To change it, click **Browse** and specify the path for installation. Click **Next** to proceed.

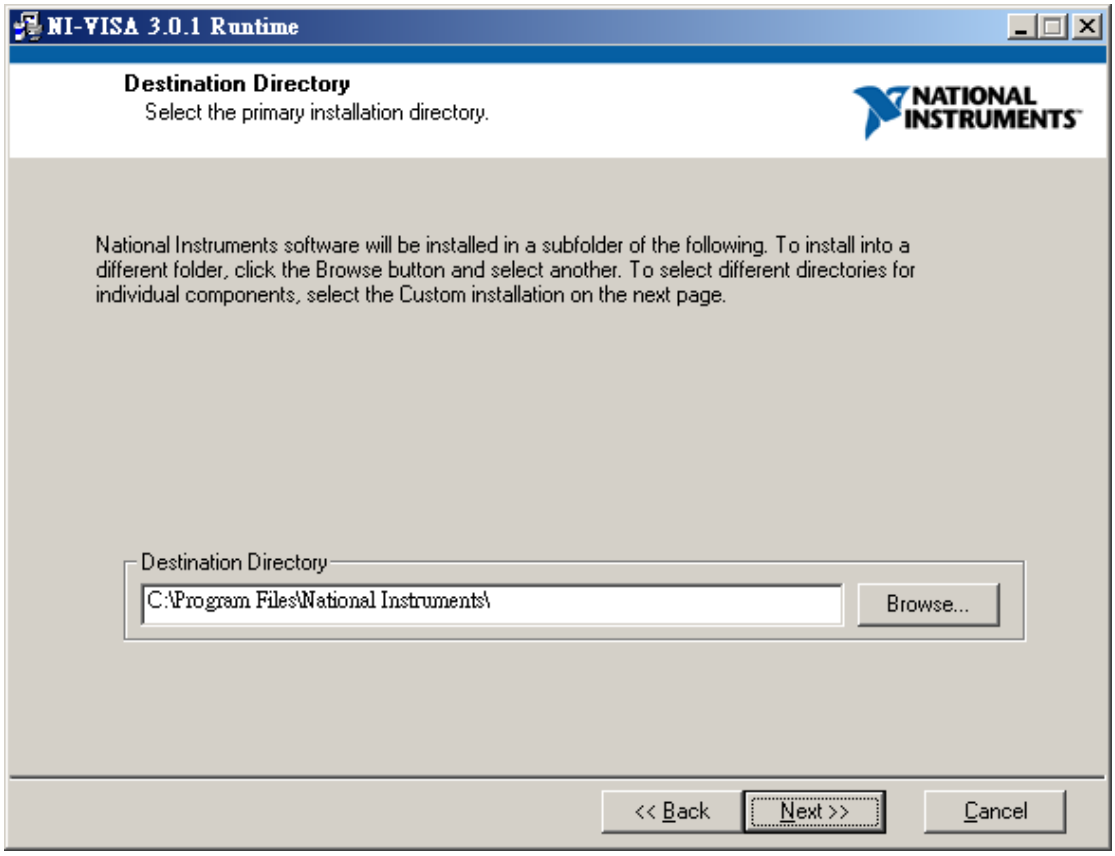


Figure 2-10 Selecting NI VISA Installation Path

Step 5

Select the NI VISA installation option. The default is Complete.

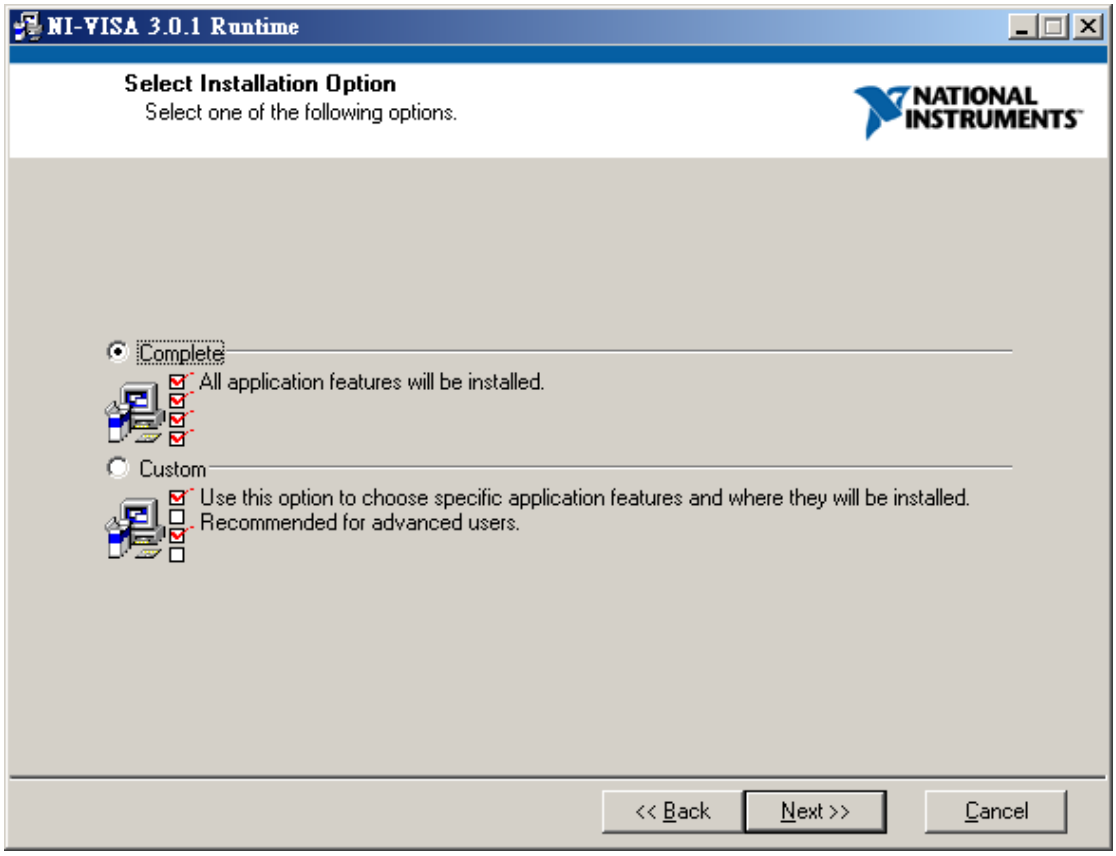


Figure 2-11 Selecting NI VISA Installation Option

Step 6

Start installing NI VISA. Click **Next** to go on.

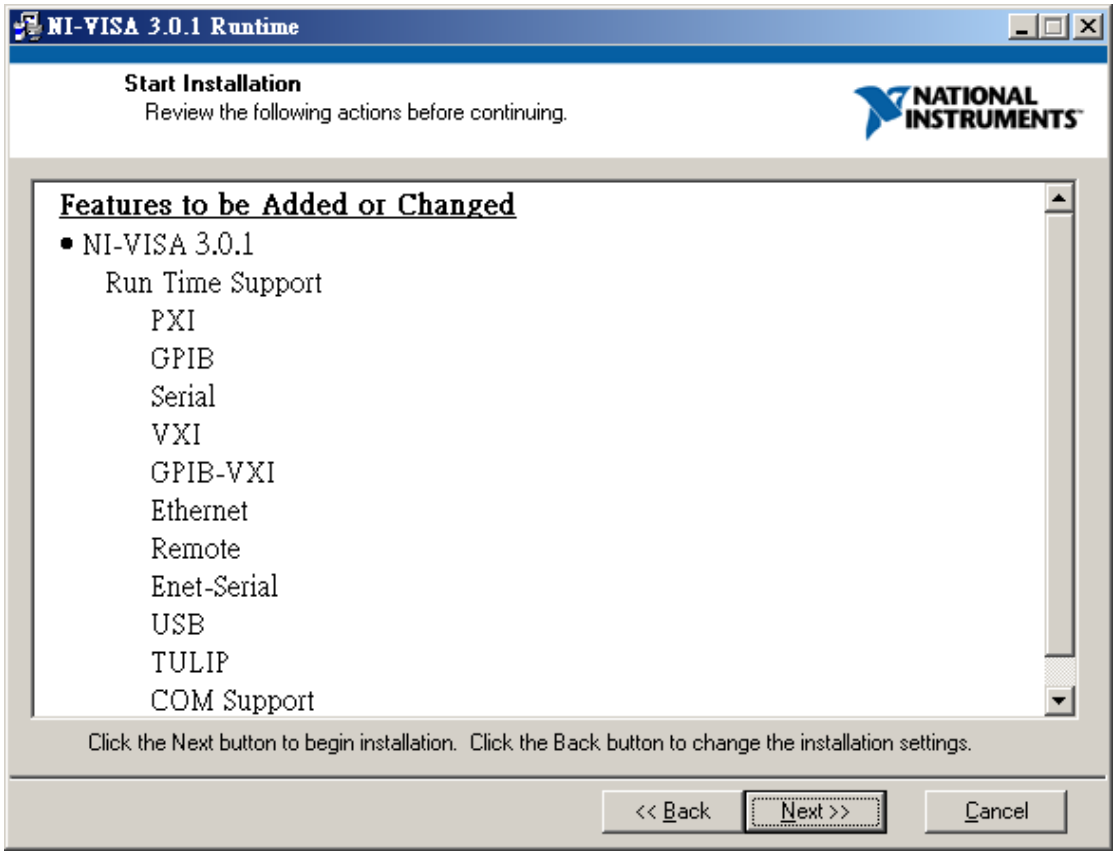


Figure 2-12 Start Installing NI VISA

Step 7

Figure 2-13 shows the installation progress of NI VISA and Figure 2-14 prompts when it is done. Please restart the PC when the NI VISA is successfully installed.

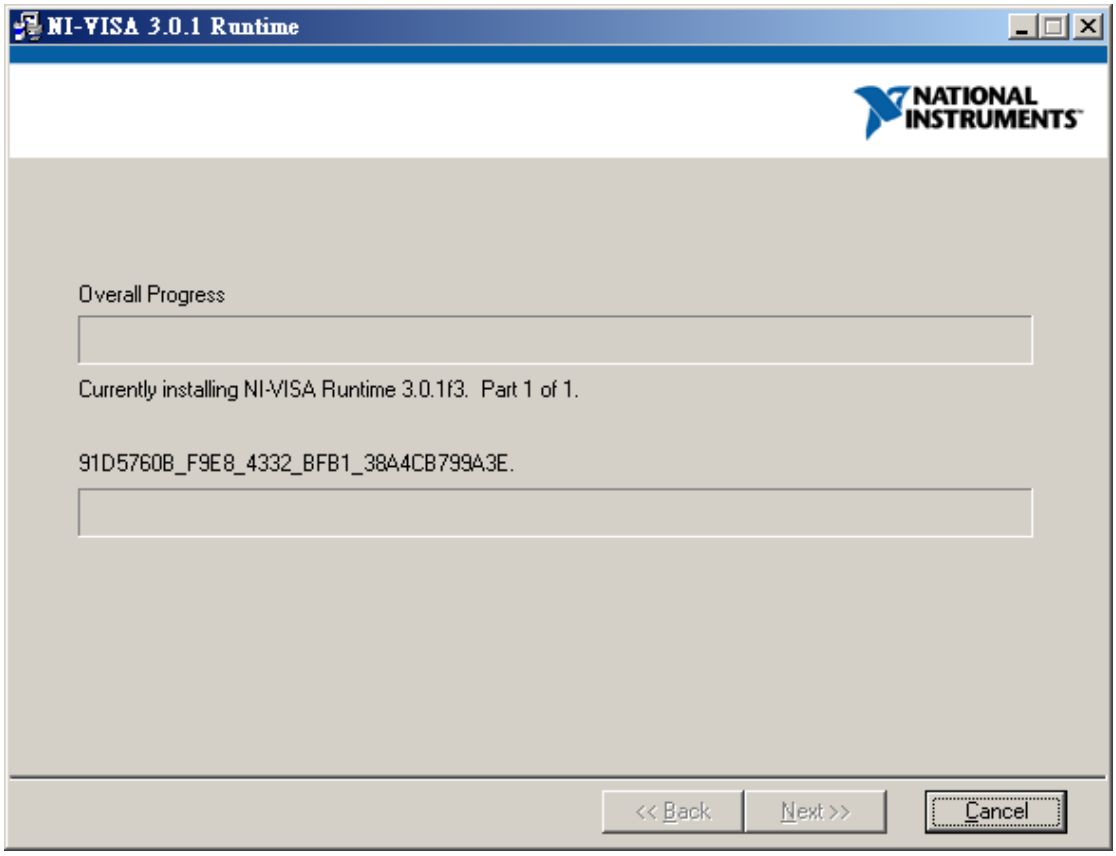


Figure 2-13 NI VISA Installation Progress Screen

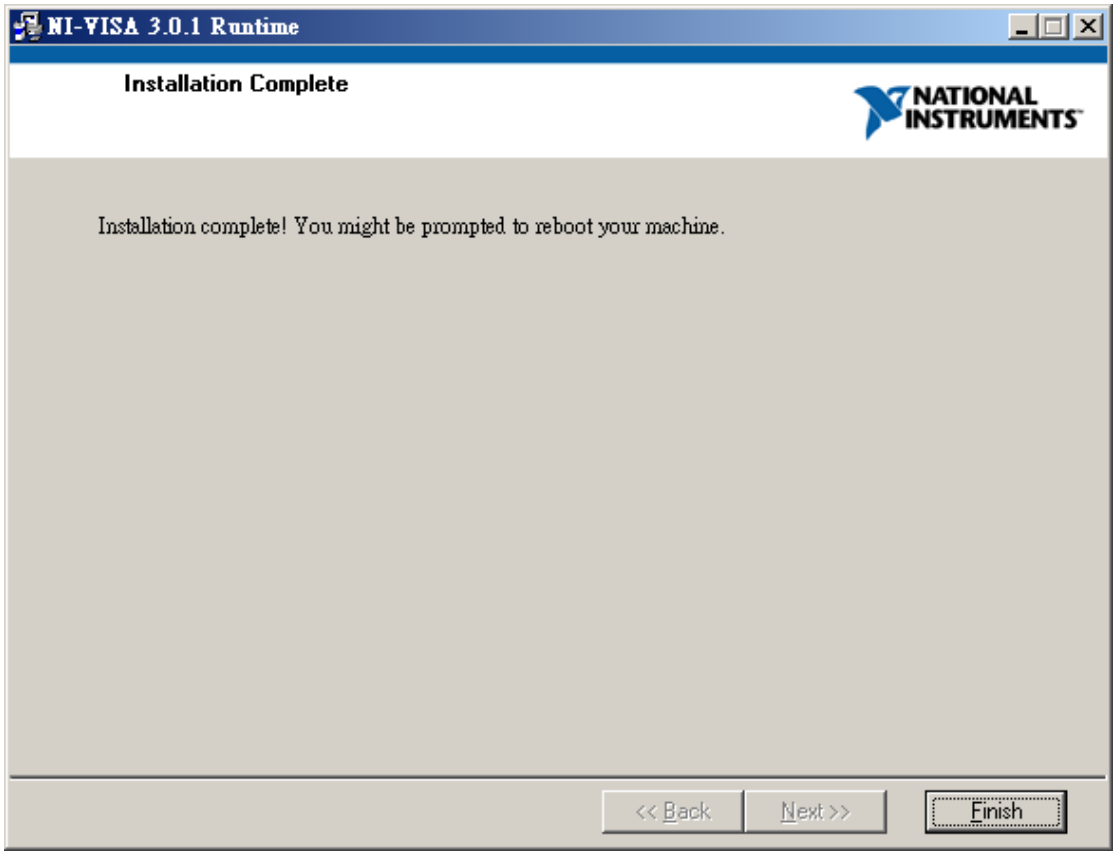


Figure 2-14 NI VISA Installation Complete Screen

2.4 Installing GPIB Interface Driver

Follow the steps listed in the user's manual of GPIB Interface Driver for installation. There is no need to install this drive if RS232 interface is in use.

2.5 Uninstalling Chroma DC Load 6310_30 Soft Panel

Uninstalling the Soft Panel is same as installing, double-click "Setup.exe" will prompt the window as Figure 2-15 shows. Click **Next** to continue removing the program.

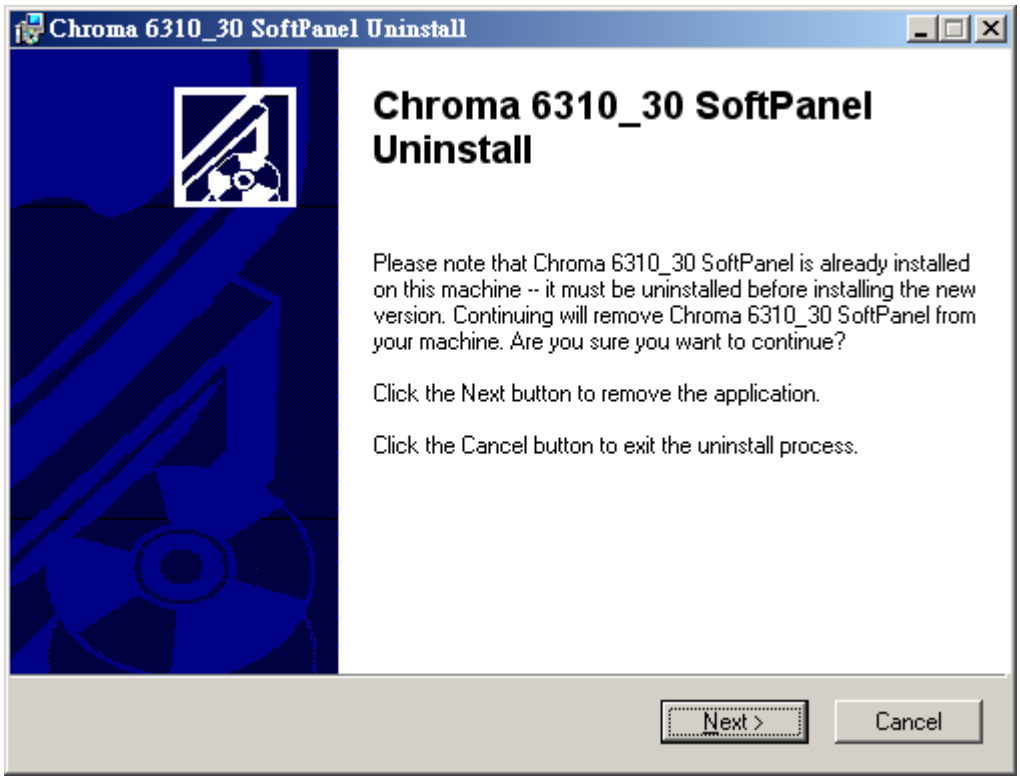


Figure 2-15 Uninstalling Chroma 6310_30 Soft Panel

3. Starting Chroma DC Load 6310_30 Soft Panel

3.1 Starting

After the installation is done, click **Start\Programs**\`Chroma 6310_30 Soft Panel` will prompt the start screen as Figure 3-1 shows.

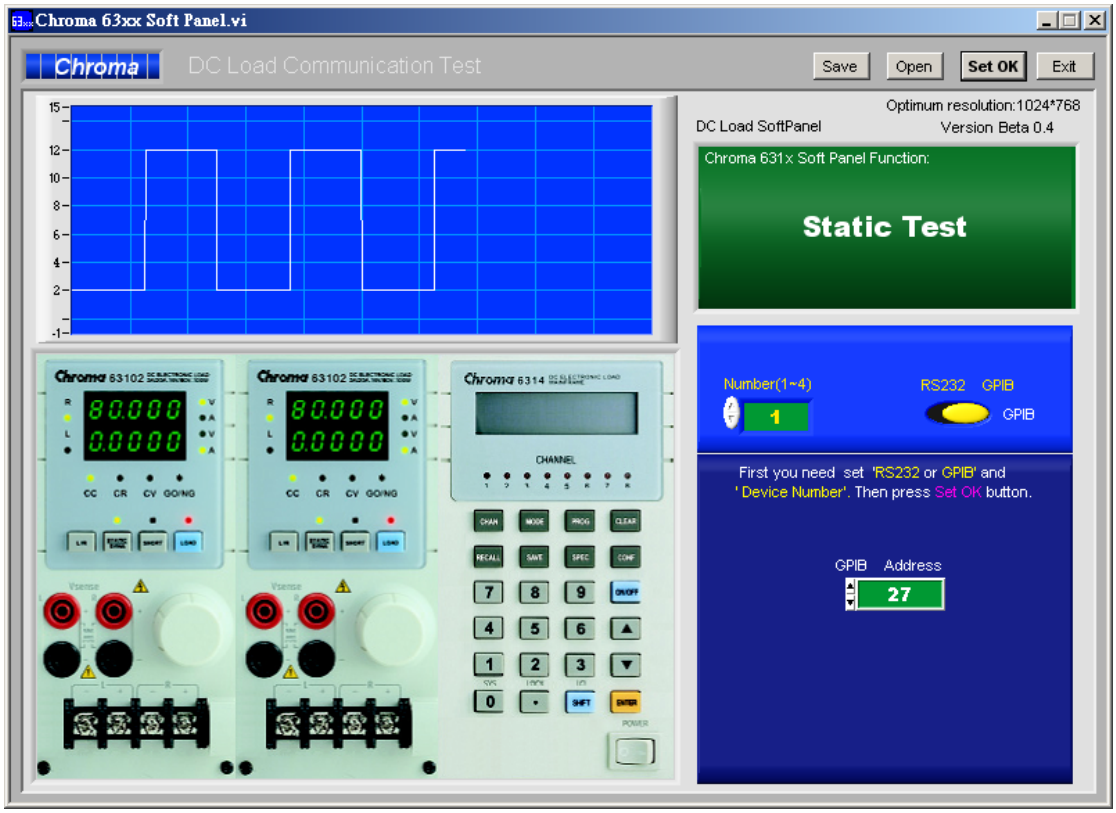


Figure 3-1 Start Screen of Chroma DC Load 6310_30 Soft Panel

Description:

a. The Hardware Configuration needs to be defined first when entering into Chroma DC Load 6310_30 Soft Panel. Users must define how many hardware devices or Frames to be used and their communication protocol in this screen. The current Soft Panel can control 4 Frames at most and each Frame is able to detect the selected module. Each frame has different channel numbers; however, the last applicable channel must be under 32. So if the channel number used in Hardware is larger than 32, only 32CH are available or users have use them in parallel.

Figure 3-2 Setting the Number of Connected Hardware

b. Users need to define the communication protocol which is the transmission command between PC and DC Load. The communication protocols available at present are GPIB and RS232. A mapping parameter element will appear when it is in use, for instance the GPIB Address will prompt if GPIB is selected and Baud rate, Parity and COM parameters will prompt for setting if RS232 is selected.

Figure 3-3 Selecting Communication Interface

c. The parameter set for communication interface needs to be same as the one set on DC Load. For instance, the GPIB Address on DC load is set to 27, and then the GPIB Address on Soft Panel has to be set to 27 as well.

Figure 3-4 Setting GPIB Address

d. When the communication protocol is confirmed, click **Set OK** on Soft Panel the program will run the initial communication with hardware and go to next screen.

Figure 3-5 Confirm the Communication Interface Setting

4. Setting Hardware

Click **Set OK** on the start screen will go to the following window as Figure 4-1 shows.

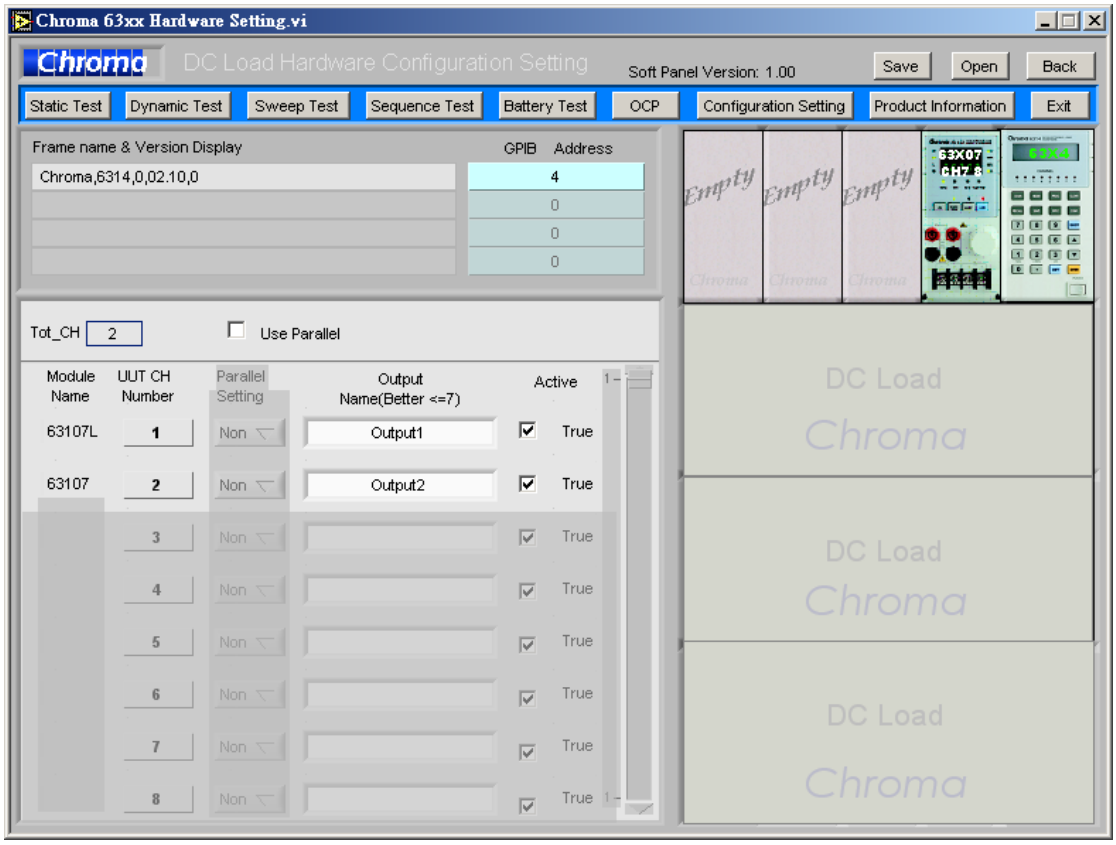


Figure 4-1 Hardware Setting Window

If the communication check passed it will read back the F/W version info of the instrument in Frame Name & Version Display also the hardware settings including the linked Frame and Module. They are displayed in icon on the left of window in order to let users verify the set structure. If there is any error in the communication protocol, the message "Connection Error" will appear as Figure 4-2 shows. If the communication protocol is correct, the model no. and firmware version will display in black as Figure 4-3 shows.

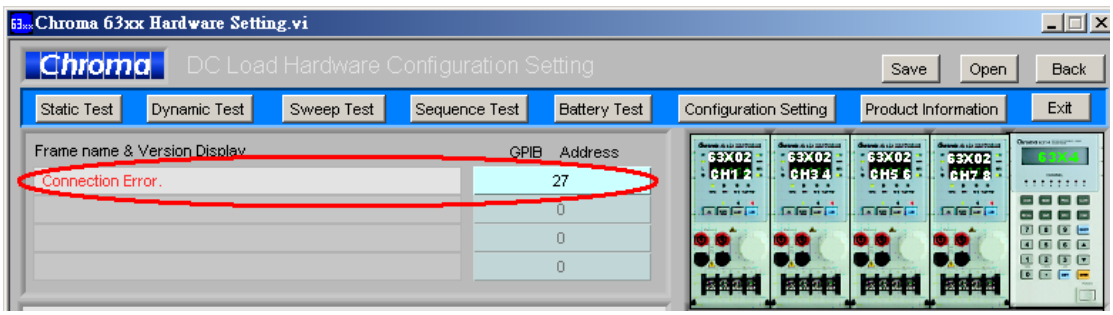


Figure 4-2 Indication when Communication Check Fail

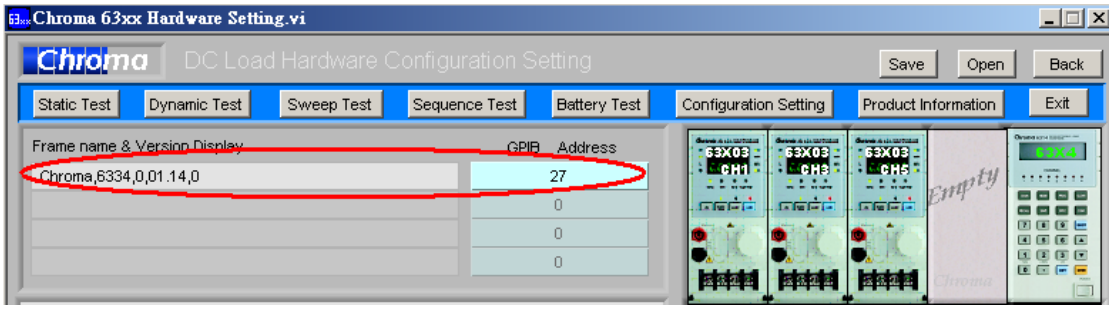


Figure 4-3 Indication when Communication Check Pass

4.1 Indication of Channels

Figure 4-4 shows that one Chroma DC Load (one Frame) is connected at the right which is 63X4, the Frame name of DC Load. For single unit, 3 modules are put in Device 1 and the Channel shows CH1, CH3 and CH5 as well as the read back module name, 63X03.

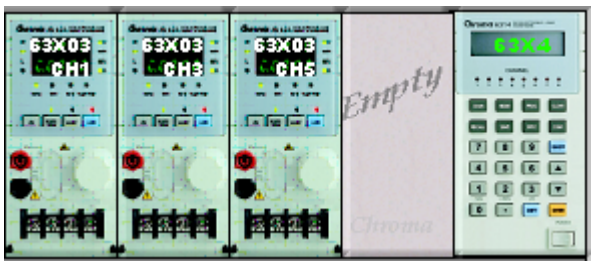


Figure 4-4 Indication of Channels

4.2 Using Demo Mode

The software will enter into Demo mode if no hardware device is connected, and users can understand the functions of Soft Panel through the Demo program.

4.3 Using Channel in Parallel

As Figure 4-5 shows, all channel's name will be listed under Module Name and the program starts to define the UUT CH Number from up to down (ex. 1, 2, 3), then defines the Output Name. The name is specified as Output plus CH Number, for instance Output1, Output2, Output3. At last set the Channel to Active True. Following explains the usage of each element or indicator.

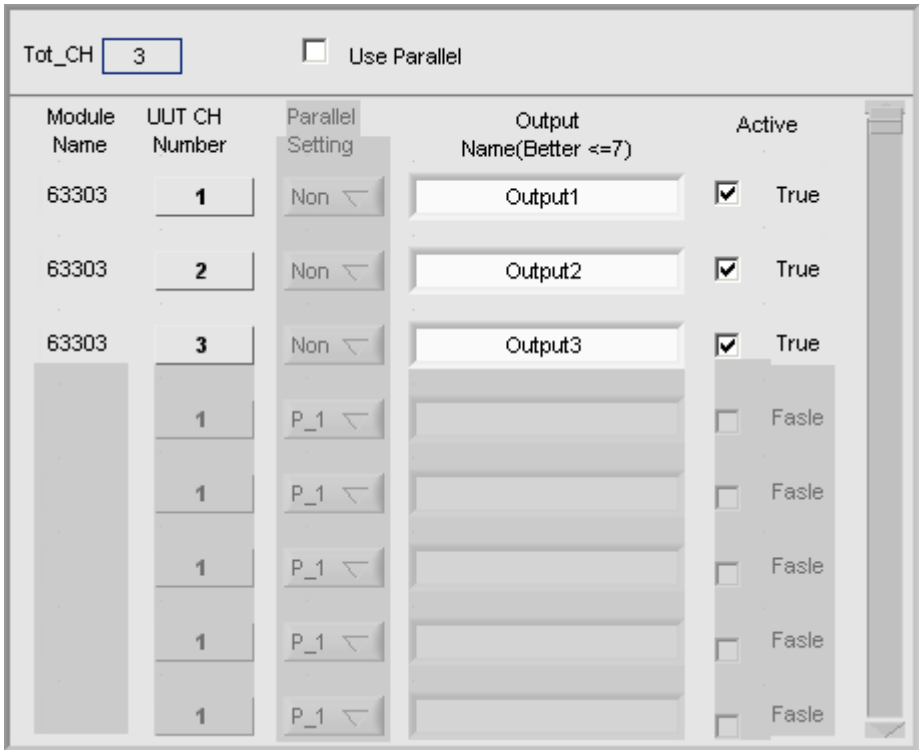


Figure 4-5 Channel and Parallel Use Display Screen

4.3.1 Total Channel

It shows the total effective channel number read back by Soft Panel after initialization. It is for indication only and is not changeable.

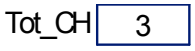


Figure 4-6 Total Channel

4.3.2 Module Name

All Channel names are listed under Module Name so that users can map them to icon and Output Name.

Figure 4-7 Module Name

4.3.3 UUT CH Number

The program starts to define the UUT CH Number, and the Channel number is counting sequentially from 1, 2, 3.

Figure 4-8 UUT CH Number

4.3.4 Output Name

Users can set the Output Name as they like; however, it is suggested not to exceed 7 characters. The reason is that the test report format of Sweep Function, Program Function and Battery Function for Output Name allows 7 characters only. Users should take this restriction under consideration when naming.

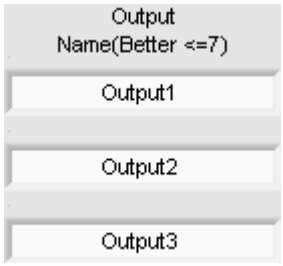


Figure 4-9 Output Name

4.3.5 Active

The default setting is True indicating the mapped channel is active. Users can specify the channel to be inactive without changing the hardware connection by clearing the check box. The Soft Panel will not send any command to the hardware device.

Figure 4-10 Active

4.3.6 Use Parallel

It sets if parallel is in use. The function of Use parallel is to add the power and even the loading current.

Figure 4-11 Selecting Use Parallel

4.3.7 Parallel Setting

Select Use Parallel will active the setting as Figure 4-12 shows. Parallel Setting turns to available from dimmed. This column is default set to None that indicates parallel is not defined. If parallel is needed, select the options starting with P such as P_1, P_2…. The common usage of parallel is two channels, so if there are 4 channels for paralleling, the number in P_*number* will be 4 divided 2. P_1 indicates the paralleled first group. Users can define how many channels to be paralleled for the first group according to the requirements. The parallel in general is to even the loading current. When users specify the a parallel set, the Output name of lower channel under Parallel Setting will be modified to be same as the upper one. However, when it restores to None, Output name will change to "?" string in order to remind users to modify it.

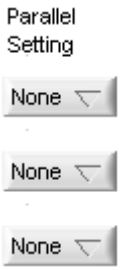


Figure 4-12 Parallel Setting

4.3.8 Function Buttons

Figure 4-13 shows the function buttons including: Static Test, Dynamic Test, Sweep Test, Sequence Test, Battery Test, OCP, Configuration Setting, Production Information and Exit. Users can click it for operation based on the test. Detail information of the Function buttons is described in the following chapter.

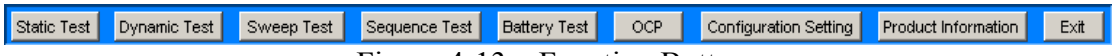


Figure 4-13 Function Buttons

4.4 Saving and Opening Parameter

There are two buttons at the upper right window, one is **SAVE** and the other is **OPEN**. It can save all Hardware Setting parameters for next time use.

4.4.1 SAVE

Click the button as Figure 4-14 shows can save the parameters set on current page to a .HW file.

Figure 4-14 Save Button

To save the current parameters for next time use, click **SAVE** will open the dialog box as Figure 4-15 shows. Select the path and the filename (with the extension .HW) for save. Users can save different settings to different files. The saved file will occupy some disk space and more settings can be saved if the disk space is large enough.

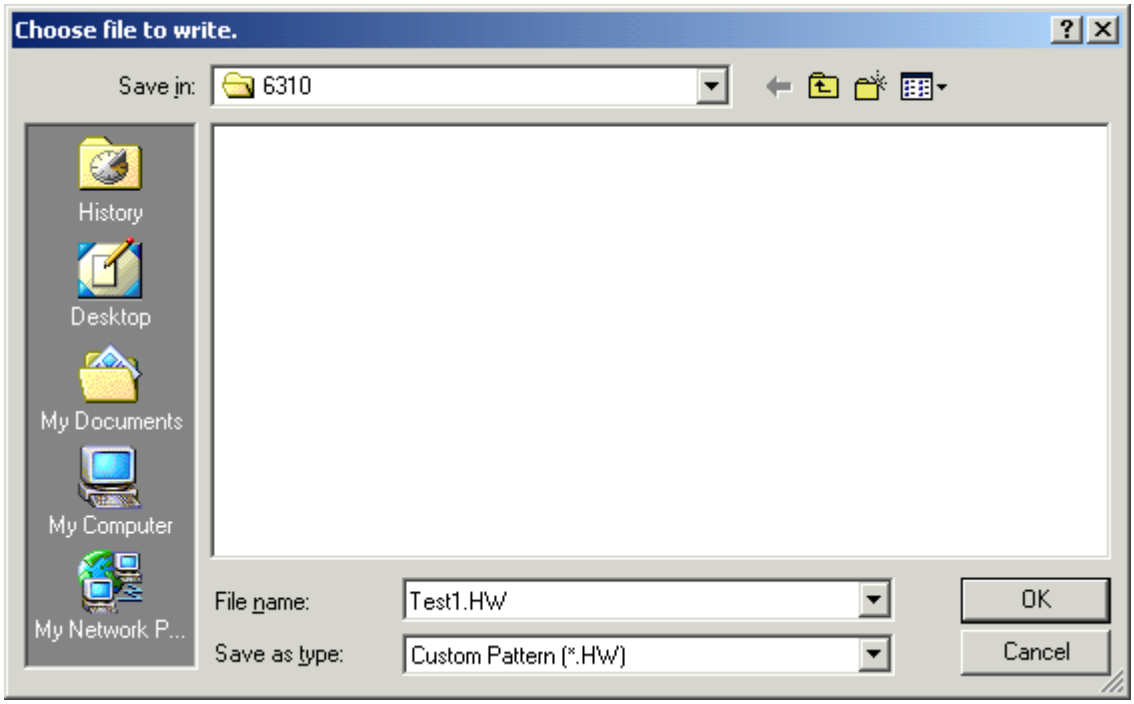


Figure 4-15 Dialog Box for SAVE

4.4.2 OPEN

Click the button as Figure 4-16 shows can open a .HW file that is already saved in the hard disk. It simplifies the work for entering parameters and avoids input errors.

Figure 4-16 Open Button

Users can enter the path in the following dialog box to open the saved parameters or click Cancel to abort the action.

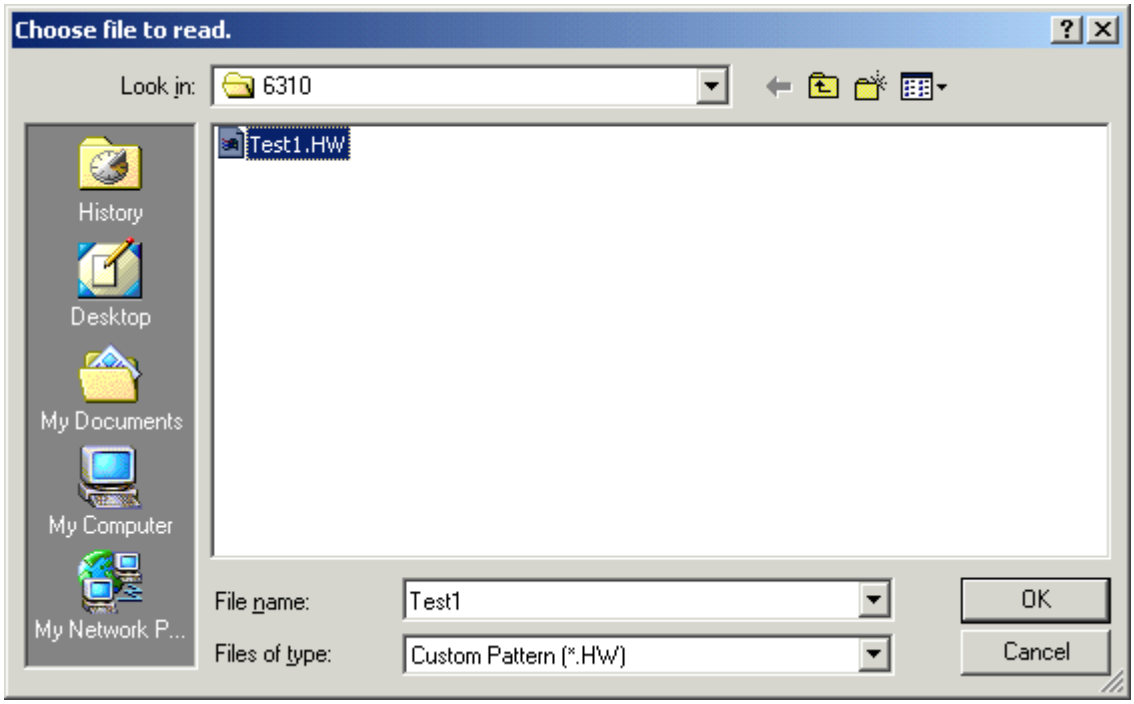


Figure 4-17 Dialog Box for OPEN

4.5 Back

Click this button will skip the current page and return to previous window.

Figure 4-18 Back Button

4.6 Exit

Click this button will quit the Soft Panel.

Figure 4-19 Exit Button

5. Configuration

Before entering for Function test, it will go to Figure 5-1 and download the default setting to instrument. Users can click Configuration Setting in Hardware Setting window for modification. The screen has 3 tabs - General and Static SPEC and Static Parameter Setting.

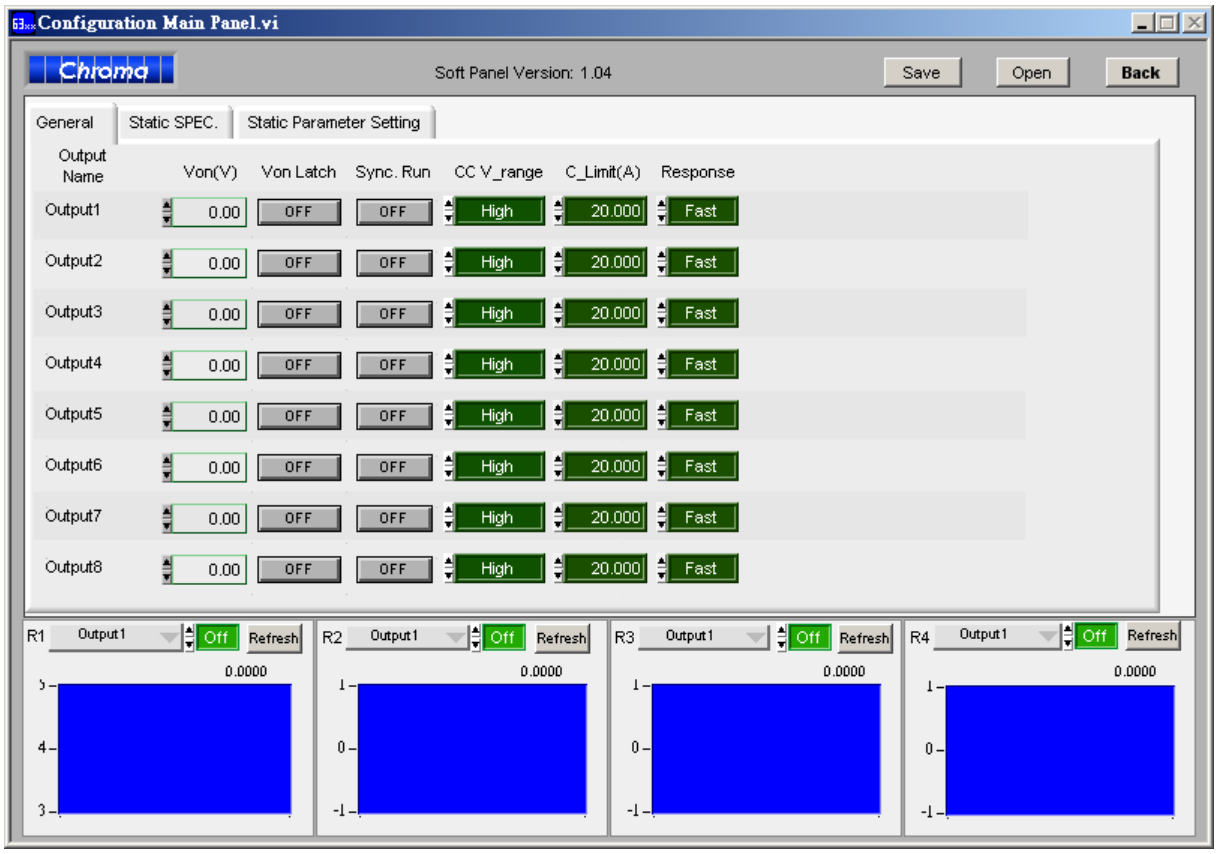


Figure 5-1 Configuration Screen

5.1 General

The General tab is Hardware Configuration Setting including Von, Von Latch, Sync Run CC V_range, C_Limit and Response. The setting is to map the Output Name to the command-receiving channel.

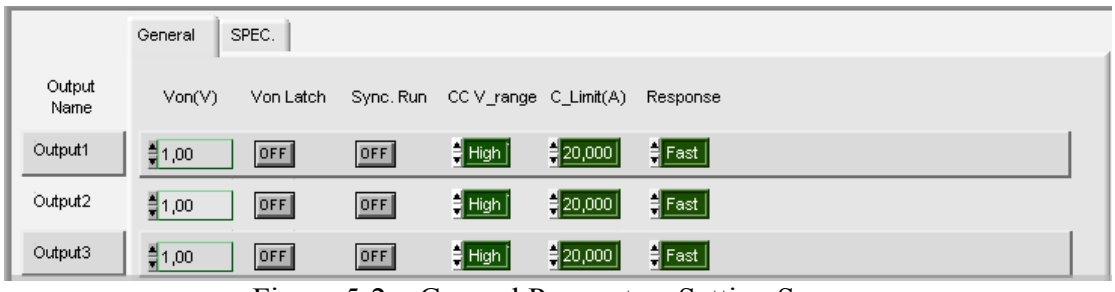


Figure 5-2 General Parameters Setting Screen

5.1.1 Von Point

It sets the UUT to start loading current when the output voltage reaches a certain volt in Configure Page.

5.1.2 Von Latch

It maps to Von Point in Configure Page. Latch On means once the measured voltage reaches Von, it will start loading current no matter if the voltage is dropping lower than Von.

5.1.3 SYNC RUN

When ON is set the spec judgment will activate under Go/NoGo Test in Configure Page.

5.1.4 CC Vrange

When it is set to High it means it is in the high range of module's voltage.

5.1.5 Current Limit

It appears when selecting CV Mode in Configure Page which means to set the maximum current and it will go to protection mode when exceeds.

5.1.6 Response

It appears when selecting CV Mode in Configure Page. It indicates the hardware internal reaction speed from original voltage raises to the set voltage when set to Fast.

5.2 Static SPEC

The settings in this page are related to Static Test only. Its main purpose is to indicate if the measured voltage, current and power are within the range. It shows PASS if yes and shows FAIL if otherwise.

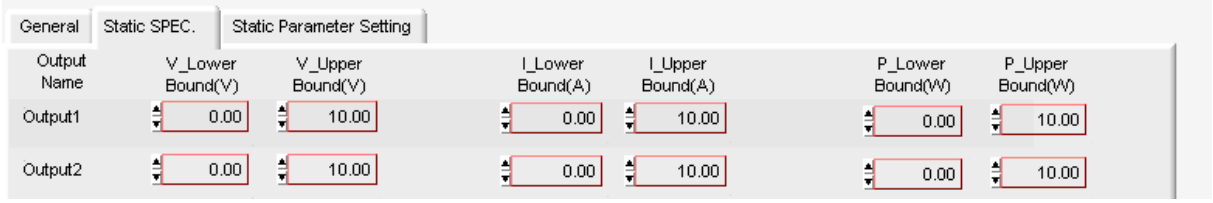


Figure 5-3 SPEC Parameters Setting Screen

5.3 Static Parameter Setting

This tab page can set the settings of Rise Slew Rate and Fall Slew Rate in Static.

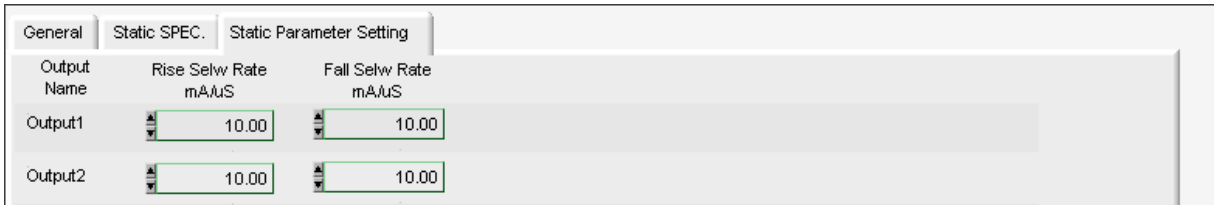


Figure 5-4 Static Parameter Setting Screen

5.4 Reading Display

The Reading Display is composed of 4 blocks and Figure 5-4 shows the individual block. Each block has same functions for selection including: graphic display, numeric display, read back type selection and graphic refresh button.

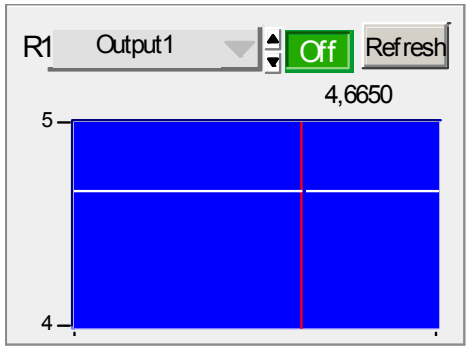


Figure 5-5 Reading Display

5.4.1 Graphic Reading Display

It displays the captured reading from machine. The red vertical line indicates the updated position (the latest value.) The reading vertical scale will adjust automatically. The X-axis is time and the Y-axis is the measured data.

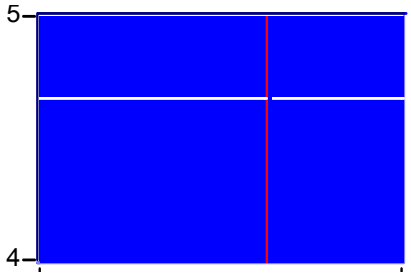


Figure 5-6 Graphic Reading Display

5.4.2 Numeric Display

It is the latest read back data shown in numbers and will continue to update.

Figure 5-7 Numeric Reading

5.4.3 Read Back Type Selection

It is able to select the value to be read back. To monitor the voltage, click R1 to select the type as Figure 5-7 shows, where Off indicates not reading back or stop returning the value.

Figure 5-8 Selecting Read Back Type

5.4.4 Refresh

It clears all data in the graphic display and redisplay again.

Figure 5-9 Refresh Button

5.4.5 SAVE, OPEN &BACK

The function of these three buttons is same as Hardware Setting Function; see section 4.4 and 4.5 for detail information.

6. Static Test

The main function of this window is to run static test. Users can follow the requirements to select the loading mode for test. First the software will prompt the Output Name to indicate the Channel for action. It is necessary to refer to this column when setting Mode and Loading. If gray shading appears in the window, it means not available for use. When the total Channel number is larger than 8, the scroll bar will be active. Users are able to scroll it for page change and the maximum channel number of each page is 8. The functions of this window are explained below.

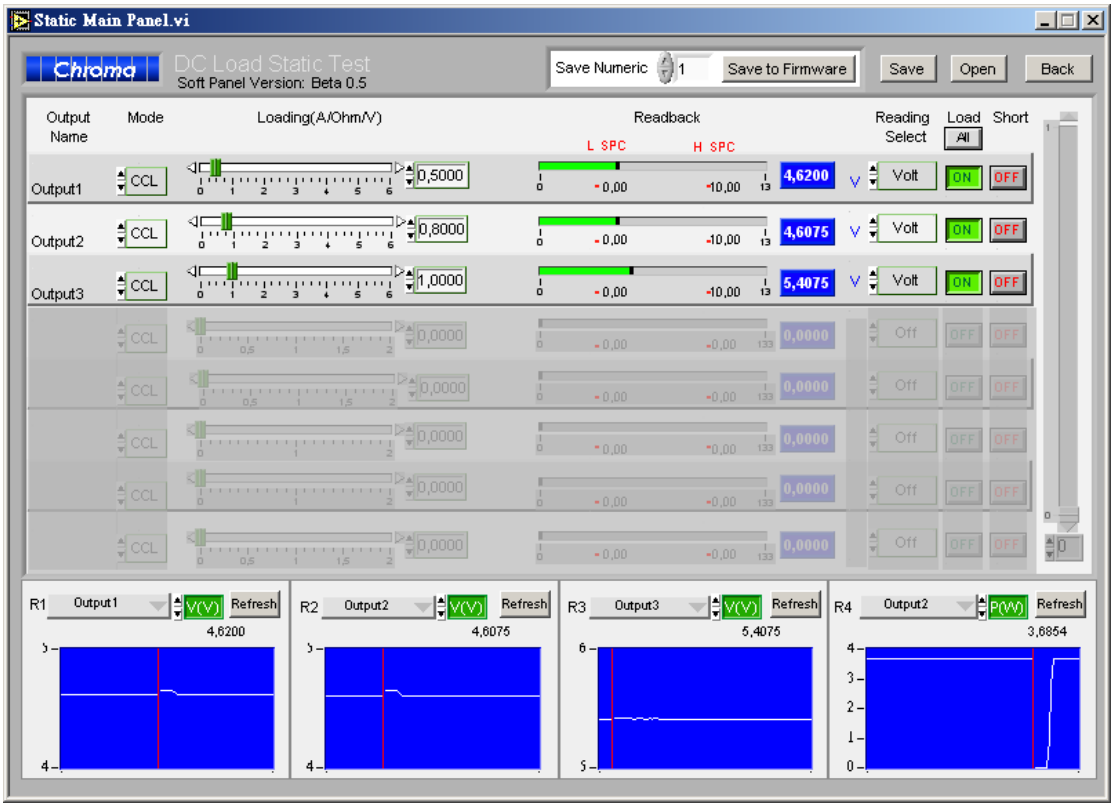


Figure 6-1 Static Test Window

6.1 Selecting Mode

There are CCL, CCH, CRL, CRH and CV loading modes in Static Test. Each channel has these 5 options for selection. When different mode is selected, the loading range to be set changes too. Click the mode of each channel will prompt a menu for selection or use the up and down arrow to select it.

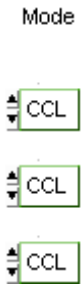


Figure 6-2 Static Test Mode Selection

6.2 Setting Loading

The Loading range changes not only according to the Mode but also following the Module No. Moreover, it changes according to parallel use which should be kept in mind. When the input value exceeds the maximum range, it will stay at the maximum and same for the minimum.

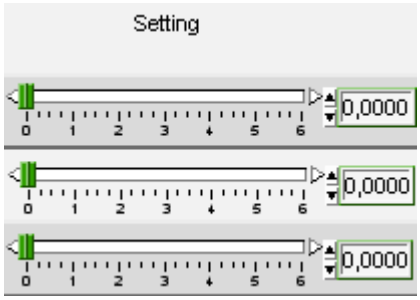


Figure 6-3 Setting Loading

6.3 Reading Select

It works with the Readback indicator at left and has Voltage, Current, Power or Off for selection. When Off is selected, the mapping Readback indicator will be cleared.

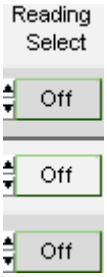


Figure 6-4 Reading Select

6.4 Readback

It is composed of a bar and a digital indicator. This digital indicator shows the measured value and the bar shows PASS or FAIL. If the reading is within the set range, the bar will appear in green to indicate PASS; otherwise it will show red to mean FAIL. The two red dots in the middle are Low Spec and High Spec. The setting of Spec is done in Configuration Setting.

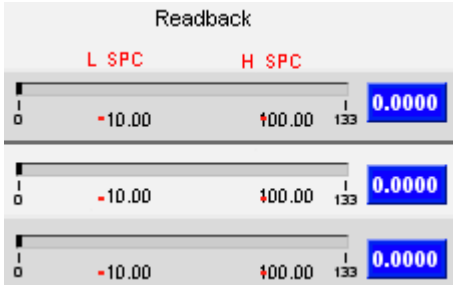


Figure 6-5 Readback Indicator

6.5 Setting Load On/Off

It can enable the loading action to Load On or disable it to Load Off. When Load All is set, all channels will be Load On or Load Off together.

Figure 6-6 Setting Load On/Off

6.6 Setting Short On/Off

It is set for short test. When On appears after clicked, the red LED indicates the hardware loading is shorted and click it again will turn to Short OFF. There are two restrictions for short test, first it has to be in CCH, CCDH, CRL, CRH or CV Mode, second it has to be Load On then Short On.

Figure 6-7 Setting Short On/Off

6.7 Save to Firmware

This button is to save the parameters set by user to instrument firmware. To use it, select the Save Number and click "Save to Firmware" to send out the present window settings to the firmware. The setting values are saved to the Program of single unit and it is necessary to execute them in the single unit Program mode.

Figure 6-8 Save to Firmware Button

6.8 Reading Display

It is same as the functions described in section 5.3.

6.9 SAVE, OPEN & BACK

The function of these three buttons is same as Hardware Setting Function; see section 4.4 and 4.5 for detail information.

7. Dynamic Test

The main function of this window is to test the dynamic loading as need. First the software will prompt the Output Name to indicate the Channel for action. It is necessary to refer to this column when setting Mode and Loading. If gray shading appears in the window, it means not available for use. When the total Channel number is larger than 3, the scroll bar will be active. Users are able to scroll it for page change and the maximum channel number of each page is 3. The functions of this window are explained below.

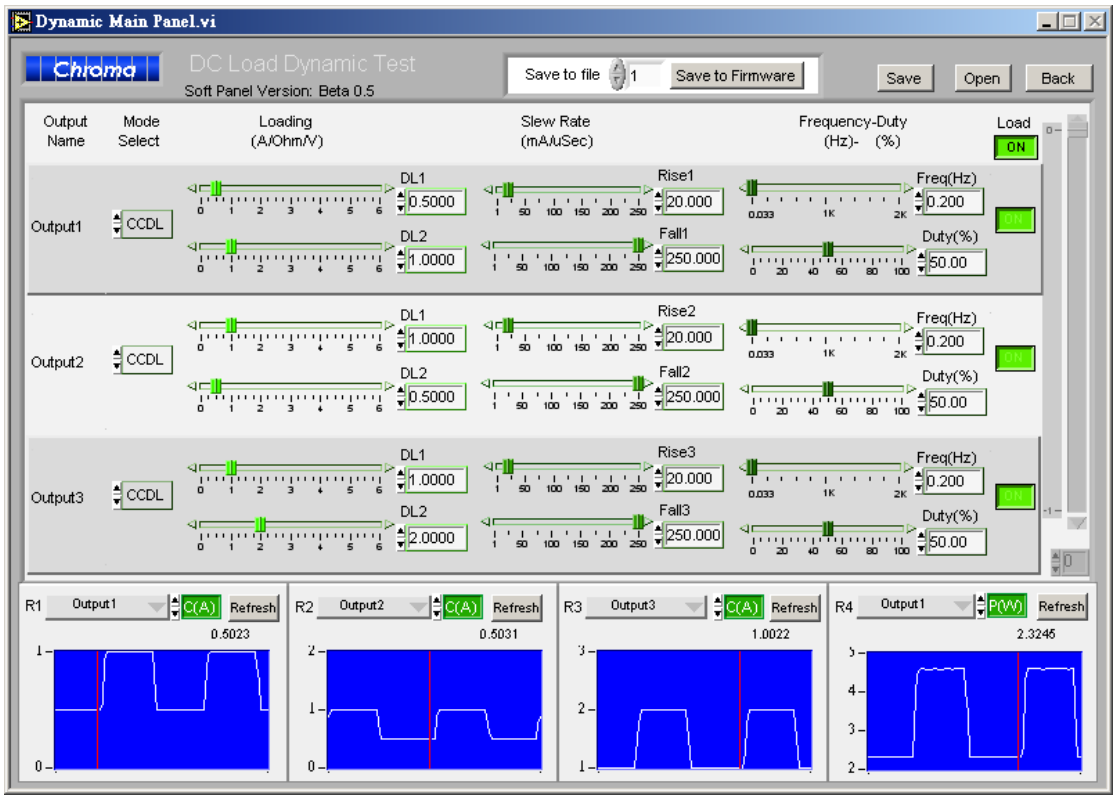


Figure 7-1 Dynamic Test Window

7.1 Selecting Mode

There are CCDL and CCDH loading modes in Dynamic Test. Each channel has these two options. When different mode is selected, the loading range to be set changes too. Click the mode of each channel will prompt a menu for selection or use the up and down arrow to select it.

Figure 7-2 Dynamic Test- Mode Select

7.2 Setting Loading

There are DL1 and DL2 two dynamic loadings. The Loading range changes not only according to the Mode but also following the Module No. Moreover, it changes according to parallel use which should be kept in mind. When the input value exceeds the maximum range, it will stay at the maximum and same for the minimum.

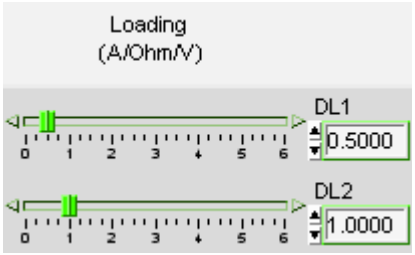


Figure 7-3 Setting Loading

7.3 Setting Slew Rate

Slew Rate has Rise and Fall two parameters. It is to set the current falling speed when setting load, the unit is mA/uS. The range changes not only according to the Mode but also following the Module No.

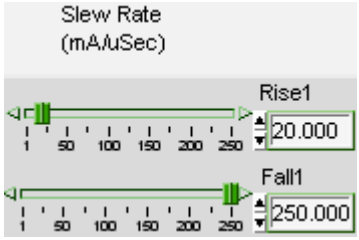


Figure 7-4 Setting Slew Rate

7.4 Setting Frequency-Duty

It is composed of Freq (Hz) and Duty (%). The setting range of Frequency is from 0.033 to 2000Hz and Duty is from 0 % to100%. The mapped instrument settings are T1 and T2, and the calculation formula is T1= (1/Frequency)* Duty%, T2= (1/Frequency)*(1- Duty%).

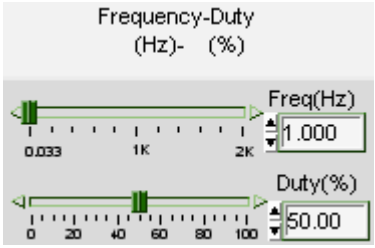


Figure 7-5 Setting Frequency-Duty

7.5 Setting Load On/Off

It can enable the loading action to Load On or disable it to Load Off. When Load All is set, all channels will be Load On or Load Off together.

Figure 7-6 Setting Load On/Off

7.6 Save to Firmware

This button is to save the parameters set by user to instrument firmware. To use it, select the Save Number and click "Save to Firmware" to send out the present window settings to the firmware. The setting values are saved to the Program of single unit and it is necessary to execute them in the single unit Program mode.

Figure 7-7 Save to Firmware Button

7.7 Reading Display

It is same as the functions described in section 5.3.

7.8 SAVE, OPEN & BACK

The function of these three buttons is same as Hardware Setting Function; see section 4.4 and 4.5 for detail information.

8. Sweep Test

Sweep Mode is mainly operated by Dynamic Mode. Its major output is a simulated sinusoidal waveform. When in different frequency the Slew Rate will adjust in order to make the dynamic loading current same as the sinusoidal waveform loading. It adjusts the value of T1, T2 and Slew Rate based on the THD (Total Harmonic Distortion), which is 0.04471 and the value of L1 and L2. The operation mode is divided into Auto and Manual where Auto means to run following the execution time of each step from the start frequency to end automatically, while Manual can define the start frequency and the increment of each step to determine the execution period and number of times. Sweep Mode is not available in parallel mode.

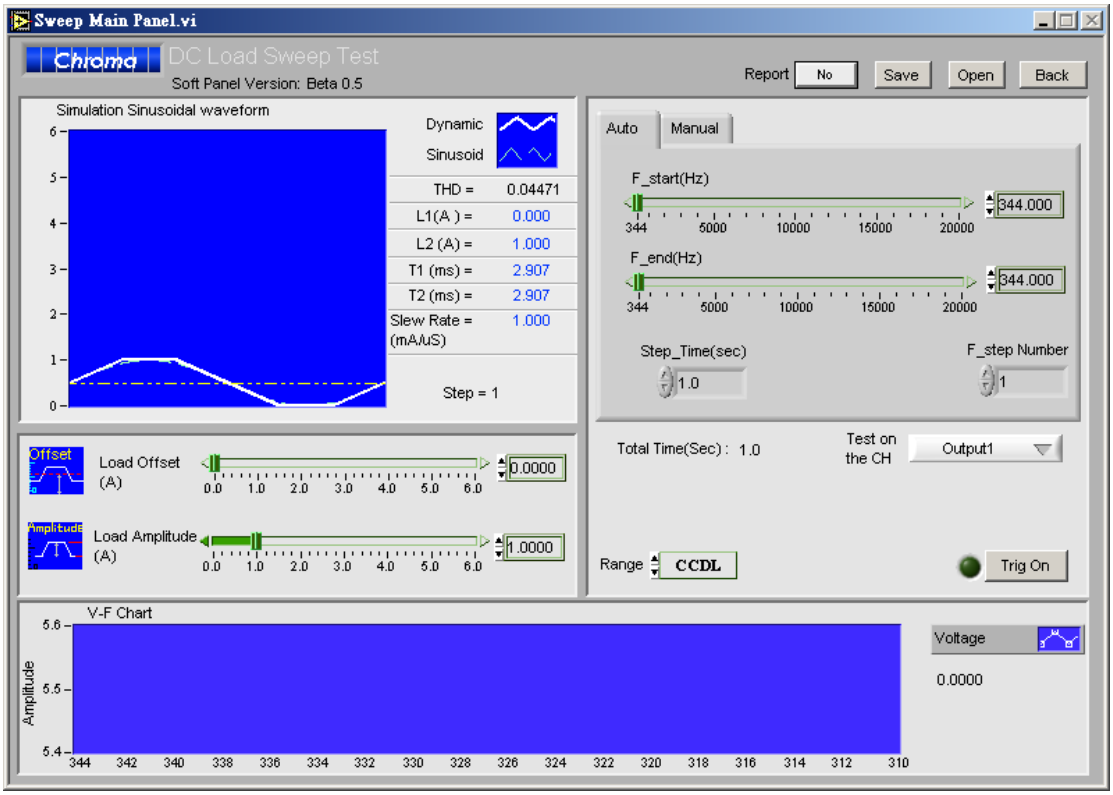


Figure 8-1 Sweep Mode Window

8.1 Simulation Sinusoidal Waveform

This display area will follow setting of Load Offset and Load Amplitude to redraw a Sine wave. Since THD=0.04471, the software will calculate different T1, T2 and Slew Rate for various frequencies. Users can see a simulated trapezoidal waveform on the sine wave clearly. This simulated waveform is the output waveform of loading current. Step indicates the how many steps had been executed. L1, L2, T1, T2 and Slew Rate will show the current setting according to the execution condition.

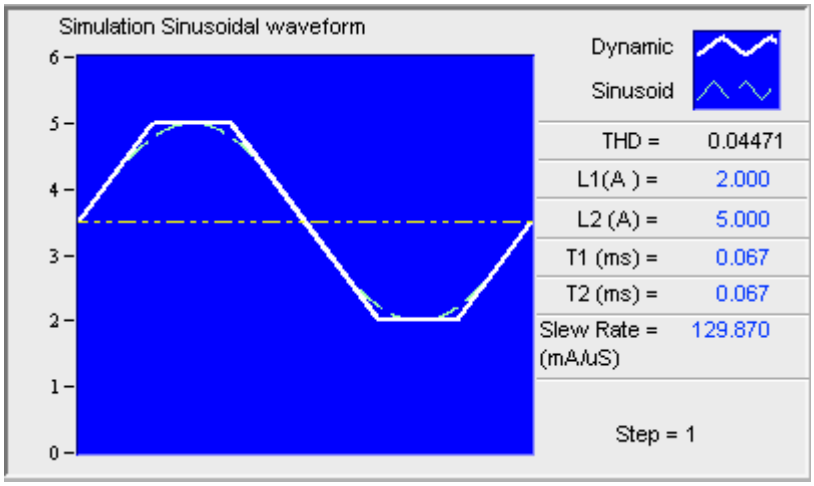


Figure 8-2 Simulation Sinusoidal Waveform

8.2 Setting Loading

There are Load Offset and Load Amplitude two items where Load Offset maps to L1 and Load Offset + Load Amplitude maps to L2. The Loading range changes not only according to the Mode but also following the Module No. Moreover, it changes according to parallel use which should be kept in mind.

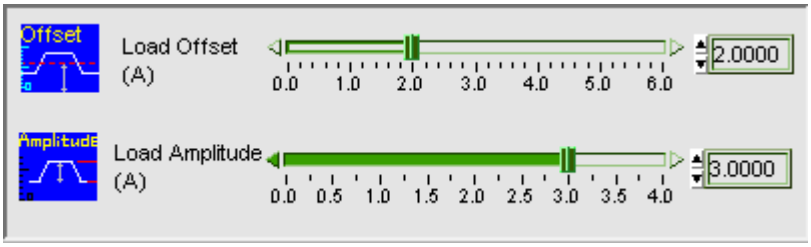


Figure 8-3 Setting Loading

8.3 Scanning Frequency

There are Auto and Manual two tabs for scanning frequency. The scanning and calculation of frequency are related to T1, T2 and Slew Rate. The scanning starts right after it is triggered. The setting range varies with the setting of Loading, Loading Mode and Module. Auto means to run following the execution time of each step from the start frequency to end automatically, while Manual can define the start frequency and the increment of each step to determine the execution period and number of times.

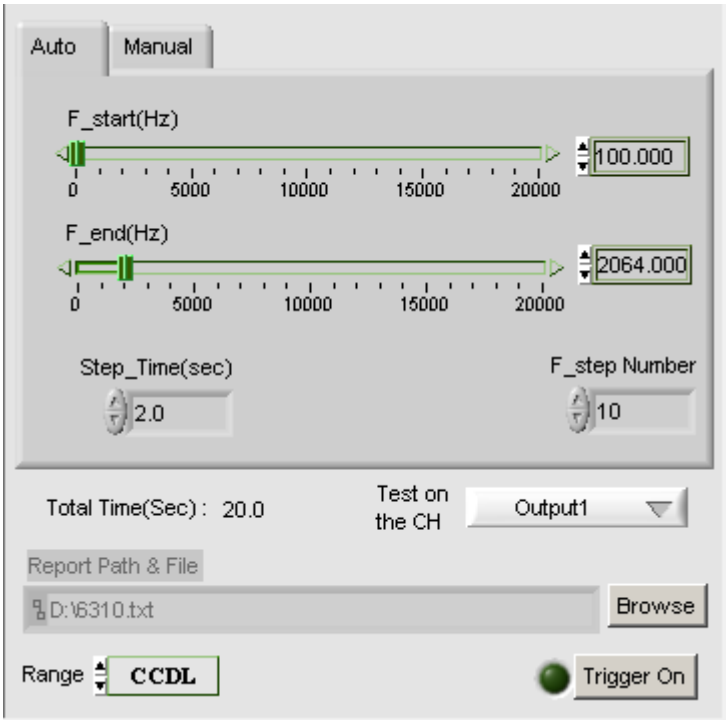


Figure 8-4 Scanning Frequency

8.3.1 Auto

There are F_start, F_ end, Step_Time and F_step Number in Auto tab.
F_start: It sets the start frequency. The maximum is 20000Hz and minimum is restricted by THD, Loading, Module and high/low range of loading mode.

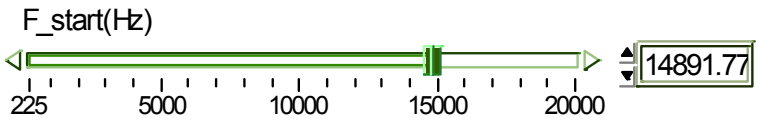


Figure 8-5 F_start

F_ end: It sets the end frequency. The range is same as F_start.

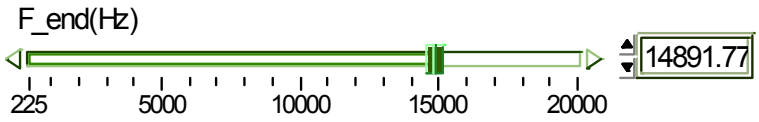


Figure 8-6 F_ end

Step_Time: It sets the execution time of a step. The unit is Sec.

Figure 8-7 Step_Time

F_step Number: It sets the number of steps from F_start to F_end.

Figure 8-8 F_step Number

8.3.2 Manual

There are F_start, dF and Next in Manual tab.
F_start: It sets the start frequency. The maximum is 20000Hz and minimum is restricted by THD, Loading, Module and high/low range of loading mode.

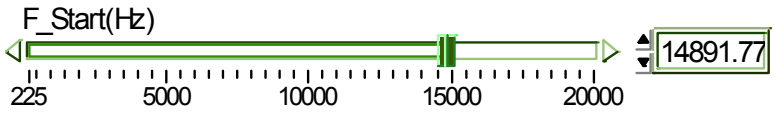


Figure 8-9 F_start

dF: It sets the frequency increment of each addition step from the range of 0.033 to 20000Hz.

Figure 8-10 dF

Next: It can be clicked only when Trigger On. The frequency will increase dF from F_Start but won't exceed the maximum frequency range.

Figure 8-11 Next Button

8.3.3 Test on the CH

It is used to select the channel to be tested. If a parallel channel is selected, the software will give a warning as the parallel mode is not supported. Sweep Test can only test one channel a time.

Figure 8-12 Test on the CH

8.3.4 Range

There are CCDL and CCDH two options for range setting and it affects the loading current to be set

Figure 8-13 Range

8.3.5 Trigger On Button

It triggers Sweep Test for execution. The test starts when Trigger on is clicked and click it again to Trigger Off will cancel the test.

Figure 8-14 Trigger On Button

8.3.6 Total Time Indicator

It sums up the total test time when operating in Auto mode. When in Manual mode, it starts counting the execution time after Trigger On.

Figure 8-15 Total Time Indicator

8.4 V-F Chart

When Trigger On enables, the frequency is scanned for the readback voltage of each dot. The voltage curve is drawn according to F_start and the execution time of each step.

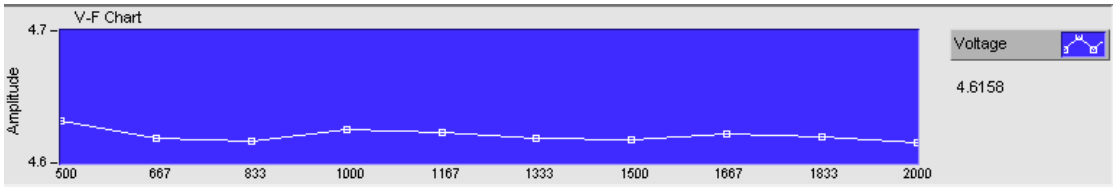


Figure 8-16 V-F Chart

8.5 Report Format

Sweep test provides a simple, pure text report in *.txt format. The report function and its file path as well as filename are explained below:

8.5.1 Report Yes/No

If there is a need to open the Report function, just set the Report to Yes to enable it and the Report Path & File will appear.

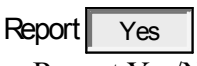


Figure 8-17 Report Yes/No Selection

8.5.2 Report Path & File

This is for users to define the Report path and file name when Report function is enabled. Click Browse will prompt a dialog box for selecting path and file name.

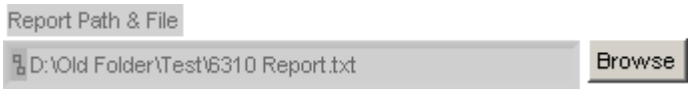


Figure 8-18 Report Path & File

8.5.3 Report Result

The Sweep Test Report contains settings and readings. The settings include: Output Name, Range, Load Offset(A), Load Amplitude(A), Sweep Mode, F_satart (Hz), F_end(Hz), Step Time(Sec), and F_step Number. The readings include all mapping values of F_V as the figure shown below.

```
                Chroma DC Load Sweep Test Report

---------- Setting ----------
Output Name      :Output1
Range            :CCDL
Load Offset(A)   :0.5000
Load Amplitude(A):1.5000
Sweep Mode       :Auto
F_satart (Hz)    :500.000
F_end(Hz)        :2000.00
Step Time(Sec)   :1.0
F_step Number    :10


---------- Reading ----------
No.     F(Hz)   Voltage(V)
------- ------- -----------
1       500.00  4.63150
2       666.67  4.61900
3       833.33  4.61675
4       1000.00 4.62575
5       1166.67 4.62275
6       1333.33 4.61825
7       1500.00 4.61725
8       1666.67 4.62250
9       1833.33 4.61975
10      2000.00 4.61575
```

Figure 8-19 Report Result

8.6 SAVE, OPEN & BACK

The function of these three buttons is same as Hardware Setting Function; see section 4.4 and 4.5 for detail information.

9. Program Test

This mode provides List Sequence Test and Step Sequence Test to replace the manual step test. The test program can be defined in advance so that the software can control the hardware for execution following the set timing. First the Output Name will prompt to show the channel that will be mapped when setting Mode and Loading. If gray shading appears in the window, it means not available for use. When the total channel number is larger than 4, the scroll bar will be active. Users are able to scroll it for page change and the maximum channel number of each page is 4. Please be aware that the Program Mode execution in Soft Panel is done by software and is different from the Program Mode of single unit. The functions of this window are explained below.

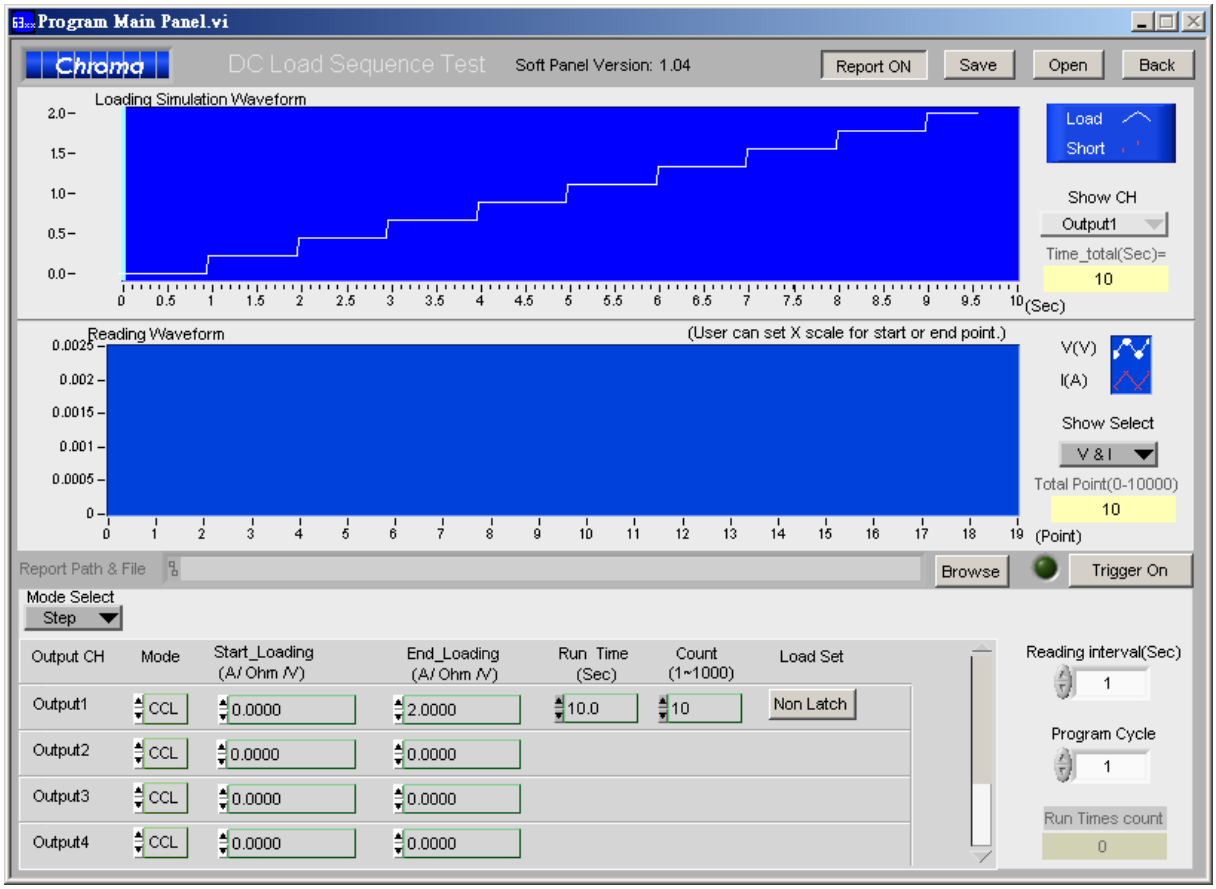


Figure 9-1 Program Test Window

9.1 Loading Simulation Waveform

This is a display area that draws the changes of loading to include Loading value (Y axis), execution time ratio (X-axis) and if using Short (List Mode). The red line area represents short. Show Channel indicates which channel settings are used to do the simulation. Users can choose only one channel at a time. Time_total indicates the time required for execution under the present settings. The 0 indicator beneath will start counting to inform users how much time has passed. In the mean time the Waveform Chart has a scanning

line running to inform users the number of sequence is in execution, the loading value and completion percentage.

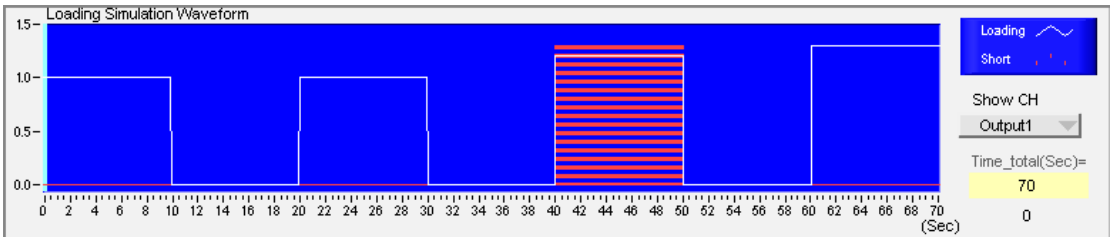


Figure 9-2 Loading Simulation Waveform

9.2 Setting List Mode Parameter

Select List as Figure 9-3 shows in List_Step to use the List Mode. It is composed of 100 sequences (0-99) and users can enter the settings to specified items based on the requirements or conditions. Each sequence contains Setting, Short and Time parameters. Mode and Load Set will not change as the sequence changes. The definition of each item is described below.

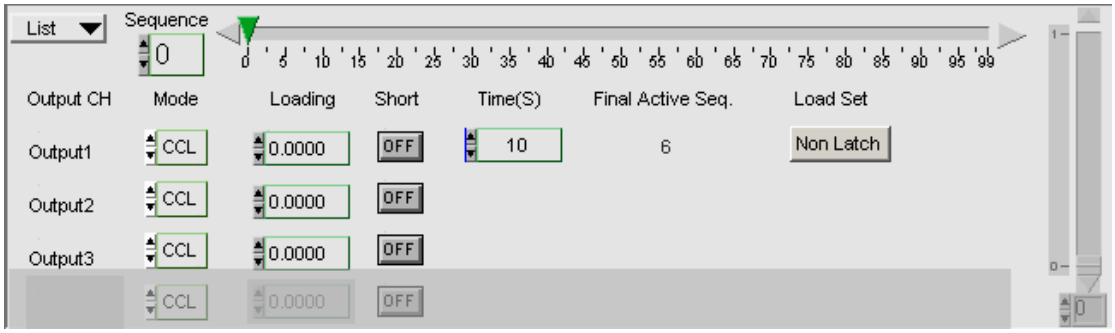


Figure 9-3 List Mode Parameters

9.2.1 Setting List_Step

It is at the upper left of setting area with List or Step Mode for selection. The selected mode will stay when done.

Figure 9-4 Setting List_Step

9.2.2 Setting Sequence

The range of sequence is from 0 to 99. There are 100 sequences in List Mode for execution. When switching to different sequence, the parameters - Setting, Short and Time will change as well, and each of them has 100 sets available for setting.

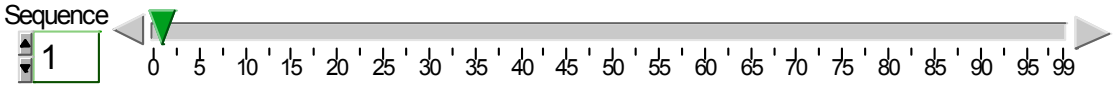


Figure 9-5 Setting Sequence

9.2.3 Displaying Output CH

The names of Output Channel display are defined by the configuration in Hardware window. Users can refer to the chapter *Setting Hardware* for the settings.

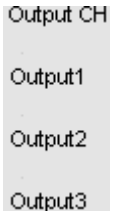


Figure 9-6 Displaying Output CH

9.2.4 Setting Mode

There are CCL, CCH, CRL, CRH and CV loading modes in Program Test. Each channel has these 5 options. When different mode is selected, the Loading range will be changed too. Click the channel will prompt a menu of modes for selection or use the up/down arrow to select it. Only one mode can be applied for the 100 sequences and no switch is allow during the process. The setting will not change in List Mode or Step Mode.

Figure 9-7 Setting Mode

9.2.5 Setting Loading

There are 100 sets of “Loading” available for setting in List Mode. When users change the sequence, the Index will modify the “Loading” as well for mapping. The Loading range varies with Mode and Module No. Moreover, it changes according to parallel use which should be kept in mind. When the input value exceeds the maximum range, it will stay at the maximum and same for the minimum.

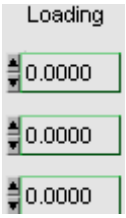


Figure 9-8 Setting Loading

9.2.6 Setting Time

There are 100 sets of "Time" available for setting in List Mode. The unit is second. When users change the sequence, the Index will modify the "Time" as well for mapping. However, the channels in a sequence will be executing for the same time period. In addition, if the time sets to 0 it indicates the subsequent time settings for sequence are all invalid. It also means the program doesn't have to be ended when 100 sequences are done. Set a certain sequence to 0, the program will stop running at one sequence prior. The mapping setting is Final Active Seq.

Figure 9-9 Setting Time

9.2.7 Setting Short

There are 100 sets of "Short" available for setting in List Mode. When users change the sequence, the Index will modify the "Short" as well for mapping. Short is not available in CCL Mode.

Figure 9-10 Setting Short

9.2.8 Final Active Seq.

Final Active Seq. indicates the present valid sequence, which is one that execution will stop. Set a certain sequence's time to 0 then the program will run till the sequence prior no matter if the later "Time" setting is 0.

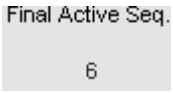


Figure 9-11 Final Active Seq.

9.2.9 Setting Load Set

It maps to Von Point. Latch On means once the measured voltage reaches Von it will do current loading no matter if the voltage is ever lower than Von. The setting will not change either in List Mode or Step Mode.

Figure 9-12 Setting Load Set

9.3 Step Mode Parameter

To use Step Mode, select Step in List_Step as Figure 10-13 shows. The same settings to List Mode are Output CH, Mode and Load Set. Following explains their definition. The biggest difference between Step and List is that the execution of each Step is fixed without increasing or decreasing loading, and the increment or decrement is also fixed.

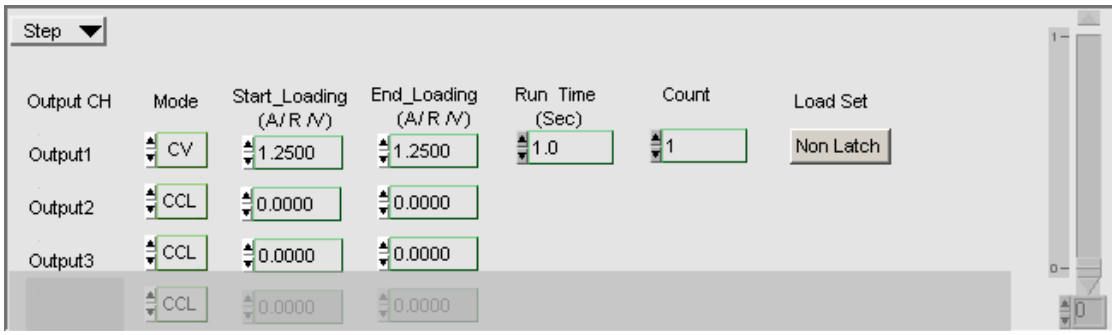


Figure 9-13 Step Mode Parameter

9.3.1 Setting Start_Loading

It sets the start loading of each channel under Step. The Loading range changes not only according to the Mode but also following the Module No. Moreover, it changes according to parallel use which should be kept in mind. When the input value exceeds the maximum range, it will stay at the maximum and same for the minimum.

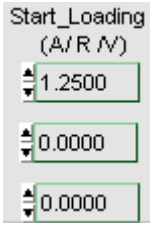


Figure 9-14 Setting Start_Loading

9.3.2 Setting End_Loading

It sets the end loading of each channel under Step. The Loading range changes not only according to the Mode but also following the Module No. Moreover, it changes according to parallel use which should be kept in mind. When the input value exceeds the maximum range, it will stay at the maximum and same for the minimum.

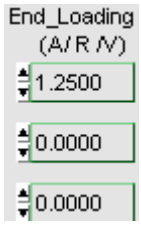


Figure 9-15 Setting End_Loading

9.3.3 Setting Run Time

It sets the total execution time for the Step that is same for all channels. The unit is second.

Figure 9-16 Setting Run Time

9.3.4 Setting Count

It sets how many steps are counted from Start_Loading to End_Loading during Run_Time. The range is from 1 to 1000. When setting to 1, it indicates only Start_Loading will be run.

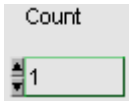


Figure 9-17 Setting Count

9.4 Setting Trigger On/Off

Once all conditions are set, they can be executed by clicking Trigger On. During execution, a Run Bar will appear in the Loading simulation figure to inform users the present progress. Click Trigger Off to stop it or Pause to suspend it.

Figure 9-18 Setting Trigger On/Off

Pause Button:
This button only shows when Trigger On to suspend present action. A dialog box will prompt when clicked and click "OK" to resume it.

Figure 9-19 Pause Button

9.5 SAVE, OPEN & BACK

The function of these three buttons is same as Hardware Setting Function; see section 4.4 and 4.5 for detail information.

9.6 Reading Waveform

This window is able to draw curve lines to show the readings. If the tested data is too much, users can adjust the start and end point of X scale as the 0 and 19 shown in the figure below for easy observation. The method is to click it directly for modification.

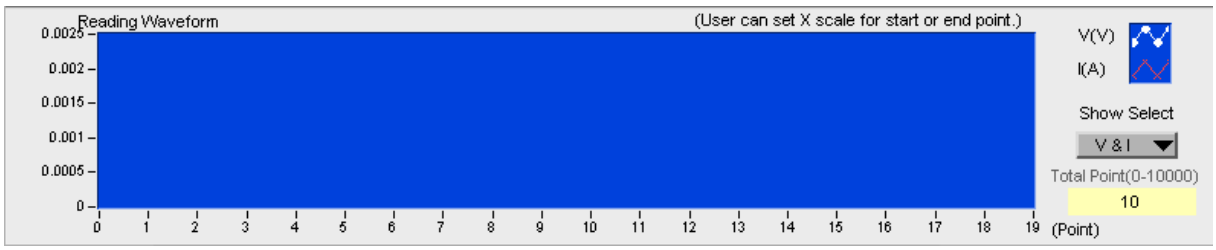


Figure 9-20 Reading Waveform Window

9.6.1 Show Select

It selects the readback value to be Voltage or Current or V & I.

Figure 9-21 Show Select Window

9.6.2 Total Point (0-10000)

It shows the point already read. The read points will change following the execution time and Program Cycle set. Presently, the Waveform points defined for observation is up to 10000 points only. Different readback interval may extend the observation time.

9.6.3 Reading Interval (Sec)

It sets the interval for reading the measurements of each CH in unit of second. If 1 second is set, it indicates the set measurements are read back every 1-second.

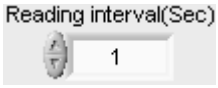


Figure 9-22 Reading Interval

9.6.4 Program Cycle

It sets the time and execution cycles in Step or List mode.

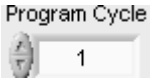


Figure 9-23 Program Cycle

9.6.5 Run Times Count

It shows the count number of executed Program Cycle.

Figure 9-24 Run Times Count

9.7 Report Format

Program test provides a simple, pure text report in *.txt format. See Section 8.5 for the detail description of report function and its file path as well as filename.

Program Test Report:
The report result contains settings and readings. The settings include: Program Function, Total run time, Load on Setting, Time Interval (Sec), Output Name, Mode, Loading Setting, Short and Time (S). The readings include: Voltage Reading (V), Current Reading (A), and the voltage or current readings of each sequence or step along with the mapping time. See Figure 9-20 for the example.

Chroma DC Load Program Test Report

---------- Setting ----------
Program Function : List Type Totoal run time : 45.0
Load on Setting : Non Latch Time Interval(Sec): 5

Output Channel	Mode	Setting(A/R/V)	Short	Time(S)
Output1	CCL	1.0000	No	5.0
Output1	CCL	0.0000	No	5.0
Output1	CCL	1.0000	No	5.0
Output1	CCL	0.0000	No	5.0
Output1	CCL	0.8000	No	5.0
Output1	CCL	0.0000	No	5.0
Output1	CCL	1.2000	No	5.0
Output1	CCL	0.0000	No	5.0
Output1	CCL	1.3000	No	5.0

---------- Voltage Reading (V)----------

Seq.No	Output1	Date/Time
0	4.625	2005/10/20 PM 03:48:58
1	4.665	2005/10/20 PM 03:49:03
2	4.6275	2005/10/20 PM 03:49:08
3	4.665	2005/10/20 PM 03:49:13
4	4.635	2005/10/20 PM 03:49:17
5	4.665	2005/10/20 PM 03:49:22
6	4.6175	2005/10/20 PM 03:49:27
7	4.665	2005/10/20 PM 03:49:32
8	4.615	2005/10/20 PM 03:49:37

---------- Current Reading (A) ----------

Seq.No	Output1	Date/Time
0	0.99843	2005/10/20 PM 03:48:58
1	0.00018	2005/10/20 PM 03:49:03
2	0.99843	2005/10/20 PM 03:49:08
3	0.00018	2005/10/20 PM 03:49:13
4	0.79912	2005/10/20 PM 03:49:17
5	0.00018	2005/10/20 PM 03:49:22
6	1.19925	2005/10/20 PM 03:49:27
7	0.00018	2005/10/20 PM 03:49:32
8	1.29806	2005/10/20 PM 03:49:37

Figure 9-25 Report Result

10. Battery Test

This function is to test battery discharge by setting a fixed load and checking the battery output voltage after loading started. Once the voltage is adjusted to a certain cutoff potential, stop loading and calculate the total electric charge (mA-hour). The entire battery discharge status can be seen from the Battery Voltage and Current Reading Chart. If gray shading appears in the window, it means not available for use. When the total channel number is larger than 4, the scroll bar will be active. Users are able to scroll it for page change and the maximum channel number of each page is 4.

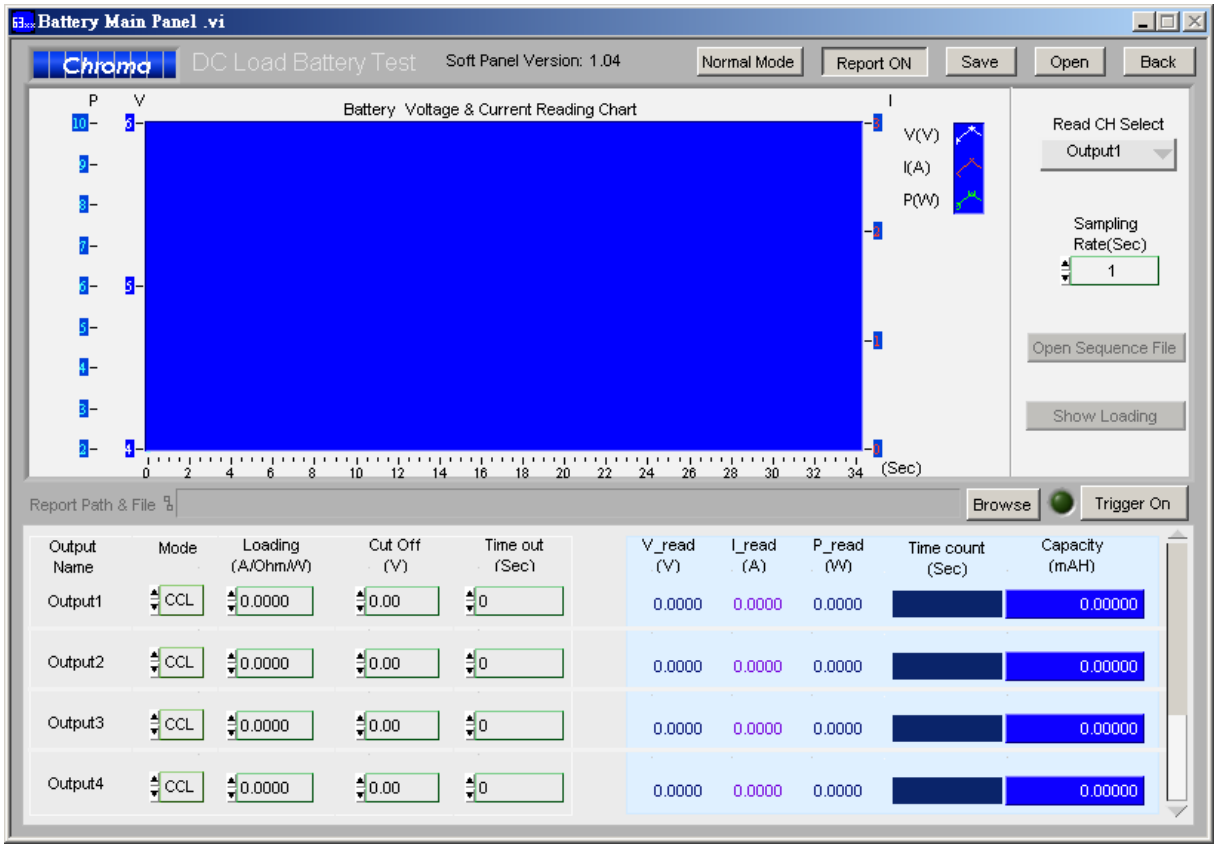


Figure 10-1 Battery Test Window

10.1 Operation Mode

It sets the operation mode to Normal or By Sequence. If Normal is selected, it means both loading and end conditions are activated by this Battery Test window; and if Program Mode is selected, it means the loading condition is determined by Program Test window and end condition is still activated by this Battery Test window. So when Program Mode is in use, the settings are same as the Chapter *Program Test* described; however, the trigger and end control are still performed by Battery Test window.

Figure 10-2 Selecting Operation Mode

10.2 Battery Voltage & Current Reading Chart

This chart draws voltage, current and power three curves at the same time as Figure 10-3 shows. The voltage curve is in white mapping to the Y axis scale at left of the first column in chart. The current curve is in red mapping to the Y-axis scale at right of the first column in chart. The power curve is in green mapping to the Y-axis scale at leftmost of chart. Read CH Select indicates what channel reading will be used to draw the curve and one channel can be selected at a time at the beginning. Sampling Rate is to set the time (sec.) to display the graphic readings. For long hour discharge, the rate can be increased so that the points won't be too much. The X-axis is the points for drawing. The points are calculated by comparing the time set by channel with the Sampling Rate before executing discharge test.

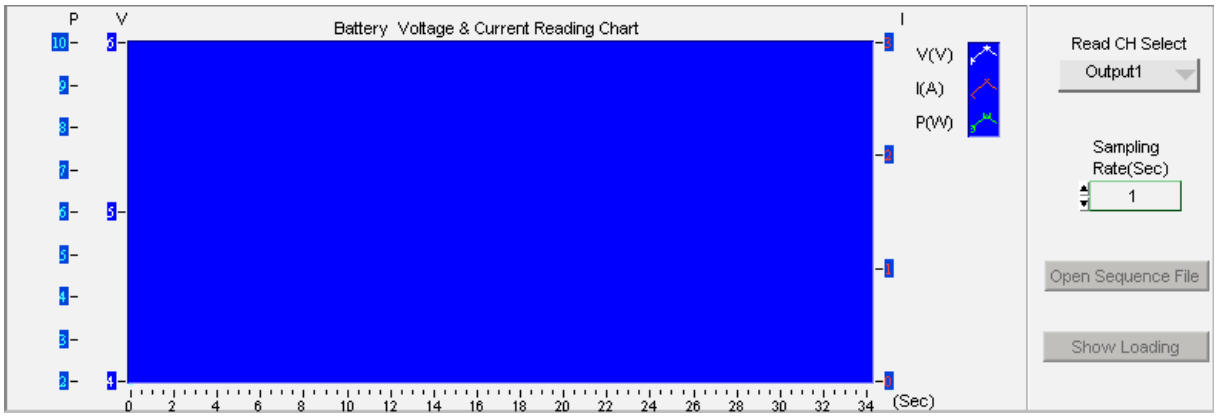


Figure 10-3 Battery Voltage & Current Reading Chart

10.3 Setting Battery Parameter

It sets the discharge loading mode and how many loads for loading. It also sets the end condition such the Cut Off voltage or when to Time Out. Once a condition is met, loading or discharge test will stop immediately.

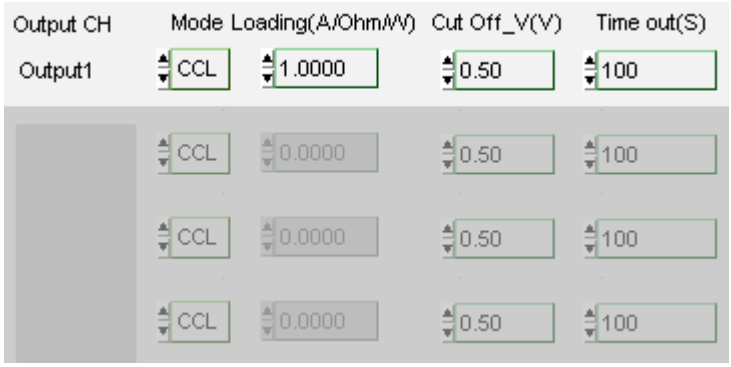


Figure 10-4 Setting Battery Parameter

10.3.1 Displaying Output CH

The name of Output Channel display are defined by the configuration in Hardware window. Users can refer to the chapter *Setting Hardware* for the settings.

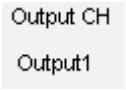


Figure 10-5 Displaying Output CH

10.3.2 Setting Mode

There are CCL, CCH, CRL, CRH, CPL and CPH loading modes in Battery Test. Each channel has these 6 options. When different mode is selected, the Loading range will be changed too. Click the channel will prompt a menu of modes for selection or use the up/down arrow to select it. CP mode is simulated by software, for instance, when a power is set and triggered to read back the voltage, it decides the loading current based on the voltage reading. Though CP mode was applied, it is actually operated in CC mode by changing loading current constantly.

Figure 10-6 Setting Mode

10.3.3 Setting Loading

There are 100 sets of "Loading" available for setting in List Mode. When users change the sequence, the Index will modify the "Loading" as well for mapping. The Loading range varies with Mode and Module No. Moreover, it changes according to parallel use which should be kept in mind. When the input value exceeds the maximum range, it will stay at the maximum and same for the minimum.

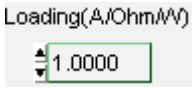


Figure 10-7 Setting Loading

10.3.4 Setting Cut Off_V

It sets the condition to end discharge test. When the measured voltage is lower than the set condition, the loading stops and so does the channel discharge test to get the capacity mAH.

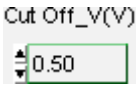


Figure 10-8 Cut Off_V

10.3.5 Setting Time Out

It sets the condition to end discharge test. Once the test time reaches the time out setting though the measured voltage is not lower than the set conditon, the loading stops the loading stops and so does the channel discharge test to get the capacity mAH.

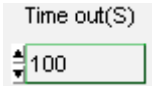


Figure 10-9 Setting Time Out

10.4 Displaying Measurements

This area shows the measured voltage, current, power, execution time and the discharged capacity at present. The voltage, current and power read back one time per second. When the voltage is lower than Cut Off_V, the Channel Time Count will stop and the Capacity (mAH) will stop counting too.

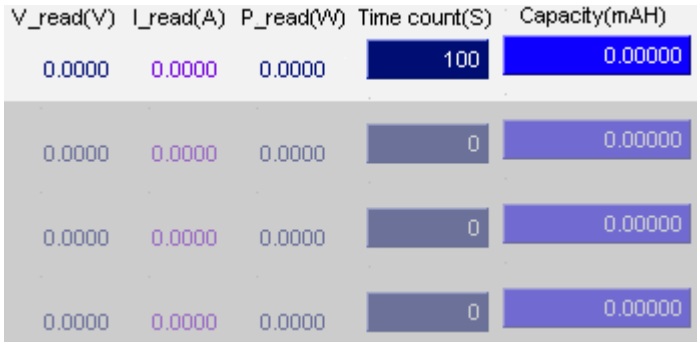


Figure 10-10 Displaying Measurements

10.5 Setting Trigger On/Off

Once all conditions are set, they can be executed by clicking Trigger On. During execution, a Battery Voltage & Current Reading Chart will start to draw the curve according to the measurement values to inform users the present progress. To stop it, just click Trigger Off. All tested channels will follow the set conditions to proceed counting or stop.

Figure 10-11 Setting Trigger On/Off

10.6 Program Mode

This function will enable when switching from Normal Mode to Program Mode and the load change of battery discharge will be dynamically. Related settings include Open Sequence File and Show Loading. Click Open Sequence File can select a saved file in

Program Test window for the load change of this battery discharge; while click Show Loading the load time settings can be observed by the simulation window.

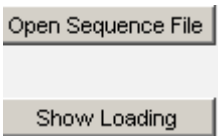


Figure 10-12 Two Settings in Program Mode

10.7 SAVE, OPEN & BACK

The function of these three buttons is same as Hardware Setting Function; see section 4.4 and 4.5 for detail information.

10.8 Report Format

Battery test provides a simple, pure text report in *.txt format. See Section 8.5 for the detail description of report function and its file path as well as filename.

Battery Test Report:
The report result contains settings and readings. The settings include: Mode, Setting (A/R/W), Cut Off (V) and Time Out (S). The readings include: Time Count, Capacity (mAH). See Figure 10-12 for the example.

```
Chroma DC Load Battery Test Report

---------- Setting ----------
Output Channel  Mode     Setting(A/R/W) Cut Off(V)      Time Out(S)
--------------  ----    --------------- ----------     -----------
Output1         CCL     1.3000          0.50           100.0


---------- Reading ----------
Output Channel  Time Count      Capacity(mAH)
--------------  --------------  ---------------
Output1         00:01:40        36.057396
```

Figure 10-13 Report Result

11. OCP Test

The over current protection test is to observe the output voltage and current changes when the loading current is getting bigger and bigger. The changes are shown in graphic. This test is not suitable when the UUT is in Hiccup mode.

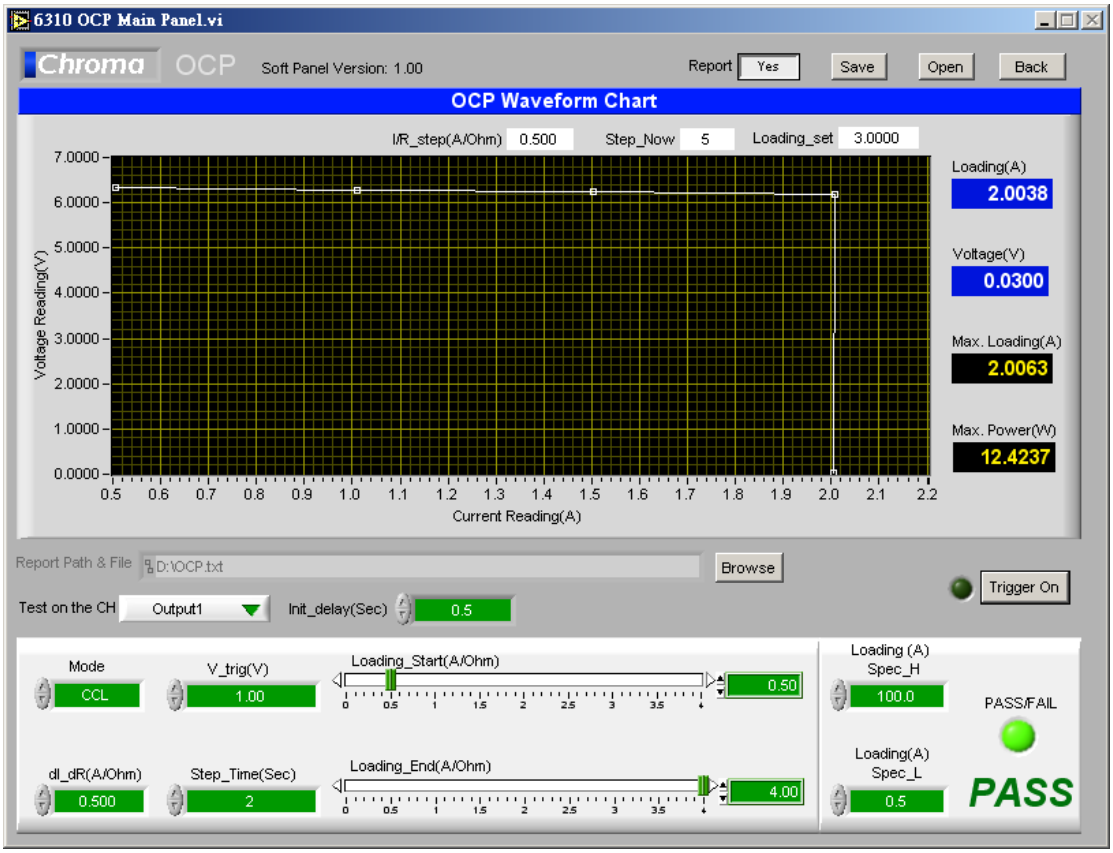


Figure 11-1 OCP Control Screen

11.1 OCP Parameter

There are Mode, V_trig, dI_dR, Step_Time, Loading_Start, Loading_End, Test on the CH, Init_delay, Loading SPEC_H, Loading SPEC_L and Trigger On parameters available for setting. Loading, Voltage, Max Loading, Max Power and Loading_set, Step_Now, and I/R_step are shown in digital format. The OCP Waveform Curve will draw the waveform according to the voltage and current readings.

11.1.1 Setting Mode

There are CCL, CCH, CRL & CRH 4 loading modes in OCP Test for selection. When different mode is selected, the Loading range will be changed too. Click the channel will prompt a menu of modes for selection or use the up/down arrow to select it.

Figure 11-2 Mode

11.1.2 V_trig

It sets the output voltage drop for terminating the test.

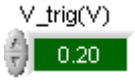


Figure 11-3 OCP – V_trig

11.1.3 Init Delay

It sets the time delayed for measurement after loading. It usually causes measurement error when measuring right after loading.

Figure 11-4 OCP – Init Delay

11.1.4 Loading Start

It sets the start loading current (resistance) for hardware when doing OCP Test.

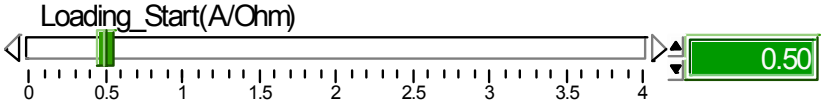


Figure 11-5 OCP – Loading Start

11.1.5 Loading End

It sets the end loading current (resistance) for hardware when doing OCP Test.

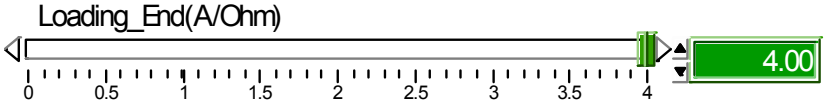


Figure 11-6 OCP – Loading End

11.1.6 dI_dR

It sets the current increment of each step from Loading Start. Since it is for OCP test, the load gets bigger and bigger. If CC is selected for Mode, the dI value will be positive and if CR is chosen for Mode, then the dR value will be negative.

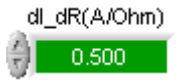


Figure 11-7 OCP – dI_dR

11.1.7 Step Time

It sets the loading time of each step in second.

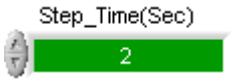


Figure 11-8 OCP – Step Time

11.1.8 Test on the CH

It specifies the channel to be tested. Only one single channel for test is supported.

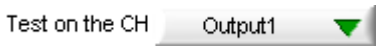


Figure 11-9 OCP – Test on the CH

11.1.9 Loading Spec_H

It sets the high limit spec for OCP measurement.

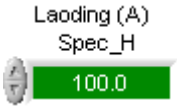


Figure 11-10 OCP – Loading Spec_H

11.1.10 Loading Spec_L

It sets the low limit spec for OCP measurement.

Figure 11-11 OCP – Loading Spec_L

11.1.11 Trigger On

Click this button will start loading current for OCP test.

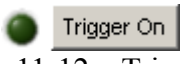


Figure 11-12 Trigger on

11.1.12 Loading Display

It shows the present measured current once the test starts.

Figure 11-13 OCP – Loading Display

11.1.13 Voltage Display

It shows the present measured output voltage once the test starts.

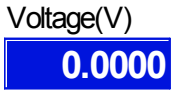


Figure 11-14 OCP – Voltage Display

11.1.14 Max Loading Display

It shows the maximum current measured at present once the test starts.

Figure 11-15 OCP – Max Loading Display

11.1.15 Max Power Display

It shows the maximum power measured at present once the test starts.

Figure 11-16 OCP – Max. Power

11.1.16 Loading_set

It shows the present used load current once the test starts.

Figure 11-17 OCP – Loading_set

11.1.17 Step_Now

It shows the number of step tested after the test begins.

Figure 11-18 OCP – Step_Now

11.1.18 I/R_step

It shows the increment (positive) of current or decrement (negative) of resistance after the test begins.

Figure 11-19 OCP – I_Step

11.1.19 OCP Waveform Chart

It shows the X-Y waveform chart of current and voltage. When the test begins the software will keep reading the present voltage/current following different loading current. This Waveform Chart is a dynamic display and it shows the point of all steps where the Y-axis is an Auto Scale of voltage and X-axis is the scale of loading current.

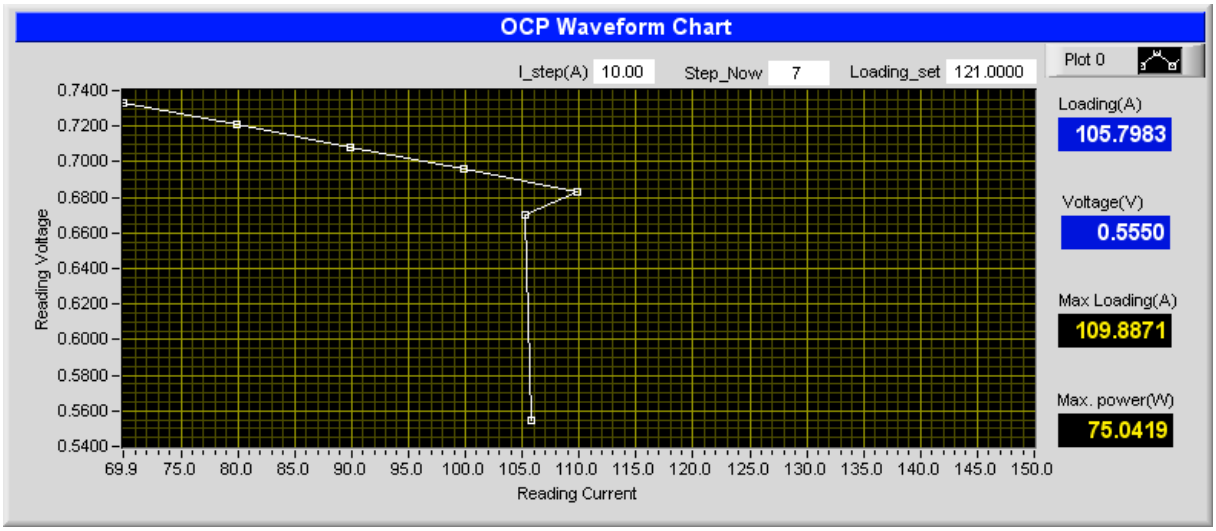


Figure 11-20 OCP Waveform Chart

11.1.20 PASS/FAIL

It shows if the measured value is within the Spec range after tested. It shows PASS in green if the measurement is within the Spec and shows FAIL in red if otherwise.

Figure 11-21 OCP - PASS/FAIL

11.2 Report

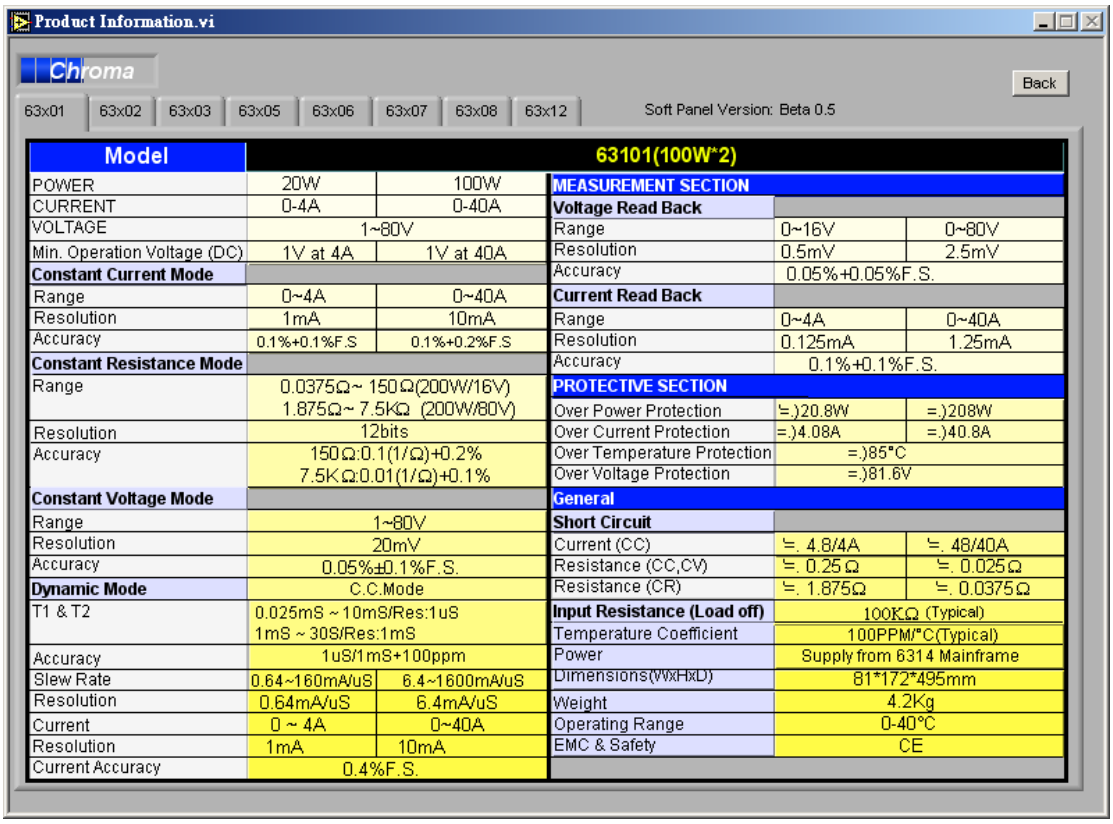
For the setting and using the report function, please refer to the section of *Report Format* in *Sweep Test* chapter.

11.2.1 Example of OCP Test Report

```
                Chroma DC Load OCP Test Report

---------- Setting ----------
Channel Mode    Load_S  Load_E  dI_dR   V_trig  Step_T  Init_T
 Name           (A/Ohm) (A/Ohm) (A/Ohm) (V)      (Sec)   (Sec)
------- ------- ------- ------- ------- ------- ------- -------
Output1 CCL     0.50    4.00    0.500   1.00    1.5     0.5


---------- Reading ----------
Test Result ------------------------------------------------PASS

Loading Spec_H  Loading(A)      Loading Spec_L
--------------- --------------- ---------------
100.0           2.0063          0.5

Max power(W):12.4237

Step    V_Read  I_Read
------- ------- -------
0       6.34    0.51
1       6.28    1.01
2       6.24    1.50
3       6.19    2.01
4       0.03    2.00
```

12. Product Information

This window is easy for users to check the specifications of each module. The modules included in the table are 63x01, 63x02, 63x03, 63x05, 63x06, 63x07, 63x08 and 63x12. Users can click the Module Name on each tab to go to the individual specification page.



Model	63101(100W*2)	
POWER	20W	100W
CURRENT	0-4A	0-40A
VOLTAGE	1~80V	
Min. Operation Voltage (DC)	1V at 4A	1V at 40A
Constant Current Mode		
Range	0~4A	0~40A
Resolution	1mA	10mA
Accuracy	0.1%+0.1%F.S	0.1%+0.2%F.S
Constant Resistance Mode		
Range	0.0375Ω~ 150Ω(200W/16V) 1.875Ω~ 7.5KΩ (200W/80V)	
Resolution	12bits	
Accuracy	150Ω:0.1(1/Ω)+0.2% 7.5KΩ:0.01(1/Ω)+0.1%	
Constant Voltage Mode		
Range	1~80V	
Resolution	20mV	
Accuracy	0.05%±0.1%F.S.	
Dynamic Mode	C.C.Mode	
T1 & T2	0.025mS ~ 10mS/Res:1uS 1mS ~ 30S/Res:1mS	
Accuracy	1uS/1mS+100ppm	
Slew Rate	0.64~160mA/uS	6.4~1600mA/uS
Resolution	0.64mA/uS	6.4mA/uS
Current	0 ~ 4A	0~40A
Resolution	1mA	10mA
Current Accuracy	0.4%F.S.	

MEASUREMENT SECTION		
Voltage Read Back		
Range	0~16V	0~80V
Resolution	0.5mV	2.5mV
Accuracy	0.05%+0.05%F.S.	
Current Read Back		
Range	0~4A	0~40A
Resolution	0.125mA	1.25mA
Accuracy	0.1%+0.1%F.S.	
PROTECTIVE SECTION		
Over Power Protection	≒)20.8W	=.)208W
Over Current Protection	=.)4.08A	=.)40.8A
Over Temperature Protection	=.)85°C	
Over Voltage Protection	=.)81.6V	
General		
Short Circuit		
Current (CC)	≒. 4.8/4A	≒. 48/40A
Resistance (CC,CV)	≒. 0.25Ω	≒. 0.025Ω
Resistance (CR)	≒. 1.875Ω	≒. 0.0375Ω
Input Resistance (Load off)	100KΩ (Typical)	
Temperature Coefficient	100PPM/°C(Typical)	
Power	Supply from 6314 Mainframe	
Dimensions(WxHxD)	81*172*495mm	
Weight	4.2Kg	
Operating Range	0-40°C	
EMC & Safety	CE	

Figure 12-1 Product Information Window