Manual Supplement for
B1500A/EasyEXPERT A.03.11

This document provides the supplemental information for supporting Agilent EasyEXPERT software revision A.03.11 and applicable to Agilent B1500A *User's Guide* and *Programming Guide*.

- "Main Screen GUI"

- "Test Results Data Auto Export"

- "Text File Export settings"

- "Waveform Pattern Editor"

- "Desktop EasyEXPERT"

- "Data Backup and Recovery"

- "B1500A System Recovery"

- "Updating EasyEXPERT"

- "SPGU Voltage Monitor Capability"

- "SPGU Pulse Output and Voltage Measurement"

Main Screen GUI

File menu   Provides the following four functions.

Import Test Setup...	Opens a dialog box used to specify a test setup to import.
Export Test Setup...	Opens a dialog box used to specify a destination file for exporting the present test setup.
Close Workspace	Closes the work space and returns to the workspace configurator.
Exit	Exits the EasyEXPERT software.

Data Display menu   Provides the following three functions.

Show Data Display	Opens Data Display used to display the test result data.
Manage Data Display...	Opens Data Display Manager used to control the appearances of the Data Display windows.
Default Data Display Properties...	Opens Data Display Properties used to set the default setting of the Data Display window.

Help menu   Provides the following three functions.

About This Instrument...	Opens the Configuration window.
About This Test...	Opens the test description dialog box.
Agilent EasyEXPERT Help	Opens the EasyEXPERT help window.

Application Test   This tab selects the application test mode of EasyEXPERT.

Classic Test   This tab selects the classic test mode of the EasyEXPERT.

Quick Test   This tab selects the quick test mode of the EasyEXPERT.

Data Display   Opens Data Display used to display the test result data. EasyEXPERT always handles the test setup corresponding to the Data Display window now active or most recently activated.

Calibration
Opens Calibration used to see the self-calibration results, to perform the self-calibration, or to perform the current offset cancel.

Configuration
Opens Configuration used to see the module configuration, to see the self-test results, to perform self-test, to establish the GPIB connection with Agilent B2200A/B2201A/E5250A switching matrix, or to see the event log.

Switching Matrix
Opens Switching Matrix Operation Panel used to control Agilent B2200A/B2201A/E5250A switching matrix.

Standby
Opens Standby Channel Definition used to set the standby channel which is the channel to keep the specified output when the standby mode is ON and in the non-measurement state.

Single
Triggers a single measurement. To abort measurement, click Stop button that appears instead of the Single button.

Append
Triggers the append measurement. The measurement results will be appended to the Data Display window that shows the previous measurement results. The Data Display window can have maximum 10 layers for displaying measurement results. To abort measurement, click Stop button that appears instead of the Single button.

Repeat
This button provides a different function depending on the status of the data record functions (Auto Record and Auto Export).

If Auto Record and Auto Export is OFF, this button starts the repeat measurement immediately.

If Auto Record or Auto Export is ON, this button opens the Repeat Measurement Setup dialog box for setting the repeat measurement condition.

Run Option
Opens the Run Option dialog box for setting the data record functions (Auto Record and Auto Export) and the Multi Display function.

Save Data
This button will appear to the right side of the Run Option button if a measurement is performed when the data record functions (Auto Record and Auto Export) are OFF. Clicking the button will save the last measurement data as a test result record.

Count
Displays the number of single measurements executed for the test setup now opened. Effective for the measurements triggered by both Single and Repeat.

Device ID   This entry field is used to enter a string in the test record. The string can data ID, device ID, test ID, or anything you want.

Performing measurement and changing setup do not change the value in this field. Change the value if you want.

Save   The button saves the present test setup into the present preset group as a new test setup of the group.

Recall   The button recalls the selected test setup. This means opening and displaying the measurement definition of the selected test setup.

My Favorite Setup The test setups you create or modify MUST be saved to My Favorite group (preset group) to reuse them.

Click the My Favorite Setup button to display the menu that provides the following functions. Select the preset group by using the field below the button. The test setups can be recalled by using the area below the field.

Cancel	Closes the menu.
Preset Group	Provides the following seven functions.
Add New Preset Group	Opens the Add Preset Group dialog box. Creates a new preset group and saves it as the specified name.
Rename This Preset Group	Opens the Rename Preset Group dialog box. You can change the name of the present preset group.
Duplicate This Preset Group	Opens the Duplicate Preset Group dialog box. Creates a copy of the present preset group and saves it as the specified name.
Delete This Preset Group	You can delete the present preset group.
Import Preset Group...	Opens the Preset Group Import dialog box. Imports the specified preset group.
Export This Preset Group...	Opens the Preset Group Export dialog box. Exports the present preset group as the specified name.
Organize Preset Group...	Opens the Organize Preset Group dialog box used to organize the preset group.
Rename	You can change the name of the selected test setup.

	Duplicate	Creates a copy of the selected test setup.
	Delete	Deletes the selected test setup.
	Delete All	Deletes all test setups in the present preset group.

Flag

Shows the flag, Important (!), Valid (#), or Questionable (?) set to the record. The top button sorts the test records by the flag.

While the Show Deleted Data function is enabled, the list area can show the test records in Delete-group. For the records, * is set to the column to the left of the Flag column. The top button sorts the list by *.

Setup Name

Shows the test setup name. The top button sorts the test records by name, in lexicographical order.

Date

Shows the date that the test result is recorded. The top button sorts the test records by date, in chronological order.

Count

Shows the measurement count shown in the Count field. The top button sorts the test records by count, in numerical order.

Device ID

Shows the string set to the record by using the Device ID field. The top button sorts the test records by device ID, in lexicographical order.

Remarks

Shows the remarks set to the record. The top button sorts the test records by the remarks in the lexicographic order.

Auto Record OFF

This indicator is located at the bottom of the EasyEXPERT main screen and is lit while the Auto Record (automatic data record) function is disabled.

Auto Export ON

This indicator is located at the bottom of the EasyEXPERT main screen and is lit while the Auto Export (automatic data export) function is enabled.

SMU Zero ON

This indicator is located at the bottom of the EasyEXPERT main screen and is lit while the SMU current offset cancel function is enabled.

Standby ON

This indicator is located at the bottom of the EasyEXPERT main screen and is lit while the standby function is enabled (standby mode is ON).

Multi Display ON

This indicator is located at the bottom of the EasyEXPERT main screen and is lit while the Multi Display function is enabled.

workspace name	Field below the Results button shows the present workspace name.
Results	This button provides the following functions. The list area shows the test records. The up or down arrow button is used to expand or reduce the list area.

Cancel	Closes the menu.
Select All	Selects all records.
Unselect All	Unselects all records.
Display Data	Opens the Data Display and displays the test result data of the selected record. Up to 15 windows can be opened by this function.
Recall	Recalls the test setup of the selected record.
Filter	Provides the following four functions.
Show Deleted Data	Check this function to see the test records of both Save-group and Delete-group. To set the data group, see "Flag and Remarks" on page 8.
Filter...	Opens the Test Result Data Filter dialog box. You can filter the test records in the list area.
Expand Application Test Results	Check this function to see all test records created by the test setups defined in an application test.
	If a test record is exported when this function is not checked, the exported file will contain all records created by the test setups defined in an application test. However, if the test record is exported by the Export As Text File function, the exported file will contain only the test record of the application test.
Show All Append Data	Check this function to see all test records created by the append measurement. In the test record list, S indicates the test records obtained by a single measurement, and A indicates the records obtained by an append measurement.
Transport Data	Provides the following ten functions.
Import...	Opens the Test Result Import dialog box. Imports the specified test record.

Export As Test Result...	Opens the Test Result Export dialog box. Exports the selected test record as the specified name in the EasyEXPERT data format.
Export As Compressed Test Result...	Opens the Compressed Test Result Export dialog box. Exports the selected test record as the specified name in the compressed EasyEXPERT data format.
Export As CSV...	Opens the CSV File Export dialog box. Exports the selected test record as the specified name in the CSV format that can be read by a spread sheet software.
Export As XML Spread Sheet...	Opens the XML Style Sheet Export dialog box. Exports the selected test record as the specified name in the XML spread sheet format that can be read by a spread sheet software.
Export in My Format...	Opens the Export in My Format dialog box. Exports the selected test record as the specified name in the style converted by using the specified XSLT filter.
Export As Text File...	Opens the Text File Export dialog box. Exports the selected test record as the specified name in the style defined on the Text File Export settings dialog box.
Text File Export Setting...	Opens the Text File Export settings dialog box used to define the style of the test record exported by the Export As Text File function.
Folder Export...	Opens the Test Result Data Folder Export dialog box used to export the selected multiple test records to the specified folder.
Auto Export Setting...	Opens the Test Result Data Auto Export dialog box used to set the automatic data export function and the automatic data save function.
Edit	Provides the following two functions.
Flag and Remarks	Opens the Test Result Editor used to put the selected test record in Save-group or Delete-group. Also this dialog box can set a flag and remarks to the selected record. The available data flags are Important (!), Valid (#), and Questionable (?).

Delete   Puts the selected test records in Delete-group. The records can be displayed in the list area while the Show Deleted Data is checked.

Properties...   Opens the Test Result Data Properties dialog box used to set the number of test records listed in the list area and the number of recoverable records in Delete-group.

Test Results Data Auto Export

This dialog box appears by clicking Results > Transport Data > Auto Export Setting... and is used to set the data record functions (Auto Record and Auto Export).

There is the following check box at the top of this dialog box.

- *Enable automatic data export to the specified storage device*

Checking this box sets the Auto Export function (automatic data export) and enables the following GUI.

Destination for Export

Selects the folder used to save the exported test records. The Browse... button opens the Browse For Folder dialog box used to select the folder.

File Name

Specifies the style of the file name for the exported test records.

File name is automatically generated by using Setup Name, Device ID, Count, and Date values defined in the main screen. If an impermissible character is used in a value, the character is automatically replaced with _ (underscore).

- Default Format: File name without extension is as follows.

    Setup Name [*Device ID* (*Count*) ; *Date*]

    Example: Id-Vd [cmos1(1) ; 1_22_2006 3_44_55 PM]

- Custom Format: You can specify the style by the File Name Format dialog box.

    The File Name Format dialog box appears by clicking the Settings... button. In the dialog box, enter the desired style into the Format field, for example, the next example sets the same style as the Default Format.

    Example: {0} [{3}({2}) ; {1}]

    {0}: Setup Name

    {1}: Date, mm_dd_yyyy hh_mm_ss AM/PM

    {2}: Count

    {3}: Device ID

File Type

Selects the file type (data format).

Test Result　　　　　　　　EasyEXPERT data format

Compressed Test Result	Compressed EasyEXPERT data format
CSV	CSV format
XML Spread Sheet	XML spread sheet format
My Format	Custom format created by the specified XSLT filter. The following two entry fields are available.

- My Format

  Specifies the file name of the XSLT filter (XML style sheet) used to export test records. The Browse... button opens the Select XML Style Sheet File dialog box used to select the file.

- Extension of Output File

  Enters the appropriate extension, or selects the extension from xml, txt, csv, or xls.

Text File	Custom format defined in the "Text File Export settings" on page 12 dialog box. The Settings... button opens this dialog box.
Data Storage	Remove a check from the following check box to disable the Auto Record function (automatic data record).

- *Enable automatic data record to the internal storage device*

OK	Applies the setup, and closes this dialog box.
Cancel	Cancels the setup, and closes this dialog box.

NOTE Automatic Data Record Output

When the automatic data record function is enabled, one test execution result is stored in one test record. For the classic test, one test result is stored in one test record. For the application test, all test results taken by executing one application test are stored in one test record. However, the automatic data export function using the Text File type exports the file for each test result.

Text File Export settings

This dialog box is opened by clicking Results > Transport Data > Text File Export Settings... or the Settings button on the Test Results Data Folder Export dialog box or the Test Results Data Auto Export dialog box. This dialog box is used to define the style of the test record exported by the Export As Text File function.

Reset   Applies the default value to the all setup items.

OK   Defines and memorizes the present setting, and closes this dialog box.

Cancel   Cancels and clears the setting changes, and closes this dialog box.

Miscellaneous, Save As   Specifies the delimiter (data separator) and file extension. CSV (comma separated, .csv, default), Text (tab separated, .txt), or Formatted Text (space separated, .prn).

Miscellaneous, Quotation   Specifies the quotation for the string values. Single (single quotes), Double (double quotes), or None (no quote, default). Even if None is specified, the string which contains delimiter and/or new line character will be double quoted.

Identification section   Record items which are used to identify and characterize the test record. They are a sub set of the meta data, test type, and test name. See Table 0-2 for the definition of the record items. Check the box for the items you want to record, and uncheck the box for the items you do not want to record. In the default, all items are checked.

The pull-down menu specifies the action for recording the items in the Identification section. See Table 0-1 to specify the action.

Table 0-1   **Actions for Identification and Setup Data Items**

Action	Description
Save with measurement data	The checked items are recorded in the test record with the measurement data. Default.
Do not save	No item is recorded even if any box is checked.
Save as separate file	The checked items are recorded in a separate file. The name will be the test record's file name plus $-s$ before the extension.

Table 0-2   **Identification Section Record Items**

Item	Description
Setup title	Test setup name
Classic test name	Classic test name. I/V Sweep, Multi Channel I/V Sweep, I/V-t Sampling, C-V Sweep, SPGU Control, Switching Matrix Control, or Direct Control. This record item is exclusive against the "Application test name" record item.
Application test name	Application test name. This record item is exclusive against the "Classic test name" record item.
Test date	Test execution date corresponding to the date part of the RecordTime meta data.
Test time	Test execution time corresponding to the time part of the RecordTime meta data.
Device ID	Device ID corresponding to the TestTarget meta data.
Count	Test count corresponding to the IterationIndex meta data.
Flags	Flags set to the test result data, corresponding to the Flag meta data.
Remarks	Remarks set to the test result data, corresponding to the Remarks meta data.

Setup data section Record items which describes the test conditions. They are the test parameters, DUT parameters, and analysis setup. See Table 0-5 for the definition of the record items. Check the box for the items you want to record, and uncheck the box for the items you do not want to record.

Tag information for the setup data is string value; TestParameter, DutParameter, or AnalysisSetup, which means the type of data put in the same row in the exported test record. If *Tag information* box is unchecked (default), the tag information is not recorded. Then, the setup parameter names, such as Channel.Unit, are recorded in the first column in the test record and the parameter values are recorded in the following columns. If the *Tag information* box is checked, the tag information is recorded in the first column and the parameter names and values are shifted to the next columns.

The pull-down menu specifies the action for recording the items in the Setup data section. See Table 0-1 to specify the action.

Measurement data section

Record items of the measurement data. It may contain the measurement parameter names, data units, and data size. See Table 0-6 for the definition of the record items. Check the box for the items you want to record, and uncheck the box for the items you do not want to record.

Tag information for the measurement data is string value; Dimension1, Dimension2, Data Name, Data Unit, or Data Value, which means the type of data put in the same row (in case of Rowwise orientation) or column (in case of Columnwise orientation) in the exported test record. The tag information will be recorded in the test record if the *Tag information* box is checked.

See Table 0-3 for the Rowwise orientation. All data relative to a measurement parameter will be put in the same column. The first column (ex. column A) contains the tag information. For the Columnwise orientation, see Table 0-4. All data relative to a measurement parameter will be put in the same row. And the first row (ex. row 1) contains the tag information. If the *Tag information* box is unchecked (default), the tag information is not recorded and the measurement data is shifted.

Table 0-3   **Rowwise Orientation Export Example**

	A	B	C	D	E	F
1	Dimension1	101	101	101	1	
2	Dimension2	1	1	1	1	
3	Data Name	Vg	Id	Gm	Vth	
4	Data Unit	V	A	S	V	
5	Data Value	0	4.55E-09	1.24E-10	1.23	
6	Data Value	0.02	8.59E-09	5.25E-10		

Table 0-4   **Columnwise Orientation Export Example**

	A	B	C	D	E	F
1	Dimension1	Dimension2	Data Name	Data Unit	Data Value	Data Value
2	101	1	Vg	V	0	0.02
3	101	1	Id	A	4.55E-09	8.59E-09
4	101	1	Gm	S	1.24E-10	5.25E-10
5	1	1	Vth	V	1.23	
6						

Table 0-5   **Setup Data Section Record Items (ON: checked, OFF: unchecked)**

Item	Description	Default
Test parameters	Test parameters defined by the classic test or the application test.	ON
DUT parameters	DUT parameters defined by the application test.	ON
Analysis setup	Data Display setup status at and after the measurement, such as Graph configuration, Graph format, Graph text, Marker configuration, Cursor configuration, Line configurations, Pointer configuration, List configuration, and Scalar list configuration.	OFF

Table 0-6   **Measurement Data Section Record Items (ON: checked, OFF: unchecked)**

Item	Description	Default
Data names	Measurement parameter name.	ON
Data units	Unit of measurement data.	OFF
Size	Dimension1 (VAR1 size) and Dimension2 (VAR2 size) of the measurement data.	OFF
Data values	Record items can be specified by the following segments.	

Segment	Default
Data assigned to X-Y Graph	ON
Data assigned to List Display	ON
Data assigned to Parameter Display	ON
User function defined but not displayed	OFF
Analysis function defined but not displayed	OFF
Any data referred to by the user function but not directly displayed	OFF
Any data referred to by the analysis function but not directly displayed	OFF

Waveform Pattern Editor

This window is opened by several actions, for example by selecting New from the Pattern menu, and is used to create or edit the pattern data.

File menu

Provides the following three functions.

Save	Saves the pattern data.
Save As...	Opens a dialog box used to specify a pattern name and save the pattern data.
Close	Closes the Waveform Pattern Editor without saving the data.

Edit menu

Provides the following seven functions.

Undo	Undoes the last action.
Redo	Cancels the Undo operation.
Add a New Point	Adds a point.
Delete a Point	Deletes the highlighted point.
Same Level As Left Point	Sets the highlighted point to the same level as the left point.
Copy Pattern to Clipboard	Copies the highlighted pattern data to the Clipboard in the tab-separated spreadsheet format.
Paste Pattern from Clipboard	Pastes the tab-separated spreadsheet format data stored on the Clipboard.

Display menu

Provides the following function.

Channel	Opens the Display Channels dialog box used to select the SPGU channels displayed on the Waveform Pattern Editor. This function is available if the Waveform Pattern Editor was opened with the column data.

Pattern Editor   Defines the pattern data. The Pattern Editor provides two methods, graphic mode and tabular mode, for defining the pattern data.

In the graphic mode, you can define the pattern data by using the mouse pointer and GUIs on the graph (on the left side of the Pattern Editor).

In the tabular mode, you can define the pattern data by entering Time in seconds, Level in V, and Switch 0 (pulse switch open) or 1 (pulse switch close) into the table (on the right side of the Pattern Editor).

The Delta Time check box and the Delta Level check box are used to switch the data expression in the table. If the box is not checked, the value will be an absolute value; if the box is checked, the value will be the difference from the previous point.

The Pattern Editor provides the following buttons.

Undo	Undoes the last action.
Redo	Cancels the Undo operation.
Add a New Point	Adds a point.
Delete a Point	Deletes the highlighted point.

The Pattern Editor also provides the following functions in the menu displayed by right-clicking the area.

Cancel	Closes the menu.
Save	Saves the pattern data.
Edit	Displays the Edit menu.
Display	Displays the Display menu.

If the Pattern Editor is opened with the column data, the following GUI will be available.

Ref Ch.	Specifies the channel or the pattern which contains the reference point.
Ref Pt.	Specifies the reference point by the index number (No. column of table).
Delta T	Displays the difference from the reference point. For time data.
Delta V	Displays the difference from the reference point. For level data.

Desktop EasyEXPERT

The Desktop EasyEXPERT software CD-ROM is included with Agilent B1500A. This section describes the following topics.

- "About Desktop EasyEXPERT"
- "System Requirements"
- "To Install Desktop EasyEXPERT"
- "Before Starting Desktop EasyEXPERT"
- "To Start Desktop EasyEXPERT"
- "Execution Mode dialog box"
- "Start EasyEXPERT window"
- "To Change Execution Mode and GPIB Settings"
- "To Move the EasyEXPERT Database"
- "Using 4155B/4156B/4155C/4156C"

NOTE Desktop EasyEXPERT Standard Edition

There are two editions Plus and Standard for Desktop EasyEXPERT. The Standard edition does not support the Agilent E5250A Switching Matrix.

NOTE Software Update and Database Backup

To perform software update of Desktop EasyEXPERT, see "Updating EasyEXPERT" on page 36.

To make and restore EasyEXPERT database, see "Data Backup and Recovery" on page 28.

About Desktop EasyEXPERT

The Desktop EasyEXPERT software provides the following additional advantages to the B1500A, allowing you to minimize the amount of offline tasks performed on B1500A and increase the working ratio for measurements.

- Allows B1500A to be controlled from an external computer via GPIB while online.

- Allows test setup to be created on an external computer while offline.

- Allows data analysis to be performed on an external computer while offline.

The Desktop EasyEXPERT can use the 4155B, 4156B, 4155C, or 4156C instead of the B1500A. Then, there are some differences in the functions and operations compared with when the B1500A is used. See "Using 4155B/4156B/4155C/4156C" on page 25.

Figure 0-1   **Using Desktop EasyEXPERT**
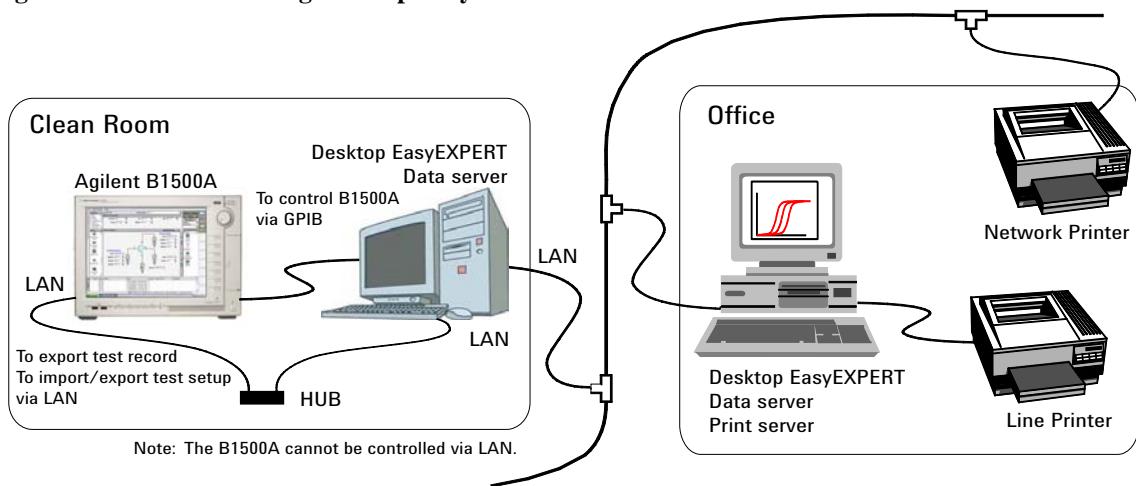
NOTE   Desktop EasyEXPERT supports most B1500A/EasyEXPERT functions. However, some functions are not supported on an external computer due to differences in hardware and so on.

System Requirements

The following are the minimum requirement for executing Desktop EasyEXPERT revision A.03.11 or later.

- Processor: Intel Celeron 2 GHz

- Memory: 512 MByte DDR266

- Display: XGA 1024×768. SXGA 1280×1024 is recommended.

- Hard disk drive: 1 GB free space in the C drive, 10 GB (30 GB recommended) free space in a drive for test setup/result data storage.

- GPIB interface: Agilent 82350B GPIB interface or equivalent, for Online execution

- Operating system: Windows XP Professional SP2

- Software:

    - Microsoft .NET Framework Version 2.0 Redistributable Package

    - Microsoft .NET Framework 2.0 Service Pack 1

    - Agilent IO Library Suite 14.0 or 14.2, for Online execution

NOTE　　If your computer does not install all required software, install them in the above sequence.

If your computer does not install a software, install it and the following software. For example, if your computer does not install Microsoft .NET Framework 2.0 Service Pack 1, install it and Agilent IO Libraries (if you use the Online execution mode) in this sequence.

Prepare the Agilent IO Libraries software CD-ROM provided with Agilent GPIB interface to install the IO Libraries.

Open the Desktop EasyEXPERT Prerequisites folder to get installation packages for the other required software.

To Install Desktop EasyEXPERT

To install Desktop EasyEXPERT onto your computer, follow the procedure below.

1. Insert the Desktop EasyEXPERT software CD-ROM into the CD-ROM drive.

2. Execute Setup.exe and follow the instructions of the setup wizard.

3. Wait for installation to complete, and remove the CD-ROM from the CD-ROM drive.

NOTE   To set the same module configuration as B1500A

The module configuration of the B1500A can be set to the Desktop EasyEXPERT in the offline mode. Copy the following file on the B1500A internal HDD to the same location on the PC which the Desktop EasyEXPERT runs.

```
\Documents and Settings\All Users\Application Data\Agilent
Technologies, Inc\EasyEXPERT\UnitConfigB1500A.xml
```

Before Starting Desktop EasyEXPERT

Note the following when you use Desktop EasyEXPERT.

- When using the Offline mode, use the data import/export function to transfer your test setup data files and test result records.

- When using the Online mode, do not send a control command to the analyzer (B1500A, 4155B, 4156B, 4155C, or 4156C) by using a programming environment except for Desktop EasyEXPERT.

- Do not send a control command to the analyzer by using the GPIB IO statement in the application test definitions.

- To control the B1500A by using Desktop EasyEXPERT, exit EasyEXPERT on B1500A. The Start EasyEXPERT window (button) must be displayed or be minimized to the Windows task bar on the B1500A screen.

To Start Desktop EasyEXPERT

To launch Desktop EasyEXPERT, follow the procedure below.

1. Double click the Start EasyEXPERT icon or click Start > All Programs > Start EasyEXPERT. The Execution Mode dialog box is displayed.

2. Select the execution mode, Online or Offline.

   If you select the Online mode, set the GPIB configuration. See "Execution Mode dialog box" on page 22.

3. Click the OK button. The Start EasyEXPERT window is displayed.

4. Click the Start EasyEXPERT button to launch Desktop EasyEXPERT.

Execution Mode dialog box

The Execution Mode dialog box provides the following graphical user interface.

Online   Click the Online radio button to select the online execution mode. Then the following fields are available.

VISA interface ID	VISA interface ID of the GPIB interface installed in your computer. Select one from the pop-up menu.
GPIB address	GPIB address of the analyzer (B1500A, 4155B, 4156B, 4155C, or 4156C). Select one from the pop-up menu. 0 to 30 are available.

Offline   Click the Offline radio button to select the offline execution mode. And select the analyzer assumed by the Desktop EasyEXPERT in the offline mode.

Model	Select B1500A, 4155B, 4156B, 4155C, or 4156C.

NOTE   @ANALYZER Function

This function returns the present Model setting. It can be used in the application test definitions. The return value can be read by using a string variable (e.g. String1) as shown below.

Example: String1=@ANALYZER

The return value is B1500A, 4155B, 4156B, 4155C, or 4156C.

Start EasyEXPERT window

The Start EasyEXPERT window provides the following graphical user interface.

Start EasyEXPERT   This button launches Desktop EasyEXPERT.

File menu   *Exit* closes the Start EasyEXPERT window.

Option menu   *Execution Mode* opens the Execution Mode dialog box.

EasyEXPERT Database provides the following three functions.

- *Backup EasyEXPERT Database*

  Opens the EasyEXPERT Database Backup Creation Wizard used to make backup of the EasyEXPERT database. You can make backup easily by following the wizard. Required time depends on the database size.

- *Restore EasyEXPERT Database*

  Opens the EasyEXPERT Database Restoration Wizard used to restore the EasyEXPERT database backup. You can restore the backup easily by following the wizard. Required time depends on the database size.

- *Move EasyEXPERT Database*

  Opens the EasyEXPERT Database dialog box used to move the EasyEXPERT database. To move the database, enter the destination folder name into the Move To field. For example, enter C:\EasyEXPERT_user_1\database.

EasyEXPERT Database is the folder used to store your test setup data and such.

To Change Execution Mode and GPIB Settings

To change the Desktop EasyEXPERT execution mode or the GPIB configuration, follow the procedure below.

1. Launch Start EasyEXPERT.

   If the Execution Mode dialog box is not opened, click Option > Execution Mode.

   If Desktop EasyEXPERT is running, exit it. And in the Start EasyEXPERT window, click Option > Execution Mode.

2. Select the execution mode, Online or Offline.

   If you select the Online mode, set the GPIB configuration. See "Execution Mode dialog box" on page 22.

3. Click the OK button to set the changes.

   Click the Cancel button to cancel the setup changes.

To Move the EasyEXPERT Database

When the HDD (hard disk drive) is full, add a humongous HDD and move the EasyEXPERT database to it. To move the database, follow the procedure below. Required time depends on the database size.

1. Launch Start EasyEXPERT.

   If the Execution Mode dialog box is opened, click the Cancel button.

   If Desktop EasyEXPERT is running, exit it to open the Start EasyEXPERT window.

2. Click Option > EasyEXPERT Database > Move EasyEXPERT Database. The EasyEXPERT Database dialog box is displayed.

3. Enter the destination folder name into the Move To field. For example, enter C:\EasyEXPERT_user_1\database.

4. Click the OK button to start the database move operation.

   Click the Cancel button to cancel the move operation.

Using 4155B/4156B/4155C/4156C

This section describes the notices when using Desktop EasyEXPERT and 4155/4156.

4155/4156 Firmware Revision

4155/4156 firmware revision supported by Desktop EasyEXPERT

• HOSTC: 03.08 or later

• SMUC: 04.08 or later

4155/4156 Functions

4155/4156 functions unsupported by Desktop EasyEXPERT

• Log sampling measurement and Thinned out sampling measurement

• Functions using R Box

• Differential voltage measurement using VMU (Voltage Monitor Unit)

• DC bias output using PGU (Pulse Generator Unit)

• Other functions unavailable for the B1500A

Desktop EasyEXPERT

Classic tests available for 4155/4156

• I/V Sweep, I/V-t Sampling, and Switching Matrix Control for 4155C/4156C

• I/V Sweep and Switching Matrix Control for 4155B/4156B

Desktop EasyEXPERT functions unavailable for 4155/4156

• Functions using SMU Series Resistor

• Functions using ASU (Atto Sense Unit)

• Functions using SCUU (SMU CMU Unify Unit)

• Functions using CMU (Capacitance Measurement Unit)

• Functions using SPGU (Semiconductor Pulse Generator Unit)

  PGU can be used instead of SPGU for the I/V Sweep and I/V-t Sampling classic tests. The Load Z function and the ALWG output are not supported. The Output Impedance dialog box is available to set the output impedance of the PGU.

Calibration

Differences on Calibration window

- Calibration window provides Module Self Calibration screen only.
- Module Self Calibration screen provides Enable Auto Calibration only.

Configuration, Main Frame

Differences on Configuration window Main Frame screen

- Line Frequency just displays the setting of 4155/4156.
- Firmware Rev. displays as follows.

  [HOSTC Rev.]:[SMUC Rev.]:[ADC Rev.]

- Main Frame Diagnosis is not supplied.

Configuration, Module

Differences on Configuration window Module screen

- Self-test cannot be performed.
- Status, SCUU, and Notes columns are not supplied.
- Start Self Test and Recover Module buttons are not supplied.
- Accessory Configuration is not supplied.

I/V Sweep

Differences on I/V Sweep Classic Test

- Time Stamp Name field is not supplied for 4155B/4156B.
- SMU Pulse Period and Width value must satisfy Period $\geq$ Width + 4 ms.

I/V-t Sampling

Differences on I/V-t Sampling Classic Test

- Log sampling is not supported.
- Sampling interval must be 60 μs to 65.535 s.
- Number of samples must be 1 to 10001.
- Base hold time must be 0 sec.

ADC and Integration Time

Differences on A/D Converter & Integration Time Setup

- ADC always shows HR ADC.
- High Resolution ADC is set as shown in Table 0-7.

  For the sampling measurement of Interval < 2 ms, the Integration Time setting is ignored.

Advanced Setup   Differences on Advanced Setup

•   Series R always shows NONE.

•   Wait Time Control is not supplied.

Restrictions for Standard Edition   There are the following restrictions for the Desktop EasyEXPERT Standard edition.

•   I/V-t Sampling classic test is not supported.

•   VSU, VMU, and PGU are not supported.

•   Agilent E5250A Switching Matrix is not supported.

Table 0-7   Setting of High Resolution ADC

Mode	Factor	Setting of 4155/4156
AUTO	–	MEDIUM
MANUAL	$1 \leq N \leq 127$	SHORT, TIME=80 μs × N
PLC	1	MEDIUM
	$N \geq 2$	LONG, NPLC=N

NOTE   To reuse the test setup for B1500A

Perform the following procedure to reuse the test setup created for the B1500A.

1. Launch Desktop EasyEXPERT with the condition *Set Analyzer*=B1500A.

2. Export the test setups to be reused. And exit Desktop EasyEXPERT.

3. Launch Desktop EasyEXPERT with the condition *Set Analyzer*=4155B, 4156B, 4155C, or 4156C.

4. Import the test setups exported at the step 2.

5. Set the channel for the analyzer to use.

Also, the procedure made by replacing the step 1 with the step 3 can be used to reuse the test setup created for the 4155/4156.

Data Backup and Recovery

Unexpected trouble of HDD (hard disk drive), operation mistake, or malfunction may cause elimination of valuable data. To avoid this kind of risk, make backup of data in the HDD as frequently as possible.

- "Folders to Backup"

- "To Make Database Backup"

- "To Restore Database Backup"

- "To Make Backup of Other Data"

- "To Restore Backup of Other Data"

NOTE   Drive for making backup

Make backup into the storage device that has large free space and can be accessed by the B1500A directly. The device may be the D drive, a USB memory, an external HDD with USB interface and such.

If you make backup into the B1500A internal HDD, C drive or D drive, make a copy of the backup into an external storage device or backup media, CD-ROM, CD-RW, USB memory and such.

Folders to Backup

Backup should be made for the following data areas.

- EasyEXPERT database, below *D:\Agilent\EasyEXPERT*

  `D:\Agilent\EasyEXPERT\1`

- Personal folders, below *C:\Documents and Settings*

  Example: `C:\Documents and Settings\B1500user`

- Desktop EasyEXPERT user folder

  Example: `C:\Program Files\Agilent\B1500\EasyEXPERT\User`

- Desktop EasyEXPERT database

  Example:
  `C:\Program Files\Agilent\B1500\EasyEXPERT\User\1`

- Folders that store the data exported by EasyEXPERT or Desktop EasyEXPERT

- Other folders that store the data to be saved

To Make Database Backup

EasyEXPERT database backup can be made by the following procedure.

1. Launch Start EasyEXPERT.

2. Click Option > EasyEXPERT Database > Backup EasyEXPERT Database in the Start EasyEXPERT window.

3. Follow the EasyEXPERT Database Backup Creation wizard, and make backup into the D drive. The extension of the backup file is xdb.

4. Make a copy of the xdb file into an external storage device or backup media.

   Example: `COPY EasyEXPERT_backup_1.xdb F:\`

To Restore Database Backup

EasyEXPERT database can be restored by the following procedure.

1. Make a copy of the database backup file (xdb file) into the D drive.

2. Launch Start EasyEXPERT.

3. Click Option > EasyEXPERT Database > Restore EasyEXPERT Database in the Start EasyEXPERT window.

4. Follow the EasyEXPERT Database Restoration wizard, and restore the backup of EasyEXPERT database.

NOTE   If the backup is not the xdb file

The backup for recovery must be "a copy of the folder that contains the EasyEXPERT database image". And it must be stored in the location other than the following folders.

• `D:\Agilent` folder

• EasyEXPERT database folder

For the Windows backup (bkf file) or the compressed backup (zip file or other), uncompress the backup file at the location other than the above folders. And launch the wizard after the uncompression is completed.

Also, for the Backup Type Selection of the wizard, select "A Copy of the folder that contains the EasyEXPERT database image" and follow the wizard.

To Make Backup of Other Data

There are the following three ways to make backup of data other than the EasyEXPERT database. Make backup by using one of the following methods.

- To use Windows backup program:

    1. Click Start > All Programs > Accessories > System Tools > Backup.

    2. Follow the Backup or Restore wizard, and make backup into the D drive. The extension of the backup file is bkf.

    3. Make a copy of the bkf file into an external storage device or backup media.

        Example: `COPY Mydata_backup_1.bkf F:\`

- To make and copy a compressed file:

    1. Make a compressed file for the whole folder to back up.

    2. Make a copy of the compressed file into an external storage device or backup media.

        Example: `COPY Mydata_backup_1.zip F:\`

- To copy a whole folder for backup:

    1. Connect an external storage device, HDD with USB interface and such, to the B1500A.

    2. Make a copy of the folder into the external storage device.

        Example: `XCOPY Folder_user_1 F:\Backup_user_1`

To Restore Backup of Other Data

Backups can be restored as shown below. The recovery method depends on how the backup was made.

- Backup is a bkf file:

    1. Make a copy of the backup file (bkf file) into the D drive.

    2. Click Start > All Programs > Accessories > System Tools > Backup.

    3. Follow the Backup or Restore wizard, and restore the bkf file.

- Backup is a compressed file:

    1. Make a copy of the compressed file into the D drive.

    2. Uncompress the file at the place different from the original folder.

    3. Copy all of the uncompressed files and folders, and paste them to the original folder.

- Backup is a whole folder:

    1. Make a copy of the whole folder into the D drive.

       Example: XCOPY F:\Backup_user_1 Backup_user_1

    2. Delete the original folder.

       Example: RMDIR /S Folder_user_1

    3. Change the folder name to the original one.

       Example: RENAME Backup_user_1 Folder_user_1

B1500A System Recovery

If you find problems in the B1500A system, perform the system recovery.

- "To Perform System Recovery"
- "To Initialize Database"
- "To Restore Database"

To Perform System Recovery

B1500A system recovery can be performed by the following procedure.

1. Set the B1500A Standby switch to the OFF position.

2. Disconnect all USB devices from the B1500A.

3. Connect the USB keyboard to a USB port of the B1500A.

4. Set the B1500A Standby switch to the ON position.

5. On the boot system selection menu, select Agilent Recovery System, and press Enter key. To select the system, use arrow keys.

   The Command Prompt window is opened. See Figure 0-2.

   Where, 2 is not valid now. 3 should be entered for rebooting the B1500A without performing system recovery.

6. For the message "Enter a Choice:", enter 1 and press the Enter key. Message will be displayed for asking if you allow to overwrite the C drive.

7. For the message, enter 1 and press the Enter key. System recovery starts. After the recovery completes successfully, system boot starts automatically.

8. Perform "To Initialize Database" on page 34.

9. Perform "To Restore Database" on page 35.

Figure 0-2   **Agilent System Recovery Screen**

```
Agilent Technologies System Utilities
Recovery Options

Choose one of the following:
-----------------------------------------------------------

  1. Recover Factory Backup Image.
  2. Update System.
  3. Exit


-----------------------------------------------------------

Enter a Choice:
```

To Initialize Database

EasyEXPERT database can be initialized by the following procedure. You can use EasyEXPERT after this procedure is completed.

1. Exit Start EasyEXPERT.

2. Rename *D:\Agilent\EasyEXPERT\1* folder (EasyEXPERT database).

   Example:

   ```
   CHDIR /D D:\Agilent\EasyEXPERT
   RENAME 1 1-backup
   ```

3. Create *D:\Agilent\EasyEXPERT\1* folder.

   Example:

   ```
   MKDIR 1
   ```

4. Copy all files and folders in the *D:\Agilent\EasyEXPERT\Copy of 1* folder, and paste them to the *D:\Agilent\EasyEXPERT\1* folder.

   Example:

   ```
   CHDIR Copy of 1
   COPY * ..\1
   ```

To Restore Database

EasyEXPERT database can be restored by the following procedure.

In the example shown in "To Initialize Database" on page 34, the EasyEXPERT database backup is the whole `D:\Agilent\EasyEXPERT\1-backup` folder. The database can be restored by using the data in this folder.

• For EasyEXPERT revision A.02.10 and earlier

   The database reconfiguration tool is required. Obtain it from Agilent Technologies web site. For the execution procedure, see the readme text file included in the package.

• For EasyEXPERT revision A.02.11 and later

   1. Launch Start EasyEXPERT.

   2. Click Option > EasyEXPERT Database > Restore EasyEXPERT Database in the Start EasyEXPERT window.

   3. Follow the EasyEXPERT Database Restoration Wizard and complete the restoration of EasyEXPERT database.

Updating EasyEXPERT

NOTE The latest version of the EasyEXPERT update package can be obtained from Agilent Technologies web site.

Update procedure EasyEXPERT can be updated by the following procedure.

1. Make a backup of EasyEXPERT database. See "To Make Database Backup" on page 29.

2. If this is the update from the revision A.03.10 or earlier to the revision A.03.11 or later, install the following software. They are included in the update package.

   • Microsoft .NET Framework Version 2.0 Redistributable Package

   • Microsoft .NET Framework 2.0 Service Pack 1

   If they are already installed, go to the step 3.

3. Execute the setup program of the update package.

4. Follow the setup wizard and complete the update of EasyEXPERT.

5. After the update is completed, make a backup of EasyEXPERT database.

If update fails Perform the following procedure.

If EasyEXPERT could recover to the revision before starting the update procedure, skip the following step 1 to 2.

1. Perform system recovery. See "B1500A System Recovery" on page 33. This is not required for Desktop EasyEXPERT software.

2. Update EasyEXPERT to the revision before starting the update procedure.

3. Restore the backup made by the update procedure step 1. See "To Restore Database Backup" on page 30.

4. Perform the update procedure step 2 to 5.

SPGU Voltage Monitor Capability

SPGU provides the function to monitor the channel output voltage. To monitor the voltage, use an external computer and execute the CORRSER? command. See "CORRSER?" and "SPGU Pulse Output and Voltage Measurement". Also see *Programming Guide*.

• "Supplemental Information"

• "CORRSER?"

Supplemental Information

The following data shows the supplemental information of the SPGU output voltage monitor capability.

• Measurement resolution: approximately 2 V

• Measurement accuracy: $\pm (0.1 \% + 25 \text{ mV})$, at open load and 1 PLC

CORRSER?

This query command monitors the SPGU channel output voltage and returns the measurement data and the calculated impedance data. Setting *mode*=1 automatically executes the SER command using this impedance data as the input parameter. Only one channel can be specified in this command. So the voltage monitor cannot be performed by using multiple channels simultaneously.

Execution Conditions

The SPGU output channel must be set up by using the following commands before executing this command.

• SPPER, SPM, SPT, and SPV commands, in PG mode

• ALW and ALS commands, in ALWG mode

The voltage must be measured in the first pulse or ALWG sequence output. In the PG mode, the pulse period must be more than *delay* + *interval* × *count* value.

Set the command parameters properly. The voltage must be measured at the output timing of the voltage effective for the automatic adjustment of the SPGU output voltage.

Syntax

```
CORRSER? chnum,mode,delay,interval,count
```

Parameters

chnum **:**   SPGU channel number. Integer expression. 1 to 10 or 101 to 1002. See Table 4-1, *Programming Guide*.

mode **:**   Automatic execution modes of SER. Integer expression.

0: Does not execute the SER command (set the load impedance)

1: Executes the SER command (set the load impedance)

delay **:**   Delay till start of measurement (seconds). Numeric expression. 0 (initial setting) to pulse period $-5E-6$ seconds, setting resolution $1E-8$ seconds.

interval **:**   Measuring interval (seconds). Numeric expression. $5E-6$ (initial setting) to 0.001 seconds, setting resolution $2E-8$ seconds.

count **:**   Measurement repetitions (times). Integer expression. 1 (initial setting) to 65535 times.

Figure 0-3   **Voltage Monitor and CORRSER? Setup Parameters**
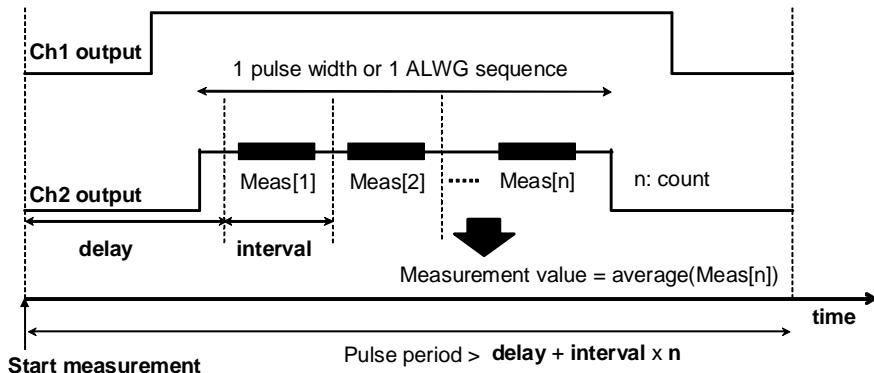
Query Response

```
loadZ,voltage<CR/LF^EOI>
```

loadZ **:**   Returns the impedance calculation data (Ω).

voltage **:**   Returns the voltage measurement data (V).

Remarks

Active SPGU outputs are stopped by the CORRSER? command.

Any other channels specified as SPGU output channels, but not specified in this command, will output synchronized to the CORRSER? command.

After executing the CORRSER? command, all SPGU channel outputs are changed to the following value.

- *base* value set by the SPV command, in PG mode

- initial value of waveform, in ALWG mode

Example Statements

```
OUTPUT @B1500;"SPPER 10E-6"
OUTPUT @B1500;"SPM 101,1"
OUTPUT @B1500;"SPT 101,1,0,5E-7,20E-9"
OUTPUT @B1500;"SPV 101,1,-0.5,0.5"
OUTPUT @B1500;"CORRSER? 101,1,1E-7,1E-8,10"
ENTER @B1500;A,B
```

In this example, the voltage measurement data is returned to the variable B, and the load impedance calculation data is returned to the variable A.

See Also

"SER" and "SER?", *Programming Guide*

SPGU Pulse Output and Voltage Measurement

To control the SPGU channel, use the following commands.

Function	Command	Parameters
Enables channels	CN	[*chnum* ... [,*chnum*] ...]
Disables channels	CL	[*chnum* ... [,*chnum*] ...]
Sets SPGU pulse output mode	SIM	0
Sets output operation mode	SPRM	*mode*[,*condition*]
Sets pulse period for all of SPGU channels	SPPER	*period*
Sets channel output mode	SPM	*chnum*,*mode*
Sets pulse timing parameters	SPT	*chnum*,*src*,*delay*,*width*,*leading* [,*trailing*]
Sets pulse level parameters	SPV	*chnum*,*src*,*base*[,*peak*]
Sets load impedance	SER	*chnum*,*loadZ*
Monitors output voltage and sets load impedance	[CORRSER?]	*chnum*,*mode*,*delay*,*interval*, *count*
Sets pulse switch	[ODSW]	*chnum*,*state*[,*normal*[,*delay*, *width*]]
Sets SPGU trigger output	[STGP]	*chnum*,*state*
Applies SPGU channel setup	SPUPD	*chnum*[,*chnum* ... [,*chnum*] ...]
Starts SPGU pulse output	SRP	
Stops SPGU pulse output	[SPP]	
Returns SPGU output status	[SPST?]	

The following program controls a SPGU to output 2-level pulse from the channel 1 and 3-level pulse from the channel 2. This program can run without the project template (Table 3-1, *Programming Guide*).

Table 0-8   **SPGU Pulse Output Example**

```
Imports Ivi.visa.interop                                                  '1

Module Module1

Sub Main()
 Dim B1500 As IResourceManager                                            '6
 Dim session As IMessage
 B1500 = New ResourceManager
 session = B1500.Open("GPIB0::17::INSTR")
 session.WriteString("*RST" & vbLf)                                       '10
 MsgBox("Click OK to start measurement.", vbOKOnly, "")
 Console.WriteLine("SPGU setup." & Chr(10))

 Dim sp_ch() As Integer = {101, 102}                                      '14
 Dim duration As Double = 10
 Dim loadz As Double = 1000000.0
 Dim period As Double = 0.0001
 Dim p1_del As Double = 0.00001
 Dim p1_wid As Double = 0.00008
 Dim p2_del1 As Double = 0.00001
 Dim p2_del2 As Double = 0.00006
 Dim p2_wid1 As Double = 0.00003
 Dim p2_wid2 As Double = 0.00003
 Dim p_lead As Double = 0.00000002
 Dim p_trail As Double = 0.00000002
 Dim p1_base As Double = 0
 Dim p1_peak As Double = 3
 Dim p2_base1 As Double = 0
 Dim p2_base2 As Double = 0
 Dim p2_peak1 As Double = 3
 Dim p2_peak2 As Double = -3
 Dim p_stat As Integer = 0                                                '32
```

Line	Description
1	This line is required to use the VISA COM library.
6 to 9	Establishes the connection with the Agilent B1500 of the GPIB address 17 on the interface GPIB0. "GPIB0" is the VISA name. Confirm your GPIB settings, and set them properly.
10	Resets the B1500.
14 to 32	Declares variables and sets the value. This program uses the SPGU installed in the slot 1 of the B1500.

```
 Dim msg As String = "No error."                                          '34
 Dim err As Integer = 0

 session.WriteString("CN " & sp_ch(0) & "," & sp_ch(1) & vbLf)  'SPGU ch on    '37
 session.WriteString("SIM 0" & vbLf)                            'PG mode
 session.WriteString("SPRM 2," & duration & vbLf)               'Duration mode
 session.WriteString("ODSW " & sp_ch(0) & ", 0" & vbLf) 'Disables pulse switch '40
 session.WriteString("ODSW " & sp_ch(1) & ", 0" & vbLf)
 session.WriteString("SER " & sp_ch(0) & "," & loadz & vbLf)    'Load impedance
 session.WriteString("SER " & sp_ch(1) & "," & loadz & vbLf)
 session.WriteString("SPPER " & period & vbLf)                  'Pulse period
 session.WriteString("SPM " & sp_ch(0) & ",1" & vbLf)   '2-level pulse setup   '45
 session.WriteString("SPT " & sp_ch(0) & ",1," & p1_del & "," & p1_wid & "," &
p_lead & "," & p_trail & vbLf)
 session.WriteString("SPV " & sp_ch(0) & ",1," & p1_base & "," & p1_peak & vbLf)
 session.WriteString("SPM " & sp_ch(1) & ",3" & vbLf)   '3-level pulse setup   '48
 session.WriteString("SPT " & sp_ch(1) & ",1," & p2_del1 & "," & p2_wid1 & "," &
p_lead & "," & p_trail & vbLf)
 session.WriteString("SPT " & sp_ch(1) & ",2," & p2_del2 & "," & p2_wid2 & "," &
p_lead & "," & p_trail & vbLf)
 session.WriteString("SPV " & sp_ch(1) & ",1," & p2_base1 & "," & p2_peak1 & vbLf)
 session.WriteString("SPV " & sp_ch(1) & ",2," & p2_base2 & "," & p2_peak2 & vbLf)
 session.WriteString("SPUPD" & sp_ch(0) & "," & sp_ch(1) & vbLf) 'Apply setup  '53
```

Line	Description
34 to 35	Declares variables used for error check.
37	Enables the SPGU channels specified by sp_ch(0) and sp_ch(1).
38	Sets the pulse generator mode to all of the SPGU channels.
39	Selects the duration output mode.
40 to 41	Disables the pulse switch.
42 to 43	Sets the load impedance value.
44	Sets the pulse period for all of the SPGU channels.
45 to 47	Sets the channel specified by sp_ch(0) to the 2-level pulse output channel using the source 1, sets the pulse timing parameters, and sets the pulse level parameters.
48 to 52	Sets the channel specified by sp_ch(1) to the 3-level pulse output channel using the source 1 and 2, sets the pulse timing parameters, and sets the pulse level parameters.
53	Applies the setup to the channels specified by sp_ch(0) and sp_ch(1). The channels start the pulse base output.

```
 session.WriteString("ERRX? 0" & vbLf) : msg = session.ReadString(256)        '55
 err = Val(Left(msg, 2))
 If err <> 0 Then session.WriteString("DZ" & vbLf) : GoTo Check_err

 session.WriteString("SRP" & vbLf)         'starts pulse output              '59
 Console.Write("SPGU output in progress")

Spgu_stat:                                                                    '62
 Console.Write(".")
 session.WriteString("SPST?" & vbLf) : p_stat = session.ReadString(1 + 2)
 If p_stat = 1 Then GoTo Spgu_stat
 If p_stat = 0 Then GoTo Close

Check_err:                                                                    '68
 MsgBox("Instrument error: " & Chr(10) & msg, vbOKOnly, "")

Close:                                                                        '71
 Console.WriteLine(Chr(10) & "SPGU output stopped.")
 session.WriteString("CL" & vbLf)
 session.Close()
 MsgBox("Click OK to stop the program.", vbOKOnly, "")
 Console.WriteLine("Program completed." & Chr(10))                            '76

End Sub

End Module
```

Line	Description
55 to 57	Reads error buffer. If an error is detected, changes the channel output to 0 V and goes to Check_err.
59	Starts the SPGU pulse output.
62 to 66	Checks the SPGU pulse output status. And waits for the end status.
68 to 69	Clears the error buffer. And displays a message box to show an error message.
71 to 76	Disables all channels, and closes the connection with the Agilent B1500.

Measurement Result Example

```
SPGU setup.

SPGU output in progress.........................................
...............................................................
SPGU output stopped.
```

The following program controls a SPGU to monitor the SPGU channel output voltage, calculate the load impedance, set it for the automatic output level adjustment, and output 2-level pulse voltage. This program can run without the project template (Table 3-1, *Programming Guide*).

Table 0-9   **SPGU Voltage Measurement and Pulse Output Example**

```
Imports Ivi.visa.interop                                              '1

Module Module1

Sub Main()
 Dim B1500 As IResourceManager                                        '6
 Dim session As FormattedIO488
 B1500 = New ResourceManager
 session = New FormattedIO488
 session.IO = B1500.Open("GPIB0::17::INSTR")
 session.IO.Timeout = 10000

 session.WriteString("*RST" & vbLf)                                   '13
 MsgBox("Click OK to start measurement.", vbOKOnly, "")
 Console.Write("SPGU setup...   ")

 Dim sp_ch() As Integer = {101, 102}                                  '17
 Dim duration As Double = 5
 Dim loadz As Double = 50.0
 Dim period As Double = 0.0001
 Dim p1_del As Double = 0.00001
 Dim p1_wid As Double = 0.00008
 Dim p_lead As Double = 0.0000001
 Dim p_trail As Double = 0.0000001
 Dim p1_base As Double = 0
 Dim p1_peak As Double = 3
 Dim p_stat As Integer = 0
 Dim delay As Double = p1_wid / 8
 Dim count As Double = 3
 Dim interval As Double = (p1_wid - delay * 2) / count
 Dim measv As Double = 3.0
 Dim rval As String = ""                                              '32
```

Line	Description
1	This line is required to use the VISA COM library.
6 to 11	Establishes the connection with the Agilent B1500 of the GPIB address 17 on the interface GPIB0. "GPIB0" is the VISA name. Confirm your GPIB settings, and set them properly. Also sets the B1500 GPIB IO timeout.
13	Resets the B1500.
17 to 32	Declares variables and sets the value. This program uses the SPGU installed in the slot 1 of the B1500.

```
 Dim msg As String = "No error."                                              '34
 Dim err As Integer = 0

 session.WriteString("CN " & sp_ch(0) & vbLf)                                 '37
 session.WriteString("SIM 0" & vbLf)                      ' PG mode
 session.WriteString("SPRM 2," & duration & vbLf)         ' Duration mode
 session.WriteString("ODSW " & sp_ch(0) & ", 0" & vbLf)   ' Disables pulse switch
 session.WriteString("SPPER " & period & vbLf)            ' Pulse period
 session.WriteString("SPM " & sp_ch(0) & ",1" & vbLf)     ' 2-level pulse setup
 session.WriteString("SPT " & sp_ch(0) & ",1," & p1_del & "," & p1_wid & "," &
p_lead & "," & p_trail & vbLf)
 session.WriteString("SPV " & sp_ch(0) & ",1," & p1_base & "," & p1_peak & vbLf)
 session.WriteString("SPUPD" & sp_ch(0) & vbLf)           ' Apply setup        '45
 session.WriteString("ERRX? 0" & vbLf) : msg = session.ReadString() : err =
Val(Left(msg, 2))
 If err <> 0 Then session.WriteString("DZ" & vbLf) : GoTo Check_err
 Console.Write("Completed." & Chr(10) & Chr(10))                              '48

 session.WriteString("CORRSER? " & sp_ch(0) & ", 1," & delay & "," & interval & ","
& count & vbLf)
 rval = session.ReadString()
 Console.WriteLine("Before compensation: LoadZ, TermV = " & rval)
 session.WriteString("CORRSER? " & sp_ch(0) & ", 1," & delay & "," & interval & ","
& count & vbLf)
 rval = session.ReadString()
 Console.WriteLine("After compensation:  LoadZ, TermV = " & rval)
 session.WriteString("SRP" & vbLf) ' Start pulse output                       '56
 Console.Write("SPGU output in progress")

Spgu_stat:
 Console.Write(".")
 session.WriteString("SPST?" & vbLf) : p_stat = session.ReadString()
 If p_stat = 1 Then GoTo Spgu_stat                                           '62
```

Line	Description
34 to 35	Declares variables used for error check.
37	Enables the SPGU channels specified by sp_ch(0).
38 to 45	Defines the channel setup and applies them to the channel specified by sp_ch(0). The channels start the pulse base output.
46 to 47	Reads error buffer. If an error is detected, changes the channel output to 0 V and goes to Check_err.
50 to 55	Measures the terminal voltage, calculates the impedance, sets it to the channel specified by sp_ch(0), and displays the voltage and impedance. This is performed twice.
56 to 62	Starts the SPGU pulse output and checks the SPGU pulse output status. And waits for the end status.

```
 Dim i, n As Integer                                                        '64
 session.WriteString("CORRSER? " & sp_ch(0) & ", 0," & delay & "," & interval & ","
& count & vbLf)
 rval = session.ReadString()
 n = Len(rval)
 i = InStr(rval, ",")
 loadz = Val(Left(rval, i - 1))
 measv = Val(Right(rval, n - i))
 Console.WriteLine(Chr(10) & Chr(10) & "After SPGU output:")
 Console.WriteLine("Load impedance  = " & loadz & " ohm")
 Console.WriteLine("Terminal voltage = " & measv & " V")
 GoTo Close

Check_err:                                                                  '76
 MsgBox("Instrument error: " & Chr(10) & msg, vbOKOnly, "")

Close:                                                                      '79
 Console.WriteLine(Chr(10) & "SPGU output stopped." & vbLf)
 session.WriteString("CL" & vbLf)
 session.IO.Close()
 MsgBox("Click OK to stop the program.", vbOKOnly, "")
 Console.WriteLine("Program completed." & Chr(10))                          '84

End Sub

End Module
```

Line	Description
64 to 74	Measures the terminal voltage, calculates the impedance, and displays the result.
76 to 77	Clears the error buffer. And displays a message box to show an error message.
79 to 84	Disables all channels, and closes the connection with the Agilent B1500.

Measurement Result Example

```
SPGU setup...   Completed.

Before compensation: LoadZ, TermV = +3.02579E+05,+6.029515

After compensation:  LoadZ, TermV = +1.50844E+05,+3.004060

SPGU output in progress.........................................
...........................................................

After SPGU output:
Load impedance  = 150865 ohm
Terminal voltage = 3.003394 V

SPGU output stopped.
```