Installation and Getting Started Guide

Agilent Technologies I/CV

Version 2.1

© Copyright 1999-2003, Metrics Technology, Inc. All rights reserved.

Table of Contents

Installation and Configuration

Metrics Codewords

Metrics Technology software products use a combination of a Security Key and Codeword. The unique combination of a Codeword and Security Key allows the software product to be run.

The Software Codeword Certificate

The Codeword is found on the Software Codeword Certificate included in the packaging. There will be a certificate for each software component ordered. The certificate is made up of two (2) parts, the Registration Information and Codeword Information.

The Registration Information

We encourage all customers to register their software with Metrics Technology. Only registered users will receive technical support for their products.

Note: Only one user may be registered per copy of software. This person is the only person that will receive support.

Customer ID

The Customer ID is a number that has the form IAXXXXXA. Where the X is a number. Variations include IHXXXXA, MHXXXXXA, and MKXXXXXA. This number must match the number on the Security Key.

Product Desc

This is the Product Description. This will be the name of the product, such as Metrics I/CV or Metrics ICS.

Product ID

The product ID is a second description of the software.

Version

This is the version of the software.

Note: The version number and the codeword are matched. Thus, customers who have not purchased an upgrade will not be able to run it without purchasing the correct codeword.

Codeword Serial

This is the codeword for the software. During installation you are prompted to enter this number. You must enter it exactly as it is printed on the certificate, including the hyphens. i.e. 111-111-1-1111111

Re-Entering the Code Words

The software codeword can be re-entered in one of two different ways, either by re-installing the I/CV software according the instructions above or by re-entering the codeword in each application separately.

To re-enter ICS code word:

1. Open the ICS program.
2. Click on the Codeword button.

3. Enter the code word supplied on the product registration form.
4. Click the **OK** button.

To re-enter the Metrics Switch code word:

1. Open the Metrics Switch program.
2. Click on the Codeword button.

3. Enter the code word supplied on the product registration form.
4. Click the **OK** button.

To re-enter the Metrics I/CV code word:

1. Open the Metrics I/CV System Tools toolbar.
2. Click on the System Config button.
3. Click on the Software License Codewords tab
4. Enter the Product ID, Version, and Codeword supplied on the product registration form.
5. Click the **Set** button.
6. Click the **OK** button.

Installing the I/CV Software

The installation program for the I/CV software installs all components necessary to run the I/CV program automatically. During the installation you will be prompted to furnish codewords for the various components of the software.

Note for people upgrading from Previous versions of ICS

The I/CV setup program installs ICS v3.6 in the same directory as the I/CV software. If you are upgrading from a previous version of ICS please note that the .INI file for your previous version is saved as ICS.INI. ICS v3.6 makes a copy of the existing ICS.INI file and saves it as ICS35.INI. The I/CV software will not work with versions of ICS prior to v3.6. To use your existing setups, either point the file manager in ICS v3.6 to the old data base or copy the database into the directory where I/CV is installed.

Procedure to Install I/CV

1. Insert the Metrics Applications CD into the CD-ROM drive of your computer.

2. The CD-ROM will automatically start the installation program.

3. Choose "Install Products".

4. Choose "Install I/CV".

5. Click **Next** button on the "Welcome" panel.

6. Read the "Software License Agreement" and click the **Yes** button to agree to the terms.

7. Complete the User Information fields. The Codeword is found on the "Metrics Software Codeword Certificate" for I/CV. Click the **Next** button.

8. Choose "destination location" for installation and click the **Next** button.

9. Select "Typical" setup type and click the **Next** button.

10. After the installation is finished, re-start the computer.

11. Connect the Security plug to the LPT (or USB) port of your computer. **Note:** The security plug must be connected directly to the computer. Also note that the optional USB plug **MUST NOT** be attached until after the I/CV software is installed and the PC is restarted. The security key requires special drivers that are installed with I/CV. If the key is accidentally installed it will be necessary to remove it and uninstall the default driver that Windows installs.

Configuring I/CV

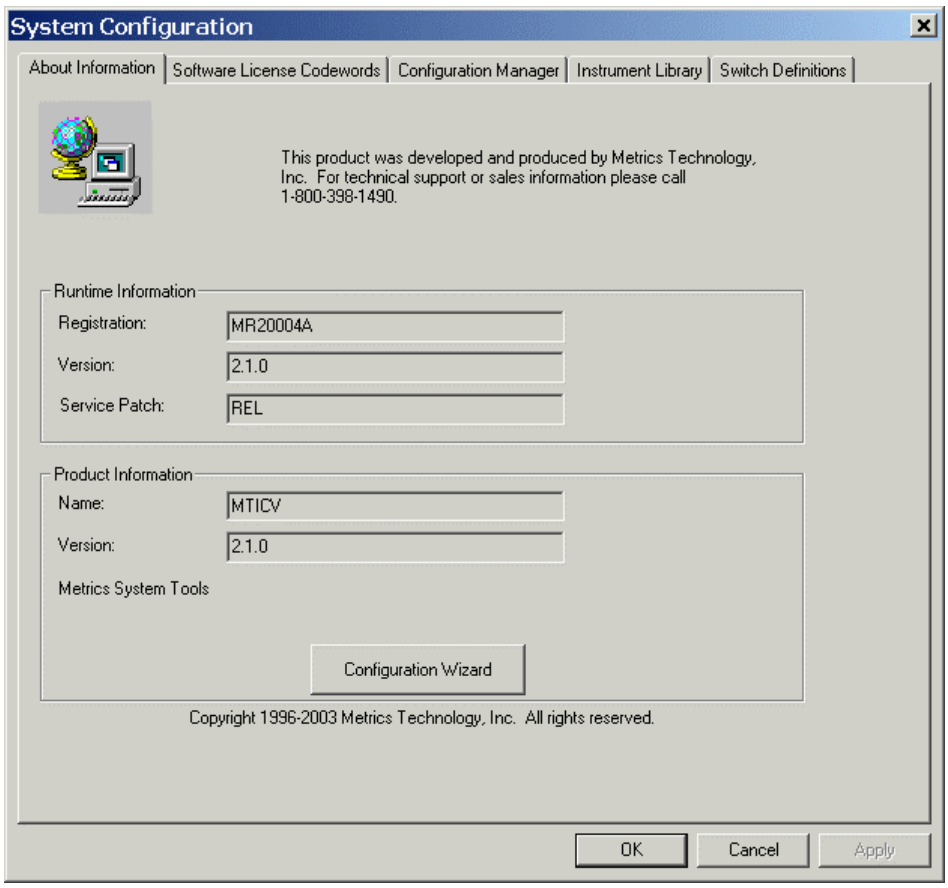
Auto Configuration

After installing Metrics I/CV, it must be configured. The first time I/CV is started, it will automatically run the Configuration Wizard Utility. This utility will ask the operator a series of questions to determine the correct configuration for the I/CV software.

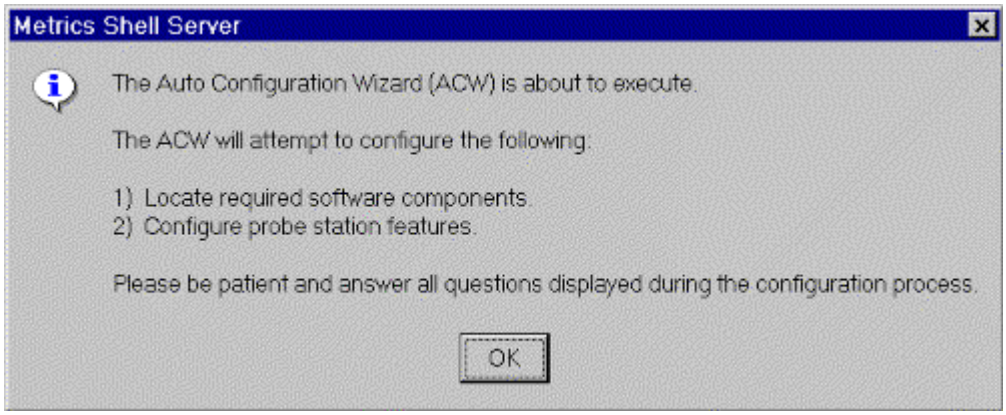
Using The Configuration Wizard Utility

The Configuration Wizard presents a series of questions to the user. The user-supplied responses allow the software to automatically configure. The Configuration Wizard can be re-run at any time to change the setup. To manually start the Configuration Wizard, follow these steps:

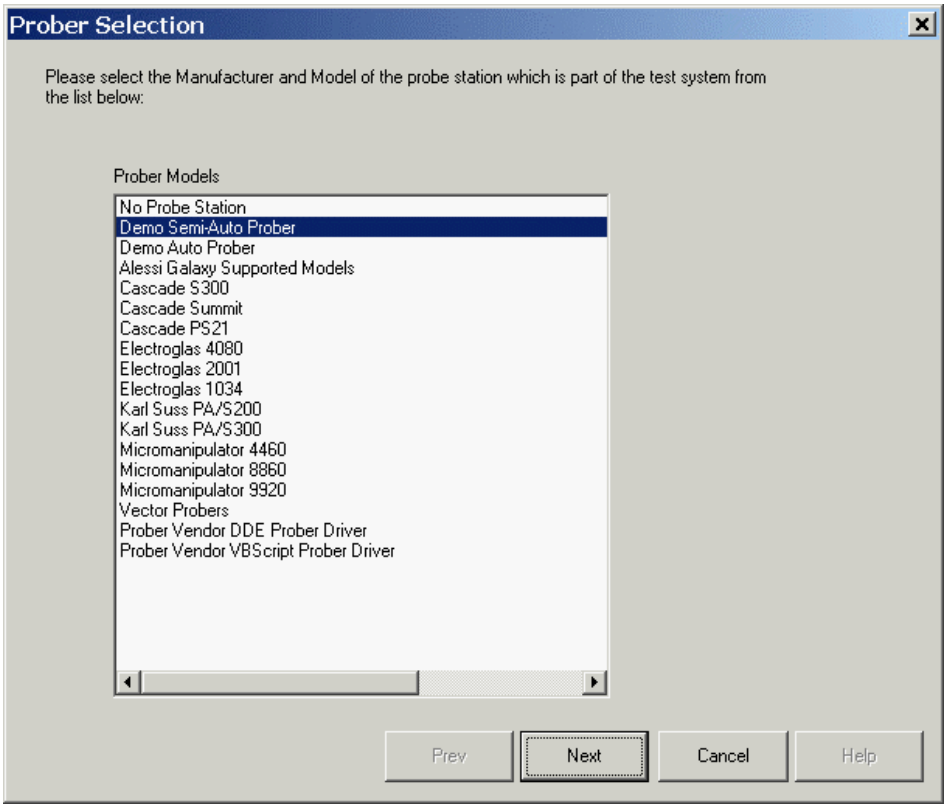
1. Start either the System Tools or Test Toolbar.
2. Click the System Configuration button.
3. Click the Configuration Wizard button found on the "About Information" Tab.



4. Click the "OK" button.



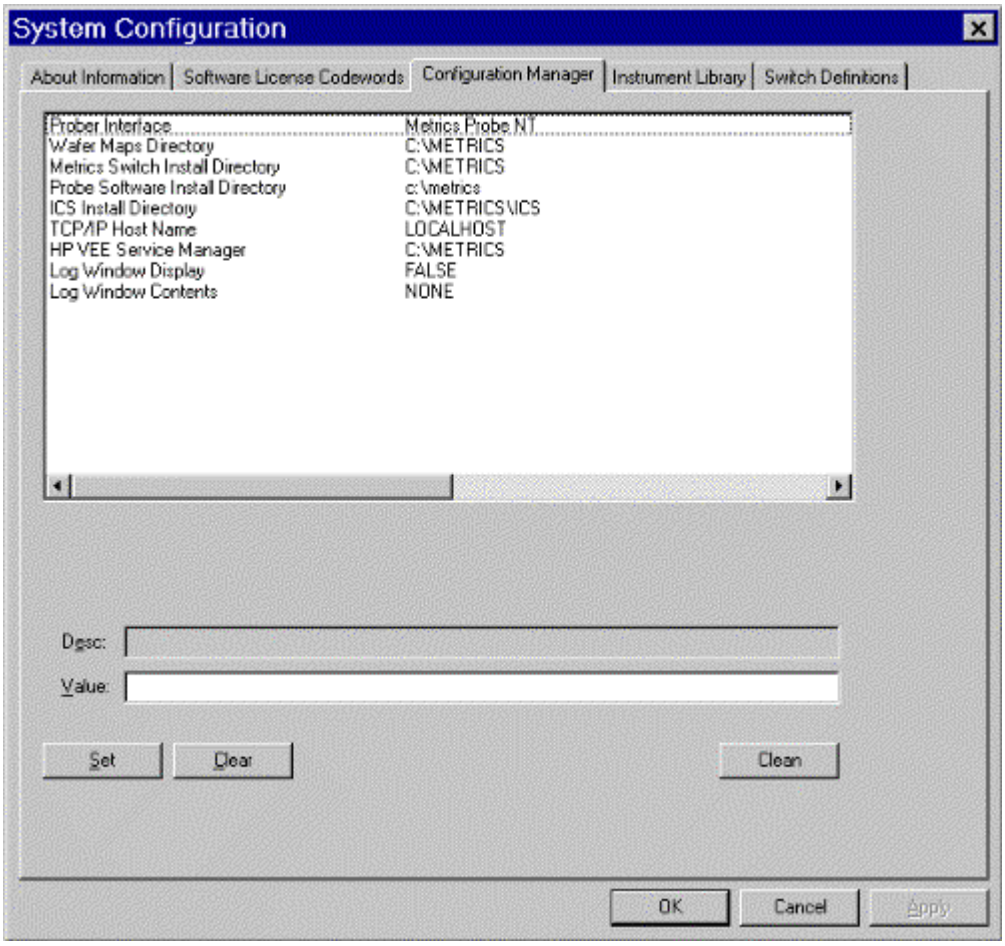
5. Select the Probe Station you are using. Based upon this selection, other questions may be asked. Please refer to the probe station documents in the Technical Reference. (Note that the list shown below is from the Full version of I/CV, some drivers in this list will not be available in the Lite version.)


Prober Selection
Please select the Manufacturer and Model of the probe station which is part of the test system from the list below:
Prober Models
No Probe Station
Demo Semi-Auto Prober
Demo Auto Prober
Alessi Galaxy Supported Models
Cascade S300
Cascade Summit
Cascade PS21
Electroglas 4080
Electroglas 2001
Electroglas 1034
Karl Suss PA/S200
Karl Suss PA/S300
Micromanipulator 4460
Micromanipulator 8860
Micromanipulator 9920
Vector Probers
Prober Vendor DDE Prober Driver
Prober Vendor VBScript Prober Driver
Prev
Next
Cancel
Help

Configuration Manager Tab

The settings determined by the Configuration Wizard are displayed in the System Configuration. To view these settings:

1. Start either the System Tools or Test Toolbar.
2. Click the System Configuration button.
3. Click the Tab labeled "Configuration Manager".



Other Settings

Some of the settings within the Configuration Manager are present for special applications or future features. The table below shows if a feature is used and where to get the configuration information.

SETTING	USED?	WHERE TO FIND MORE INFORMATION
Prober Interface	Yes	Probe Documentation in Technical Reference
Wafer Maps Directory	Yes	Probe Documentation in Technical Reference
Metrics Switch Install Directory	Yes	Metrics Switch in Technical Reference
Probe Software Install Directory	Yes	Probe Documentation in Technical Reference
ICS Install Directory	Yes	ICS Documentation in Technical Reference
TCP/IP Host Name	If using VEE	Using Agilent (HP)-VEE Application Note
HP-VEE Service Manager	If using VEE	Using Agilent (HP)-VEE Application Note
Log Window Display	NO	None
Log Window Contents	NO	None

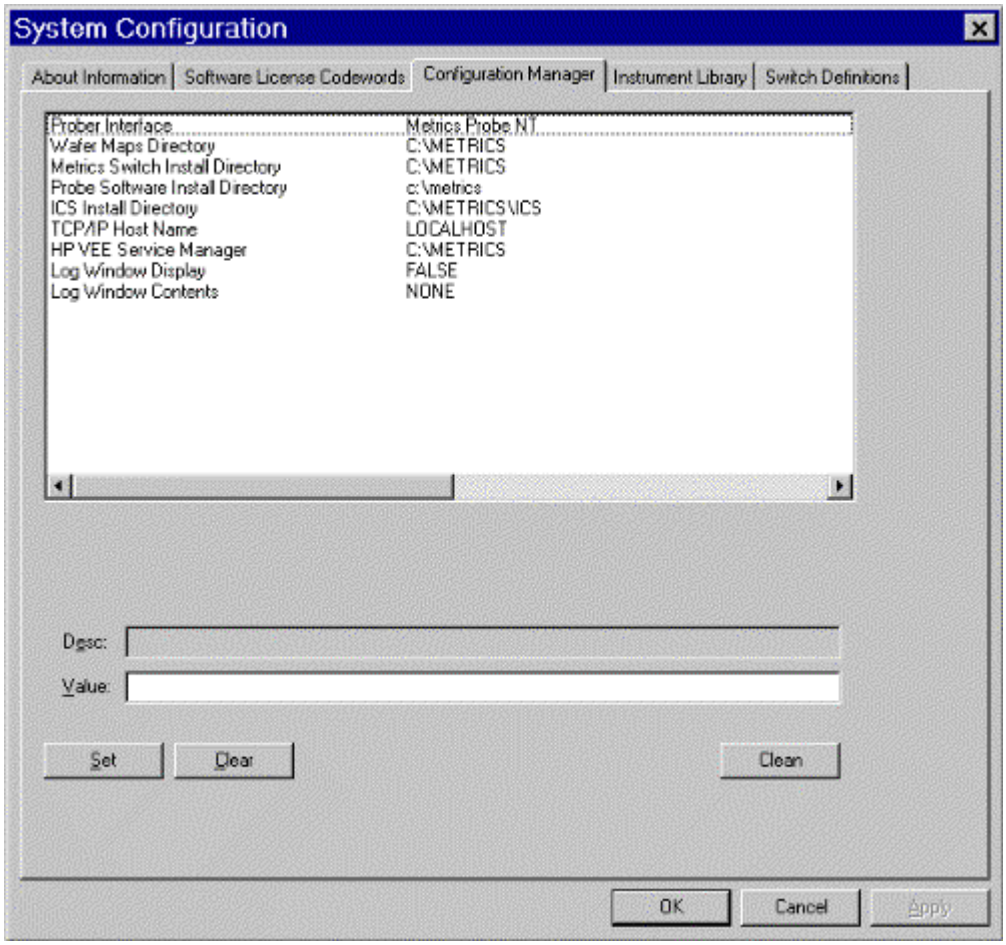
Manual Configuration

Metrics I/CV can be configured manually. Please note that the Configuration Wizard will provide this functionality automatically.

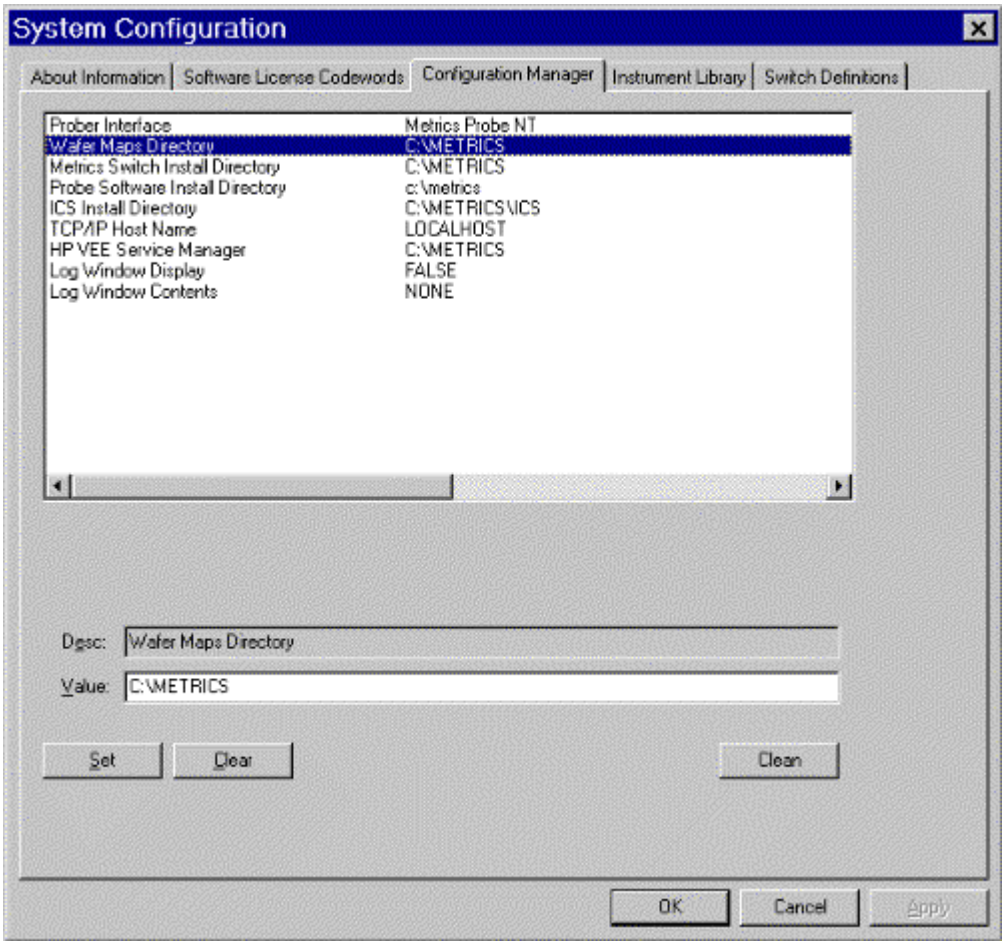
Manual Configuration of I/CV

To manually start the Configuration follow these steps:

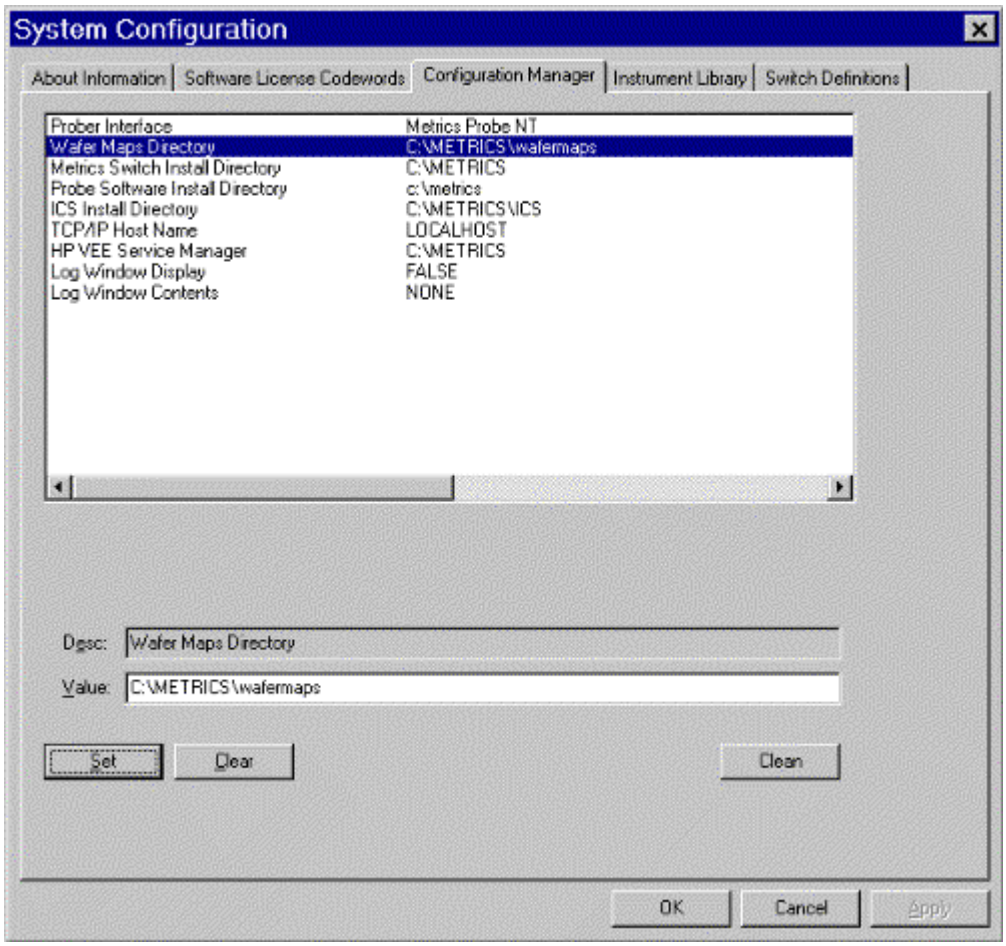
1. Start either the System Tools or Test Toolbar.
2. Click the System Configuration button.
3. Click the Tab labeled "Configuration Manager".



4. Highlight the desired setting.



5. Edit the setting and click the "Set" button.



I/CV Getting Started Guide

Version 2.1

Module 1- I/CV Getting Started Guide

Introduction

The first Module of the Self-Paced Guide introduces the Metrics I/CV software. The Module also provides important information on software versions and support.

Please note that each module builds upon the information presented in the previous Modules. It is recommended that the Guide is followed in the order presented.

Goal: A test plan will be created that tests two devices in the same module structure. This plan will be executed across a wafer. The plan will then be modified to execute this testing at several sub-die locations within each die.

Topics Covered

- What is Metrics I/CV Software?
- Overview of Metrics I/CV Software
- Updating Versions
- Support

What is Metrics I/CV Software?

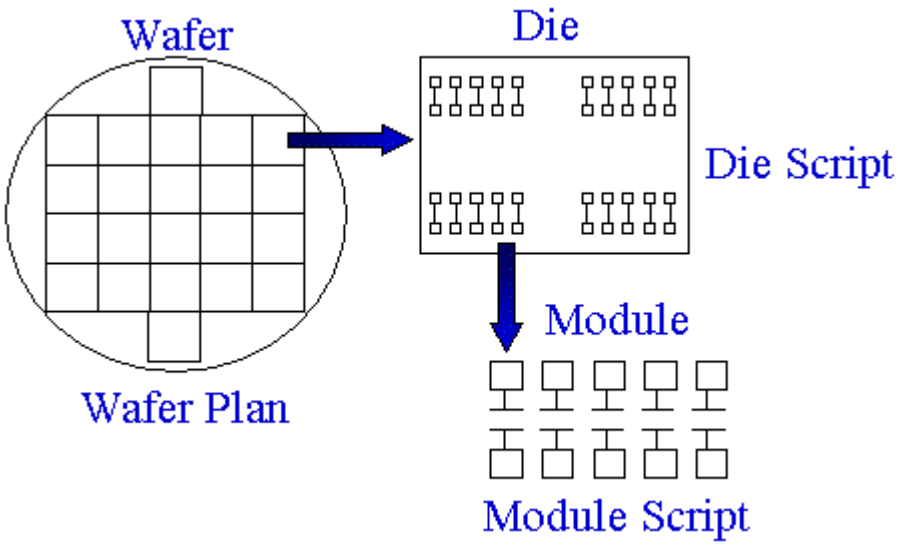
The Metrics I/CV Software is a new test environment designed for Semiconductor testing applications. The environment is designed to be flexible so that different applications can be designed using the same environment. Customer applications range from incoming parts screening to full wafer test. All of this can be accomplished from one software environment without having to write code.

Metrics I/CV Controls:

- Semiconductor Parameter Analyzers
- C-V Meters
- Switching Matrixes
- Probe Stations
- Thermal Ovens and Chucks

Overview of Metrics I/CV Software

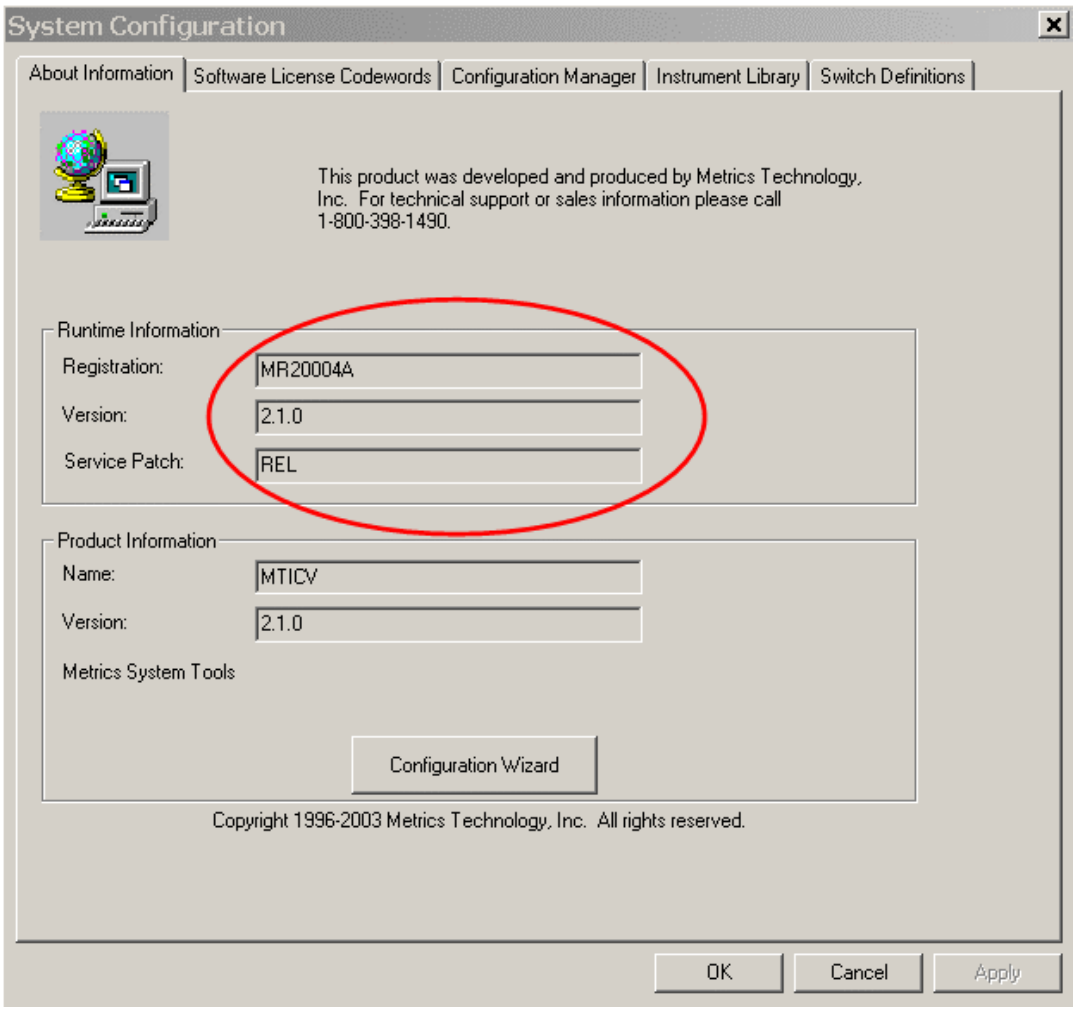
Metrics I/CV Software allows for the testing to be designed using several components. Each component can then be integrated into higher-level components. The components are the Module script, Die Script, and Wafer Plan.



The Module Script allows for the creation and ordering of all tests that occur without moving the chuck or removing a part from the fixture. This can include the changing of switch connections, execution of different tests, prompting operator for an action, and automated decision-making (IF/THEN tests).

Determining Software Version

The software version and build date are very important when requesting support. Without this information it is impossible to provide efficient service. Please be prepared to provide this information when seeking support.



To determine the software version:

1. Open an I/CV Toolbar.
2. Click the System Configuration button
3. Click the "About Information" tab

Updating the Metrics I/CV Software

Metrics Technology provides Service Patches to registered customers. Once a patch has been created and verified by Metrics Technology, it is placed on our web site (www.metricstech.com).

The patch can be downloaded from the web site. Please note the patches are very large and will take time to download depending upon your connection speed. Once downloaded the file is an .EXE application that requires a password to open. Please use the codeword request form found at the Metrics Technology website (www.metricstech.com) to request the codeword. Please note that only registered customers will be provided the codeword.

Support

Metrics Technology provides technical support to customers for one year after the purchase. Please refer to the Metrics Technology website www.metricstech.com for options available to extend the support period.

All customers who request support must have registered their copy of I/CV with Metrics Technology. The form is provided as part of the software package or you can visit the Metrics Technology web site and select the support link to access the registration forms.

Support is available from Metrics Technology

Contact Metrics Technology by:

- Reviewing our web site.
- Sending email to support@metricstech.com

To receive Technical Support services you will need:

- Registration Number
- Version and Build Date
- Complete description of issue, including any error messages

Module 2- Starting I/CV

Introduction

The Second Module of the Self-Paced Guide will cover the toolbars available in I/CV and when they are needed.

Topics Covered:

- The Metrics Program Group
- The I/CV Toolbars
- Configuring Metrics I/CV

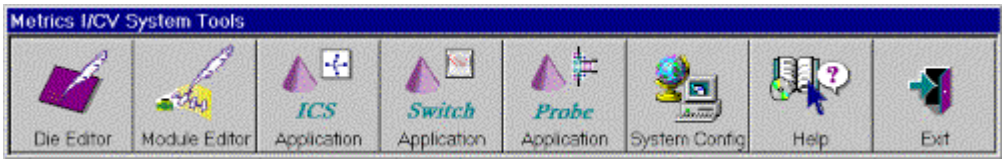
The Metrics I/CV Program Group

When Metrics I/CV is installed upon the system, a new program group and two shortcuts are created. The program group is called Metrics and can be found by clicking Start -> Programs -> Metrics. Inside the group are several links to different pieces of the Metrics I/CV software. The shortcuts that are created are displayed above and are installed on the Windows desktop. These will open each of the I/CV Toolbars.

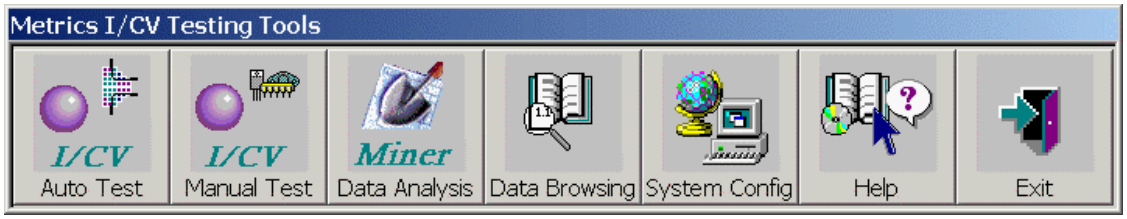
The Metrics I/CV Toolbars

Metrics I/CV contains two toolbars that are used for the creation and execution of tests. The toolbars are the I/CV System Tools Toolbar and the I/CV Testing Tools Toolbar. Each Toolbar is used for specific tasks.

When creating or editing a test, the I/CV System Tools Toolbar is used. This toolbar has buttons to access the Module and Die Editor, Switch Control, ICS software, and Probing software. These are the components primarily used for test creation.



When executing a test or reviewing the results, the I/CV Testing Tools Toolbar is used. This toolbar has buttons to start either an auto or manual tests well as the Data Miner and Browsing tools.


Metrics I/CV Testing Tools
I/CV
Auto Test
I/CV
Manual Test
Miner
Data Analysis
Data Browsing
System Config
Help
Exit

Module 3- Creating Measurements

Introduction

The first step to creating a test plan is to create the individual measurements. These measurements are created within the Metrics ICS software or Visual Basic Script. Optionally, the measurements can be created in either Agilent (HP)-VEE or LabView (not included in I/CV Lite), details can be found in the Metrics I/CV online documentation.

This Module deals with using Metrics ICS to create the measurements.

Topics Covered

- What is Metrics ICS Software?
- Configuring ICS
- Creating a Sweep Measurement
- Creating a Spot Measurement
- Creating Parameter Calculations
- Saving the Measurement

The Module introduces the Metrics ICS (Interactive Characterization Software) measurement engine and demonstrates how to create measurements with it. Special demonstration drivers have been created to allow the development to be independent of the instrument. For details about the instrument drivers provided with Metrics ICS, please refer to the Metrics ICS documentation. The steps to creating a test method will be covered.

Note: This is not an exhaustive coverage of the Metrics ICS test engine. For a more thorough discussion of ICS please refer to the ICS documentation.

What is Metrics ICS?

Metrics ICS (Interactive Characterization Software) is a software application that is used by I/CV as a measurement engine. Metrics ICS provides a windows based environment for creating measurement using a point and click methodology.

For measurement development the Metrics ICS environment can be used stand-alone.

Metrics ICS is:

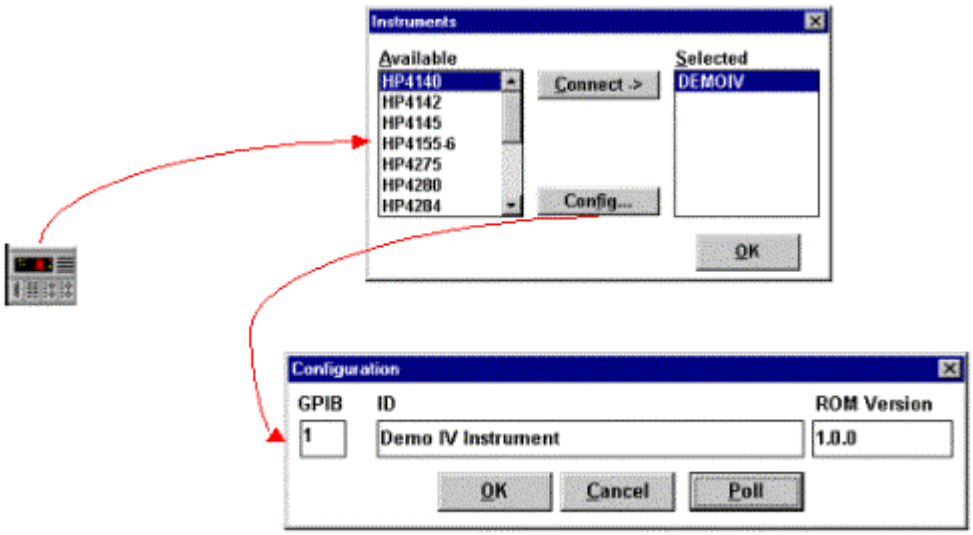
- Measurement Engine
- Windows based
- Point, Click, and Measure
- Non-Automated Applications

Configuring ICS

Before creating a measurement, ICS must know what instrument is being used. This is accomplished by configuring ICS. Once an instrument has been configured, ICS will remember this configuration. The only time ICS must be reconfigured is when the instrument is changed or the ICS35.INI file is erased.

To Select an Instrument:

1. Click the Instrument button.
2. Highlight the instrument to be added and click the Connect button.
3. Highlight the instrument to be configured and click the Config button.
4. Enter the GPIB address.
5. Click the Poll button.
6. Click the OK button to close the Configuration window.
7. Click the OK button to close the Instruments window.


Instruments
Available
HP4140
HP4142
HP4145
HP4155-6
HP4275
HP4280
HP4284
Connect ->
Selected
DEMOIV
Config...
OK
Configuration
GPIB
1
ID
Demo IV Instrument
ROM Version
1.0.0
OK
Cancel
Poll

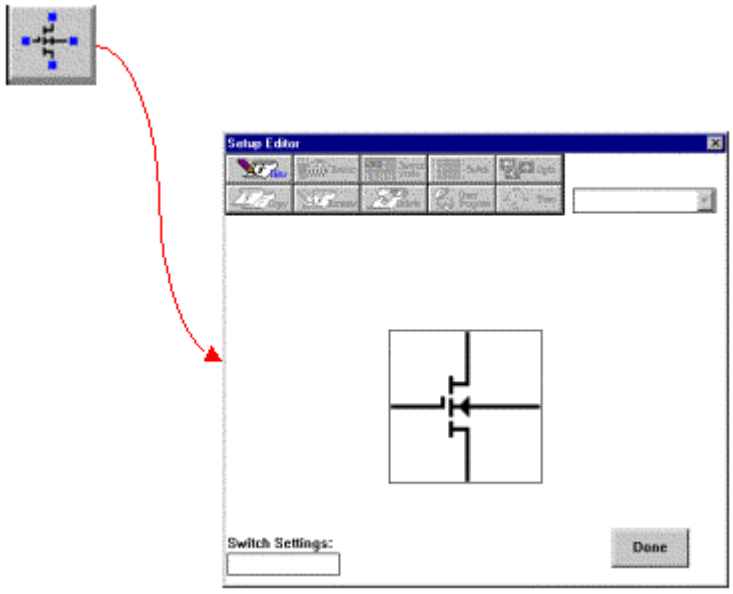
Create a Sweep Measurement

The following example demonstrates how to create a sweep measurement using ICS. This example uses the demonstration driver within ICS.

To Create a Sweep:

1. Open the setup editor.

The Setup Editor is the place in ICS where the measurement is configured. It can be opened by clicking the Setup Editor button.



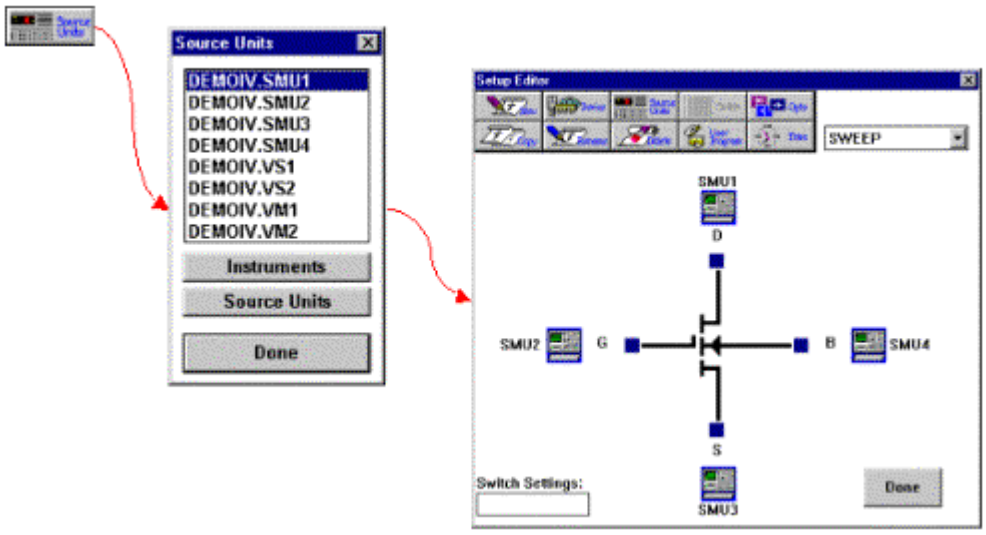
2. Name the Measurement Setup.

Each measurement must have a unique name. Before the measurement can be created, it must be given a name. To name the measurement:

a. Click the New button and type in a name.
b. Click the OK button after entering the name.

3. Select Source Units.

The source units correspond to the outputs of the instrument you are using. Metrics ICS provides a graphical way to document the connections for later reference. To add a source unit:



a. Click on the Source Units button to open the Source Units window.
b. Highlight the specific unit.
c. Click the blue box beside the device lead in the Setup Editor.

To remove a source unit:

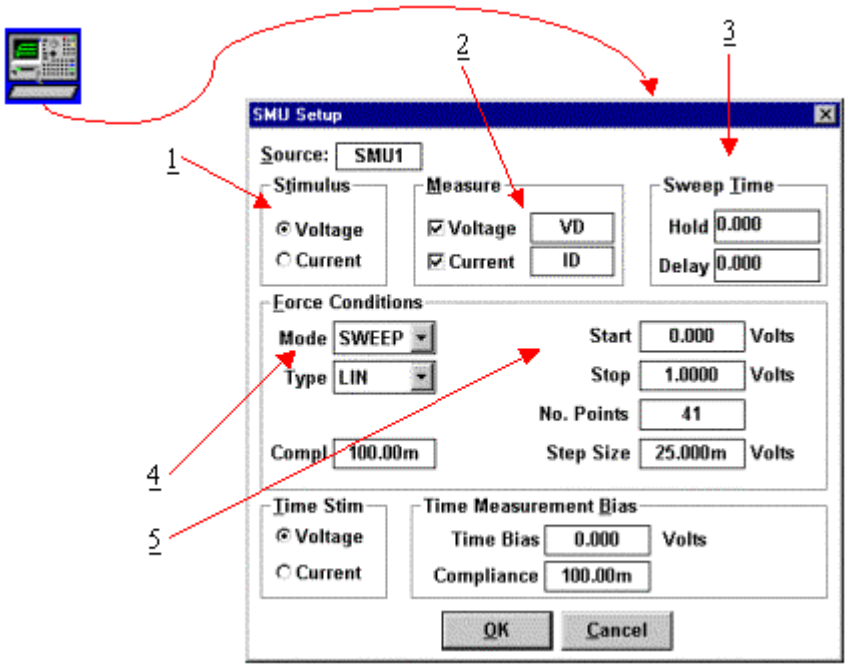
a. Highlight the specific unit.

b. Click the blue box beside the device lead in the Setup Editor.
c. Click the Yes button.

Note: The graphic is merely a representation of the device. The software does not expect behaviors from the data. Thus, the pinout does not have to exactly match, rather it is only for reference.

4. Configure Source Units.

In this example we are creating a sweep source, so we must configure the source unit properly. To setup a sweep source:



1. Select the stimulus type.
2. Select the values to be measured (see note below).
3. Click the blue box beside the device lead in the Setup Editor.
4. Select the sweep timing (see note below).
5. Select the Source Mode. In this case we want it to be Sweep.
6. Setup the sweep parameters.

Note: Most SMU's can only measure the signal that is not being sourced. Therefore in this case we have selected the Stimulus to be Voltage resulting in the Current being measured. The values returned for Voltage in this case would be the calculated voltage steps. The opposite is true when the Stimulus mode is set to Current. The Sweep Time parameters are to control the rate of the sweep. Please note that these inputs vary for different instruments.

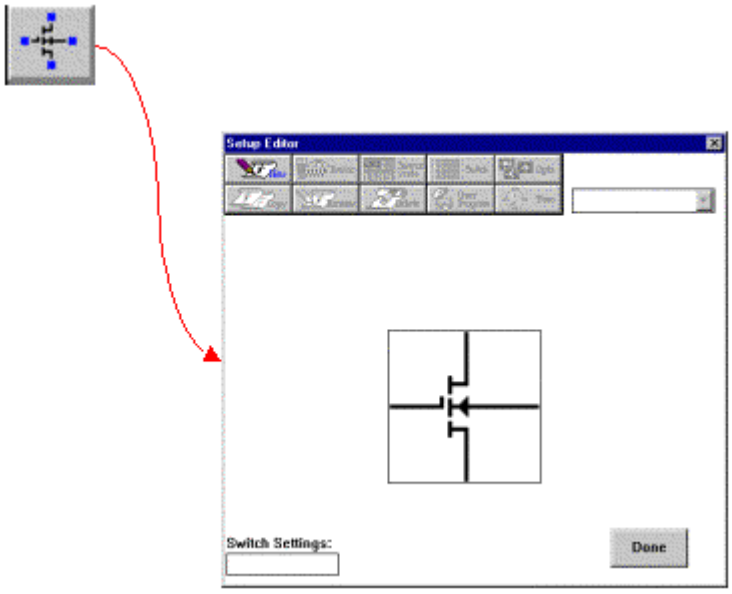
Create a Spot Measurement

In this example we will create a spot (or single point) measurement. Most of the steps are the same or similar to creating a sweep measurement. The first step is to open the setup editor. The setup editor can be opened by clicking the Setup Editor button.

To Create a Spot Measurement:

1. Open the setup editor.

The Setup Editor is the place in ICS where the measurement is configured. It can be opened by clicking the Setup Editor button.

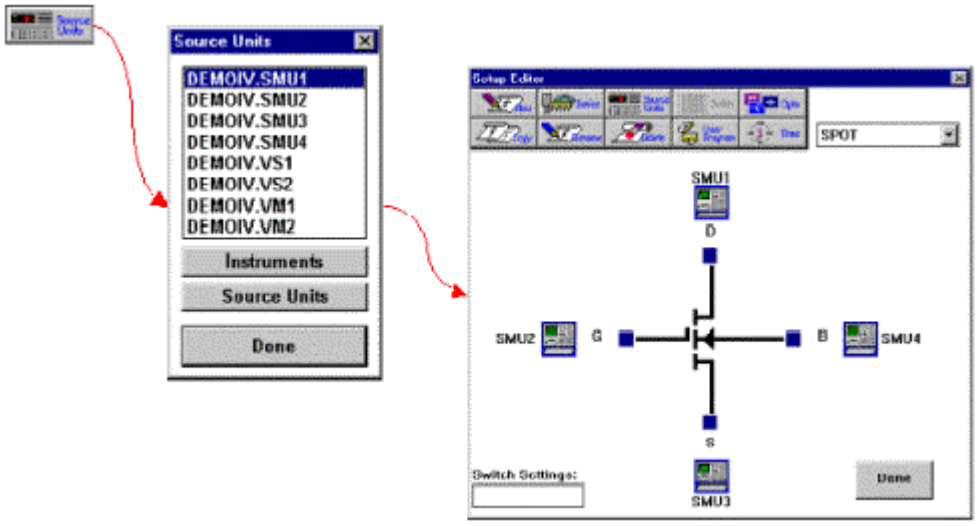


2. Name the Measurement Setup.

Each measurement must have a unique name. Before the measurement can be created, it must be given a name. To name the measurement:

a. Click the New button and type in a name.
b. Click the OK button after entering the name.
c. Select Source Units.

The source units correspond to the outputs of the instrument you are using. Metrics ICS provides a graphical way to document the connects for later reference. To add a source unit:



a. Click on the Source Units button to open the Source Units window.
b. Highlight the specific unit.
c. Click the blue box beside the device lead in the Setup Editor.

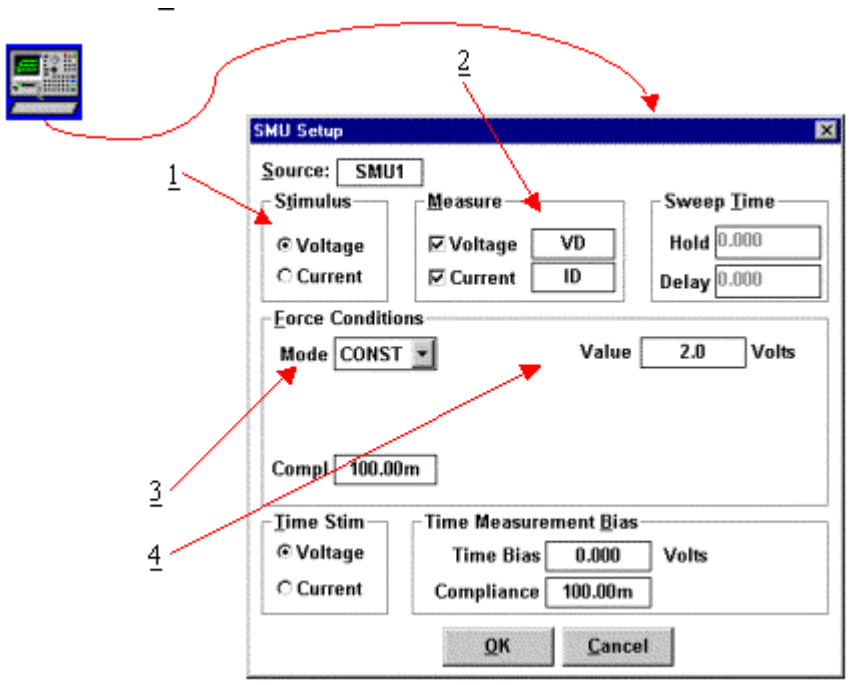
To remove a source unit:

a. Highlight the specific unit.
b. Click the blue box beside the device lead in the Setup Editor.
c. Click the Yes button.

Note: The graphic is merely a representation of the device. The software does not expect behaviors from the data. Thus, the pinout does not have to exactly match, rather it is only for reference.

3. Configure Source Units.

In this example we are creating a spot source, so we must configure the source unit properly. To setup a spot source:



1. Select the stimulus type.
2. Select the values to be measured (see note below).
3. Set the mode to CONST.
4. Enter the Bias value.

Note: Most SMU's can only measure the signal that is not being sourced. Therefore in this case we have selected the Stimulus to be Voltage resulting in the Current being measured. The values returned for Voltage in this case would be the calculated voltage steps. The opposite is true when the Stimulus mode is set to Current. Please note that these inputs vary for different instruments.

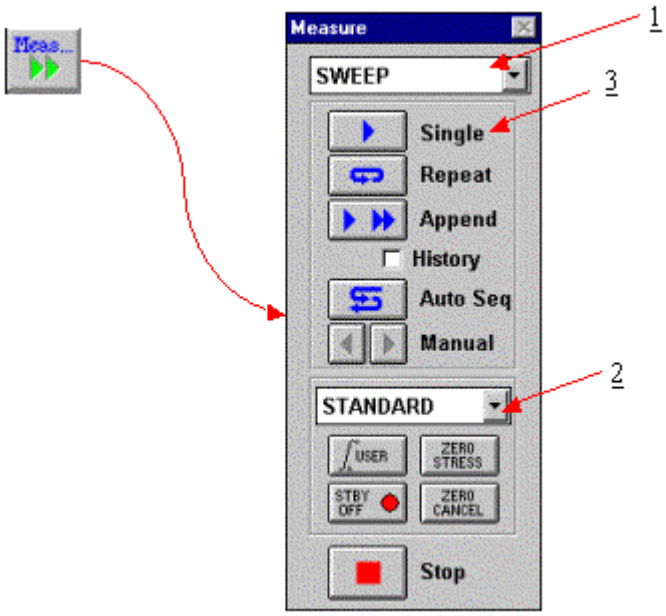
Executing the Measurement

The measurement mode is Standard by default. Thus all of the previous measurement types (sweep and single point) did not need this value changed.

To access the Measurement Remote control click on the Meas button on the ICS toolbar.

To Execute a Measurement:

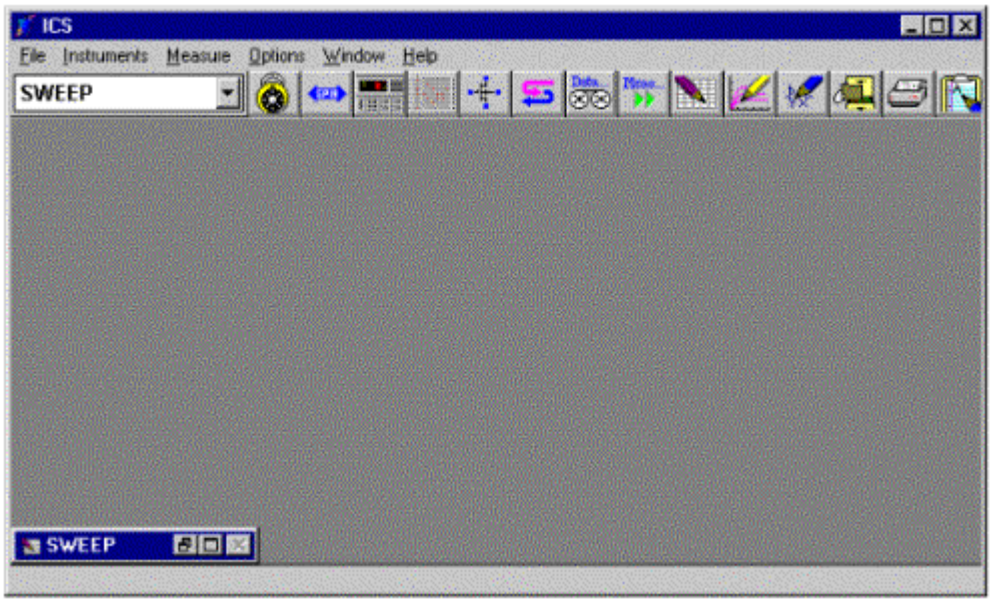
1. Make sure the measurement name is displayed in this box.
2. Use the pull down menu to select the Standard mode.
3. Click the Single button to execute the measurement.



At this point the software will communicate with the instrument and execute the measurement. The data is automatically returned to the built-in spreadsheet. The next section will demonstrate this feature.

Data Return

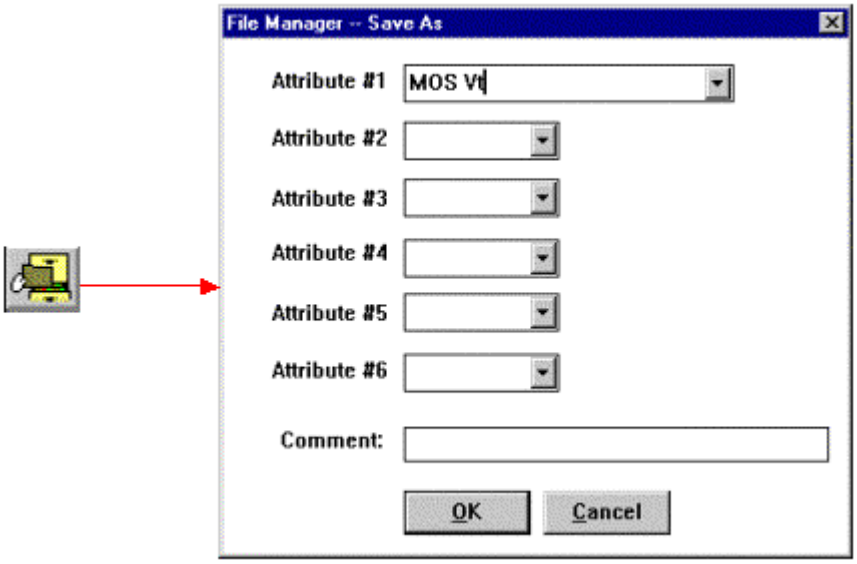
Metrics ICS (Interactive Characterization Software) automatically returns the data from an executed measurement. The data is presented in a built-in spreadsheet. The spreadsheet is automatically created when a test setup is created. It will begin as a minimized window in the lower left corner of the ICS window. To view the data simply double-click the window that has the same name as the test setup.



Saving the Measurement

The last step to creating measurements is to save them. A measurement or collection of measurements is saved in a Project File. To save a project file click the Save Project button on the ICS toolbar, enter attributes, and click the OK.

The attributes are the equivalent of directories. Attribute 1 can be thought of as the main directory and each subsequent attribute is a sub-directory.



Module 4- Creating Switch Patterns

Introduction

The next step to creating the complete test plan is to configure switch patterns that allow the instrument to connect to the device. This is the case in systems that are using switch matrixes and probe cards. If your system does not, skip this section and omit any switching control from further plan development.

This Module details how to create Switch Connection Files and their use within Metrics I/CV. The following instructions require that the Switch Software already be configured according to the Installation and Configuration Guide.

Topics Covered

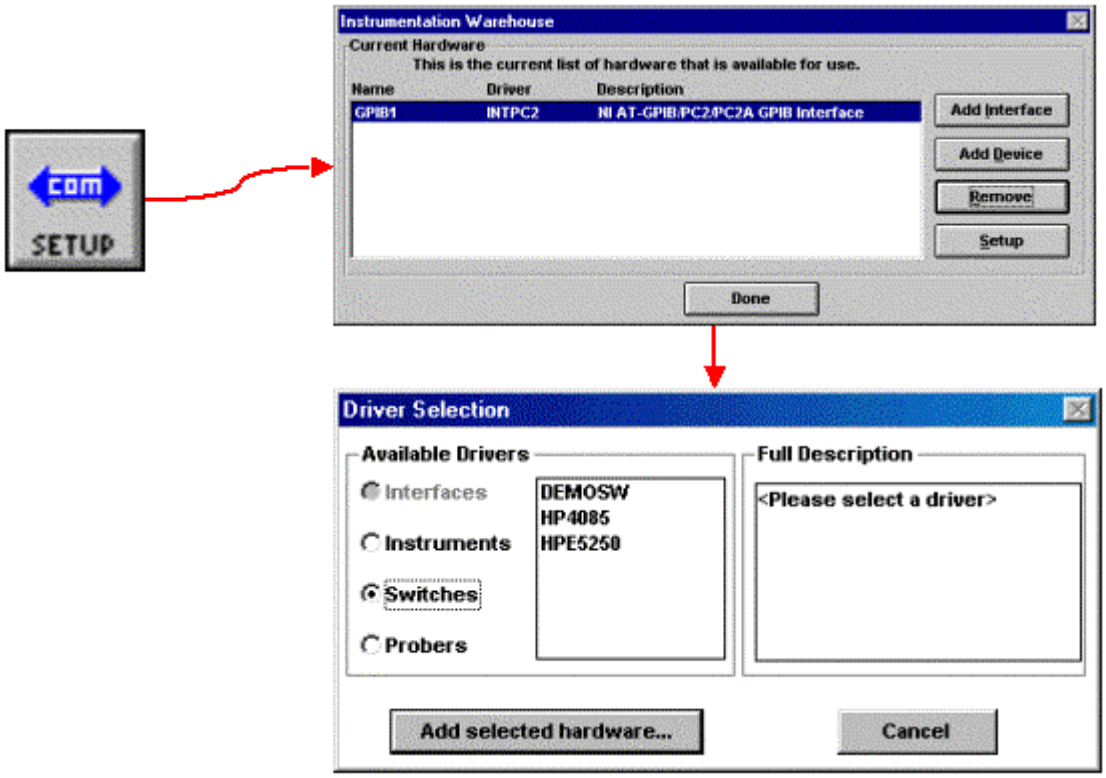
- Configuring Switch
- Selecting Crosspoint Connections
- Testing the Connections
- Saving the Switch Connection File

Configuring Switch

Configuring a switch matrix is a three-step process. Each step is detailed below. This process must occur before a switch matrix can be used by Metrics Switch.

A. Select a driver for use.

Once the driver has been selected and configured, it is stored with the Switch database and does not have to be re-configured.

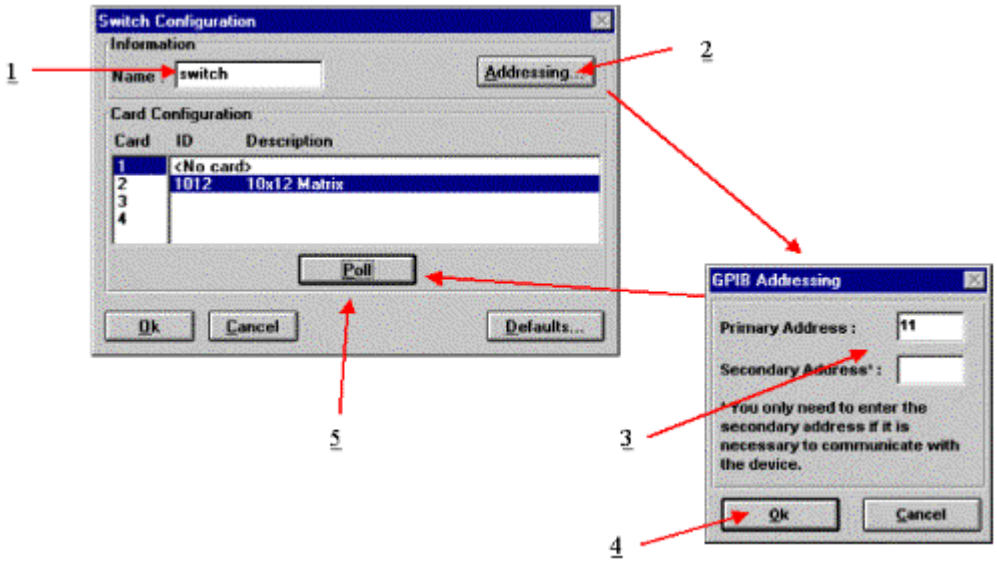


To begin selecting the driver:

1. Click the "Setup" button from the Switch toolbar.
2. Click the "Add Device" button in the Instrumentation Warehouse window.
3. Select the "Switches" option and highlight the driver to be used.
4. Click the "Add Selected Hardware" button.

B. Configure the Driver

Once a driver is selected it must be configured.



To Configure:

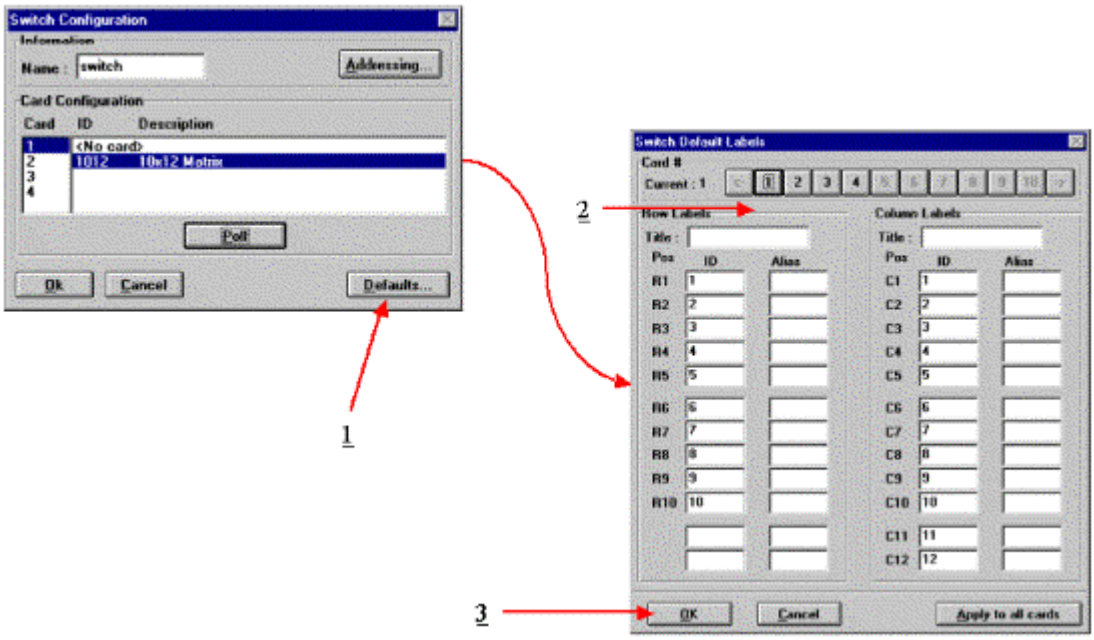
Enter a name for the switch.

1. Click the "Addressing" button.
2. Enter the GPIB address in the Primary Address.
3. Click the "OK" button.
4. Click the "Poll" button.

Most Switch matrixes have polling features where the matrix will report the card types installed. If the switch does not support this function, the card type must be manually selected. The card numbers refer to the slots in the Matrix. Some matrixes can hold more than one card.

C. Set Defaults

The labels for the cross points on the Switch Card can be setup with alias names. This can help in the rapid setup of new patterns.



To create the Aliases:

1. Click the "Defaults" button.
2. Enter any names such as SMU1 or Gate into the Alias column corresponding to the input or output of the switch.
3. Click the OK button when finished.

Selecting Crosspoint Connections

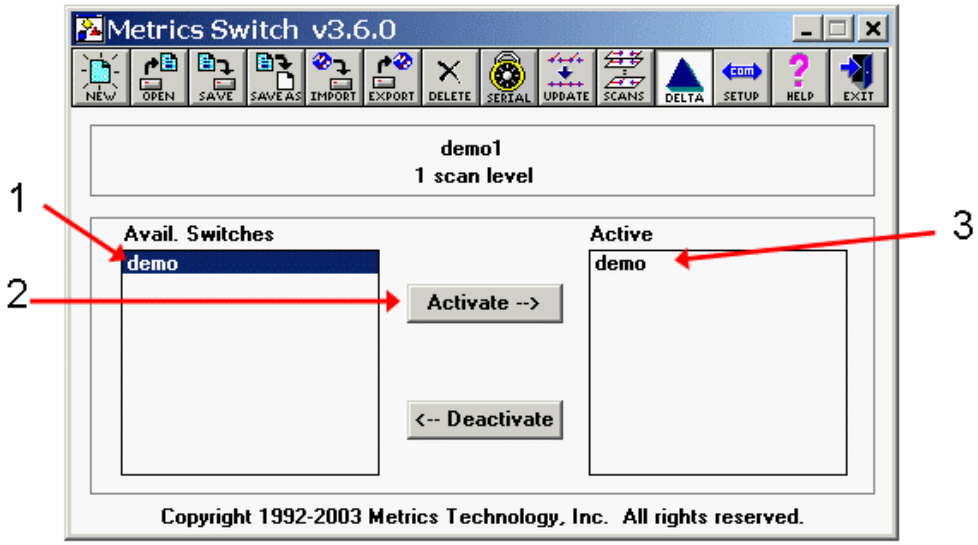
Once a switch has been made available, the individual crosspoints can be selected to connect the instrument to the device. This is a two step process, selecting the switch and selecting the crosspoints.

To Select Crosspoints:

Step 1: Select the Switch

1. Select the switch that will be used.
2. Click the Activate button.

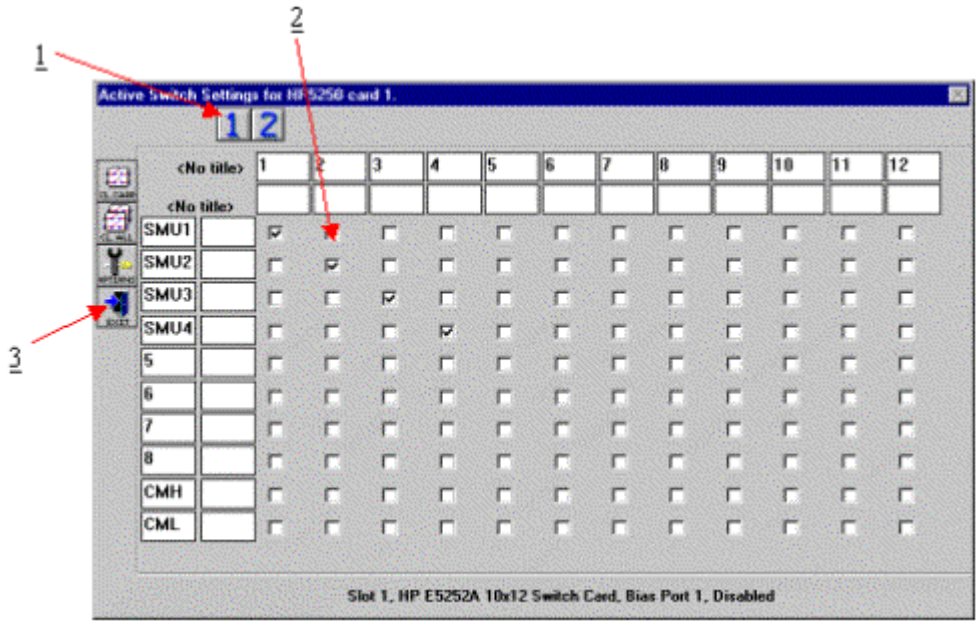
3. Double click the switch name that appears in the Active list.



Note: This architecture allows the use of multiple switch matrixes for connecting a source to a device.

Step 2: Select the Crosspoints

1. Click the button corresponding to the matrix card to be used.
2. Click each of the crosspoints to be set.
3. Click the Exit button.



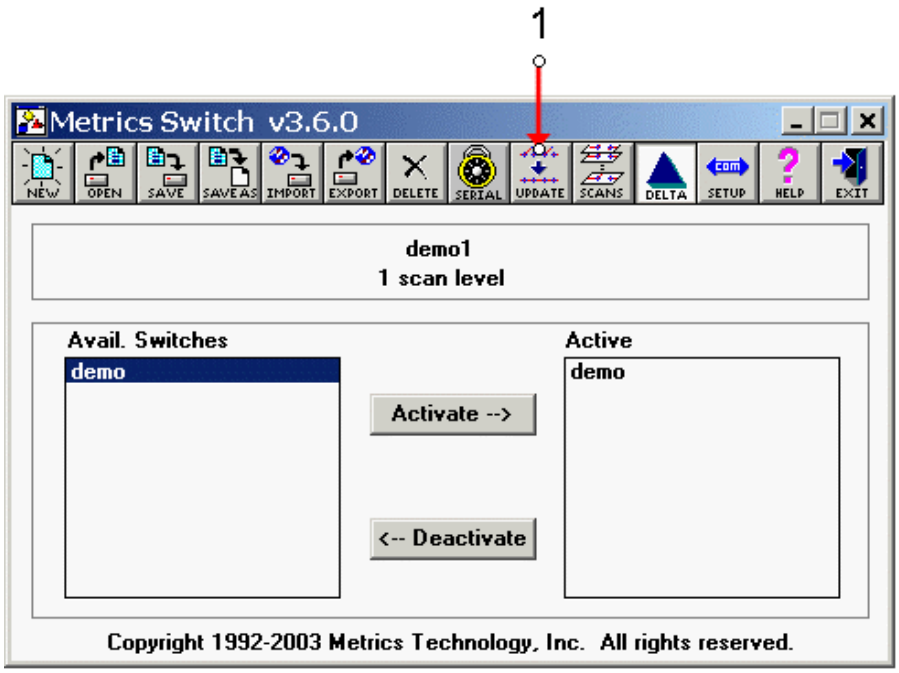
Note: At this point the setting has not been permanently saved. Exiting without saving the new setting will cause it to be lost.

Testing the Connections

The Update button sends the commands to the switch matrix for closing the selected cross points. This allows for either the execution of a test manually or for troubleshooting the system by testing paths with an Ohmmeter.

To verify the connections:

1. Click the Update button.

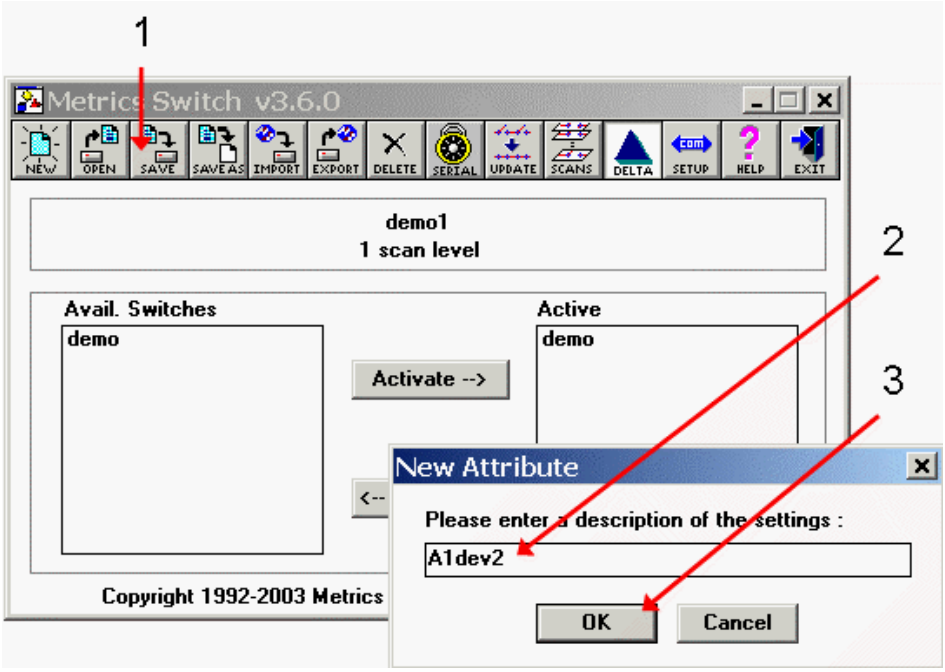


Saving the Switch Connection File

The final step for the creation of switch setting files is to save the file.

To save a switch setting:

1. Click the Save button.
2. Enter a name for the setting.
3. Click the OK button.



Module 5- Creating Scripts

Introduction

The next step in creating a test plan is to build Scripts out of the ICS and Switch files. The script designates the order in which actions occur during testing.

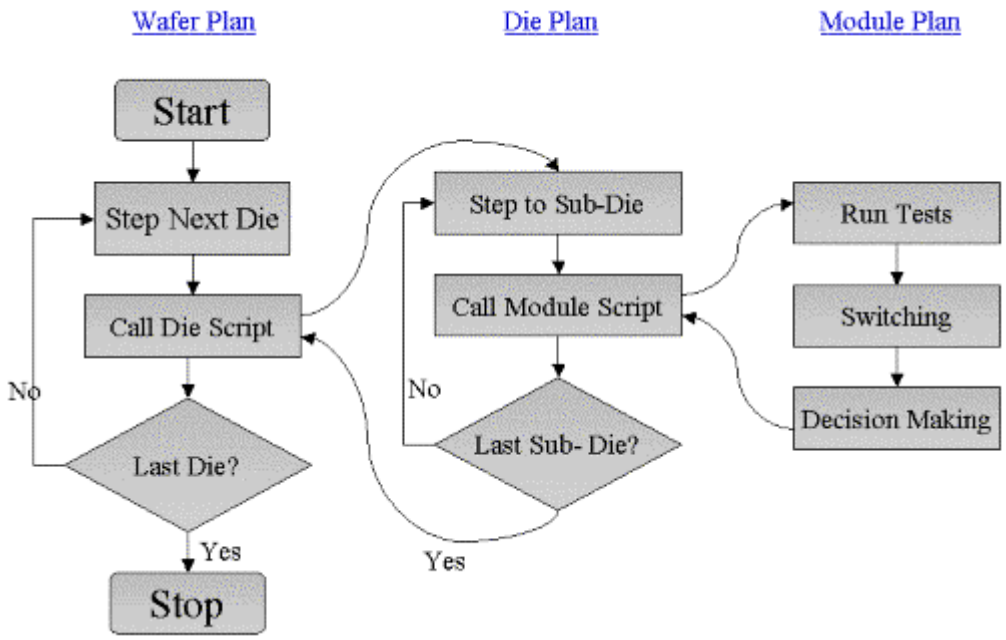
This Module explains what scripts are and how they fit into the Metrics I/CV architecture.

Topics Covered

- How Scripts Fit into Metrics I/CV
- Creating a Module Script
- Creating a Die Script

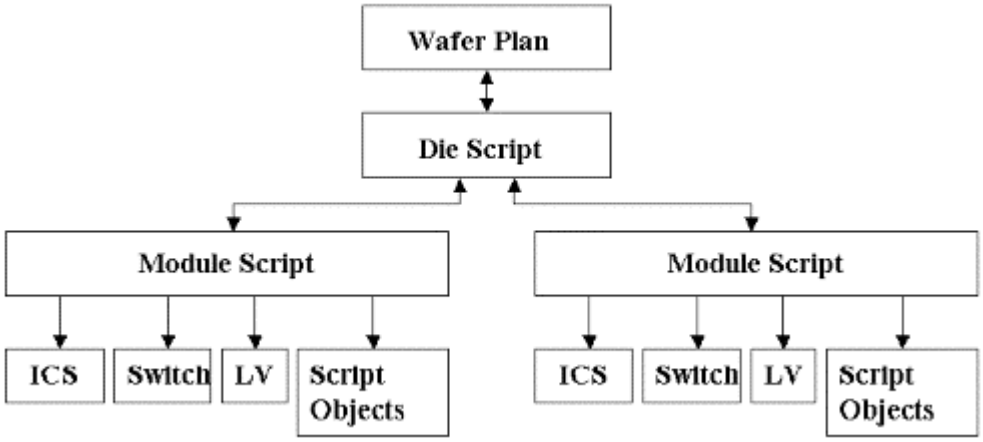
How Scripts Fit into Metrics I/CV

The Metrics I/CV software uses the above illustrated sequence of execution for testing. Once all of the components have been created they are linked together within the scripts to control when and if they are executed.



The highest level is the Wafer Plan which controls the stepping to a die on the wafer. Once the probe has landed at the die reference location, the Die plan takes over and controls any stepping within the Die as well as the execution of Module Scripts. The Module Scripts control the execution of individual tests, switch patterns, and looping.

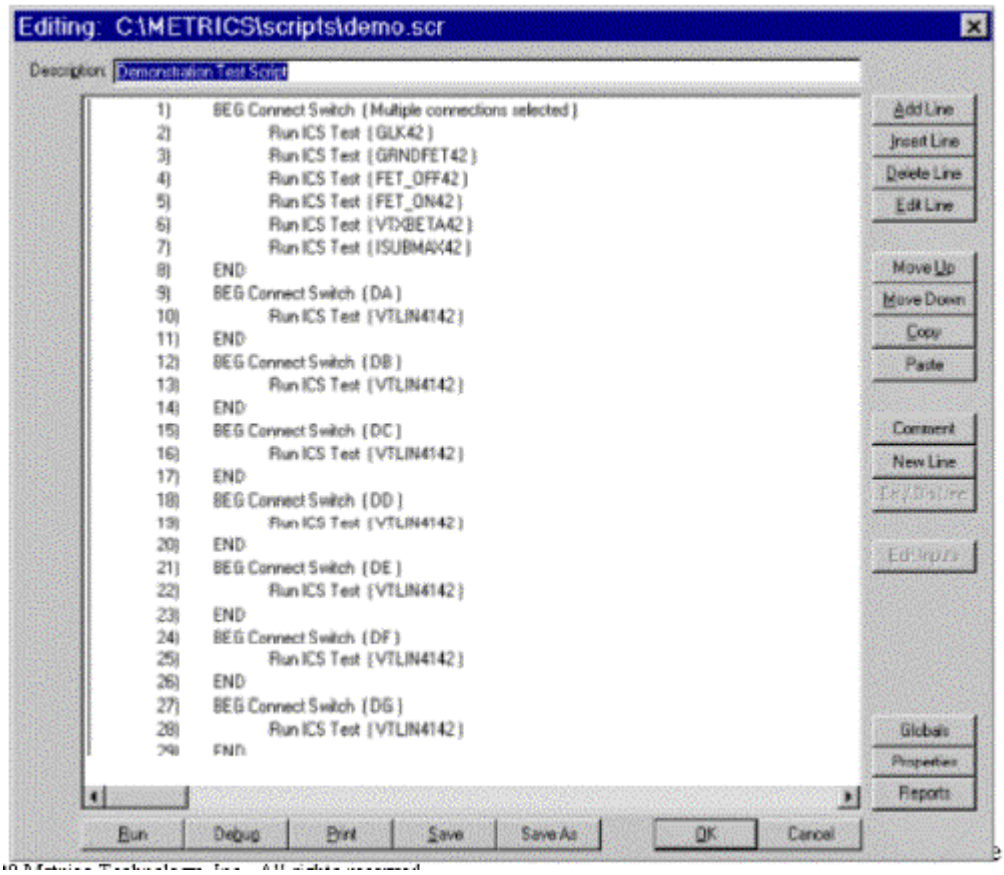
In the absence of a Die Script, the Module Script can be executed across the Wafer Plan. The advantage of the Die Script is the ability to perform different Module Scripts within the same Die.



Another illustration of the organization of the I/CV software is shown above.

Creating a Module Test Script

Module Test Scripts specify and control all of the testing performed without moving the wafer chuck. Device tests can be combined with Switching, If Then structures, Variables, and User Input to create a complete testing solution.



To create a Module Script:

1. Open the Module Editor
2. Add Script Objects
3. Save the Module Test Script

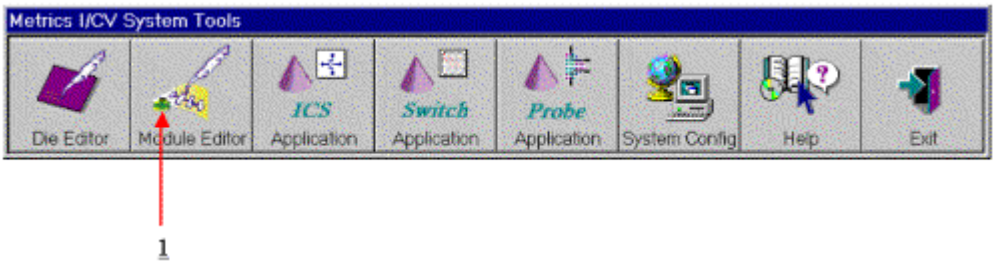
In the example above, all of the testing is performed from within a Module Script. This means that all of the devices being tested are part of the same structure and the wafer chuck is not being moved to reposition the wafer between tests.

The steps listed above are explored more deeply in the following.

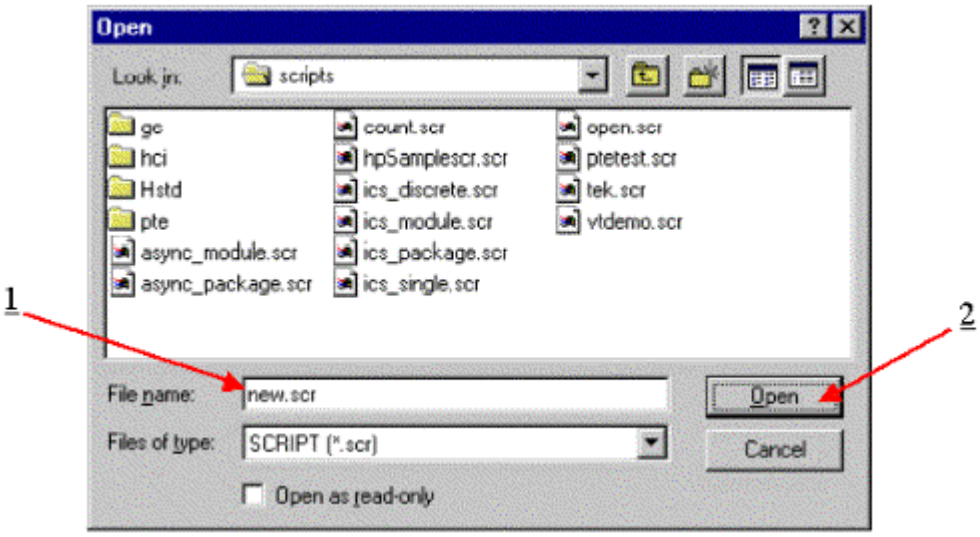
1. Open the Module Editor

The Module Editor is what gives I/CV its flexibility. We create the test script in the Module Editor which is accessible from the Metrics I/CV System Tools.

To begin creating a Module Script:

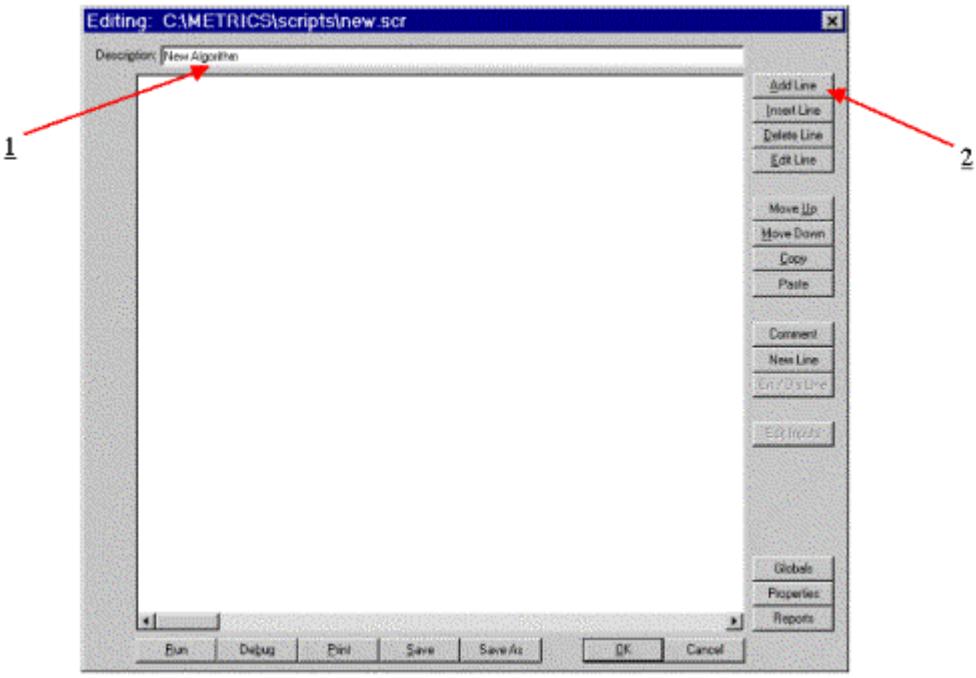


- Click the Module Editor button on the Metrics I/CV System Tools Toolbar.



- Starting the Module Editor requires that the editor have a file to edit.

1. If the file already exists, simply select it. If it is a new file select the directory location and then enter the name.
2. Click the Open button.

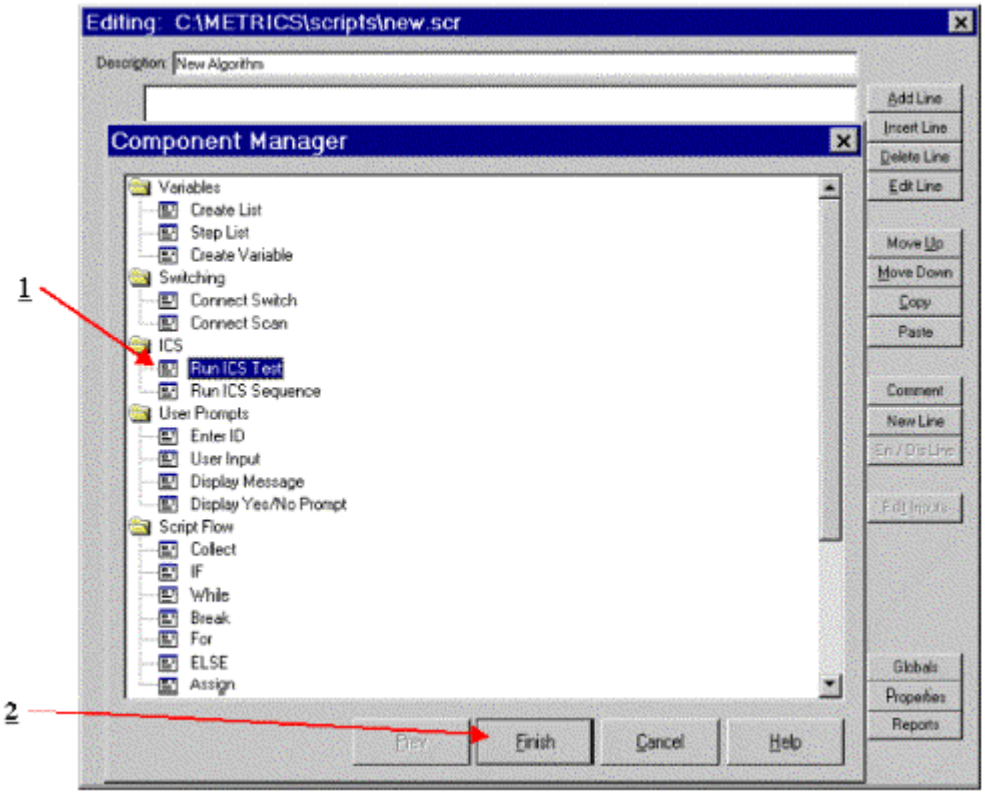


- Selecting a file opens the Module Editor interface.

1. Enter a brief description in the Description field.
2. Click the Add Line button.

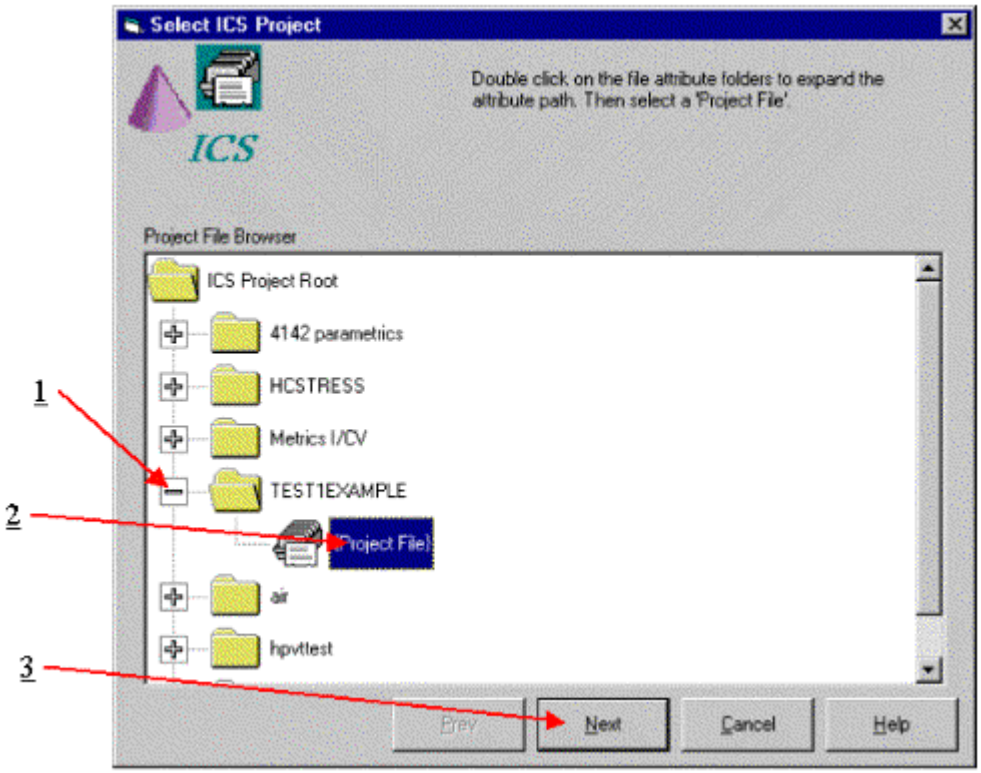
2. Add Script Objects

Clicking the Add Line button opens the Component Manager. By selecting the script objects you can create an entire script without writing any code.



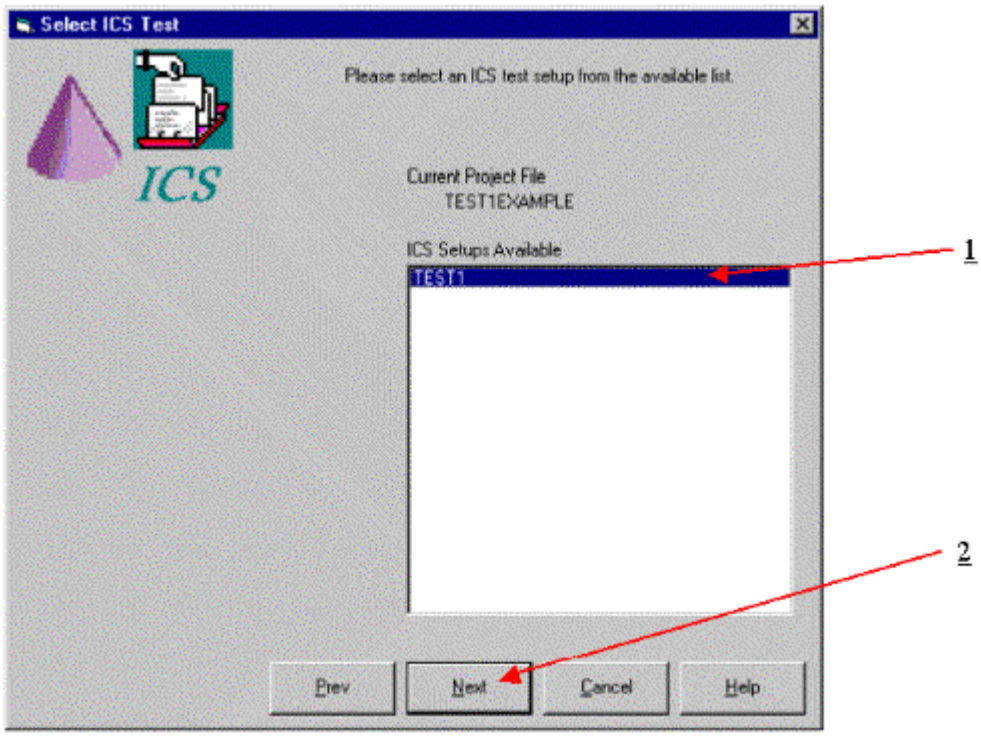
- Select a Script Object.

1. Click on the script object to highlight it.
2. Click the Finish button.



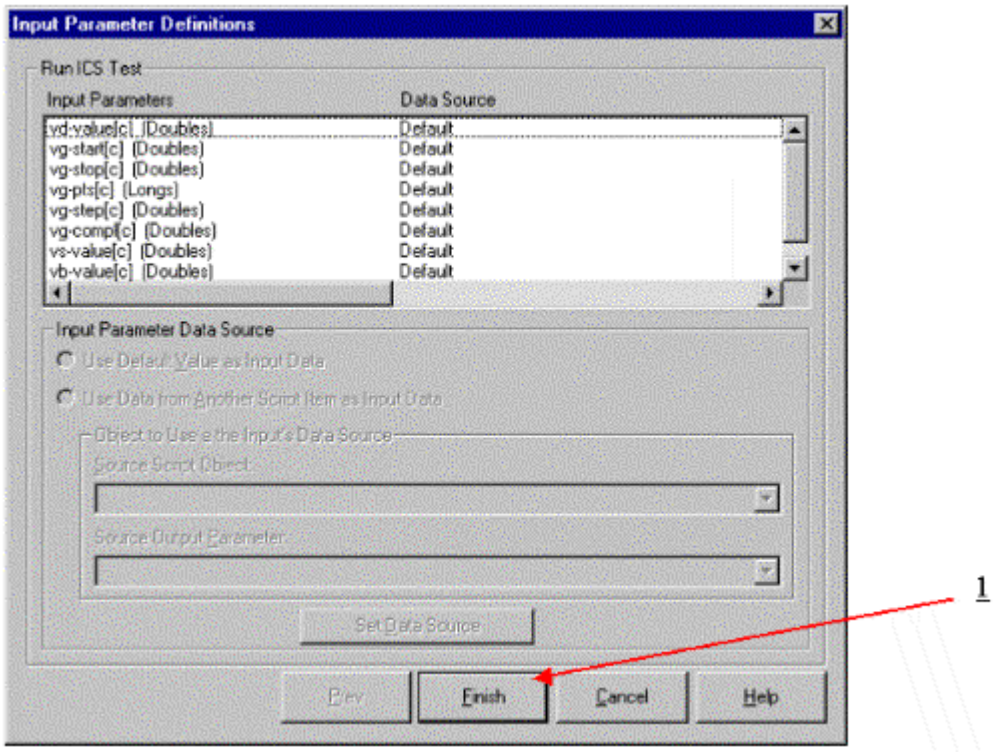
- In this case the object selected was the Run ICS Test object. The next step is to configure the object.

1. Click on the file directory name to expand the sub-directories.
2. Select the Project File.
3. Click the Next button.



- Opening a project file will expose any test setups that are available for execution.

1. Click the setup name to highlight it.
2. Click the Next button.

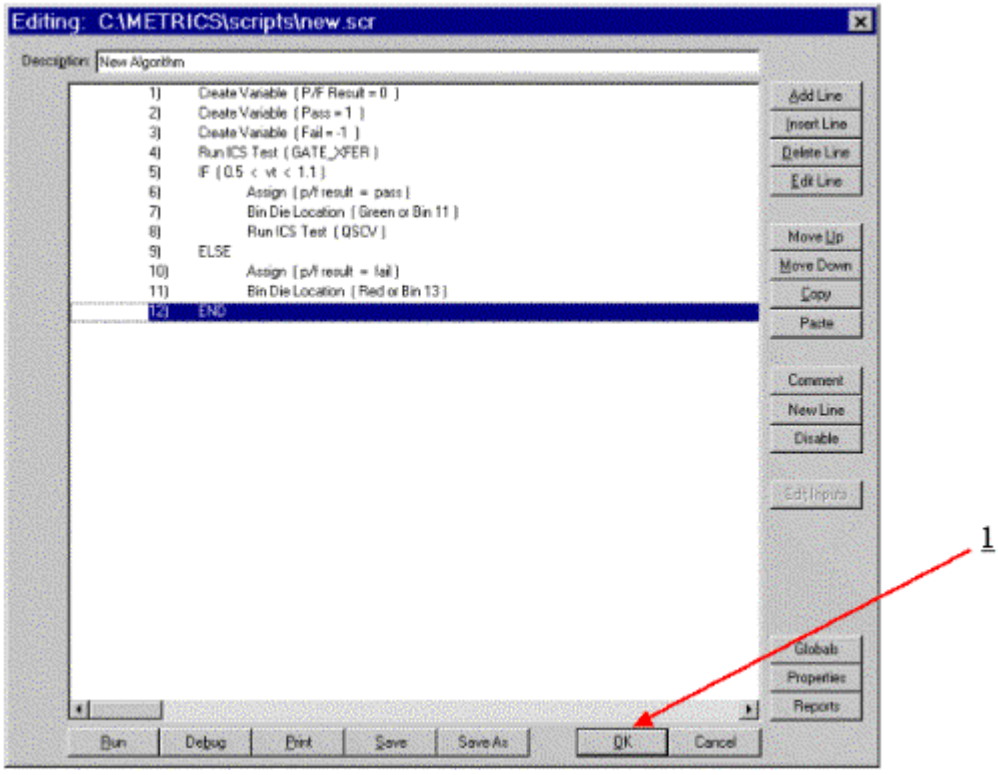


- Selecting a setup exposes the inputs of that setup. These values can be linked to other objects in the same script. Please refer to the Metrics I/CV Technical Reference manual for further information on this feature.

1. Click the Finish button.

3. Save the Module Test Script

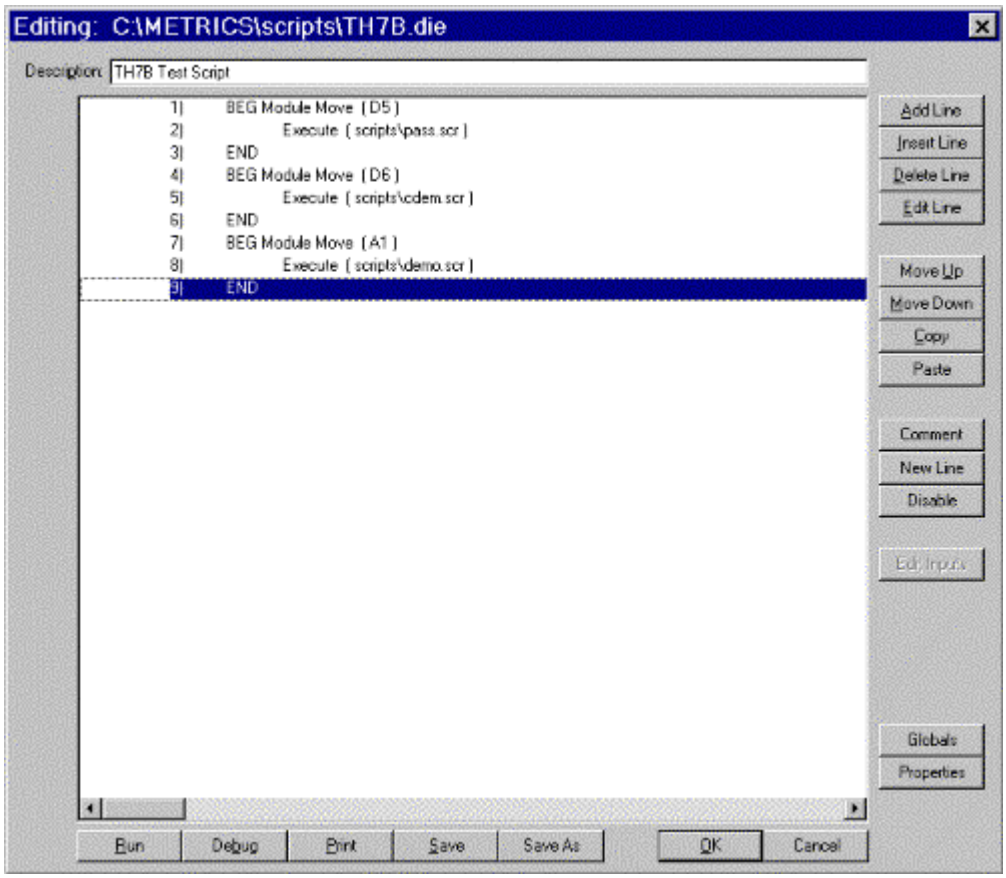
Once all of the script objects are added, the Module Editor can be closed. When the Module Editor is closed, it will automatically save the script. If you do not wish for the changes to be saved click the Cancel button.



1. Click the OK button.

Creating a Die Test Script

The Die Script coordinates the Sub-Die stepping of the Probe Station with the execution of Module Scripts. Testing can be performed upon only a single module per die. If this is the case, then a Die Script is not required.



To create a Module Script:

1. Open the Die Test Script Editor
2. Add Script Objects
3. Save the Die Test Script

The Die Editor allows for testing methods to be created which execute different Module Scripts at different Sub-Die locations. We create the test script in the Die Editor which is accessible from the Metrics I/CV System Tools.

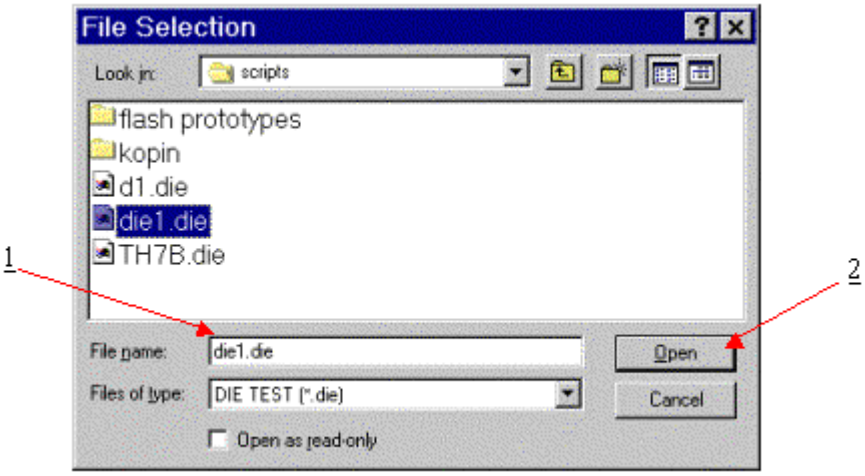
The steps listed above are explored more deeply in the following.

1. Open the Die Editor

The Die Editor allows for the testing of multiple sub-die locations. We create the test script in the Die Editor which is accessible from the Metrics I/CV System Tools.

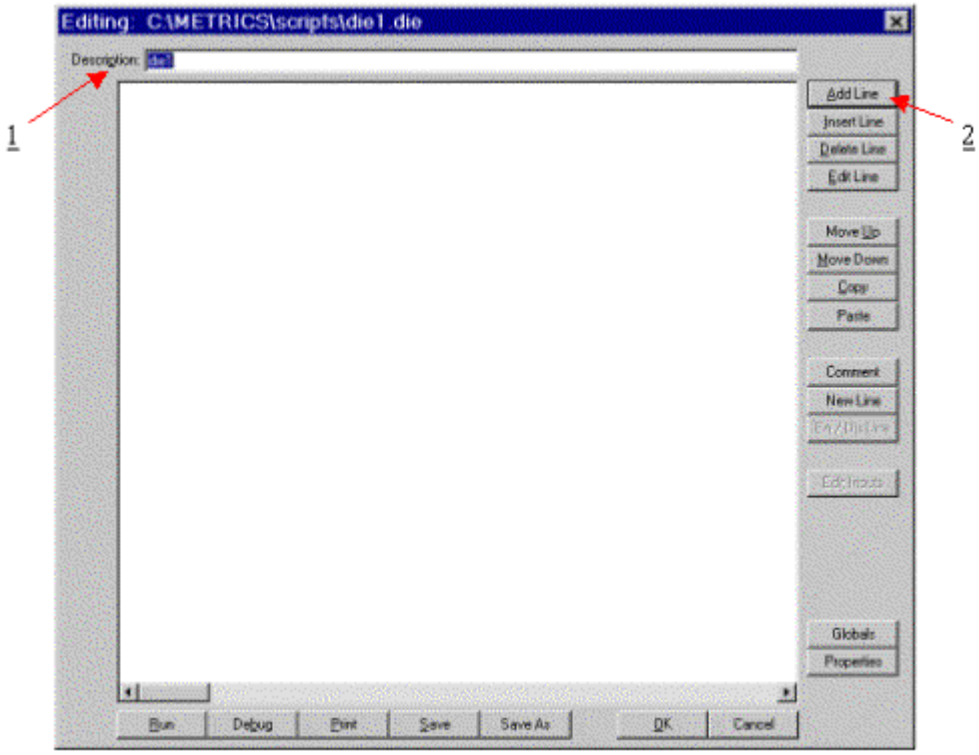
To begin creating a Die Script:

- Click the Die Editor button on the Metrics I/CV System Tools Toolbar.



- Starting the Die Editor requires that the editor have a file to edit.

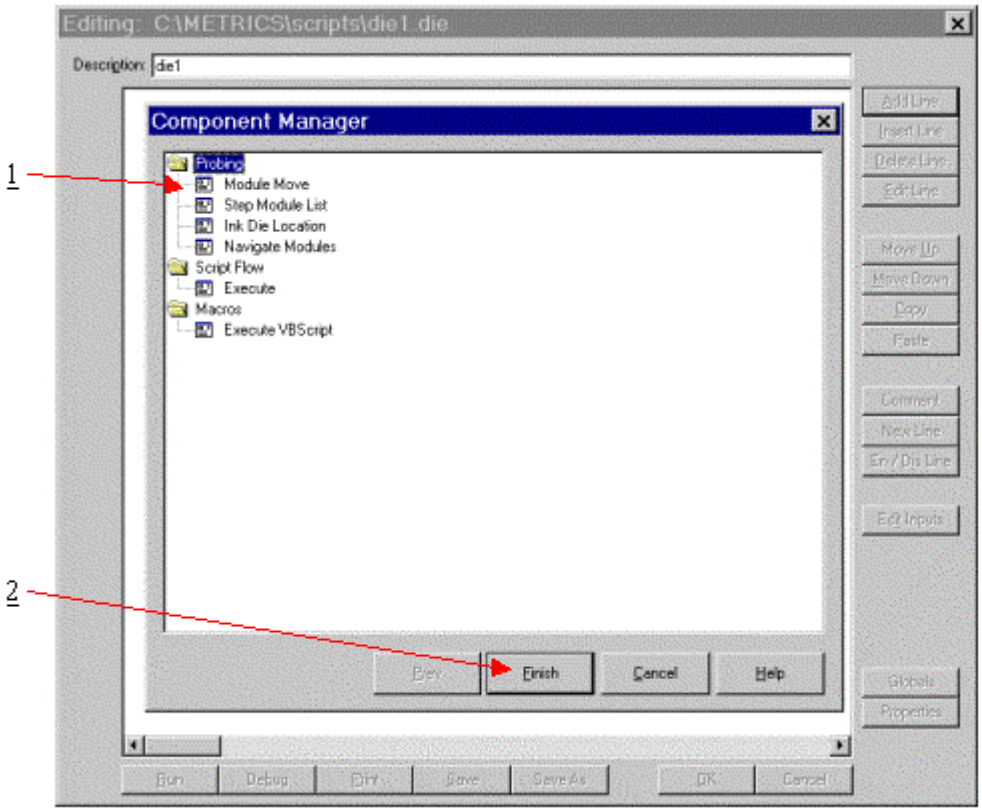
1. If the file already exists, simply select it. If it is a new file select the directory location and then enter the name.
2. Click the Open button.



- Selecting a file opens the Die Editor interface.
    1. Enter a brief description in the Description field.
    2. Click the Add Line button.

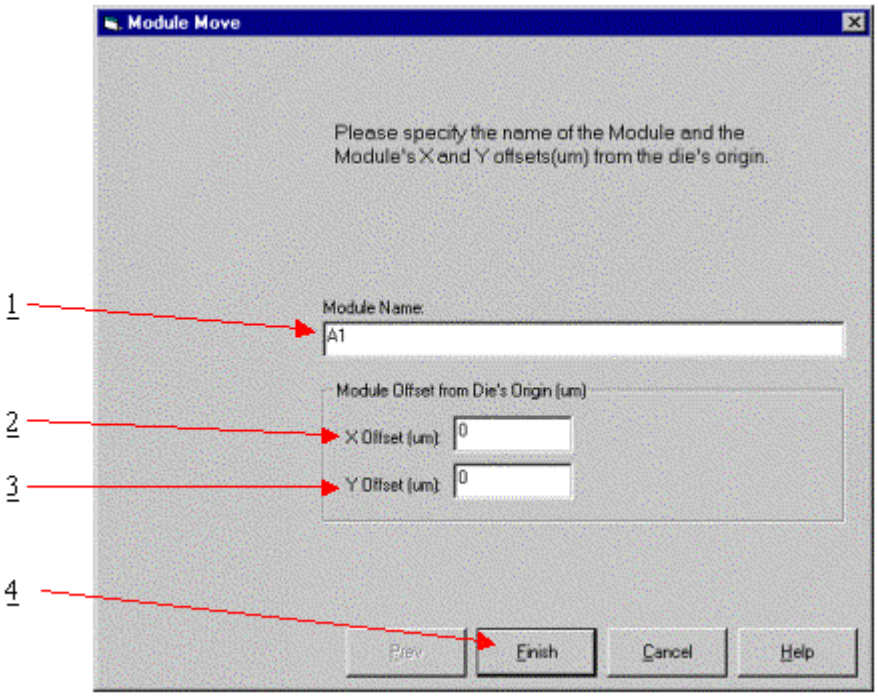
2. Add Script Objects

Clicking the Add Line button opens the Component Manager. By selecting the script objects you can create an entire script without writing any code.



- Select a Script Object.

    1. Click on the script object to highlight it.
    2. Click the Finish button.



- In this case the object selected was the Module Move object. The Module Move object moves the probes to an offset relative to the origin of the current Die. These offsets are specified by the user in units of microns (u). The Module Name is carried to the Data file.

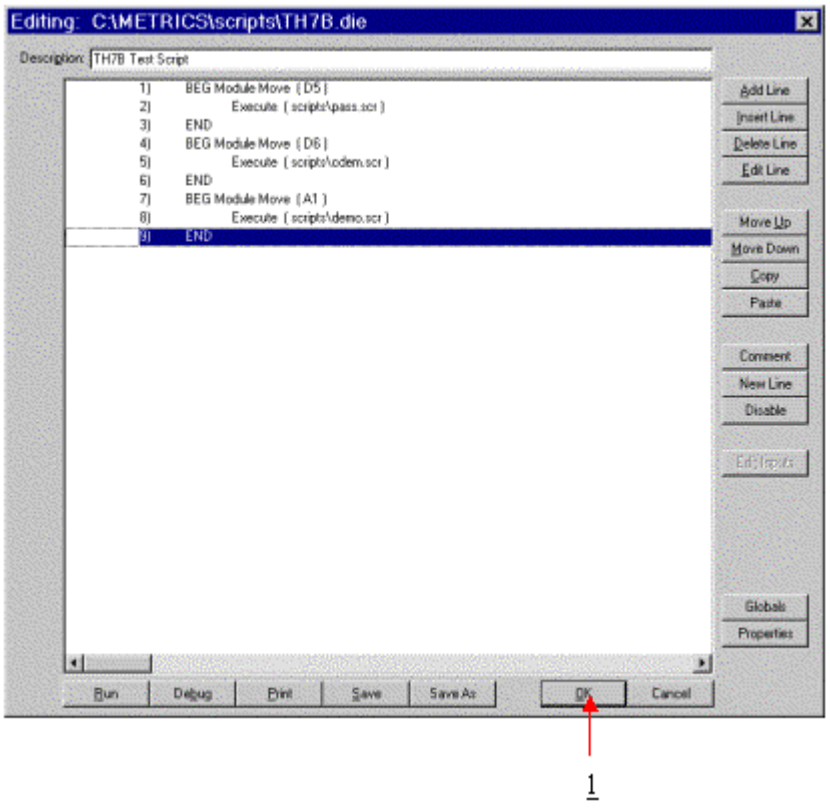
1. Enter a name for the module location.
2. Enter an offset in the X direction.
3. Enter an offset in the Y direction.
4. Click the Finish button.

Note: Regardless of the orientation of X and Y in any other software controlling the station, Metrics I/CV defines X and Y as:

When standing in front of the station looking at the chuck, positive X is defined as increasing moving to the right. Positive Y is defined as increasing when moving away from you.

3. Save the Die Test Script

Once all of the script objects are added, the Die Editor can be closed. When the Die Editor is closed, it will automatically save the script. If you do not wish for the changes to be saved click the Cancel button.



1. Click the OK button.

Module 6- Creating Probe Plans

Introduction

At this point all of the methods have been defined and it is time to pick the Die that this testing will be performed upon.

This Module details the how and what of probing in Metrics I/CV. Features of the Metrics Wafer Probing Tools product will be demonstrated. Several of the Probe Stations that Metrics I/CV supports have their own software. If, during the configuration, it was determined that Metrics Probe was not the interface, then the wafer plan will be created in the probe station vendor's software.

Topics Covered

- Creating a Probe Plan with Metrics Wafer Probing Tools
- Verifying the Probe Plan

Creating a Probe plan with Metrics Wafer Probing Tools

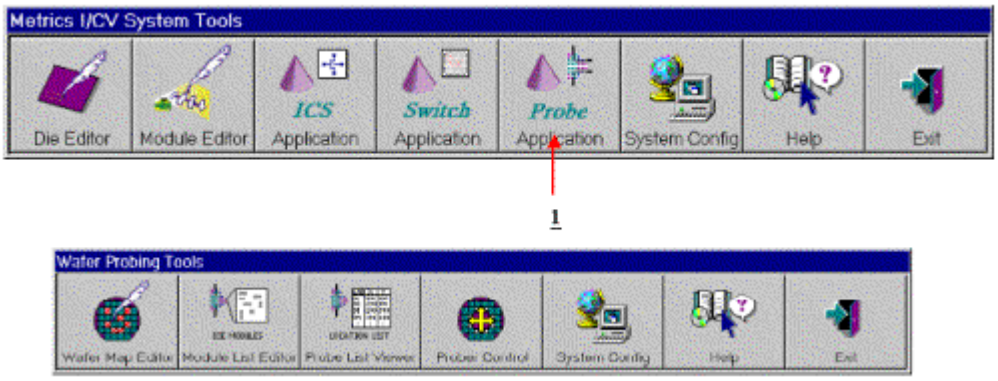
Metrics Wafer Probing Tools is the probing application designed by Metrics Technology to control probe stations that do not have a PC controller or do not support Windows 2000 or XP. If you are planning on using the control software provided by with probe station, skip this Module and review the procedures to create a wafer map as well as the Application Notes found in the Probe documentation of Metrics I/CV.

Metrics Wafer Probing Tools has its own toolbar that can be accessed from the Metrics I/CV System Tools Toolbar.

The steps to create a probe plan are:

A. Start Metrics Wafer Probing Tools

Metrics Wafer Probing Tools has its own toolbar that can be accessed from the Metrics I/CV System Tools Toolbar.



1. Click the Probe Application button on the Metrics I/CV System Tools Toolbar.

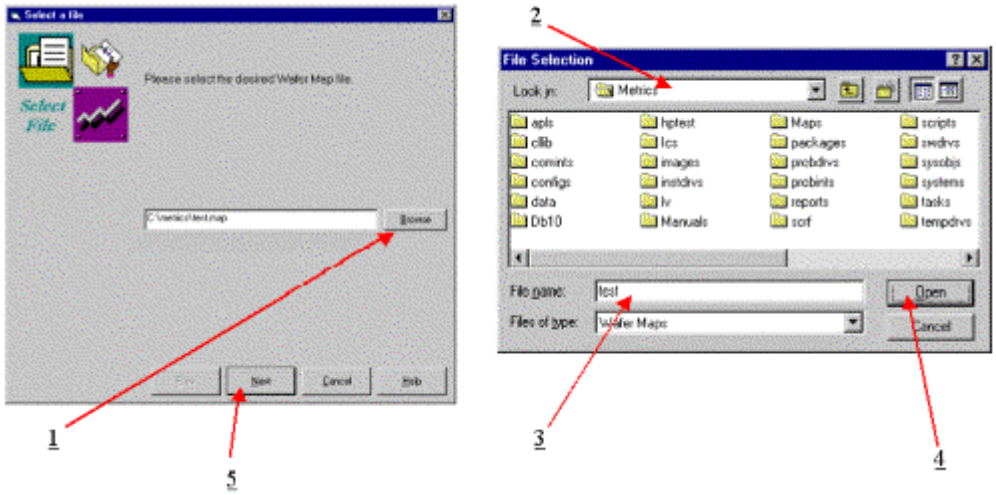
B. Start the Wafer Map Editor

Creating a wafer map is a simple process in Metrics Wafer Probing Tools. After starting the Wafer Map Editor, a series of wizards will step through the process. Once the wizards have been completed, the Map is complete.

1. Click the Wafer Map Editor button.

C. Select a new file

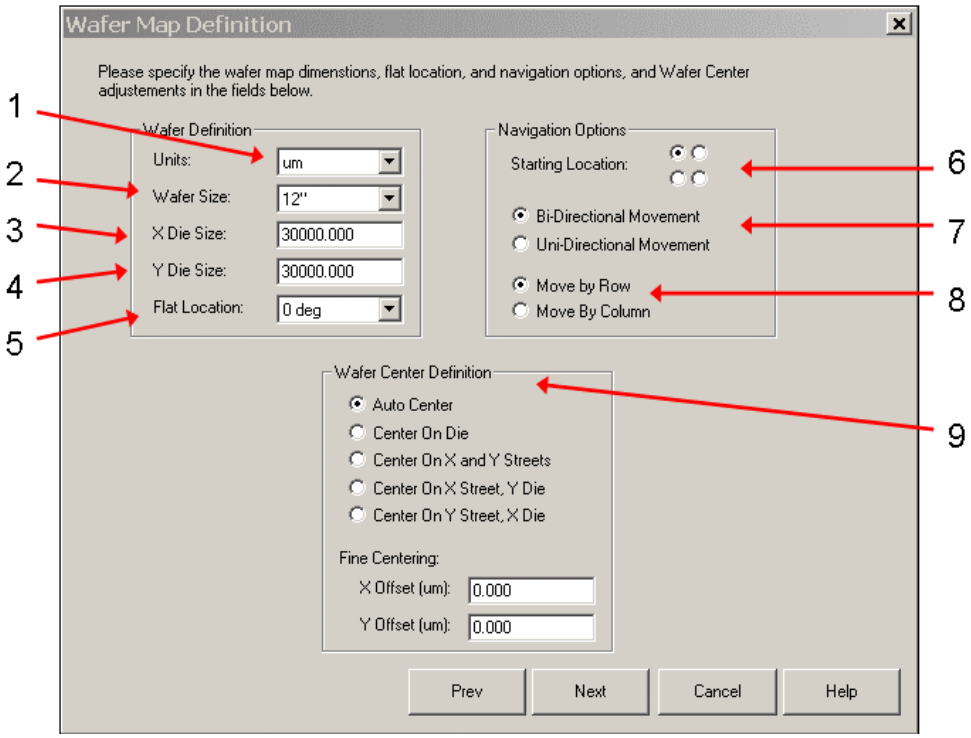
The first step to creating the Wafer Plan is to name the plan. Wafer plans should be stored in the directory selected in the Configuration Manager as the Wafer Map Directory.



1. Click the Browse button.
2. Select the directory to create the file in.
3. Enter a file name.
4. Click the Open button.
5. Click the Next button.

D. Enter the Wafer Parameters

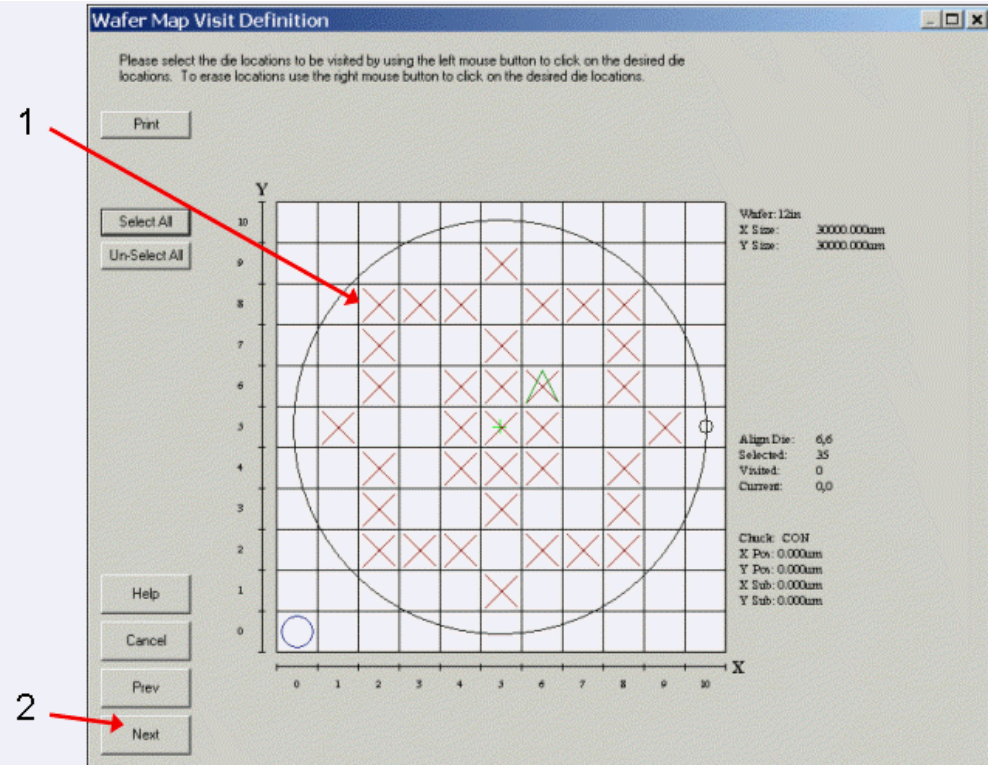
After naming the file, a wizard panel will open allowing the specification of the wafer parameters.



1. Select the Wafer Size.
2. Select the units that the dimensions will be displayed in.
3. Enter the Y Die size dimension.
4. Enter the Y Die size dimension.
5. Select the Flat location.
6. Select the Starting location.
7. Select the direction of movement.
8. Select the dominant mode of movement.
9. Click the Next button.

E. Select the Die to be Tested

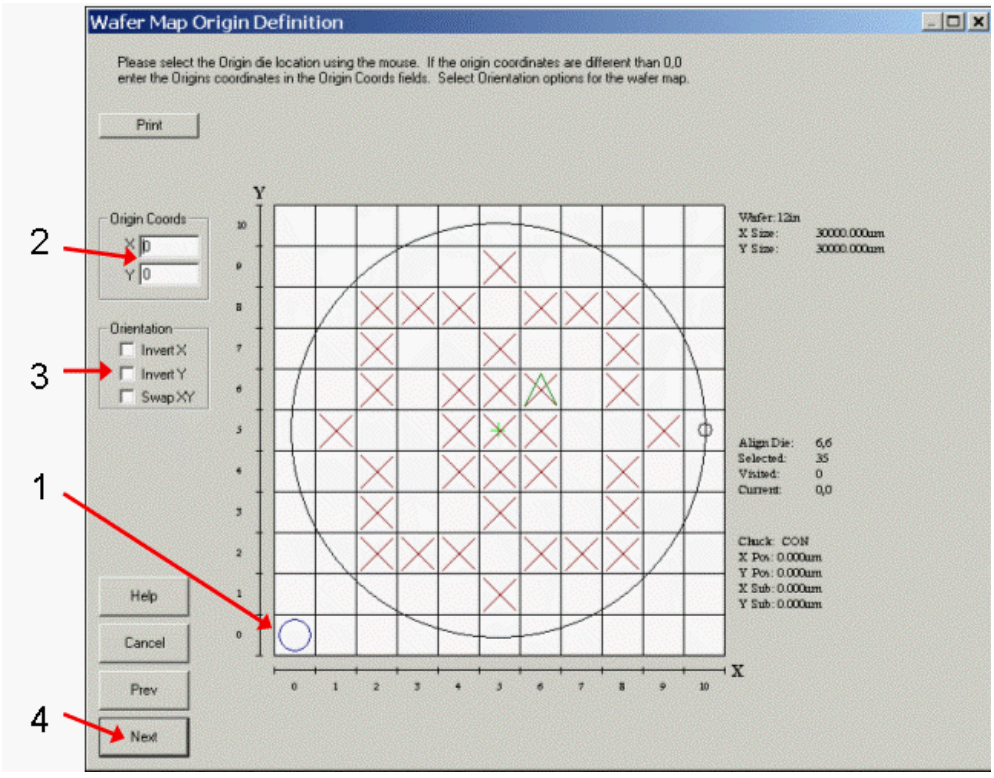
The next step is to select the die locations to be tested.



1. Click the die location.
2. Click the Next button.
3. Right click a location to remove it from the selected die.

F. Set the Origin location

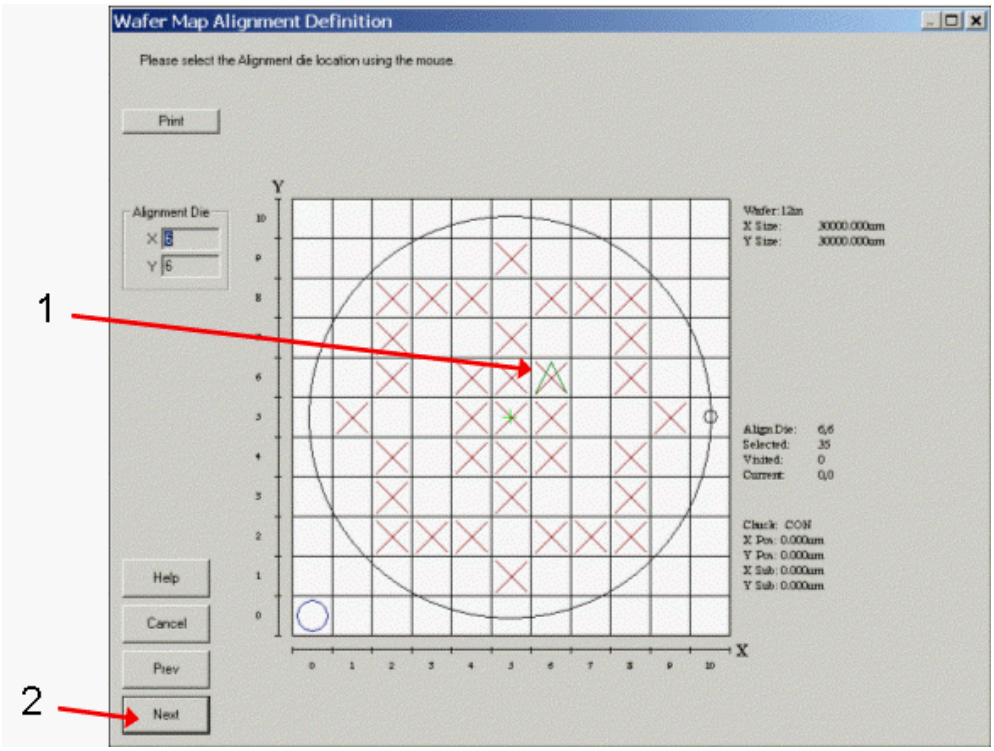
The Probe Control software labels the die according to a grid. The origin and orientation of that grid can be set by the user.



1. Click the die location for the origin position.
2. Edit the Origin coordinates.
3. Select the Options.
4. Click the Next button.

G. Set the Alignment Die

The final piece of information the software needs is the Alignment Die. The Alignment Die is called the Reference Die. When the system begins the test plan it will prompt the user to move the probes to the Alignment Die. All moves are then made relative to that position.



1. Click the die location for the alignment position.
2. Click the Next button.

Note: After clicking the Next button the wafer plan will be automatically saved and the editor will close.

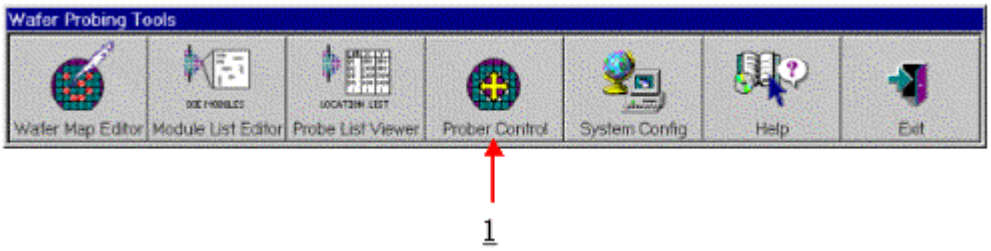
Verifying a Probe Plan with Metrics Wafer Probing Tools

Testing the probe plan is a simple process in Metrics Wafer Probing Tools. Testing is important to verify that the die size entered is correct.

The steps to verify a probe plan are:

A. Start the Prober Control

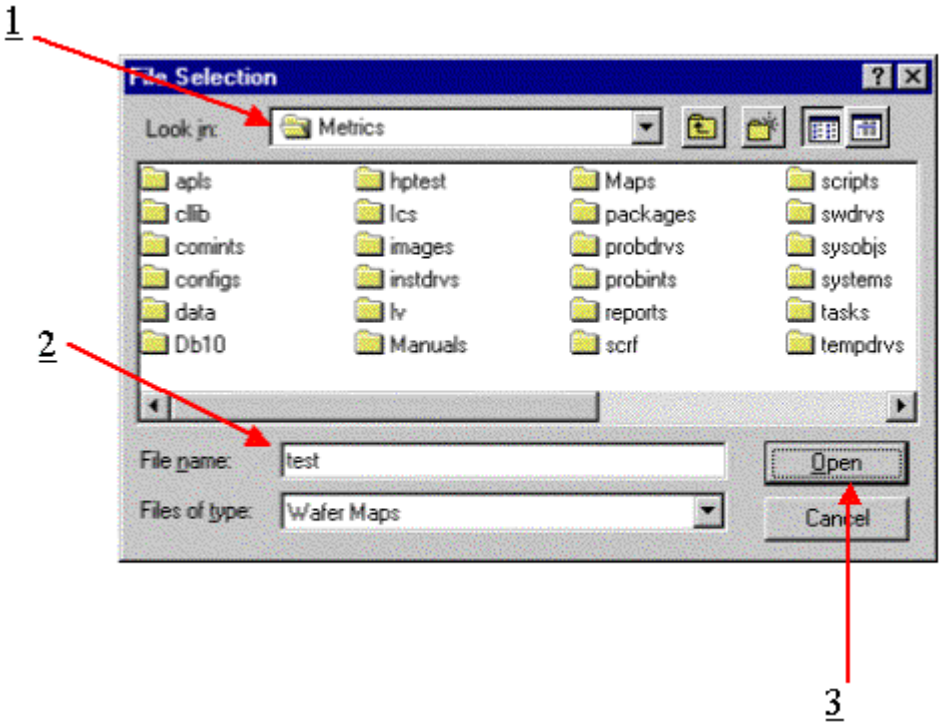
Metrics Probe provides an interactive probe control to allow the verification of the probe plan prior to collecting electrical test data.



1. Click the Prober Control button.

B. Select a Wafer Plan

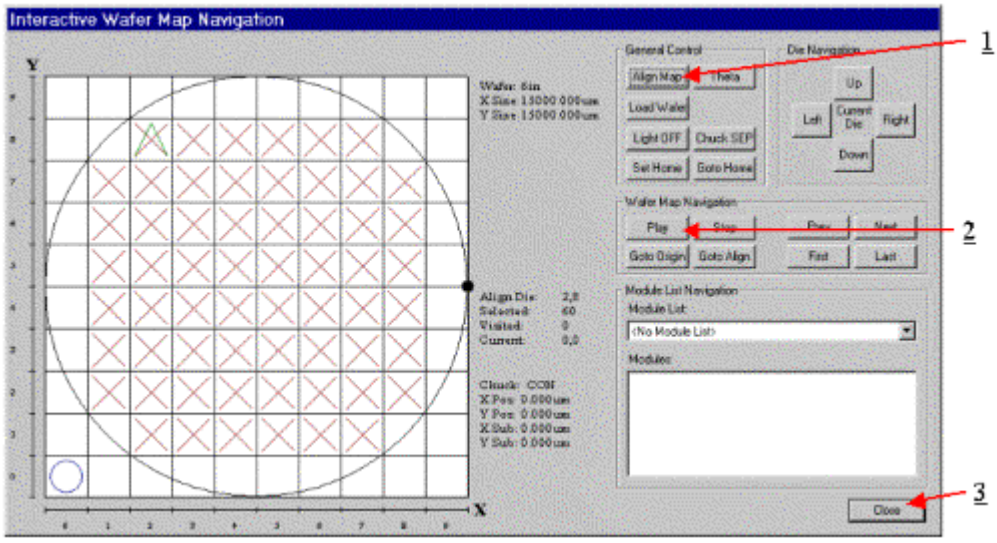
The Prober Control first prompts for the wafer plan that will be loaded.



1. Select the directory that contains the file.
2. Select the file.
3. Click the Open button.

C. Begin Verification

The Prober Control interface is loaded and verification can begin.
Note: The first step when verifying is always to Align Map. Without doing this the application assumes the current position is the Alignment Die.



1. Click the Align Map button. Follow the on-screen instructions.
2. To step the wafer select the appropriate button within the Wafer Map Navigation.
3. When complete click the Close button.

Module 7- Executing a Test

Introduction

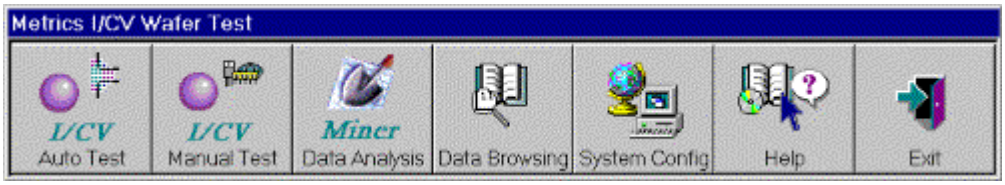
This Module demonstrates how to start a test. This section provides information on the daily operation of the probing system.

Topics Covered

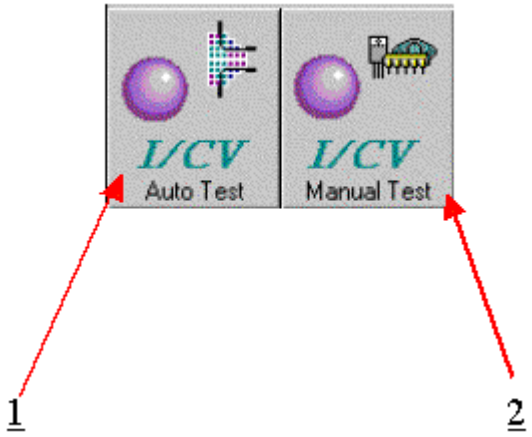
- The Testing Tools Toolbar
- Getting a Test Started

The Test Toolbar

The actual testing is started from the Metrics I/CV Testing Tools toolbar. This toolbar is started by double-clicking on the Metrics I/CV Testing Tools shortcut on the desktop of the computer. The toolbar contains buttons to start test being conducted either on a automatic (semi-automatic as well) or manual probe station.



Testing can be performed using either the Auto Test or Manual Test button. The difference between the two is that the Auto Test button allows the loading and execution of wafer plans. The Manual Test button does not incorporate a wafer plan.



Getting a Test Started

The process of starting a test can be divided into two actions. Each action is described in detail on the following pages.

To execute a test:

1. Select the test type
2. Supply information as prompted

The steps to run a test are:

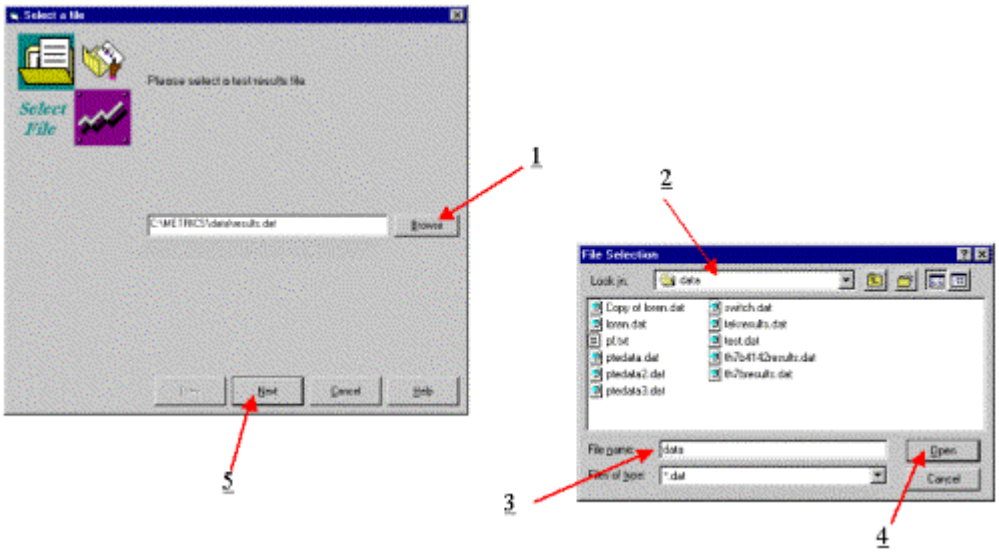
A. Start the Test Setup

The first step to starting the test is to select the test type to be executed. In this example we will select the Auto Test.

1. Click the Auto Test button.

B. Select the Data File

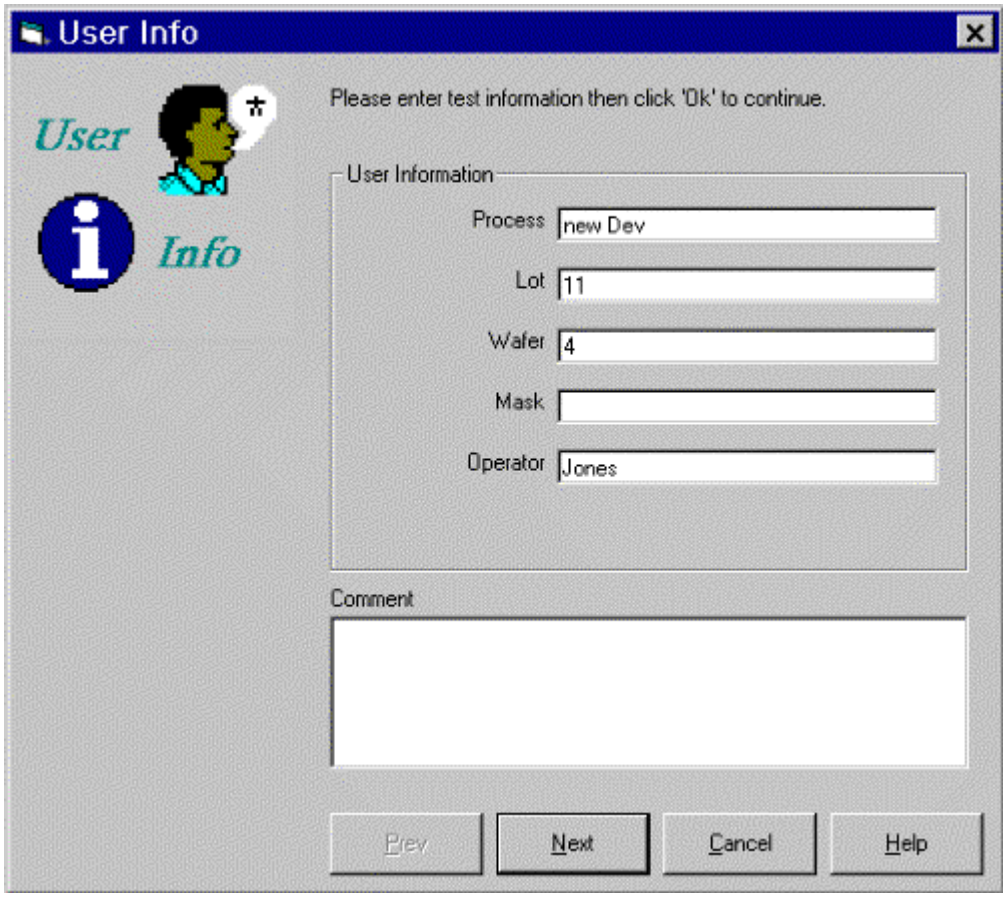
The software will prompt the operator to select a file to save the data into.



1. Click the Browse button.
2. Select the directory for the data file.
3. Enter a name for the file.
4. Click the Open button.
5. Click the Next button.

C. Provide Operator Information

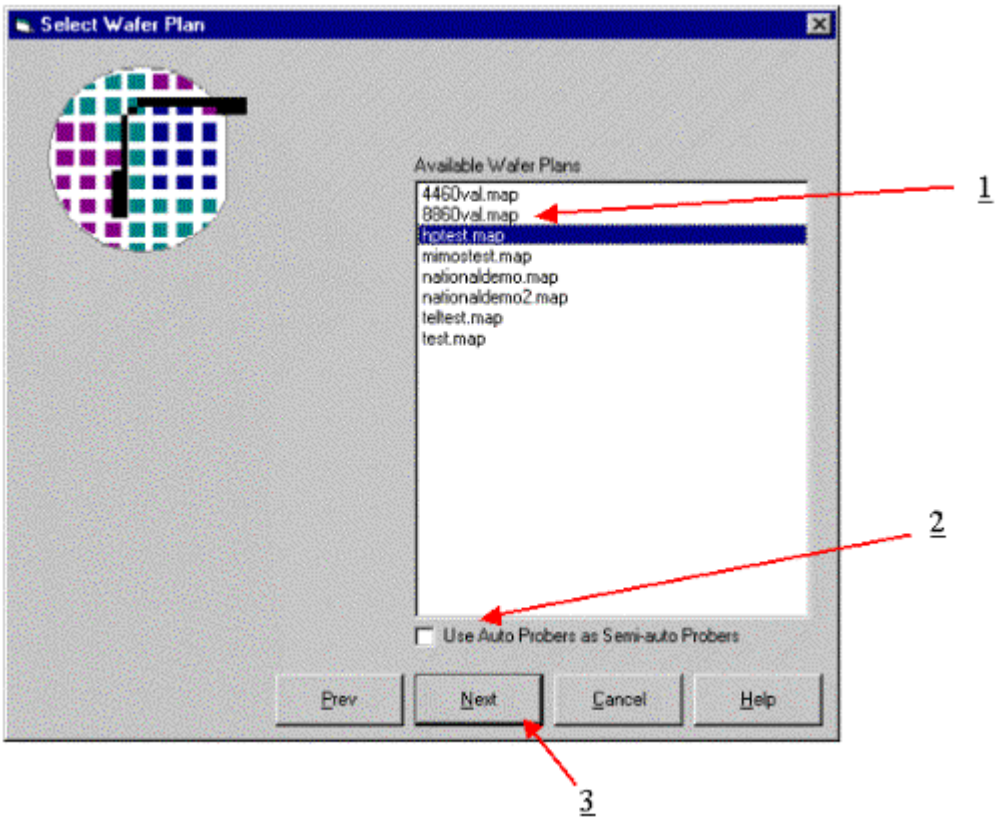
Metrics I/CV will automatically prompt the user for basic information about the test. This will be stored in the data file.



1. Enter the requested information.
2. Click the Next button.

D. Select the Wafer Plan

Once the data file is selected the software will prompt the operator to select a wafer plan for execution (see Note 1).



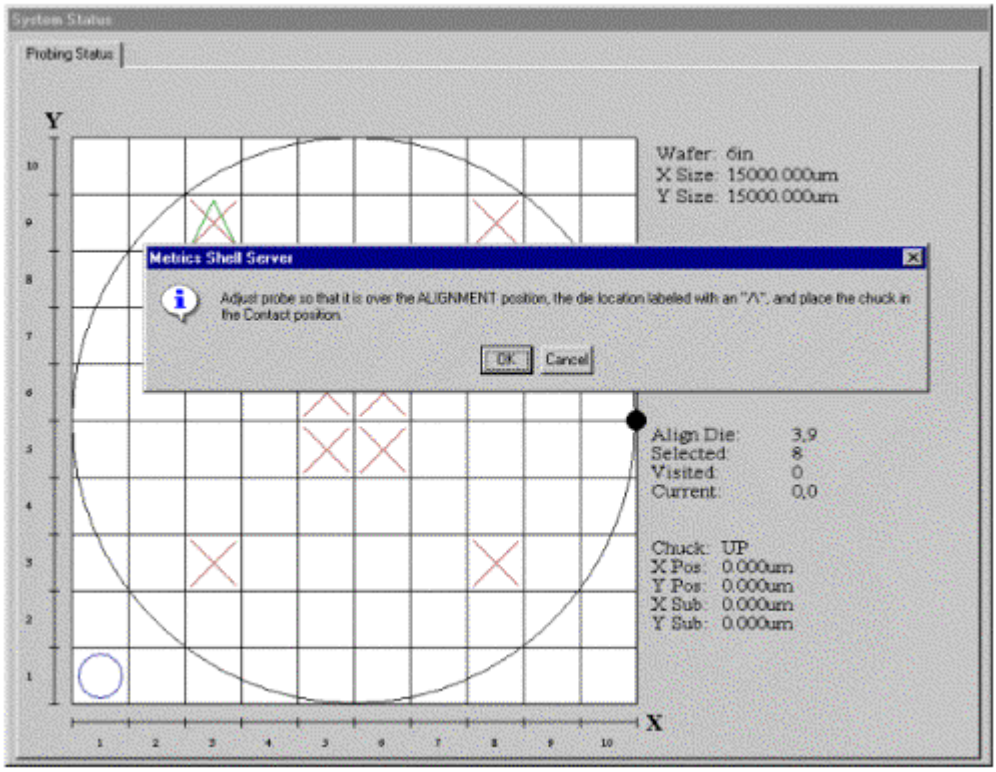
1. Click the wafer plan name to highlight it.
2. Select the auto-probing option (see Note 2).
3. Click the Next button.

Note 1: During the configuration of the software, the directory that the software is stored in is selected. The contents of that directory are automatically displayed.

Note 2: The option to Use Auto-Probers as Semi-Auto Probers allows the user to run a single wafer on the Auto prober without creating batch files, etc. Otherwise, with this option not selected for an Auto Prober, the software will send the Load Next command.

E. Align Probe Station

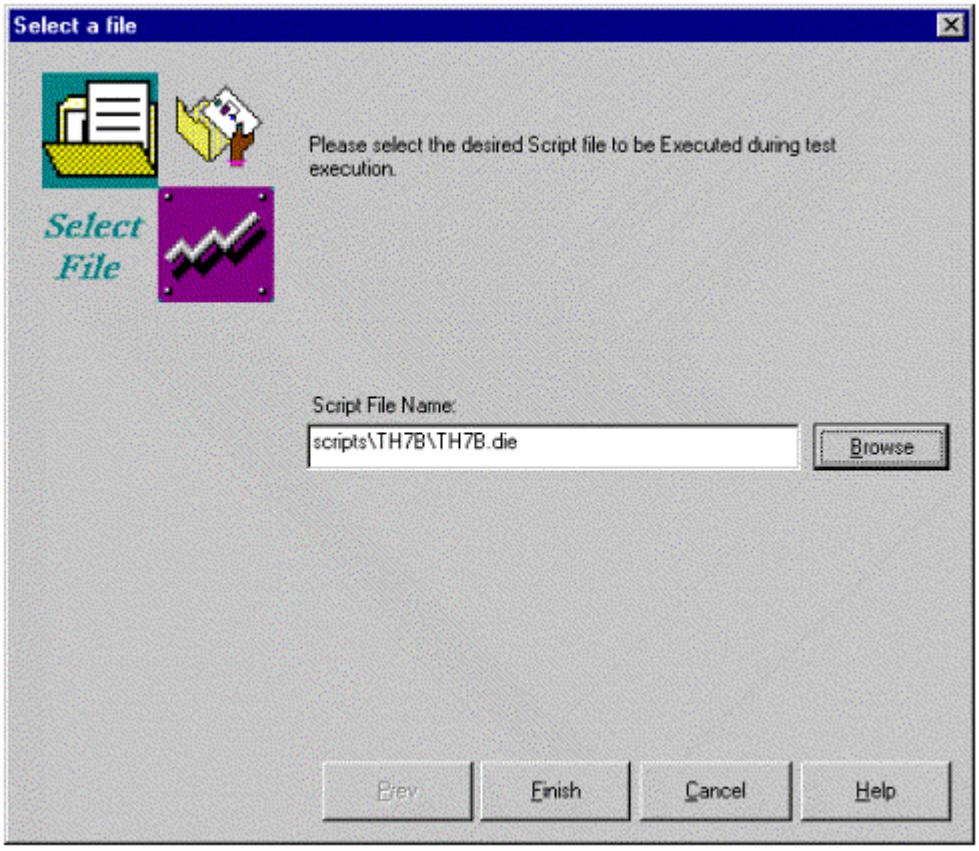
The wafer plan is loaded and the operator is prompted to move the probes over the Alignment location and place the probes in contact with the wafer.



1. Move the probe station so that the probe needles are contacting the Alignment site.
2. Place the needles in contact with the wafer.
3. Click the OK button.

F. Select the Script

The final step is to select the Die or Module Script to be executed.



1. Click the Browse button to select the script.
2. Select the script.
3. Click the Finish button.

Note: After clicking the Finish button a new interface will open. To start the test, click the Start button.

Module 8- Data Manipulation

Introduction

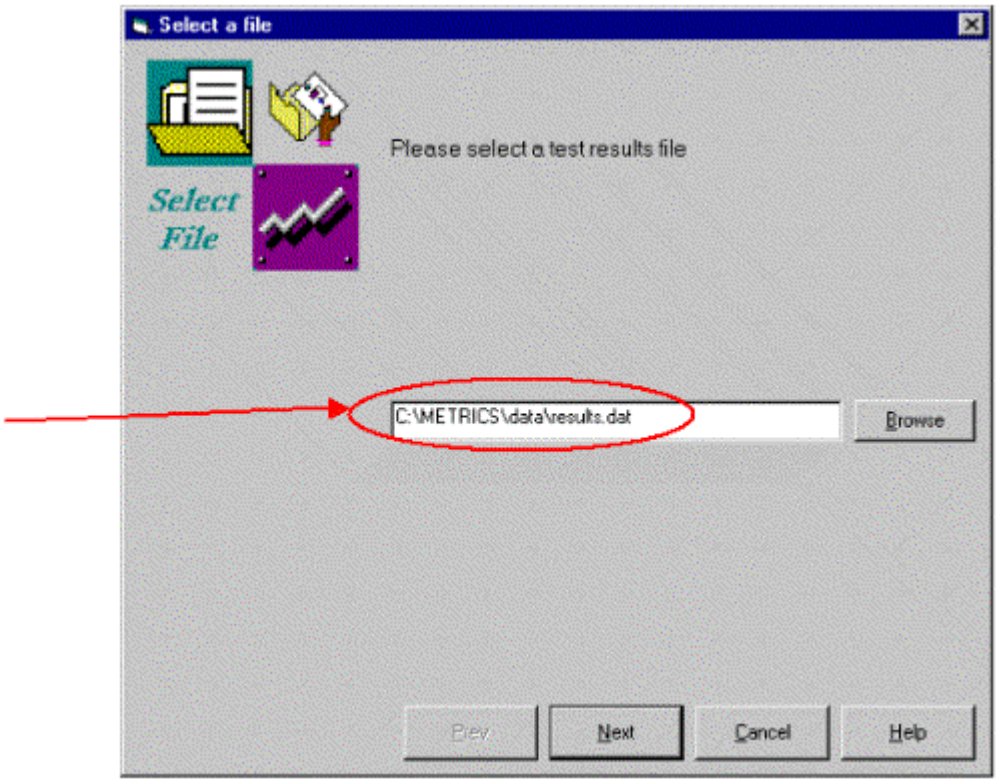
This Module covers the data that was collected in the previous Module and what can be done to it using tools built into Metrics I/CV.

Topics Covered

- Where is the Data?
- Creating a Wafer Map
- Exporting Data
- Viewing Data Curves

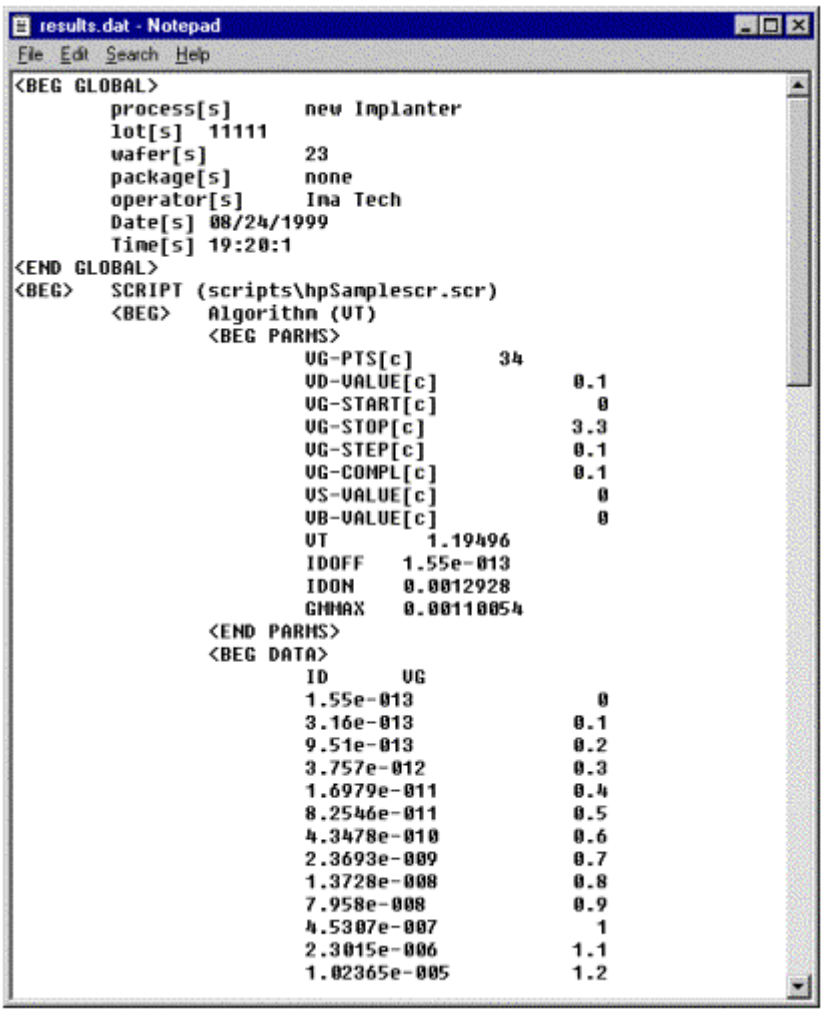
Where is the Data?

The data created by the execution of the I/CV software is saved in the file specified by the operator when starting the test.



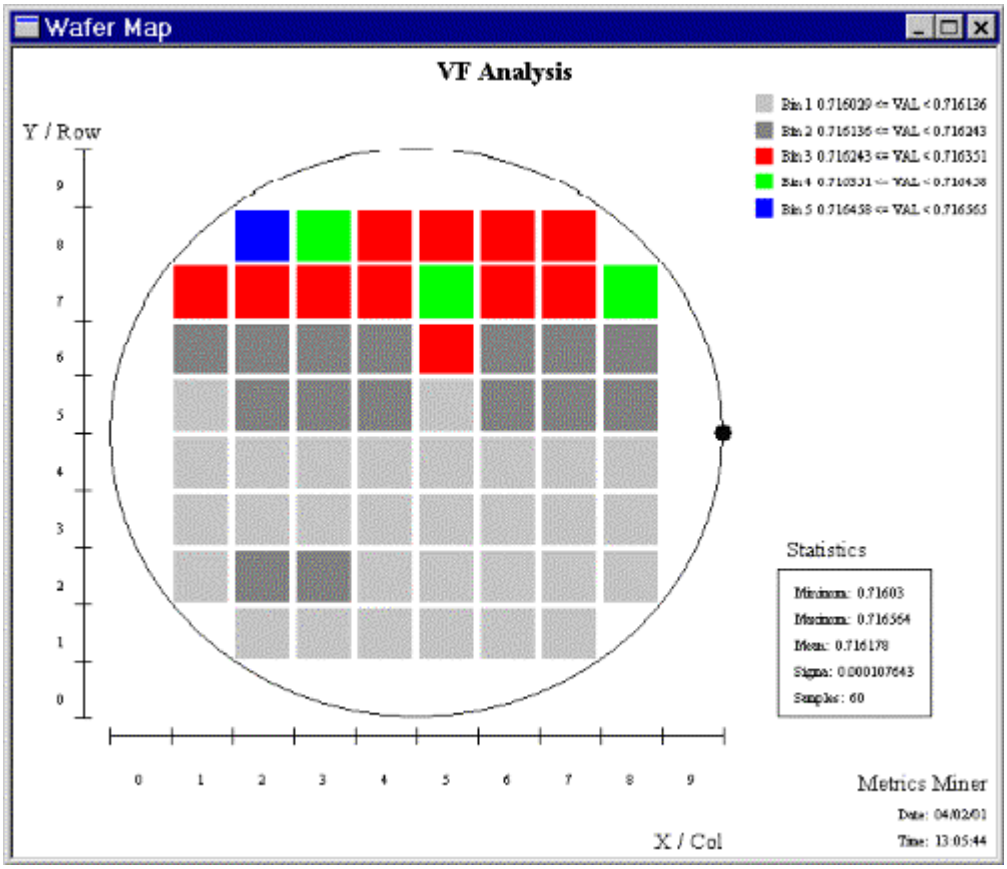
The data is saved in ASCII format.

In addition the file contains tags to identify the various levels of data. This representation is reasonable to read, but is very desirable for writing post-processing macros.


results.dat - Notepad
File Edit Search Help
<BEG GLOBAL>
process[s] new Implanter
lot[s] 11111
wafer[s] 23
package[s] none
operator[s] Ina Tech
Date[s] 08/24/1999
Time[s] 19:20:1
<END GLOBAL>
<BEG> SCRIPT (scripts\hpSamplescr.scr)
<BEG> Algorithm (VT)
<BEG PARMS>
VG-PTS[c] 34
VD-VALUE[c] 0.1
VG-START[c] 0
VG-STOP[c] 3.3
VG-STEP[c] 0.1
VG-COMPL[c] 0.1
VS-VALUE[c] 0
VB-VALUE[c] 0
VT 1.19496
IDOFF 1.55e-013
IDON 0.0012928
GMMAX 0.00110054
<END PARMS>
<BEG DATA>
ID VG
1.55e-013 0
3.16e-013 0.1
9.51e-013 0.2
3.757e-012 0.3
1.6979e-011 0.4
8.2546e-011 0.5
4.3478e-010 0.6
2.3693e-009 0.7
1.3728e-008 0.8
7.958e-008 0.9
4.5307e-007 1
2.3015e-006 1.1
1.02365e-005 1.2

Creating a Wafer Map

Metrics I/CV contains a tool named the Metrics Miner. The Metrics Miner application is very useful for the viewing of Wafer Maps and manipulation of data.

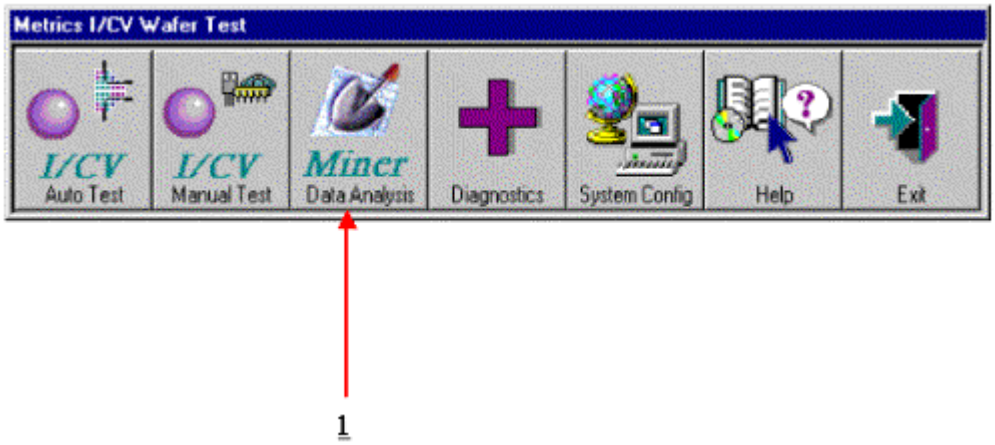


This first example will detail how to create a Wafer Map using Metrics Miner.

The steps to create a probe plan are:

A. Start Metrics Miner

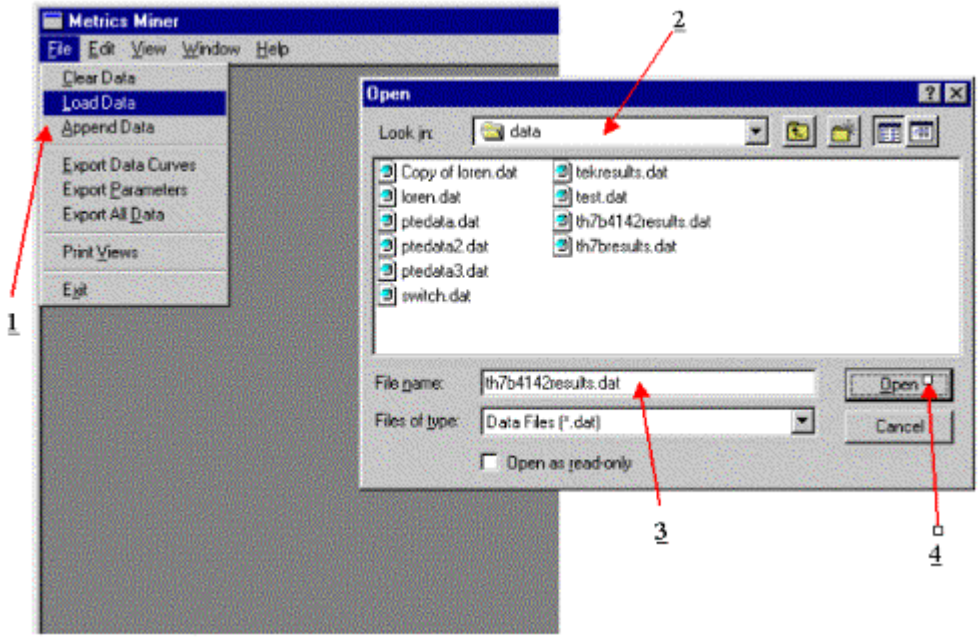
The Metrics Miner can be started from the Metrics I/CV Test toolbar.



1. Click the Metrics Miner button.

B. Load Data

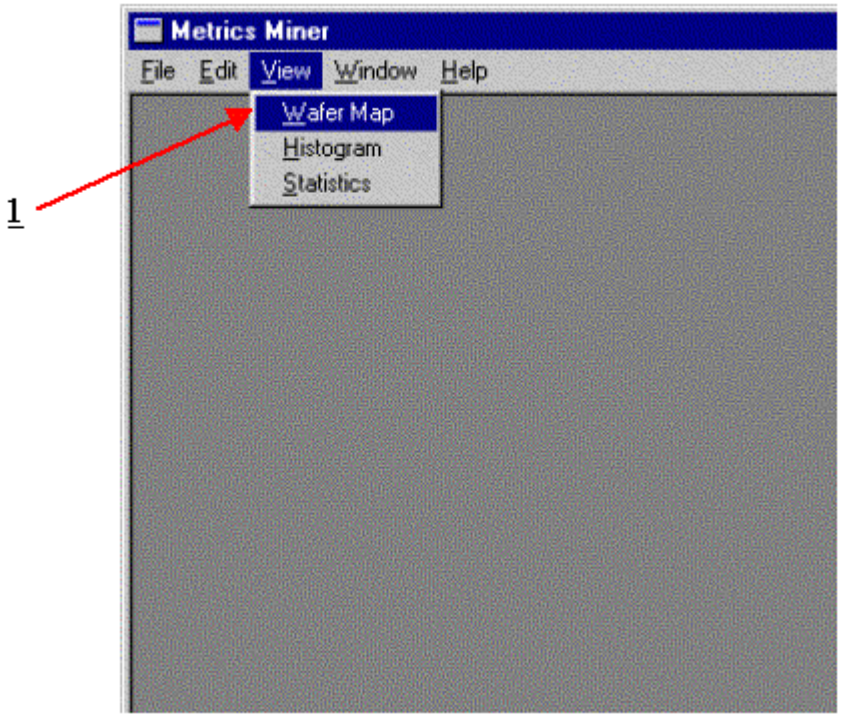
The first step to manipulating the data with Metrics Miner is to load the data from the saved data file.



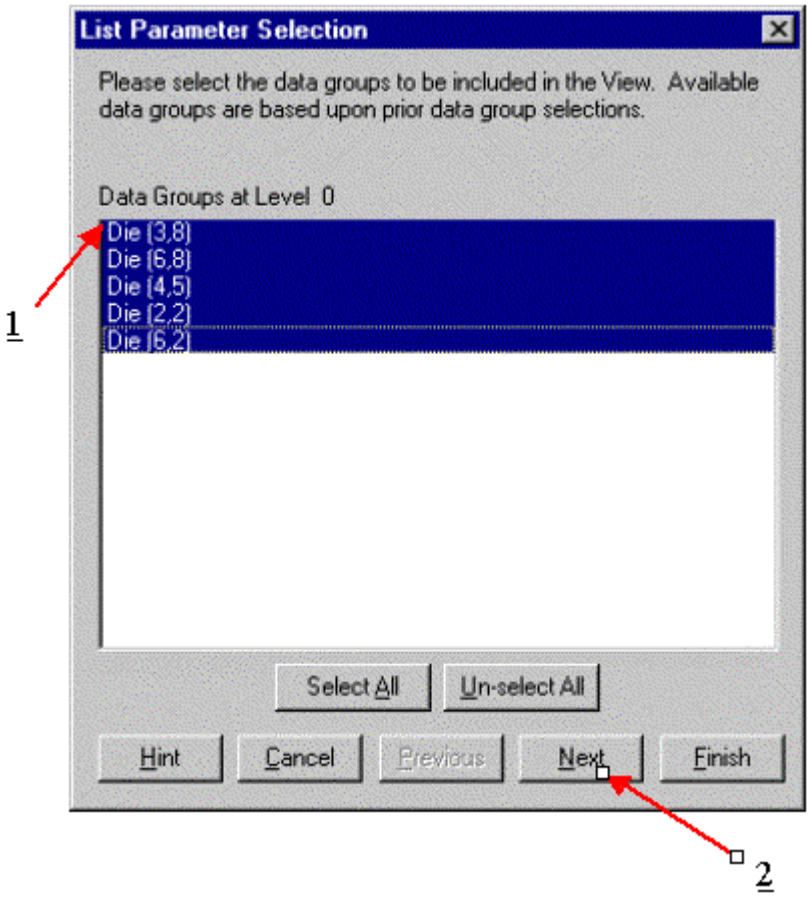
1. Click the File | Load Data menu item.
2. Select the Directory containing the data file.
3. Select the data file.
4. Click the Open button.

C. Select Parameter to Map

Once the data has been loaded, subsequent wafer maps or data exports can be created without reloading the data.

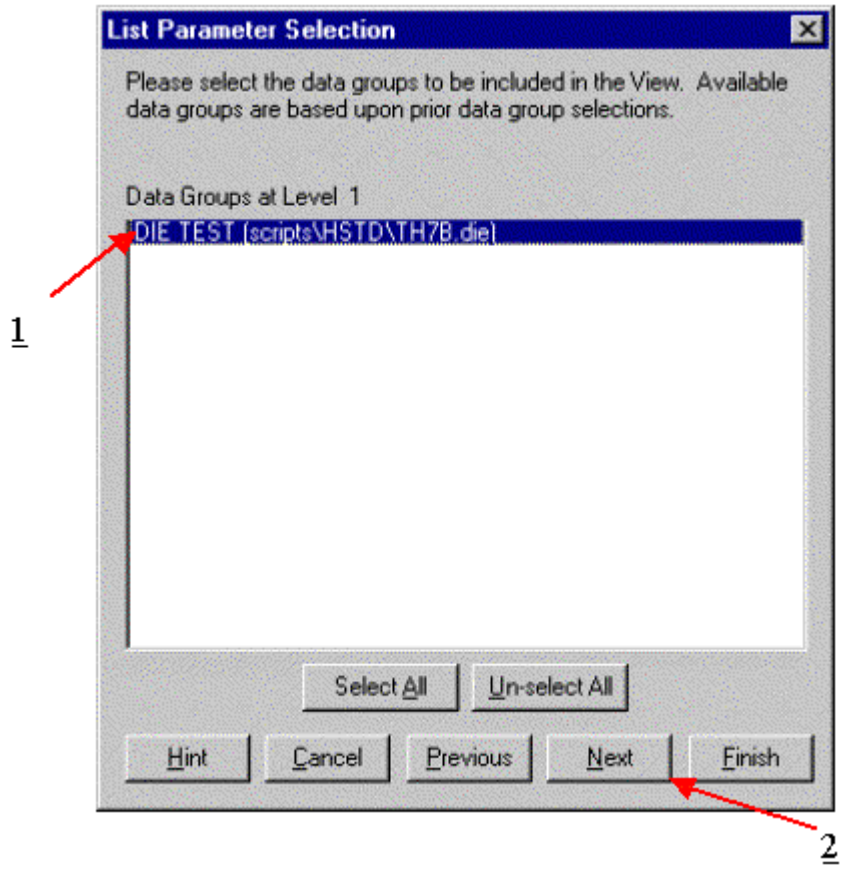


I. Click the View | Wafer Map menu item.



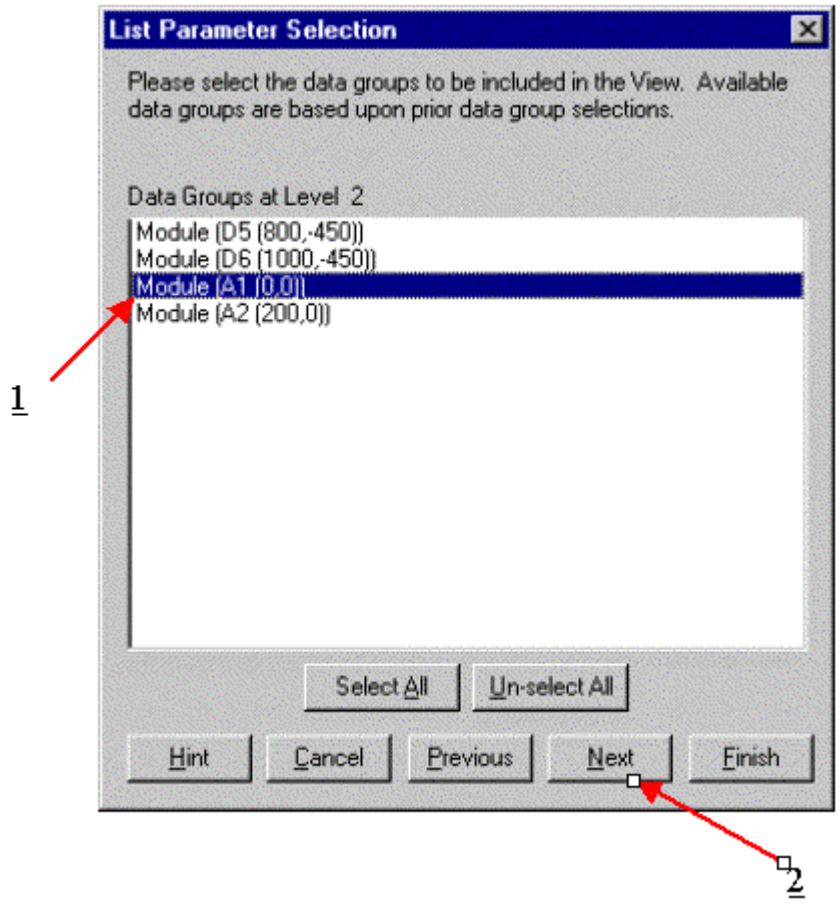
II. Select the Die locations to map:

1. Select the Die locations
2. Click the Next button.



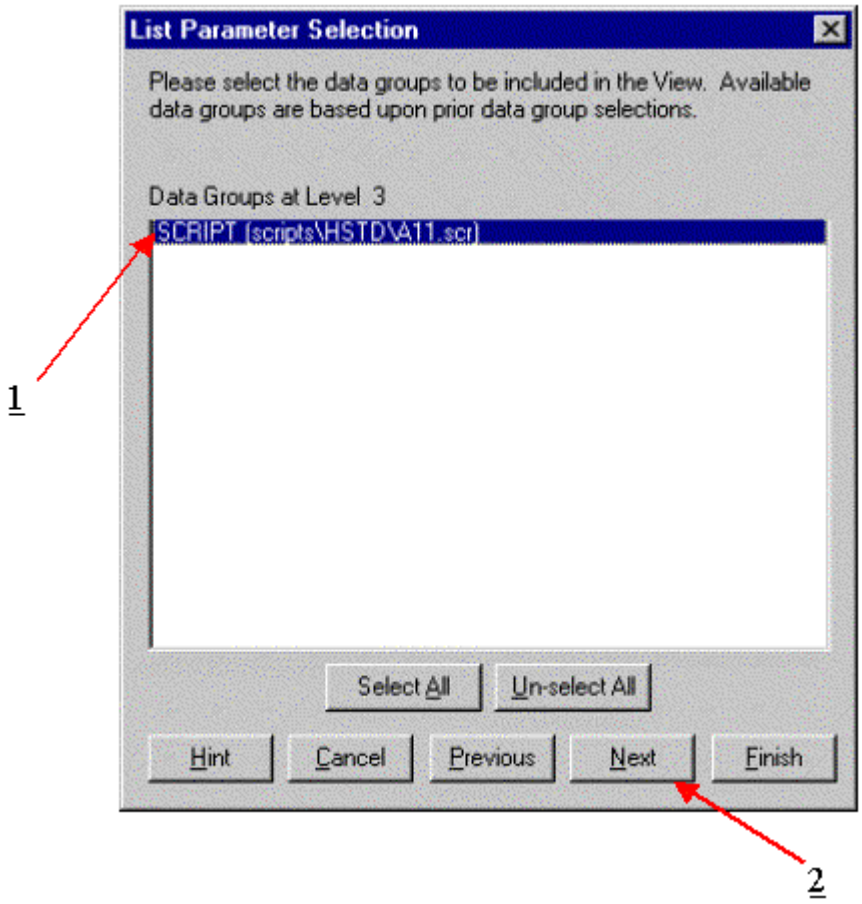
III. Select the Die script that contains the parameter to map:

1. Select the Die script
2. Click the Next button.



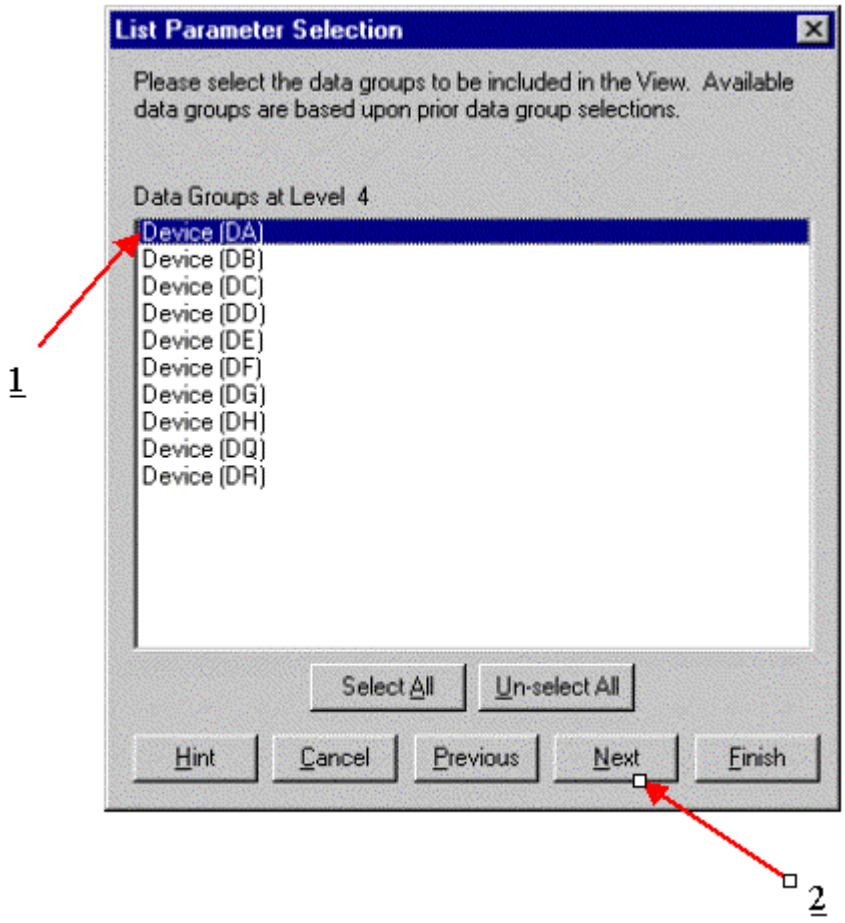
IV. Select the Module that contains the parameter to map:

1. Select the Module
2. Click the Next button.



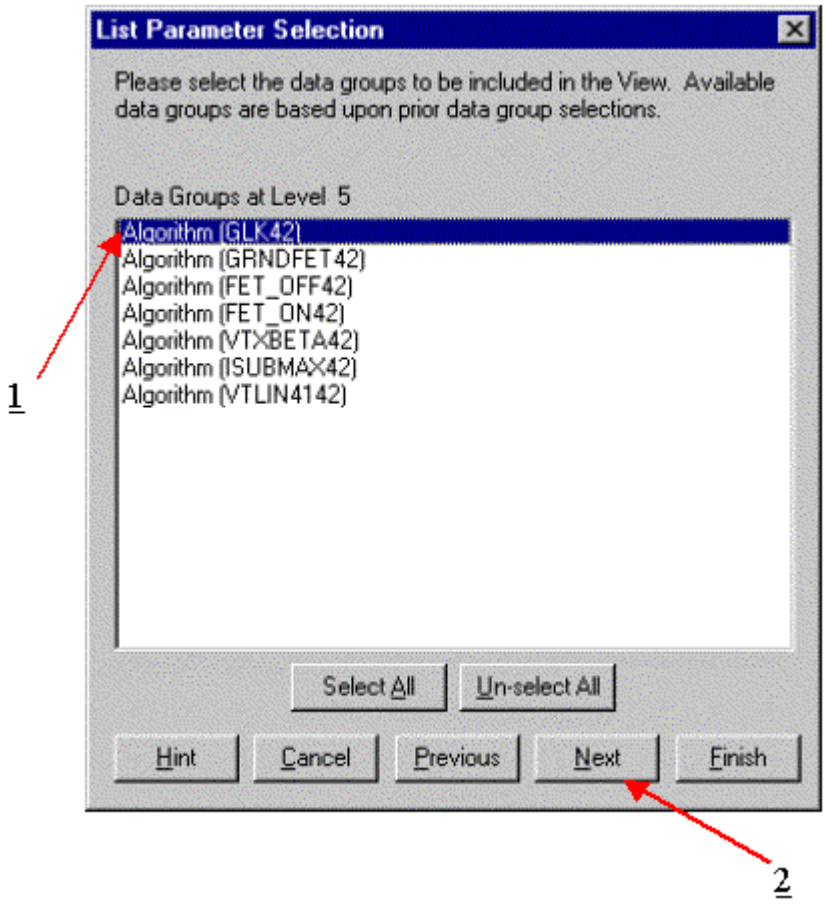
V. Select the Module Script that contains the parameter to map:

1. Select the Module script
2. Click the Next button.



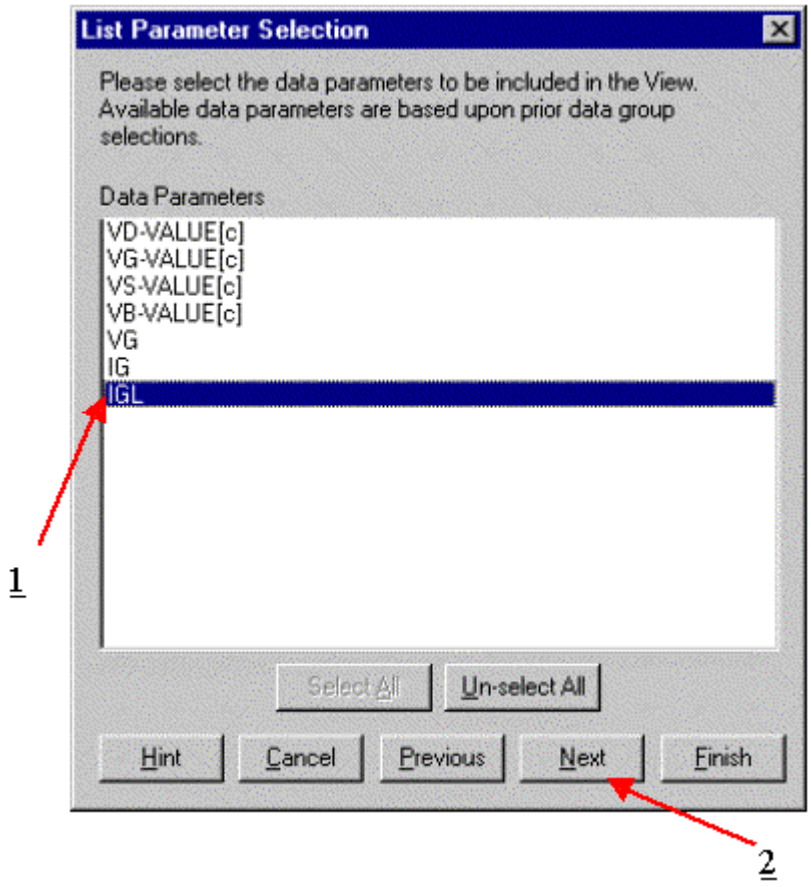
VI. Select the device whose parameter is to be mapped:

1. Select the Device
2. Click the Next button.



VII. Select the Test algorithm that contains the parameter to map:

1. Select the Test algorithm
2. Click the Next button.

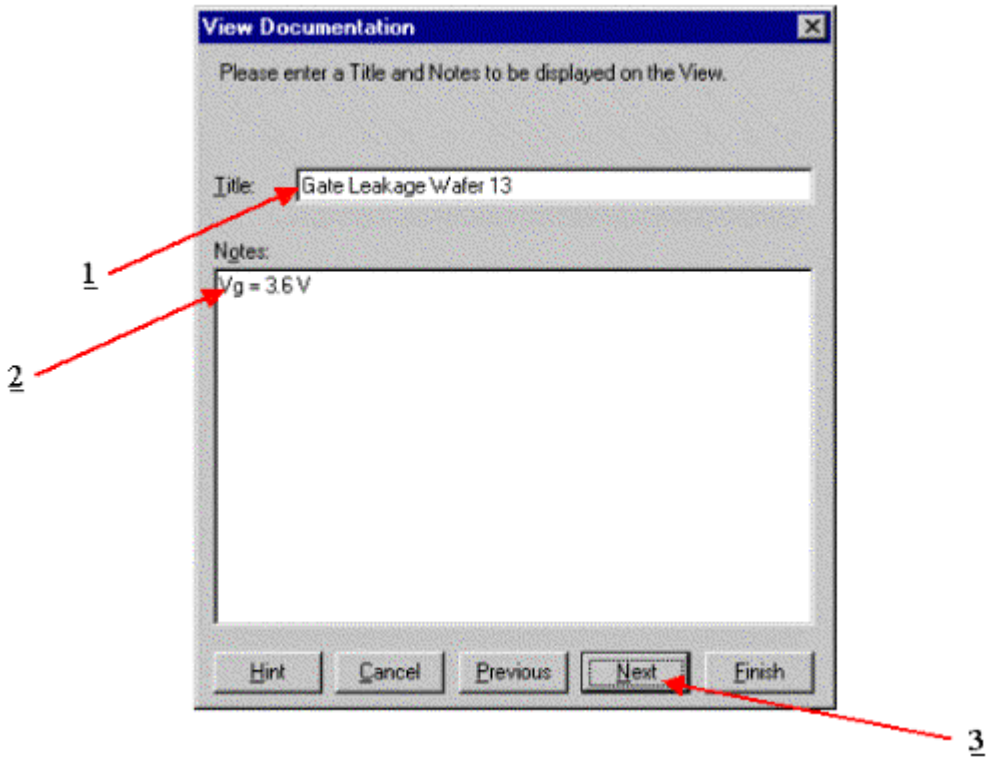


VIII. Select the parameter to map:

1. Select the parameter
2. Click the Next button.

D. Setup Map Title and Notes

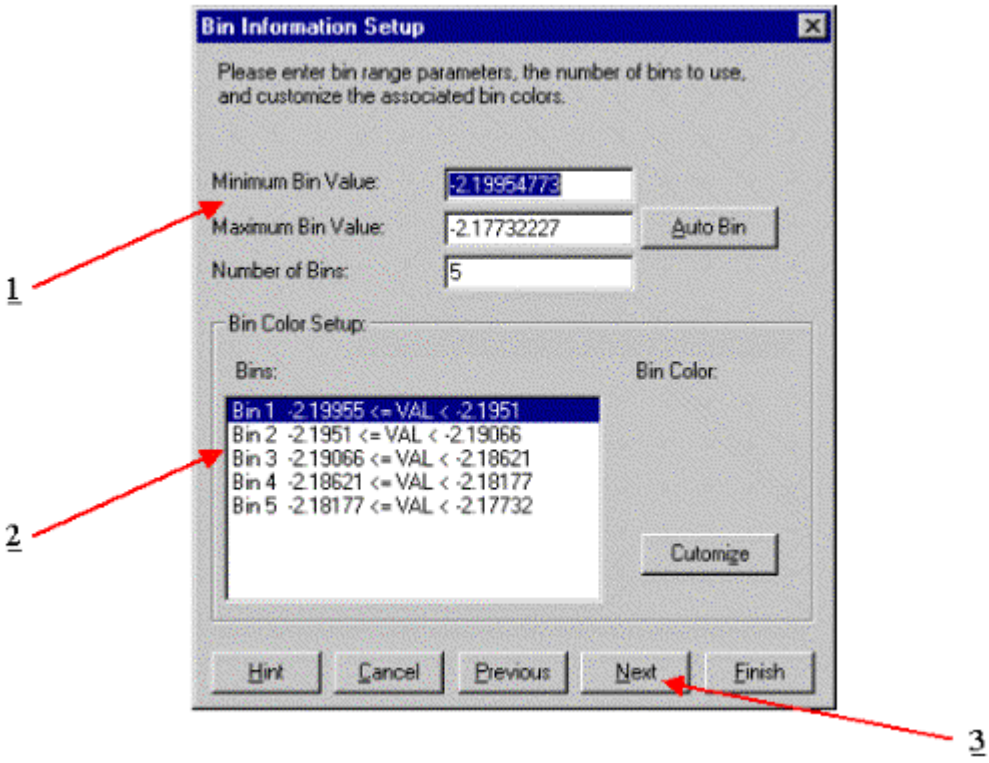
The wafer map can be given a Title and Notes.



1. Enter a title for the wafer map.
2. Enter notes for the wafer map.
3. Click the Next button.

E. Setup Bins

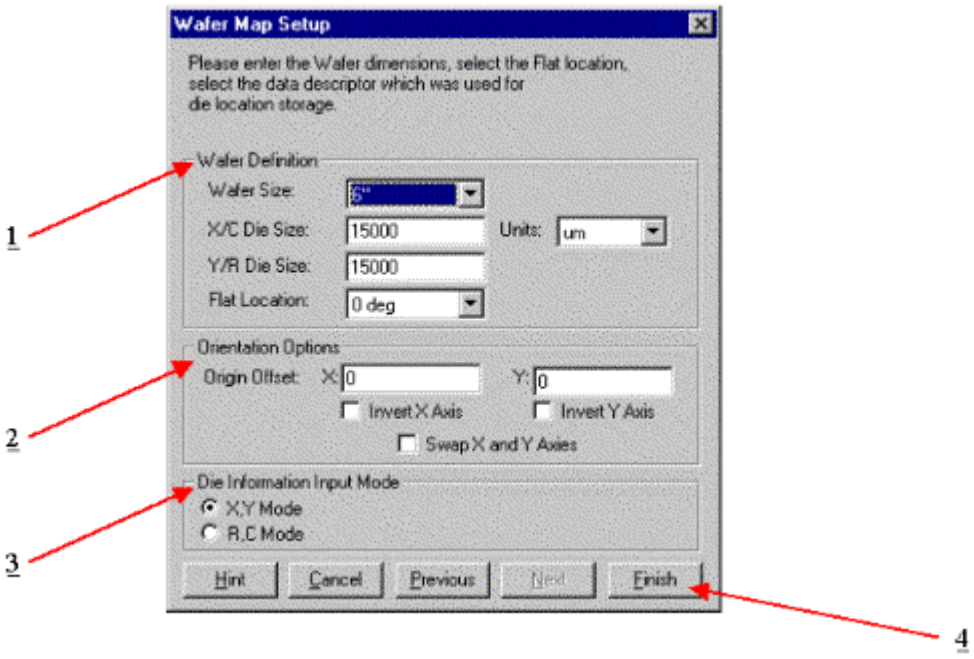
The binning must be set for the wafer map. The values can be binned automatically or the user can specify upper and lower bounds along with the number of bins.



1. Enter the bin parameters.
2. Edit the bin colors.
3. Click the Next button.

F. Configure Wafer Size

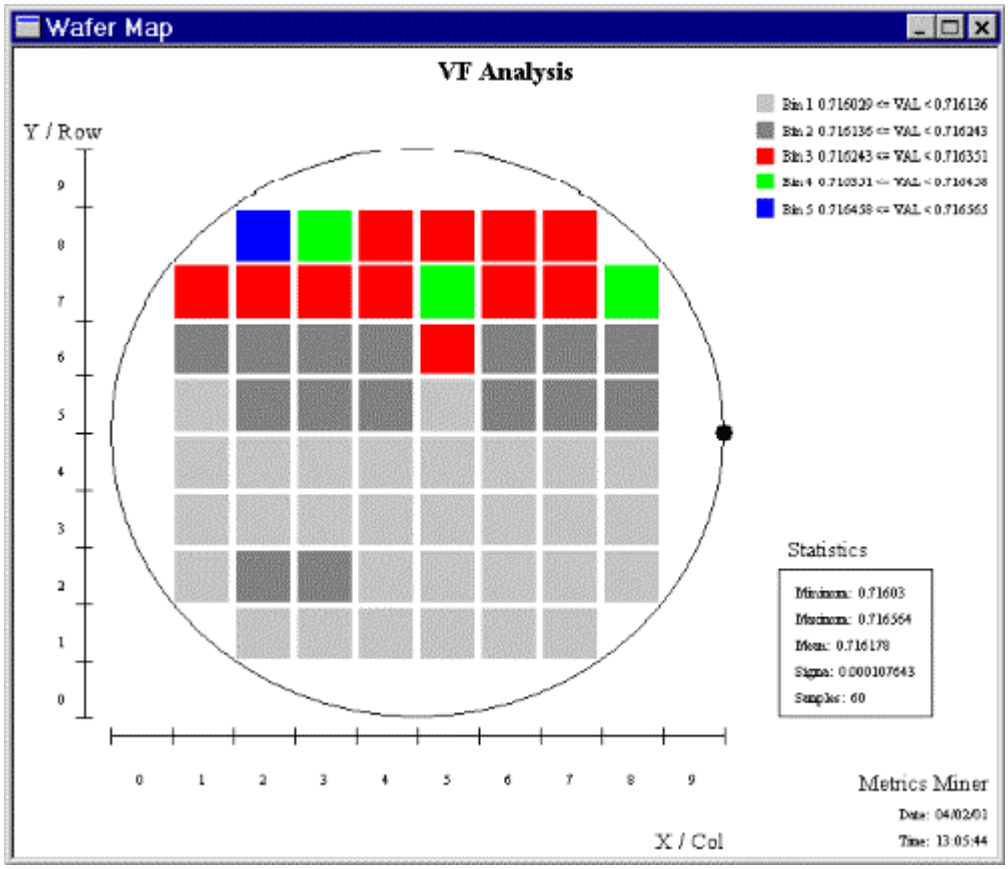
To make the wafer map match the wafer plan, the wafer parameters must be provided.



1. Select the correct values for the Wafer Definition.
2. Select the correct values for the Orientation Options.
3. Select the correct Die information Input Mode.
4. Click the Finish button.

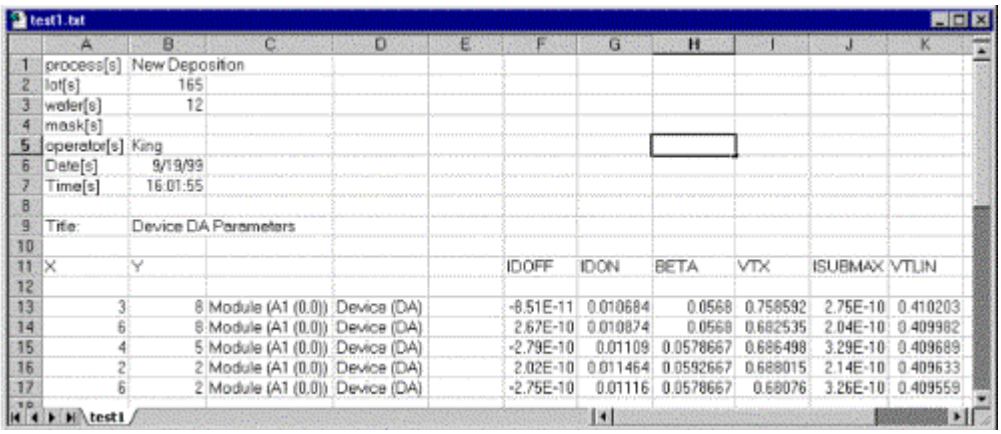
G. Results

The resulting Wafer Map is shown below. This plan can be copied to the clipboard and pasted into other programs. In addition the plan can be printed directly to a printer.



Exporting Data

Metrics I/CV contains a tool named the Metrics Miner. The Metrics Miner application is very useful for the viewing of Wafer Maps and manipulation of data.



test1.txt

	A	B	C	D	E	F	G	H	I	J	K
1	process[s]	New Deposition									
2	lot[s]	165									
3	wafer[s]	12									
4	mask[s]										
5	operator[s]	King									
6	Date[s]	9/19/99									
7	Time[s]	16:01:55									
8											
9	Title:	Device DA Parameters									
10											
11	X	Y				IDOFF	IDON	BETA	VTX	ISUBMAX	VTUN
12											
13	3	8	Module (A1 (0,0))	Device (DA)		-8.51E-11	0.010684	0.0568	0.758592	2.75E-10	0.410203
14	6	8	Module (A1 (0,0))	Device (DA)		2.67E-10	0.010874	0.0568	0.682535	2.04E-10	0.409982
15	4	5	Module (A1 (0,0))	Device (DA)		-2.79E-10	0.01109	0.0578667	0.686498	3.29E-10	0.409689
16	2	2	Module (A1 (0,0))	Device (DA)		2.02E-10	0.011464	0.0592667	0.688015	2.14E-10	0.409633
17	6	2	Module (A1 (0,0))	Device (DA)		-2.75E-10	0.01116	0.0578667	0.68076	3.26E-10	0.409559

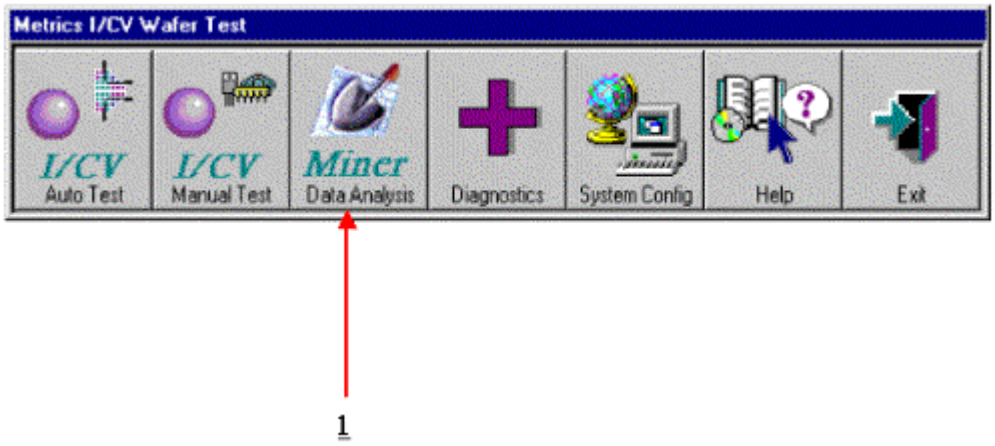
test1

This example will detail how to export Data parameters using Metrics Miner

The steps to export data are:

A. Start Metrics Miner

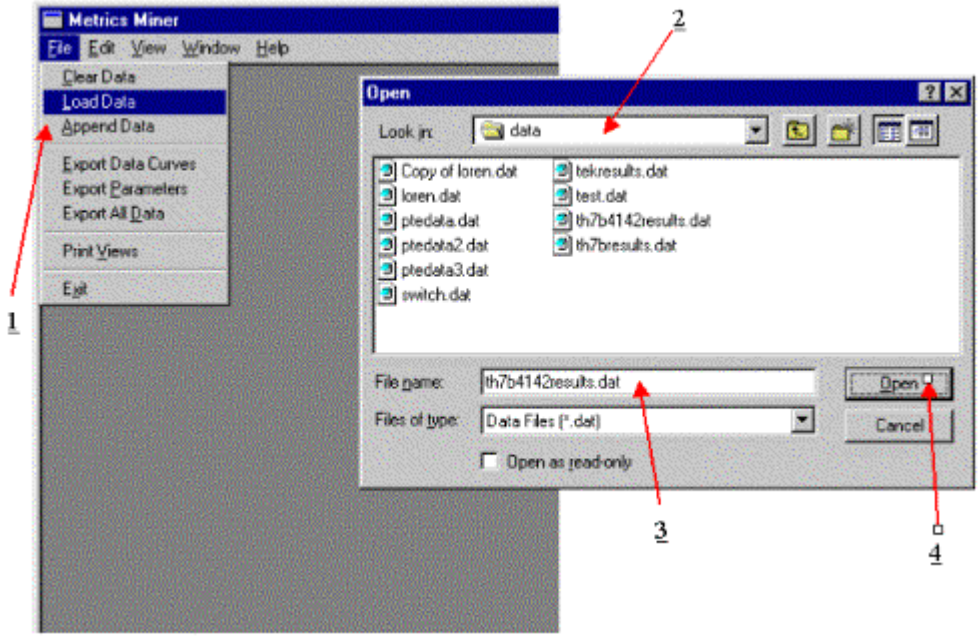
The Metrics Miner can be started from the Metrics I/CV Test toolbar.



1. Click the Metrics Miner button.

B. Load Data

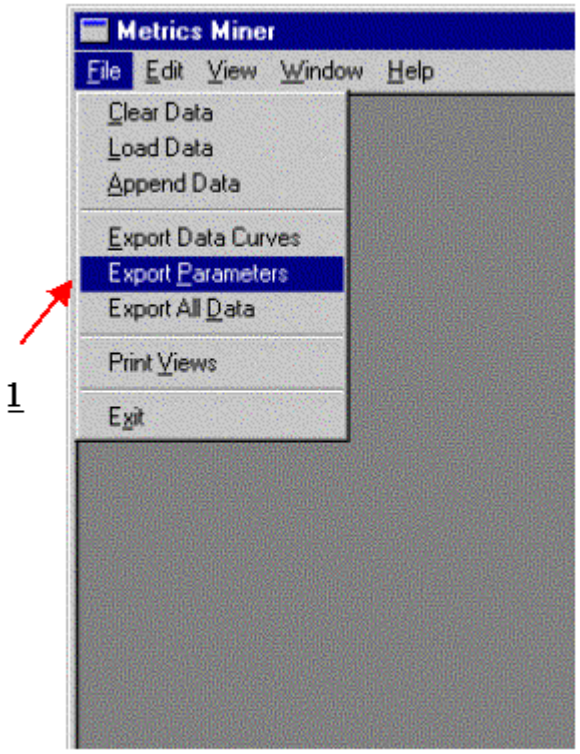
The first step to manipulating the data with Metrics Miner is to load the data from the saved data file.



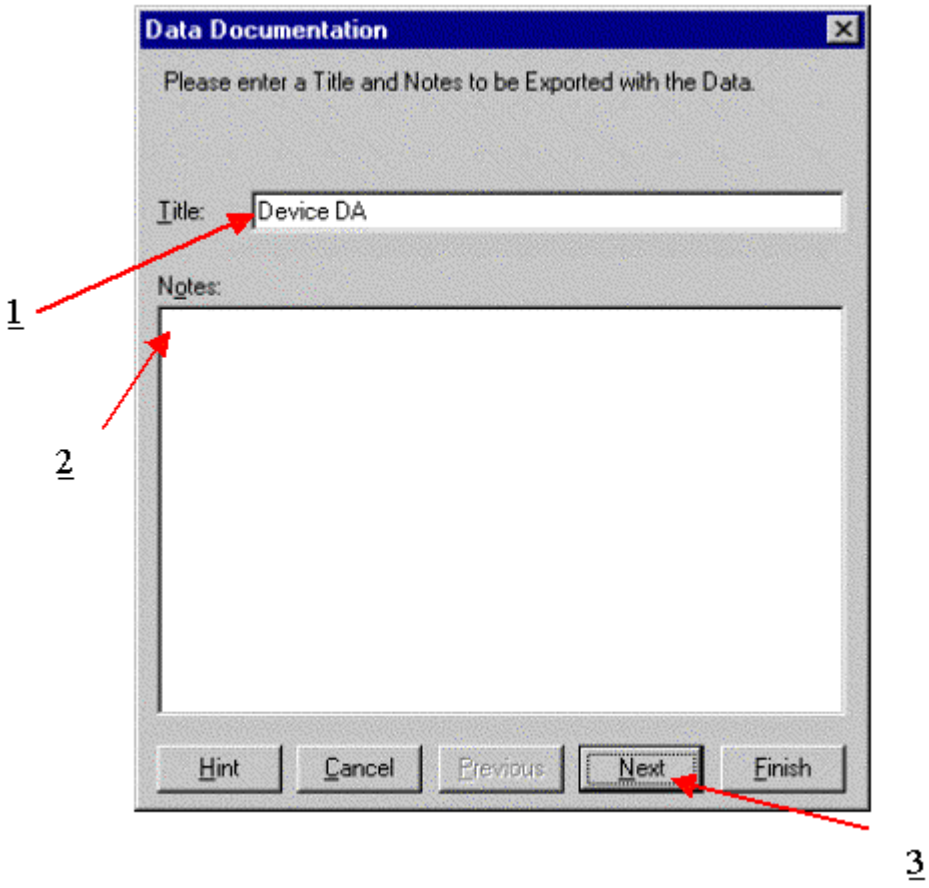
1. Click the File | Load Data menu item.
2. Select the Directory containing the data file.
3. Select the data file.
4. Click the Open button.

C. Select Parameter(s) to Export

Once the data has been loaded, subsequent wafer maps or data exports can be created without reloading the data.

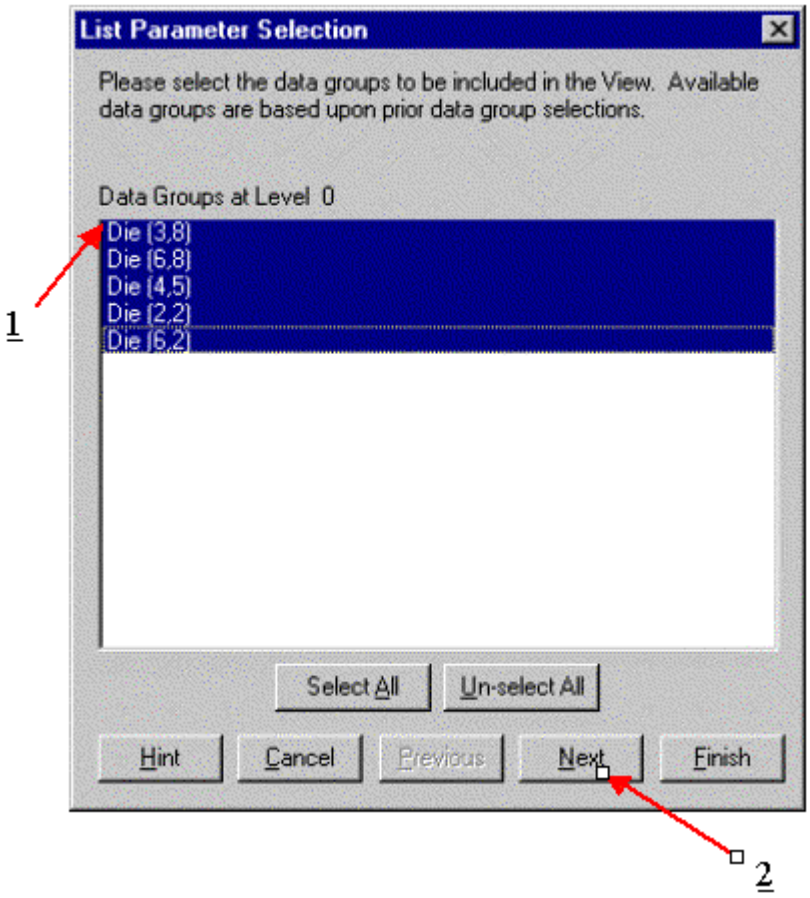


I. Click the File | Export Parameters menu item.



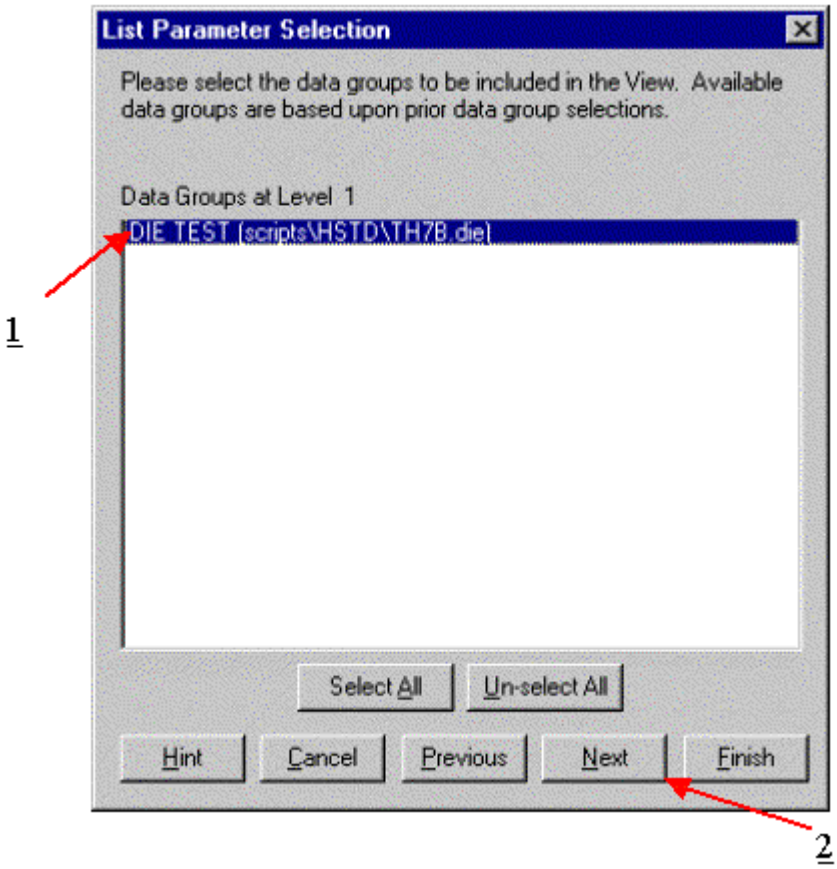
II. Give the File a Title and Notes:

1. Enter a title for the exported data.
2. Enter notes for the exported data.
3. Click the Next button.



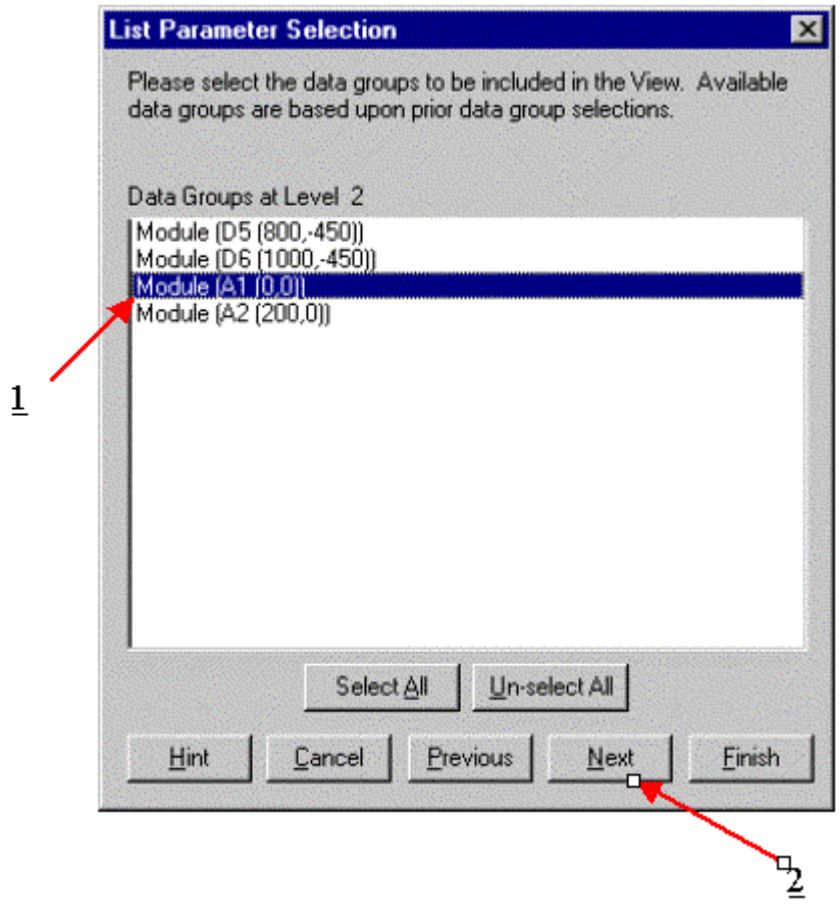
III. Select the Die locations to be exported:

1. Select the Die locations.
2. Click the Next button.



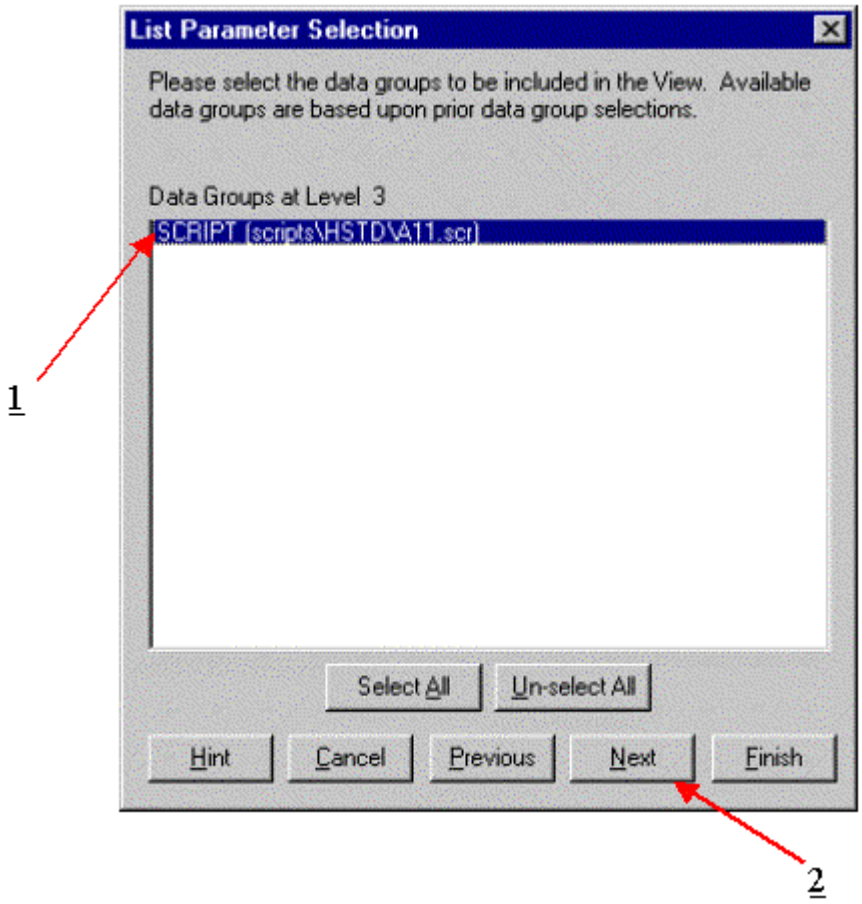
IV. Select the Die script that contains the parameter(s) to export:

1. Select the Die script
2. Click the Next button.



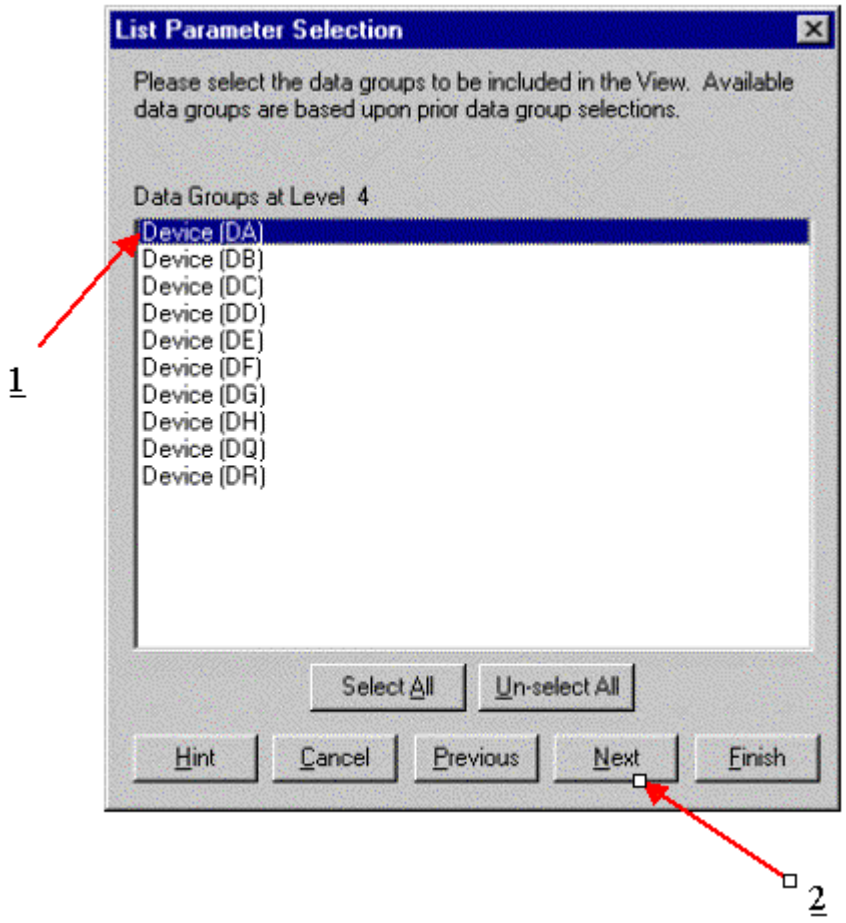
V. Select the Module that contains the parameter(s) to export:

1. Select the Module
2. Click the Next button.



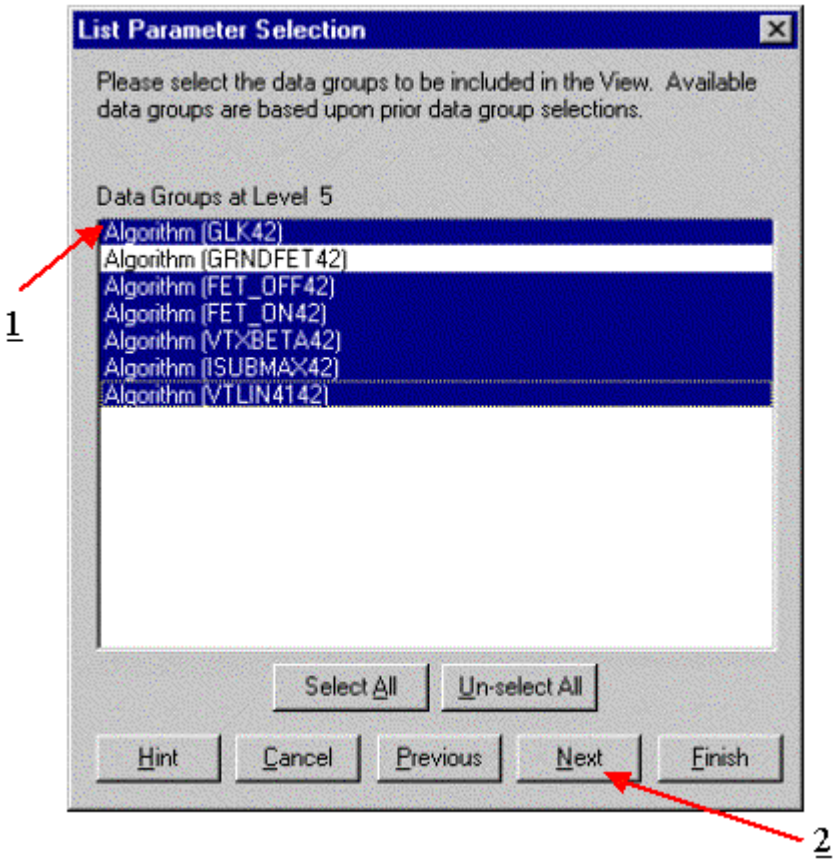
VI. Select the Module Script that contains the parameter(s) to export:

1. Select the Module script
2. Click the Next button.



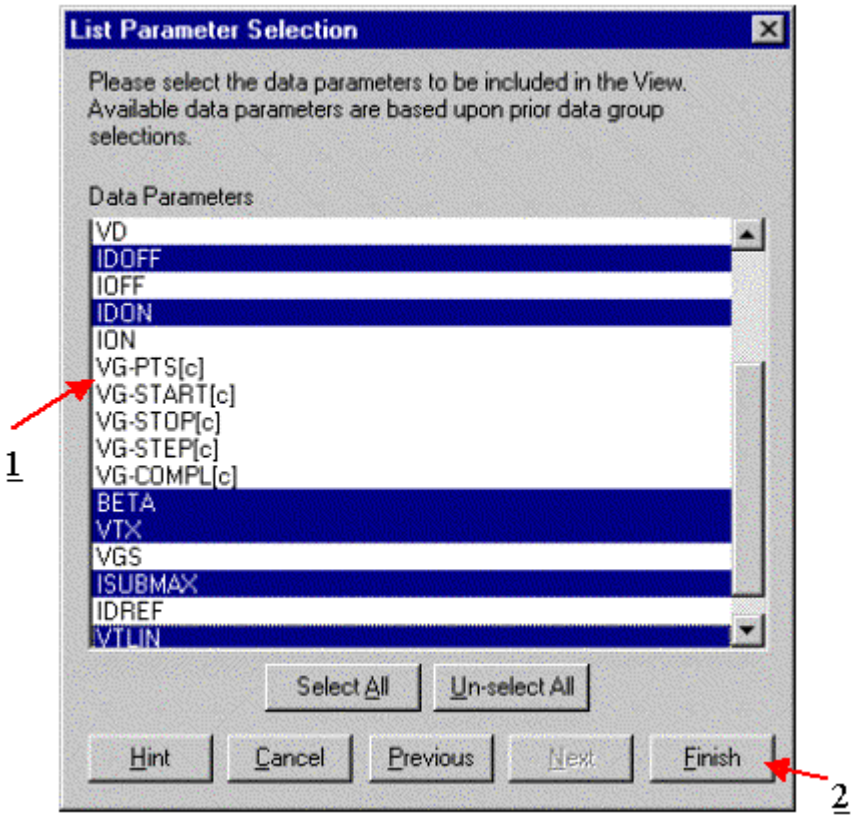
VII. Select the device whose parameter(s) is to be exported:

1. Select the Device
2. Click the Next button.



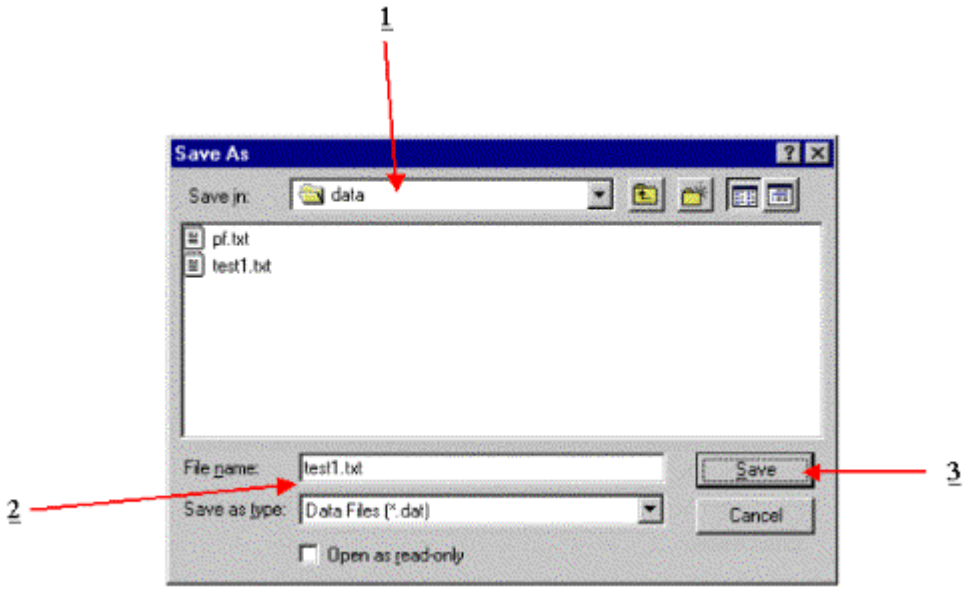
VIII. Select the Test algorithm(s) that contains the parameter(s) to export:

1. Select the Test algorithm. You can select more than one.
2. Click the Next button.



IX. Select the parameter(s) to export:

1. Select the parameter. You can select more than one.
2. Click the Next button.

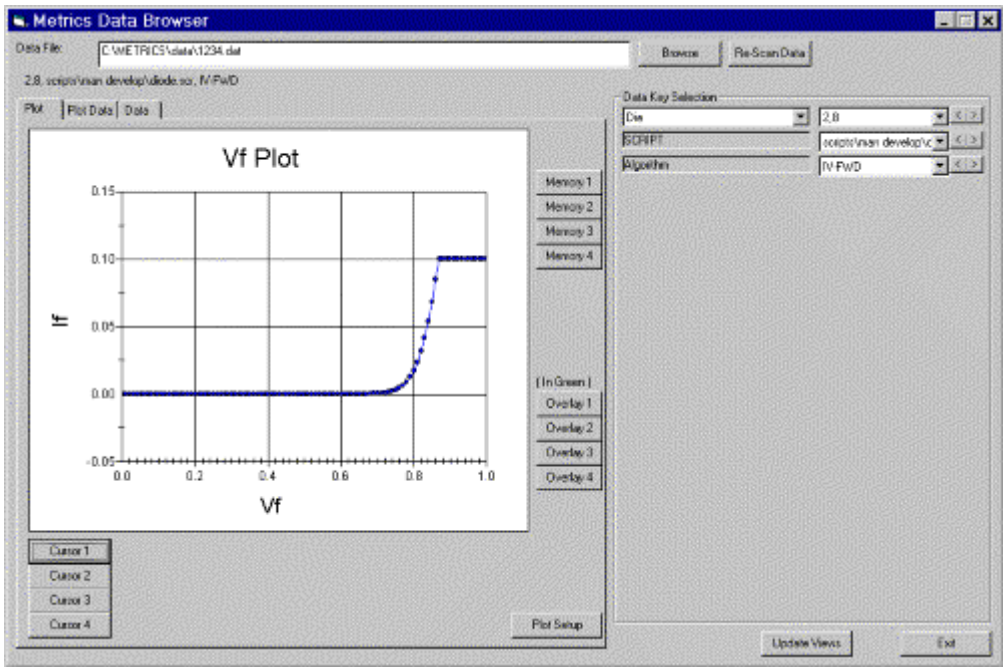


X. Select the file to save the parameters in:

1. Select the file directory.
2. Enter a file name.
3. Click the Save button.

Viewing Data

Metrics I/CV contains a tool named the Data Browser. The Data Browser application is very useful for the viewing of the data. The data can be represented in table or plot form. After defining a plot, it is easy to select other locations and view the data.

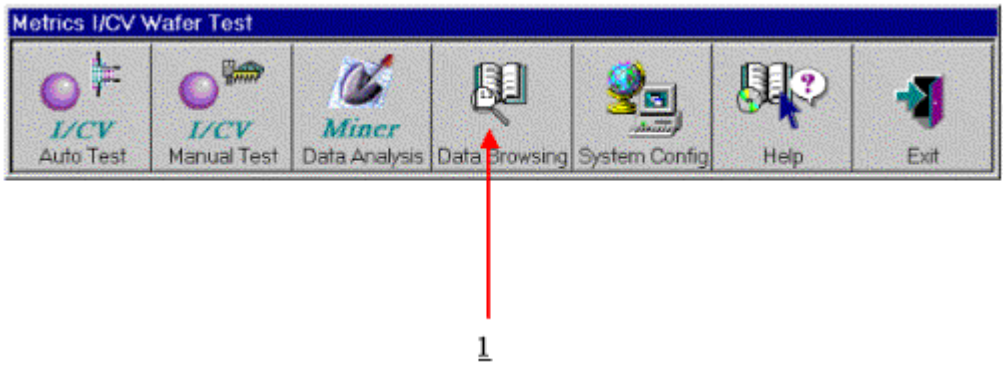


This example will demonstrate how to view Data Plots using the Metrics Data Browser.

The steps to view the data are:

A. Start Metrics Data Browser

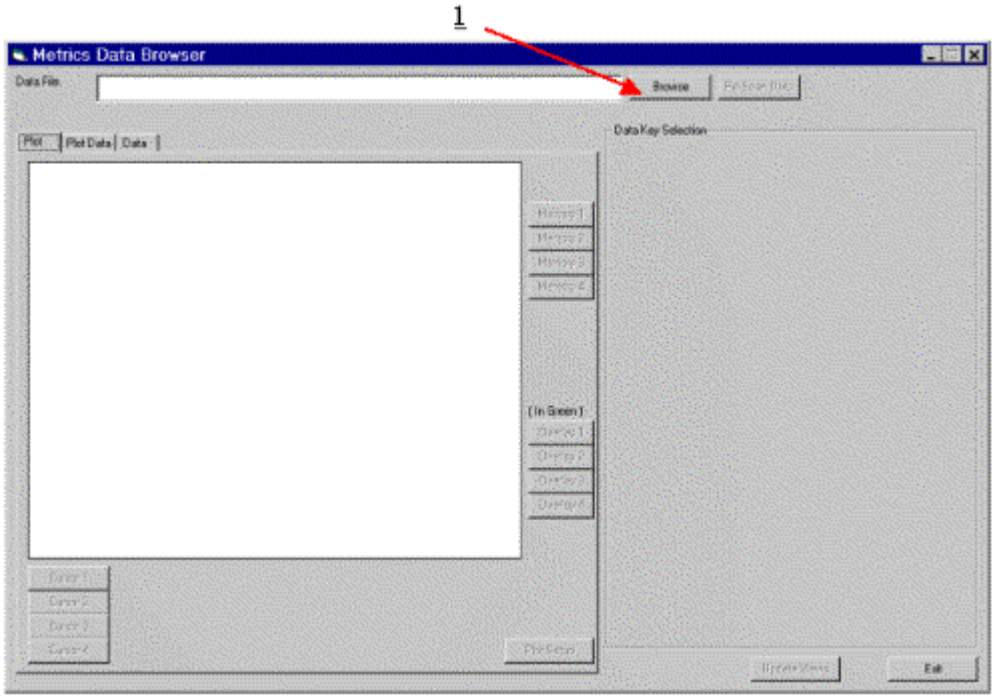
The Metrics Data Browser can be started from the Metrics I/CV Test toolbar.



1. Click the Data Browser button.

B. Load Data

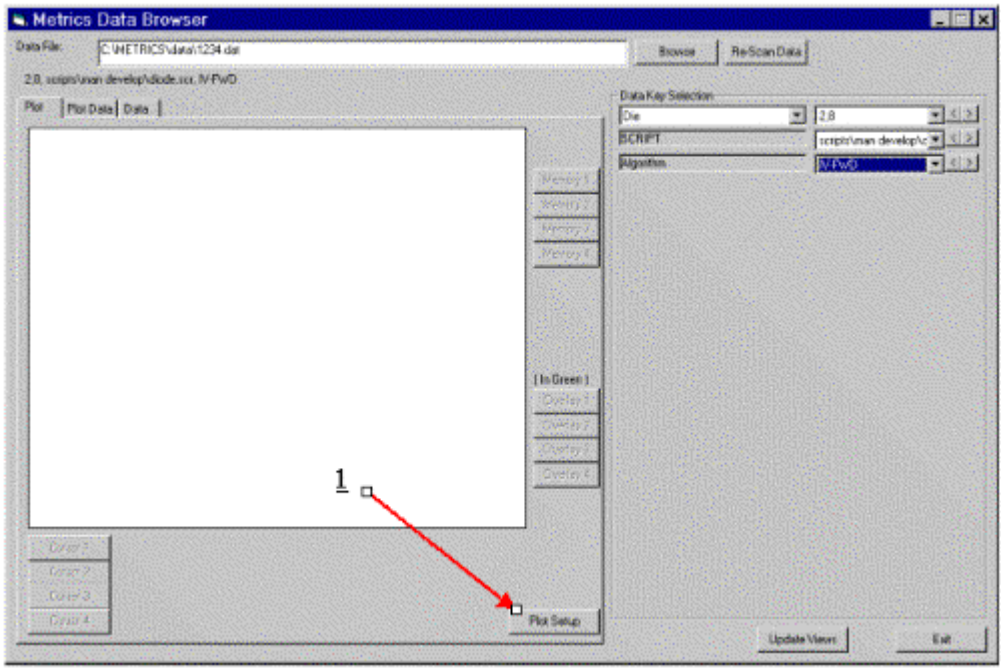
The first step to viewing the data with Metrics Data Browser is to load the data from the saved data file.



1. Click the Browse button.
2. Select the Directory containing the data file.
3. Select the data file.
4. Click the Open button.

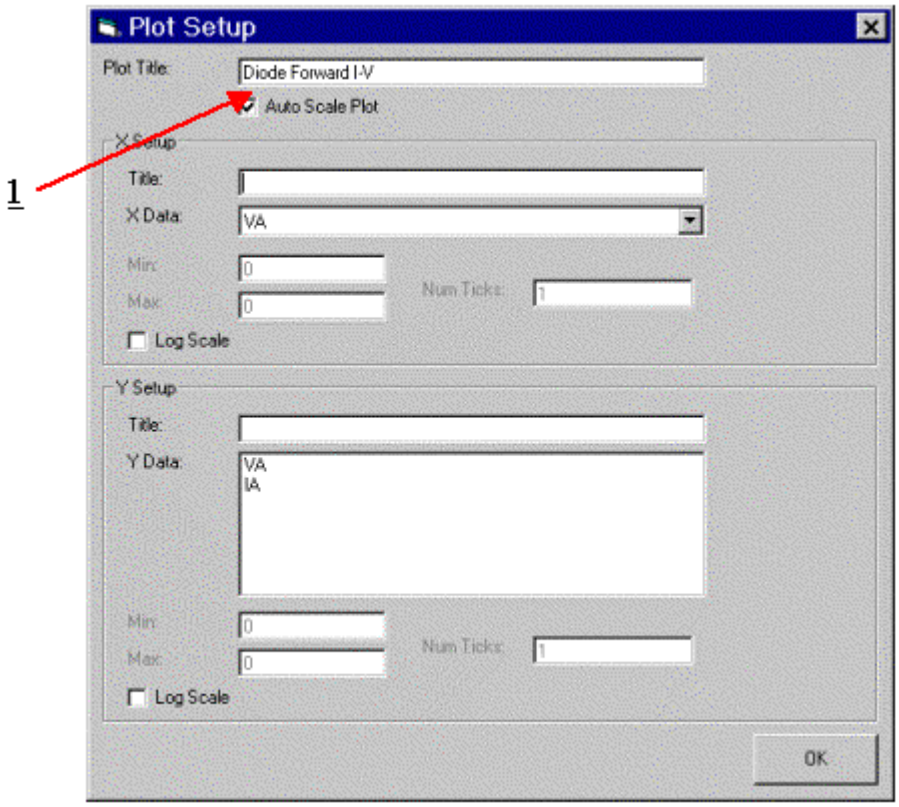
C. Setup the Plot

Once the data has been loaded it is ready to be plotted.



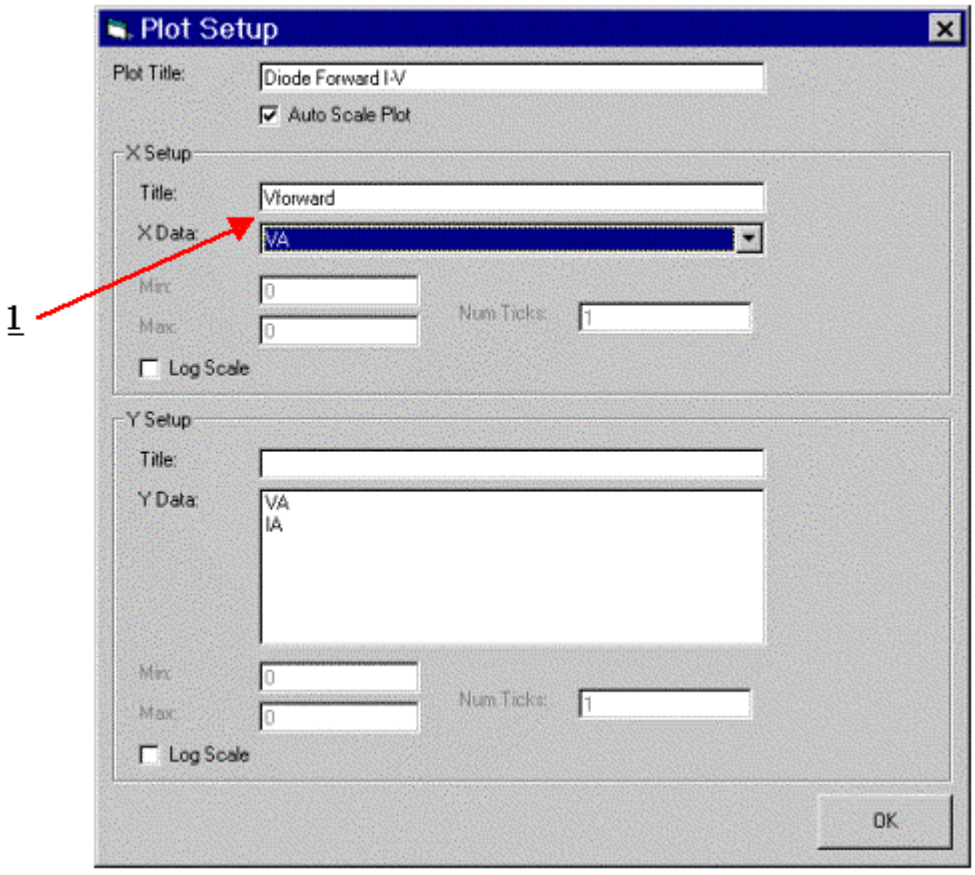
I. Open the Plot Setup window.

1. Click the Plot Setup button.



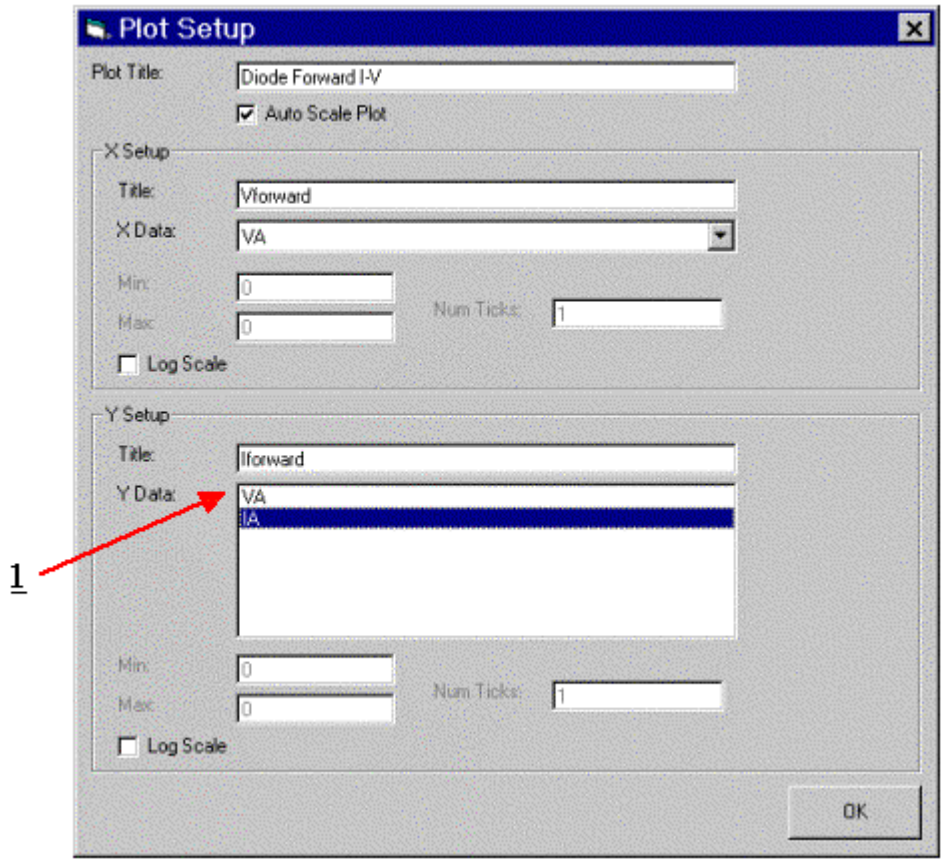
II. Provide a Plot title.

1. Highlight the Title window and enter a Title for the plot.



III. Setup the X-axis:

1. Enter a title for the x-axis.
2. Select the data vector for the x-axis.

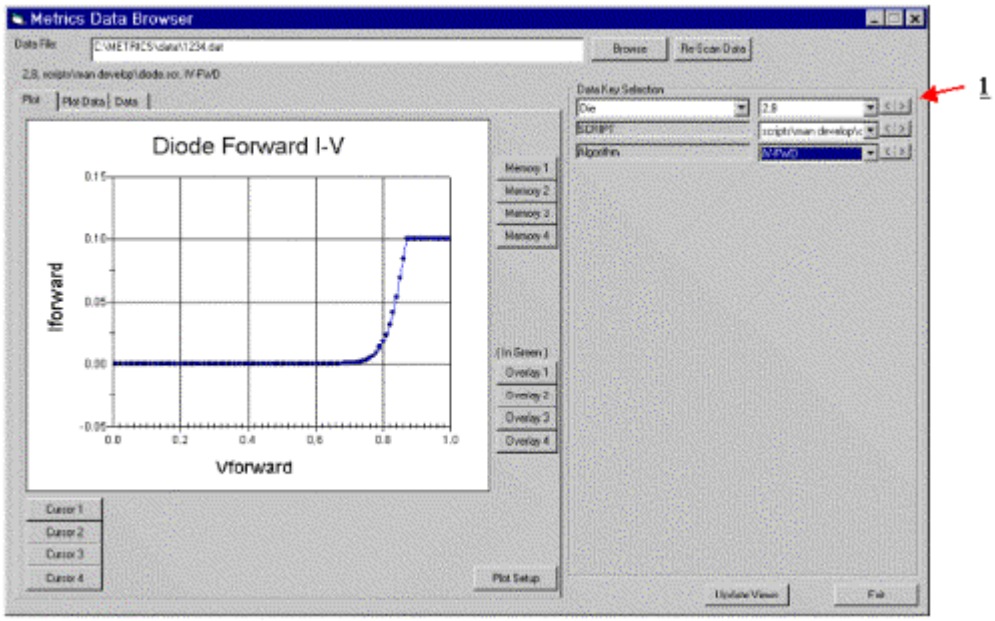


IV. Setup the Y-axis:

1. Enter a title for the y-axis.
2. Select the data vector(s) for the y-axis.
3. Click the OK button to close the Plot setup window.

D. Review Data

I. Select other die locations to view.



1. Left or Right buttons next to the Die location to change sites.
2. The plot is automatically updated.