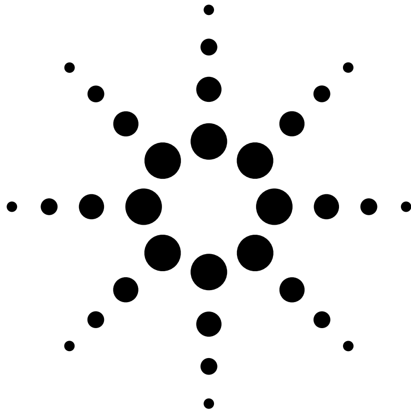


Customizing Agilent B1500A EasyEXPERT Application Tests

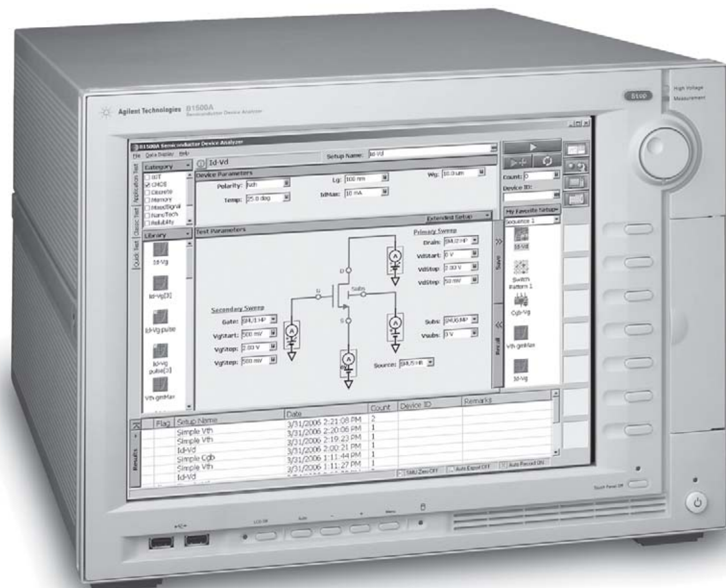
Application Note B1500-4

Agilent B1500A Semiconductor Device Analyzer

Introduction

The Agilent B1500A Semiconductor Device Analyzer with EasyEXPERT software comes with more than 100 categorized application tests, which greatly reduce the time required for characterizing new devices, processes and materials.

The application tests provided in the EasyEXPERT software library are conveniently categorized by device type and application. Sample categories include bipolar junction transistors (BJT), complementary metal-oxide-semiconductor (CMOS) transistors, nanotechnology structures and reliability tests. Although these application tests are ready to use as supplied, in some cases it may be necessary to customize them in order to meet the unique testing requirements of specialized technologies and devices.



Most of the input parameters for the EasyEXPERT application tests have upper and lower test limits. These limits are in-place to protect devices from damage that could occur from inadvertent mistakes such as incorrect keystrokes or operator entry error. However, it is a relatively simple process for users to modify the input parameter ranges of the supplied EasyEXPERT application tests. Such modification may be necessary to test some of the newer and more exotic devices and process technologies.

This application note outlines the modification process by using the “Id-Vd” application test as an example. The note also shows how easily the upper and lower input parameter limits of this application test can be modified.

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Modifying an existing application test definition

Figure 1 shows the error message that appears when the input value for an EasyEXPERT application test exceeds the predefined input parameter limits. The input parameter limit range can be easily expanded in two simple steps: opening the test definition window, and modifying the properties of the parameters. This process is explained in detail below.

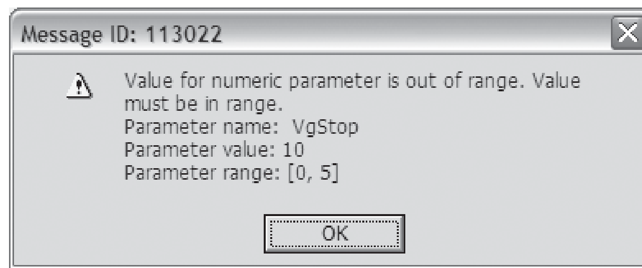

Figure 1. Input value error message.

Opening the test definition window

The test definition window is used to define the test setup used in the application test definition. Figure 2 shows the three steps involved in opening the window:

1. Select the application test category that includes the application test definition to be opened (in this example the CMOS category).
2. Under Library, select the application test to be modified (in this example, the Id-Vd test).
3. In the Library pull-down menu, select "Open Definition of This Test..." The test definition window appears, as shown in Figure 3.

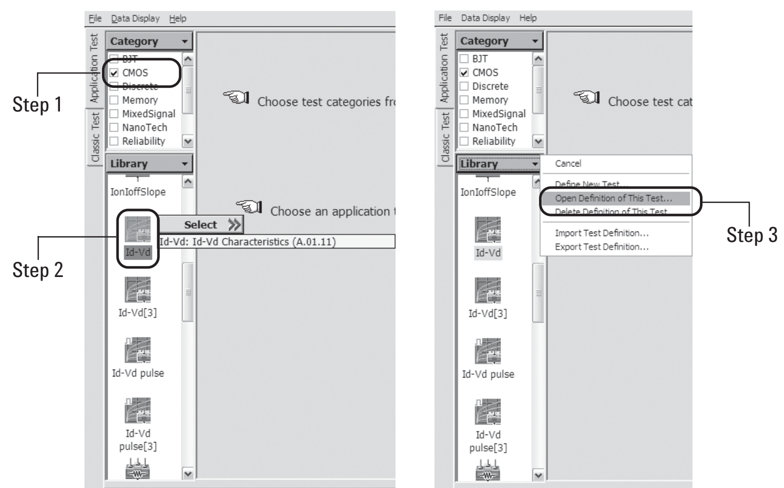

Figure 2. Steps required to open the Test Definition window.

The Test Definition window provides three tabs to define the test setup. *(Note that when the Test Definition window opens, the Test Specification tab is the default selection.)*

- The Test Specification Tab defines the look and feel of the application test by specifying the test information, device parameter definitions, and test parameter definitions.
- The Test Contents Tab contains the test execution flow that is the essence of the test definition.
- The Test Output Tab specifies the data output and is generally only needed for certain types of very complicated tests.

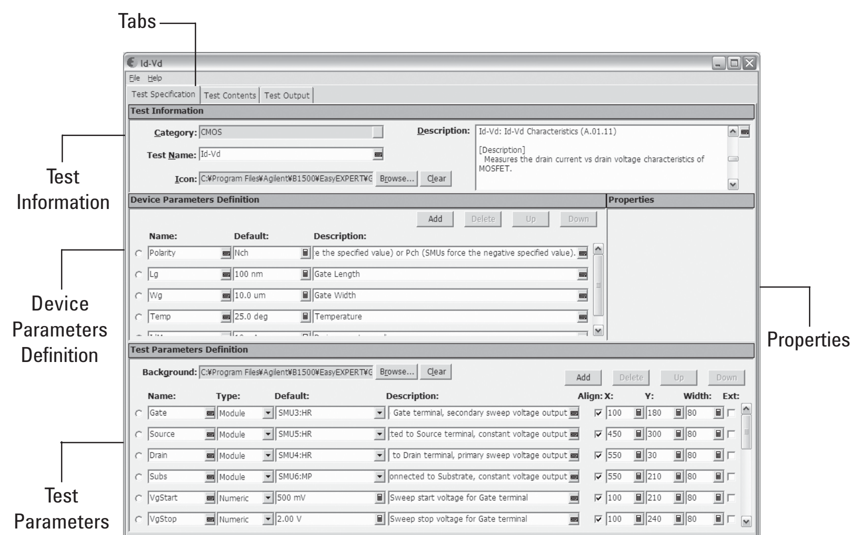

Figure 3. Test Definition window.

Changing parameter properties

In this application note, the Test Specification setup is used as an example. Figure 3 shows the four setup areas under the Test Specification tab.

- Test Information
- Device Parameters Definition
- Test Parameters Definition
- Properties

In the Test Information area, the test name, the icon file name (which appears in the Library area of the main window), and the description of the test are specified. The Device Parameters Definition and Test Parameters Definition area define the parameters used in the application test.

The Properties area is used to define the properties of the parameters of both the Device Parameters Definition area and the Test Parameters Definition area.

The relationship between the Test Specification setup area and the main window is shown in Figures 4 and 5. The default value in the Test Parameters Definition area appears as a default input parameter in the main window, and the properties of this input value can be set in the Properties area.

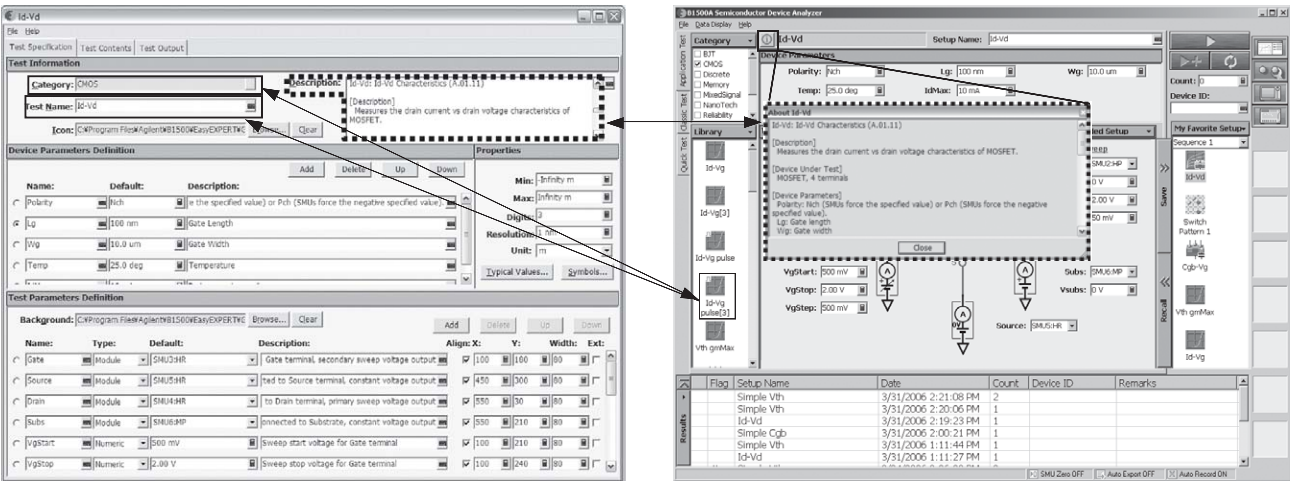

Figure 4. Relationship between the Test Specificaton window and the Main window with respect to Test Information.

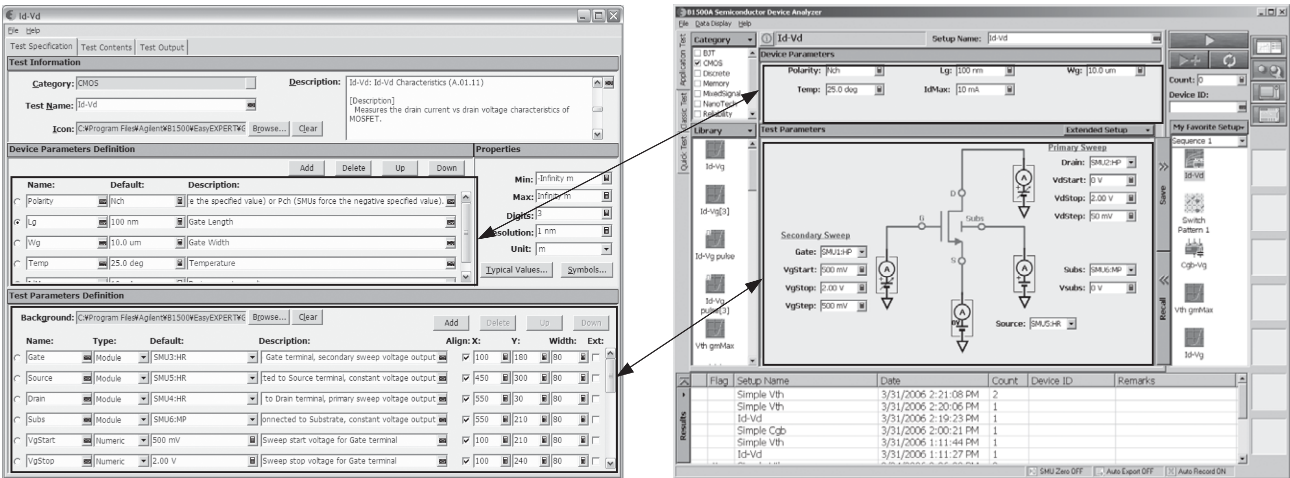

Figure 5. Relationship between the Test Specificaton window and the Main window with respect to the Device Parameters Definition and the Test Parameters Definition.

Before changing the parameters of a test definition, it is advisable to first save the test definition under another name. This prevents inadvertently overwriting the original application test. In this case, for example, the name of the test definition could be changed from "Id-Vd" to "Id-Vd Mod".

In this example, the maximum allowable value of the input parameters VgStart, VgStop, VdStart, and VdStop for the furnished Id-Vd application test was set at 5 V. Notice that when any of these parameters in the Test Parameter Definition area is selected, the properties of the input value appear in the Properties area.

Changing parameter properties (continued)

Figure 6 shows how easy it is to increase the maximum value of the input parameter (in this case from 5 V to 10 V). Of course, this operation must be repeated for each of the input parameters to be modified.

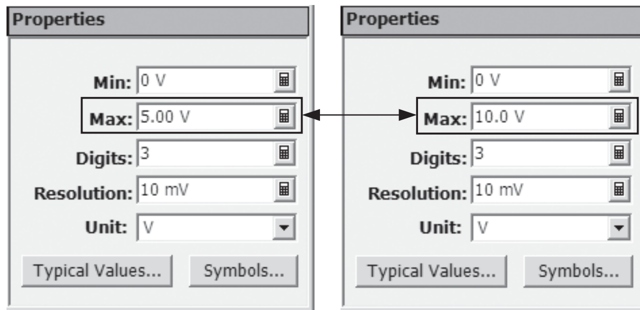

Figure 6. Increasing the maximum value of the input parameter in the Properties window.

Finally, the modified test definition must be saved by selecting the File > Save menu and then closed by the selecting the File > Close menu. Using this modified application test, it is now possible to input a value of up to 10 V into any of the VgStart, VgStop, VdStart, or VdStop input fields.

Conclusion

Modifying the input parameter range of the furnished B1500A application tests is a simple operation, which makes it possible to test a greatly expanded set of devices and technologies.

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