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Keysight 82351A PCIe®–GPIB Interface

KEYSIGHT TECHNOLOGIES

User's Guide

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NOTICE: This document contains references to Agilent Technologies. Agilent's former Test and Measurement business has become Keysight Technologies. For more information, go to **www.keysight.com.**



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Safety Symbols

The following symbols on the instrument and in the documentation indicate precautions which must be taken to maintain safe operation of the instrument.

	Direct current		Off (supply)
	Alternating current		On (supply)
	Both direct and alternating current		Equipment protected throughout by double insulation or reinforced insulation.
	Three-phase alternating current		Caution, risk of electric shock.
	Earth (ground) terminal		Caution, risk of danger (refer to this manual for specific Warning or Caution information.
	Protective conductor terminal		Caution, hot surface.
	Frame or chassis terminal		Out position of a bi-stable push control.
	Equipotentiality		In position of a bi-stable push control.

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General Safety Information

The following general safety precautions must be observed during all phases of operation, service and repair of this instrument. Failure to comply with these precautions or with specific warnings elsewhere in this manual violates safety standards of design, manufacture and intended use of the instrument. Keysight Technologies assumes no liability for the customer's failure to comply with these requirements.

WARNING

- **DO NOT use the device if it appears damaged or defective.**
- **Observe all markings on the device before connecting any wiring to the device.**
- **DO NOT operate the device in the presence of flammable gases or fumes.**
- **DO NOT install substitute parts or perform any unauthorized modification to the device.**

CAUTION

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- Repair or service that this not covered in this manual should only be performed by qualified personnels.

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Environment Conditions

This instrument is designed for indoor use in areas with low condensation. The table below shows general environment requirements.

Environment Conditions	Requirements
Operating environment	–5 °C to 60 °C
Operating humidity	Up to 90% at 40 °C non-condensing
Storage environment	–40 °C to 70 °C
Storage humidity	Up to 90% at 65 °C non-condensing

CAUTION

The Keysight 82351A PCIe-GPIB Interface complies with the following safety and EMC requirements:

- IEC 61010-1:2001 / EN61010-1:2001
- IEC 61326:2002 / EN61326:1997+A1:1998+A2:2001+A3:2003

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CE ISM 1-A	The CE mark is a registered trademark of the European Community. This CE mark shows that the product complies with all the relevant European Legal Directives.
ICES/NMB-001	ICES/NMB-001 indicates that this ISM device complies with Canadian ICES-001.
N10149	The C-tick mark is a registered trademark of the Spectrum Management Agency of Australia. This signifies compliance with the Australia EMC Framework regulations under the terms of the Radio Communication Act of 1992.
	This instrument complies with the WEEE Directive (2002/96/EC) marking requirement. This affixed product label indicates that you must not discard this electrical/electronic product in domestic household waste.

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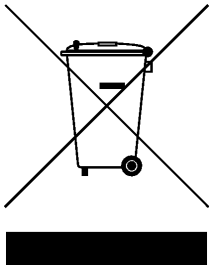
Waste Electrical and Electronic Equipment (WEEE) Directive 2002/96/EC

This instrument complies with the WEEE Directive (2002/96/EC) marking requirement. This affixed product label indicates that you must not discard this electrical/electronic product in domestic household waste.

Product Category:

With reference to the equipment types in the WEEE directive Annex 1, this instrument is classified as a “Monitoring and Control Instrument” product.

The affixed product label is shown as below:



Do not dispose in domestic household waste

To return this unwanted instrument, contact your nearest Keysight office, or visit:

www.keysight.com/environment/product

for more information.

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Declaration of Conformity (DoC)

The Declaration of Conformity (DoC) for this instrument is available on the Keysight Web site. You can search the DoC by its product model or description at the Web address below.

http://www.keysight.com/go/conformity

NOTE If you are unable to search for the respective DoC, please contact your local Keysight representative.

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1
Installing and Configuring the 82351A

This *Keysight 82351A PCIe- GPIB Interface User's Guide* shows you how to install and configure the interface and shows you how to use Keysight IO Libraries Suite.

NOTE In case of difficulty in installing the 82351A, see Chapter 2 Troubleshooting Guidelines.

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Getting Started

An 82351A GPIB Interface System is defined as a system in which GPIB instruments are connected via GPIB cables to an 82351A PCIe-GPIB interface card that is installed in a Windows PC. Figure 1-1 shows a typical system.

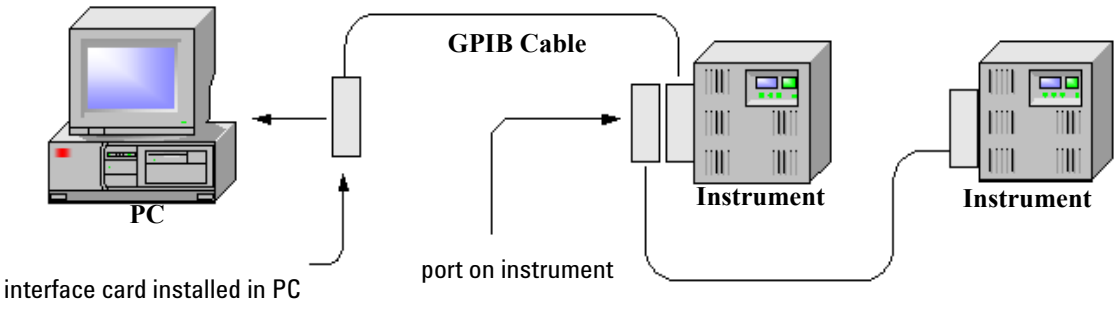


Figure 1-1 Typical configuration system

Figure 1-2 shows a suggested sequence of steps to install and configure an 82351A and to communicate between your PC and GPIB instruments via the 82351A. Use Figure 1-1 as a guide as you set up your GPIB system. See Chapter 2 Troubleshooting Guidelines if you need additional information on setting up the 82351A or GPIB instruments.

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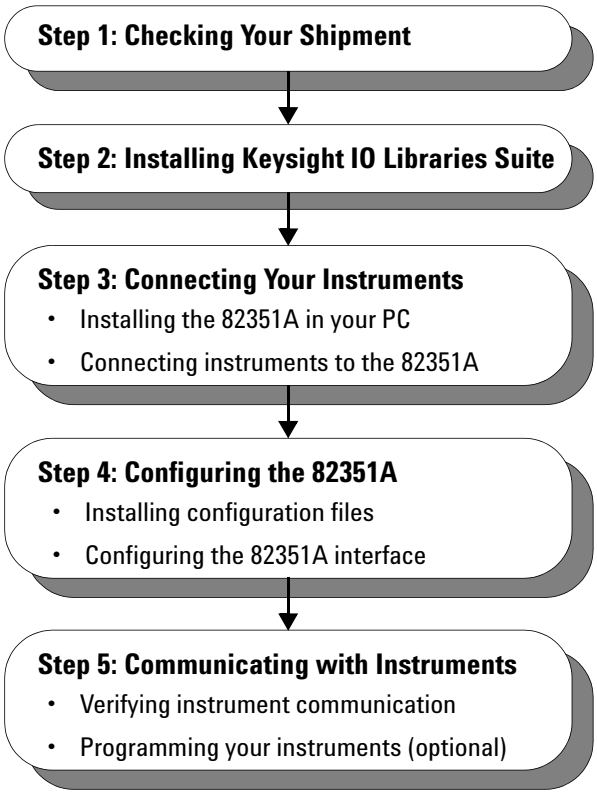


Figure 1-2 Steps to install and configure the 82351A interface

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Step 1: Checking Your Shipment

Your 82351A interface shipment should include the items in Figure 1-3. If any items are missing or damaged, keep the shipping materials and contact Keysight Technologies. See Chapter 4 General Information for addresses and telephone numbers.

CAUTION To reduce the risk of damaging the 82351A card, protect the card from static electricity. Leave the card in its anti-static bag until you are ready to install the card. Handle the card ONLY by the sheet metal frame or by the card edges. Never touch any other part of the card.



Figure 1-3 Items shipped with the 82351A PCIe-GPIB Interface

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Step 2: Installing Keysight IO Libraries Suite

NOTE You must have Administrator privileges to install Keysight IO Libraries Suite Connection Expert.

This section describes how to install the Keysight IO Libraries Suite on your PC. The Keysight IO Libraries Suite is a collection of libraries and utilities that gives you the ability to use your instruments from instrument control software.

You should install the Keysight IO Libraries Suite as your first step before installing the hardware because it installs the necessary software and drivers to control your instruments.

If possible, always use the most recent version of the Keysight IO Libraries Suite. This version supports the newest interfaces and operating systems, and has the most advanced features.

1 Verify that your PC meets the minimum system requirements. Refer to the IO Libraries Web page at www.keysight.com/find/iosuite or the IO Libraries Suite Readme.

2 Close all applications on your computer. Insert the Keysight Automation-Ready CD in your CD-ROM drive or download and install the IO Libraries software from www.keysight.com/find/iosuite.

3 Follow the instructions as prompted during the installation. You can select either a Typical or a Custom installation:

- **Typical** - In most cases, you can select the Typical installation which installs the IO Libraries Suite using the recommended settings.

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- **Custom** - Select the Custom installation to:
  - **a** Install the IO Libraries Suite in another directory (for 32-bit operating systems only).
  - **b** Save disk space by not installing interface manuals.
  - **c** Use Keysight 32-bit VISA with another vendor's VISA on the same PC in side-by-side mode. Details on side-by-side mode are available at www.keysight.com/find/side-by-side-install or in the IO Libraries Suite help.

4 After the IO Libraries suite is successfully installed, you will see the IO icon on the Windows taskbar notification area.

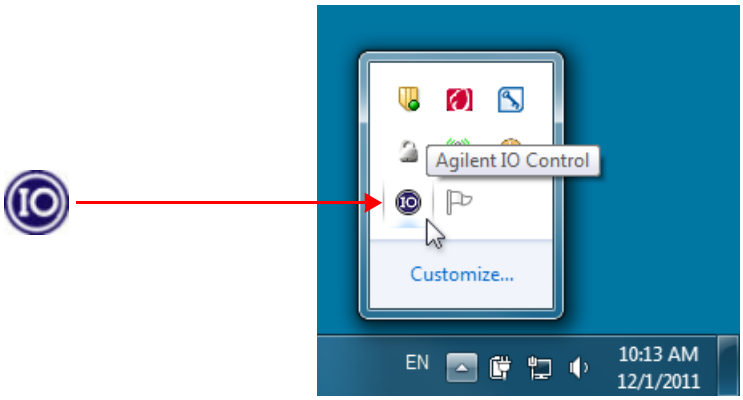


Figure 1-4 IO icon on the Windows taskbar notification area

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Step 3: Connecting Your Instruments

This step shows how to install an 82351A in a PCIe slot in your PC and how to connect GPIB instruments to the 82351A, including:

- Installing the 82351A in Your PC
- Connecting Instruments to the 82351A

NOTE If you have not yet installed the Keysight IO Libraries Suite, go to Step 2: Installing Keysight IO Libraries Suite BEFORE installing 82351A in your PC.

CAUTION To reduce the risk of damaging the 82351A, handle the card by the sheet metal frame or by its edges. Never touch any other part of the card, including the PCIe connector.

NOTE The 82351A is a 3.3 V PCIe card and will only fit in a PCIe 1x, PCIe 4x or PCIe 8x slot.

Installing the 82351A in your PC

1 **Record the card serial number**. Remove the card from its anti-static bag and record the serial number for future reference. Save the anti-static bag so you can protect the card if you need to remove the card from the PC.

The 82351A serial number is located on the white serial number label on the card. The serial number contains 10 characters that encodes the country of manufacture, Keysight year, workweek of manufacture and a unique sequential number. The last four digits indicate a unique serial number assigned sequentially to a 82351A.

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NOTE Take precautions against static discharge when handling and installing cards.

2 **Remove PC cover**. Remove power from the PC and from all of its peripherals. Then, remove the power cord from the PC. Unlock and remove the cover from the PC to allow access to the I/O slots. See your PC documentation for instructions.

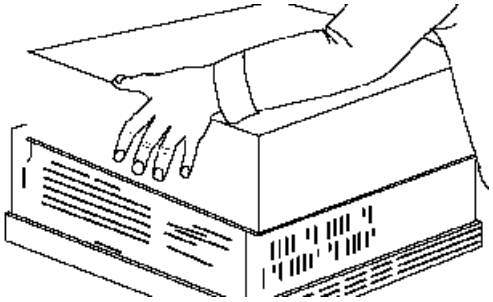


Figure 1-5 Remove PC cover

3 **Remove a cover plate**. Remove one of the PC back panel cover plates. The 82351A is a 3.3 V PCIe card and will only fit in a PCIe 1x, PCIe 4x or PCIe 8x slot. Choose a 3.3 V PCIe slot that will give adequate clearance for the GPIB connector.

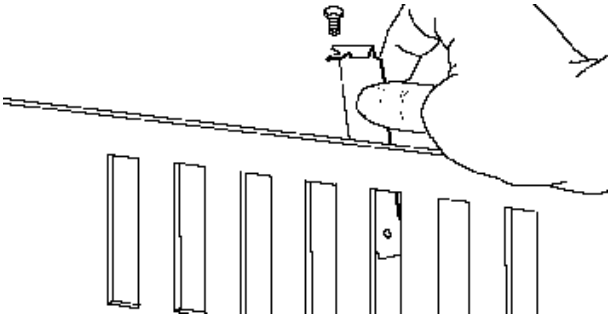


Figure 1-6 Remove cover plate

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4 **Install the 82351A**. Insert the 82351A interface card edge connector into the PCIe expansion slot connector of the PC. Make sure the interface is fully seated by pushing firmly on the top edge of the card with the palm of your hand. The GPIB connector should extend through the back panel opening to allow GPIB cable connection.

If you install more than one 82351A, you may want to install the cards so there is at least one empty slot between every two 82351As. When inserting the 82351A, be sure to hold the card by its edges. Also, be careful with the metal faceplate around the GPIB connector as the faceplate can be bent.

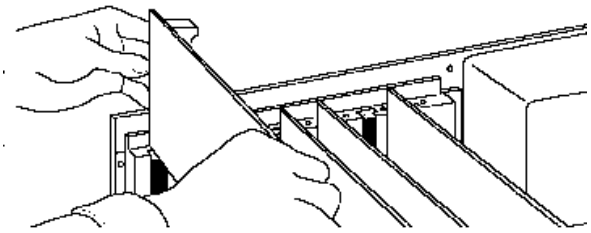


Figure 1-7 Install 82351A interface card

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5 **Replace the cover plate screw**. This will hold the 82351A in place. Save the blank cover plate for use if the 82351A is later removed. Replace the PC cover(s) as described in your PC documentation.

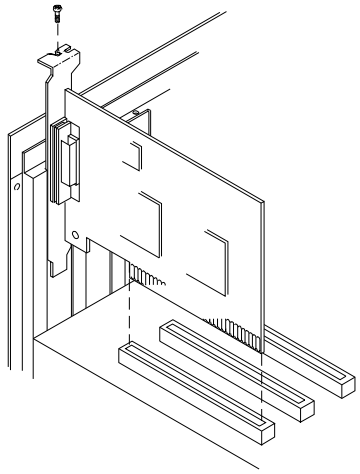


Figure 1-8 Replace the cover plate sscrew

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Connecting instruments to the 82351A

After the 82351A is installed in your PC, the next step is to connect your GPIB instruments to the installed 82351A. See the following suggested steps for the connection. When you have made the connections, go to Step 4: Configuring the 82351A.

1 **Review connection guidelines**. The recommended method for connecting a GPIB system is a linear arrangement with the system controller (PC) at one end of the system. However, a GPIB system can also be connected together in a star, linear, or a combination configuration as long as the total number of devices on the system is ≤ 14. See the following guidelines:

- To minimize stress on connector mountings, no more than three cable connectors blocks should be stacked on top of one another. The GPIB connector screws should be finger-tightened only.
- Minimize cable length as much as possible. All system devices must have tri-state drivers and must be powered on. For systems with devices that not using tri-state drivers, the transfer rate is limited to < 250 kilobytes/sec.
- For operation with data transfer rates < 500 kilobytes/sec, the total length of all GPIB cables is ≤ 2 meters times the number of devices connected together, up to a maximum of 20 meters.
- For operation with data transfer rates > 500 Kbytes/sec, the total length of all GPIB cables is > 1 meter times the number of devices connected together, up to a maximum of 15 meters.
- The length between adjacent devices is not critical as long as the overall restriction is met. GPIB bus extenders are available that allow operation over much greater distances.

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2 **Connect GPIB Cables to the 82351A**. Connect a separate GPIB cable to each installed 82351A. Tighten the GPIB connector screws finger-tight only. (The screwdriver slots are mainly for removal purposes only.) Two examples follow showing how to connect a single GPIB instrument or how to connect multiple GPIB instruments.

For information or to purchase Keysight GPIB cables, see www.keysight.com/find/gpibcables

Example: Connecting a single GPIB instrument

Figure 1-9 shows connections from a single GPIB instrument to the GPIB connector of an 82351A installed in your PC. You may want to record the primary GPIB address of the attached instrument for future programming use. After making the connections, reconnect the PC power cord and apply power to the PC and to attached peripherals or instruments.

CAUTION To avoid damage to the connectors, only finger-tighten the connectors.

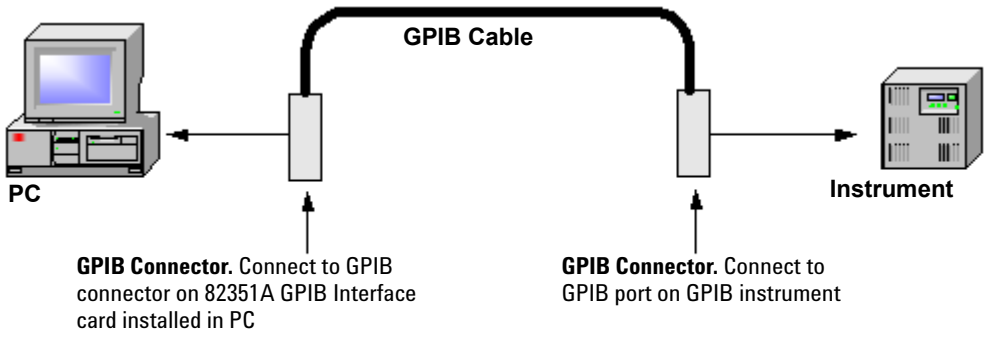


Figure 1-9 Connection from a single GPIB instrument to an 82351A GPIB interface card

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Example: Connecting multiple GPIB Instruments

Figure 1-10 shows one way to connect three GPIB instruments to an 82351A. You may want to record the primary GPIB address of each attached instrument for future programming use. After making the connections, reconnect the PC power cord and apply power to the PC and attached peripherals or instruments.

NOTE Although Figure 1-10 shows cable connections to GPIB Instrument 1, the connection can be to any GPIB instrument in the system.

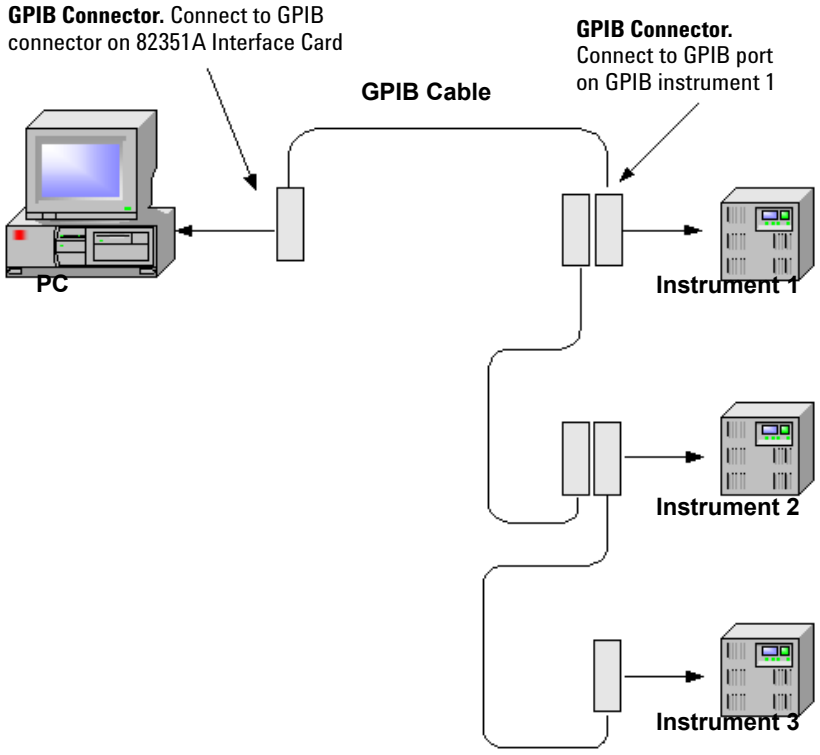


Figure 1-10 Connection from multiple GPIB instruments to GPIB interface card

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Step 4: Configuring the 82351A

This step shows how to configure a Windows XP/Vista/7/8/Server 2008 R2 operating system in a PC that has an 82351A installed, including:

- Installing Configuration Files
- Configuring the 82351A Interface

Installing configuration files

1 **Turn the PC ON**. As Windows restarts, the system will detect the new hardware and **Found New Hardware Wizard** will appear.



Figure 1-11 New Hardware Found Wizard

2 **Install Configuration Files**. Click **Next >** to accept the default suggestions. Click **Finish** to complete the installation. Then, go to Configuring the 82351A interface.

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Configuring the 82351A interface

1 **Open Connection Expert**. Click the IO icon on the Windows taskbar notification area and select Keysight Connection Expert. Highlight and right-click the GPIB interface in the explorer view (tree view at the center of the window) and then click **Change Properties...** to display the **Keysight 82351A PCIe-GPIB Interface** dialog box as shown in Figure 1-12.

NOTE For a description of Connection Expert and the Keysight IO Libraries Suite, see the Keysight IO Libraries Suite Online Help. To access this Help file, click the IO Control and select **Documentation > IO Libraries Suite Help**.

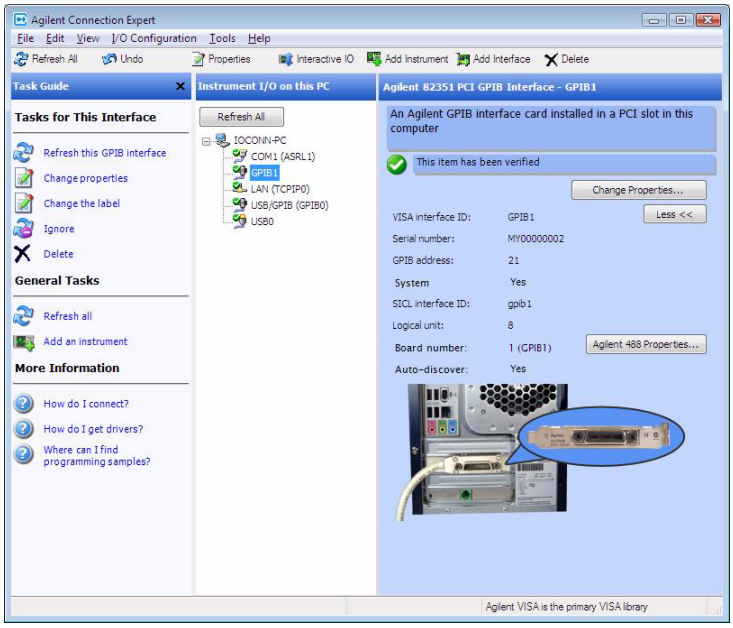


Figure 1-12 Keysight Connection Expert window

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2 **Configure GPIB Card Parameters**. When the Keysight 82351A PCIe-GPIB Interface dialog box (Figure 1-13) appears, set the **VISA interface ID**, **SICL interface ID**, **Logical unit**, and **GPIB address** values as required.

Also, verify that this is the **System controller** for the GPIB to which it is attached (this is the typical operating mode). Then, click **OK**. See Table 1-1 for description of each setting and guidelines to set these values.

NOTE

Changes to certain properties of the 82351A, including:

- GPIB address
- System controller flag
- SICL interface ID
- Logical unit

will not take effect until you reboot your PC. If you choose not to reboot immediately, Connection Expert will display a warning icon until you reboot.

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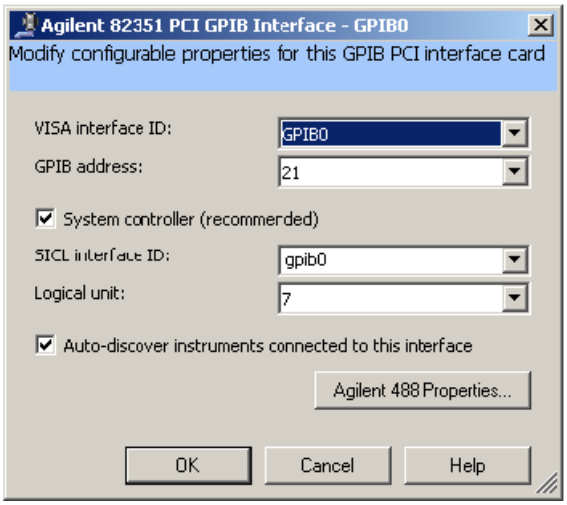


Figure 1-13 Keysight 82351A PCIe-GPIB Interface dialog box

Table 1-1 82351A GPIB interface card configuration parameters

VISA Interface ID	Symbolic name that VISA uses to uniquely identify this GPIB interface. The default VISA interface ID is GPIB0. The 82351A interface ID for VISA must begin with the string GPIB and have an integer appended to it, such as GPIB0, GPIB1, GPIB2, etc. Remember this value to properly address GPIB devices in your VISA applications.
GPIB Address	Address of this GPIB interface controller on the GPIB bus. It is usually 21 if the GPIB interface is a System Controller or 20 if the GPIB interface is a non-System Controller (see System Controller, following). These addresses are chosen by convention but any address in the range 0 - 30, inclusive, may be used.
System Controller	Determines if this interface controls which bus devices talk and which bus devices listen. If several devices exist on a bus, be sure each has a unique GPIB bus address and only one device is the System Controller. Each GPIB interface has its own independent bus. Thus, each interface may be a System Controller as long as it is not chained together with other GPIB interfaces. However, two or more System Controllers on the same bus will cause the bus to be inoperative.

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Table 1-1 82351A GPIB interface card configuration parameters

SICL Interface ID	Symbolic name that SICL uses to uniquely identify this GPIB interface. The default Interface ID is gpib0. The SICL interface ID must be a unique string of alphanumeric characters, starting with a letter. Remember this value and the logical unit number to properly address GPIB devices in your SICL applications.
Logical Unit	Number that SICL uses to uniquely identify this 82351A interface. The logical unit number is an integer in the range of 0 - 300. Remember this value and the SICL interface ID to properly address the GPIB interface in your SICL applications.

3 **Repeat steps for other cards**. If you have installed more than one 82351A in your PC, repeat these steps for the remaining cards. Then, go to Step 5: Communicating with Instruments.

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Step 5: Communicating with Instruments

After the 82351A has been configured and you have connected your GPIB instruments to the 82351A, the next step is to verify communication between your PC and the instruments using the Interactive IO utility. After communication has been established, you can begin to program the instruments using VISA, VISA COM, SICL, or SCPI commands. This section includes:

- Verifying Instrument Communication
- Programming Your Instruments (Optional)

Verifying instrument communication

When the Keysight IO Libraries Suite is installed on your PC, an I/O utility called Interactive IO is also installed. You can use Interactive IO to verify communication between your PC and the connected GPIB instruments. This section shows you how to verify instrument communication using Interactive IO.

NOTE Once your GPIB interface has been configured in Connection Expert, if you can see the attached GPIB instrument(s) in the Connection Expert explorer and the respective IDN string information in the detail pane, it means the communication has been established. Interactive IO allows you to manually verify communication and send specific commands to your instruments.

To use Interactive IO to send a `*IDN?` (identification) query to an instrument, see the steps below:

1 Select the instrument by clicking its icon in the Connection Expert explorer view.

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2 Right-click the instrument and click **Send Commands To This Instrument** to display the Interactive IO window as shown in Figure 1-14. For information of the Interactive IO, including a list of common commands and the commands' description, click **Help > Help Topics**.

3 *IDN? is the default command. Click **Send & Read** to send the identification query to the instrument and display its reply in the Interactive IO window.

4 To send other commands, click **Commands>** to select from a list of common commands, or type a command into the **Command:** field. If you experience time-out errors for some commands, click **Options** to change the time-out value.

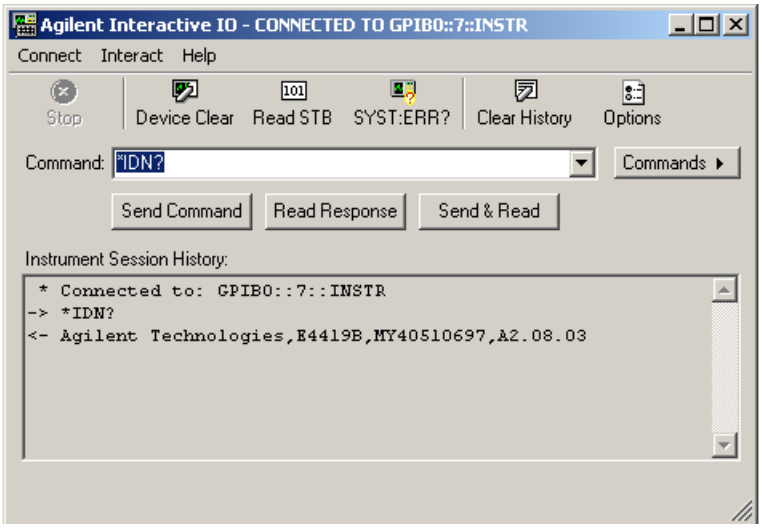


Figure 1-14 Keysight Interactive IO window

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Programming your instruments (optional)

This section provides an introduction to programming GPIB instruments via the 82351A PCIe GPIB interface using the Keysight VISA and SICL IO Libraries. You can program in various languages and applications, including Visual Basic, Visual C++, and Keysight VEE.

See the applicable user's guide, such as the Visual Basic user's guide, for programming guidelines. You can also find additional programming examples using various IO Libraries and instrument drivers in the instrument user's guide. After the 82351A is successfully installed and configured, it should act as a transparent interface for programming GPIB instruments.

For information on programming using Keysight VISA, see the *Keysight VISA User's Guide*. For information on VISA COM and for function references for VISA, VISA COM, and SICL, see the *IO Libraries Suite Online Help*.

Accessing Programming Manuals and Help

You can access .pdf copies of the *Keysight VISA User's Guide* and the *Keysight SICL User's Guide* for Windows from the IO icon located on the Windows taskbar notification area. Adobe Acrobat Reader is required to view these manuals.

To access the *Keysight VISA User's Guide*, click the IO icon and then click **Documentation > VISA Users Guide**. To access the *Keysight SICL User's Guide* for Windows, click the IO icon and then click **Documentation > SICL Users Guide.** To access VISA COM information, and function references for VISA, VISA COM, and SICL, click the IO icon and then click **Help Topics**.

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Example: GPIB Interface Configuration

An I/O interface consists of a hardware interface and a software interface. One purpose of the Connection Expert utility is to associate a unique software interface ID with a hardware interface. The Keysight IO Libraries Suite uses an interface ID or logical unit number to identify an interface. This information is passed in the parameter string of the viOpen function call in a VISA program or in the iopen function call in a SICL program.

For example, the GPIB interface system in Figure 1-15 consists of a Windows PC with two 82351A GPIB cards connected to three GPIB instruments via GPIB cables. For this system, the Connection Expert utility has been used to assign GPIB card #1 a VISA interface ID of “GPIB0” and a SICL interface ID of “gpib0”.

Connection Expert has also been used to assign GPIB card #2 a VISA interface ID of “GPIB1” and a SICL interface ID of “gpib1”. With these names assigned to the interfaces, the VISA/SICL addressing is as shown in Figure 1-15. Since unique names have been assigned by Connection Expert, you can use the VISA viOpen command to open the I/O paths to the GPIB instruments. Or, you can use the SICL iopen command to open the I/O paths shown.

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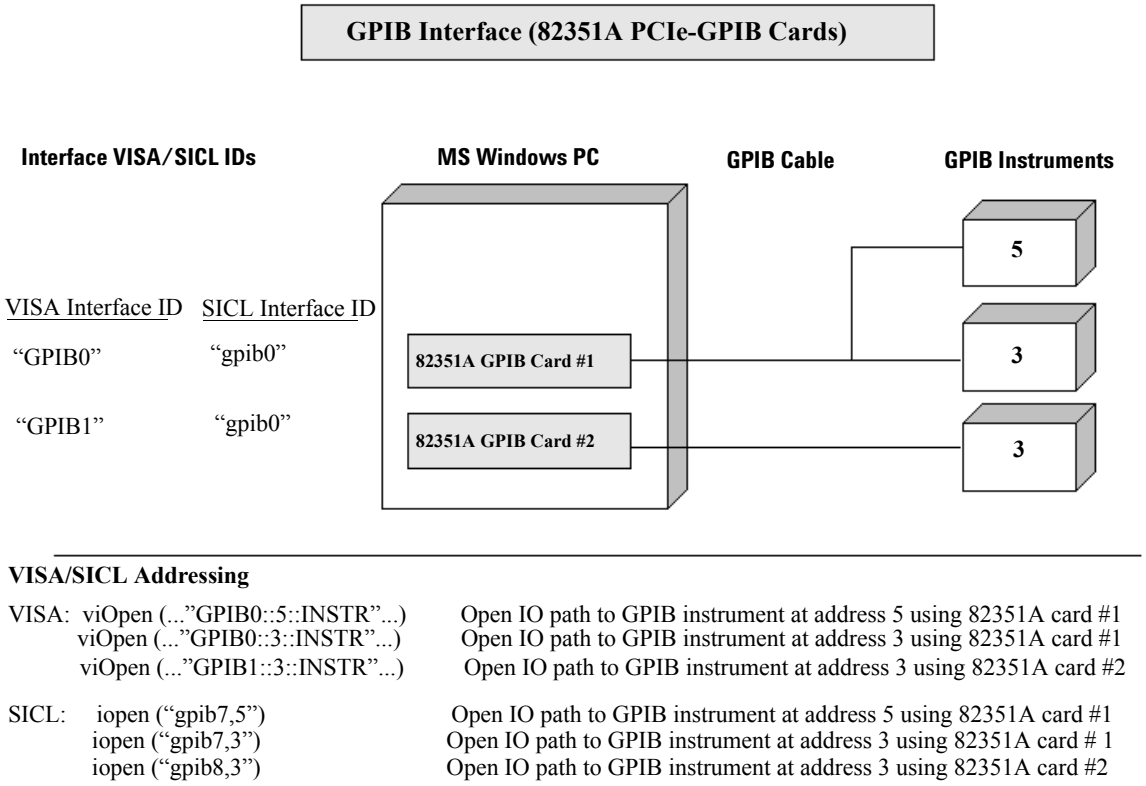


Figure 1-15 Example of GPIB interface configuration

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Set 82351A Read/Write Performance Mode

The 82351A card read and write calls using one of two modes:

- **Polling.** Bytes are transferred to/from the card, one at a time. Polling mode is advantageous for transferring a small number of bytes because the setup overhead is very low, but it does require CPU involvement for each byte transferred.
- **Interrupt.** An entire buffer is transferred to/from the card without CPU involvement. Interrupt mode is advantageous for transferring large buffers because the higher per byte transfer rate more than compensates for the relatively long interrupt setup overhead.

The default behavior of the 82351A driver is to use Polling mode for transfers of 256 bytes or less and to use Interrupt mode for larger transfers. You can modify this default behavior by doing either of the following:

SICL: The SICL ihint(id, hint) function can be called to modify the read/write behavior for a SICL session. The hint values allowed are:

- I_HINT_DONTCARE (default value) Use Interrupt mode for transfer requests larger than 256 bytes, otherwise, use Polling mode.
- I_HINT_USEPOLL Use the Polling mode.
- I_HINT_IO Use the Interrupt mode.

VISA: The VISA viSetAttribute(vi, VI_ATTR_DMA_ALLOW_EN, attrValue) function can be called to modify the read/write behavior for a VISA session. The VI_ATTR_DMA_ALLOW_EN values allowed are:

- VI_TRUE (default value) Use Interrupt mode for transfer requests larger than 256 bytes, otherwise, use Polling mode.
- VI_FALSE Use the Polling mode.

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Some additional factors to consider are:

- The settings discussed above are per session. This means you can open multiple sessions to a device and set different transfer modes for different sessions. The actual mode used will then depend on which session you are using for the read/write calls.
- In both SICL (with hint = I_HINT_DONTCARE) and VISA (with VI_ATTR_DMA_ALLOW_EN = VI_TRUE), the size of the read request (as specified by buffer size in a SICL iread() or count in a VISA viRead() function call) will determine the mode used even if the number of bytes actually read is less.
- The default formatted IO read buffer size is 4096 so when using this default size, formatted reads in SICL (with hint = I_HINT_DONTCARE) and VISA (with VI_ATTR_DMA_ALLOW_EN = VI_TRUE) will use Interrupt mode even when a small number of bytes are expected.
- The default formatted IO write buffer size is 128 so when using this default size, formatted writes in SICL (with hint = I_HINT_DONTCARE) and VISA (with VI_ATTR_DMA_ALLOW_EN = VI_TRUE) will use Polling mode even when sending a large number of bytes.
- In SICL, Polling mode will always be used for the iread(), ifread() and iscanf() regardless of the above settings, when a termchr is set (itermchr() is not set to -1.
- In VISA, Polling mode will always be used for viRead(), viBufRead() and viScanf() regardless of the above settings, when VI_ATTR_TERM_CHAR_EN = VI_TRUE.

The crossover point at which the Interrupt mode becomes faster than the Polling mode depends on the CPU speed, with a faster CPU having a higher crossover point.

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2
Troubleshooting Guidelines

This chapter shows suggested troubleshooting steps if you encounter communication failures during 82351A installation.

NOTE Additional troubleshooting information appears in the Keysight IO Libraries Suite Online Help and on the Web at http://www.keysight.com/find/iolib

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Troubleshooting Overview

A suggested troubleshooting flow chart for the 82351A, installed instruments, and the Keysight IO Libraries Suite follows. We suggest you start at Step 1 and then go to Step 2 and then to Step 3, as required.

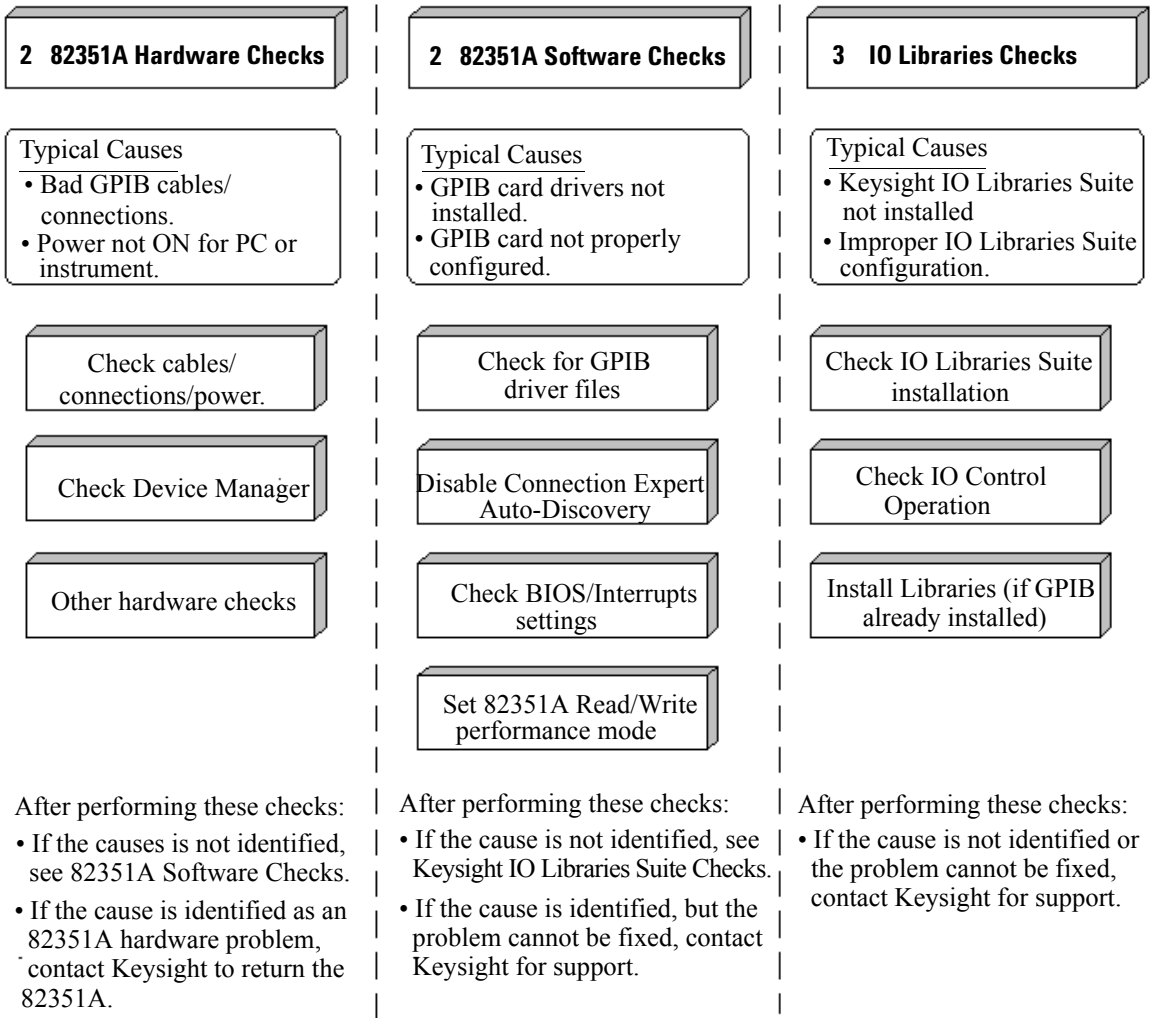


Figure 2-1 Troubleshooting flow chart

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82351A Hardware Checks

This section provides you guidelines to make hardware troubleshooting checks for the 82351A, including:

- Check Cables, Connections and Power
- Check Device Manager

Check cables/connections/power

We suggest that you start troubleshooting by performing hardware checks. If you suspect a hardware failure of the 82351A, contact Keysight for instructions to return the unit

NOTE There are no user-serviceable parts for the 82351A. If you suspect a hardware failure for the 82351A, contact Keysight for instructions to return the unit.

1. **Check GPIB cable connections.** Check all GPIB cables for good connection to the GPIB connector on the 82351A installed in your PC and the GPIB cable connections between all connected GPIB instruments. An improperly attached GPIB connector can cause the bus to malfunction.
2. **Check GPIB cables for damage.** Check all GPIB cables for cuts/damage and check for bent/misaligned/crushed connector pins. Replace cables as required.
3. **Disconnect/Reconnect GPIB cables.** If Steps 1 and 2 do not solve the problem, try disconnecting and reconnecting (or replacing) GPIB cables.
4. **Check PC/instrument power-on.** Verify that the PC and all connected GPIB instruments are functional and are powered ON. Verify that host computer is not in a suspended power management state.

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5 **Reboot your PC.** If doing steps 1, 2, 3 or 4 does not solve the problem, reboot the PC. If this does not solve the problem, go to Check Device Manager.

Check Device Manager

You can use the **Windows Device Manager** to reinstall the 82351A or equivalent, as required. Go to **Device Manager** by selecting **Start > Control Panel > System > Hardware > Device Manager**.

For Windows 8, right-click the bottom-left corner of the Desktop and select **Device Manager**.

From the Device Manager, select **82351A** and then **Properties**. Select **Driver** and click **Reinstall Driver**.

This will allow the **Windows Plug and Play Manager** to begin searching for a driver for the 82351A. Since **Device Manager** may have disabled the 82351A device, click **Enable** to restart the 82351A. If this does not resolve the problem, go to 82351A Software Checks.

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82351A Software Checks

This section provides guidelines for 82351A BIOS/Interrupts Settings software checks.

Check BIOS/Interrupts settings

If Connection Expert reports finding an 82351A card with Serial Number ffffffff, this is typically caused by PCIe cards not properly being configured. Try the following steps. If these steps do not work, remove and re-install the 82351A and then reconfigure the card.

1 **Upgrade your system BIOS to the latest version.** New computers often have newer BIOSs available. When installing new BIOS, ensure the BIOS Installed O/S setting is set correctly. This determines what software will configure all the Plug and Play cards in your system. Either the BIOS or the operating system can perform the task of querying all the cards to determine their resource needs, picking a valid configuration for all these cards, and telling the cards what their actual resource settings are.

2 **If your computer locks up or freezes after installing.** Typically, this is caused by interrupt conflicts with other drivers in the system. Some non-Keysight PCIe cards do not work properly when sharing IRQ line.

   To validate the driver of the 82351A card, go to **Device Manager** by selecting **Start > Control Panel > System > Hardware > Device Manager**. For Windows 8, right-click the bottom-left corner of the Desktop and select **Device Manager**. Find the 82351A card and check that all other cards on the same IRQ have a valid driver, not the big yellow question mark.

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When the IRQ is asserted, the OS calls each ISR in turn until one of them returns TRUE (meaning that it handled the interrupt). The ISR's responsibility is to correctly return TRUE if its device was interrupting or FALSE if not. Drivers that return TRUE, even though they did not service the interrupt, will cause problems.

To perform driver workarounds, you can upgrade the drivers for devices sharing an IRQ with Keysight, including, but not limited to, your video drivers, your LAN drivers, Keysight IDE and/or SCSI drivers, and your sound drivers.

3 **Reconfigure your PC.** Configure your PC so as to not share IRQ lines. Many PCIe cards have bugs when sharing IRQ lines. You may or may not be able to do this on all PCs. Many PCs can be configured using the setup option when the PC is booting.

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Keysight IO Libraries Suite Checks

This section provides guidelines to troubleshoot problems involving the Keysight IO Libraries Suite, including:

- Check IO Libraries Suite Installation
- Check IO Control Operation
- Install IO Libraries Suite (if 82351A was Installed First)

Check IO Libraries Suite installation

Start your Keysight IO Libraries Suite troubleshooting sequence by verifying IO Libraries Suite installation. If the IO Libraries Suite is installed, go to Check IO Control Operation.

1 **Check Keysight IO Libraries version.** If a version of the IO Libraries Suite has been installed, the IO icon is normally displayed on the Windows taskbar notification area.

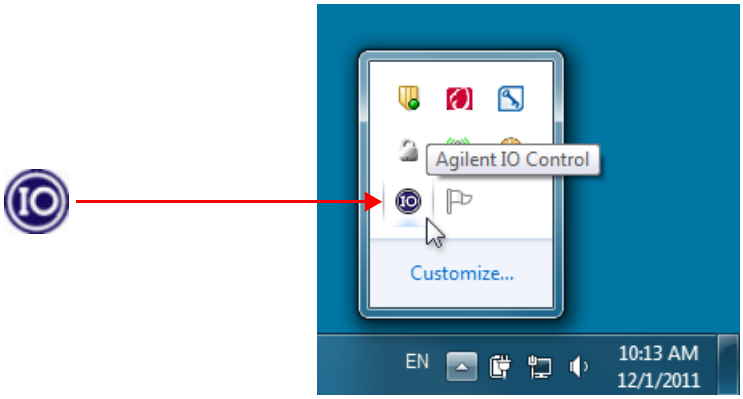


Figure 2-2 IO icon on the Windows taskbar notification area

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NOTE

If possible, you should always use the current version of the Keysight IO Libraries Suite. This version supports the newest interfaces and operating systems, and has the most advanced features. However, you may need an earlier version of the IO Libraries Suite to support an older interface or operating system. For example, Keysight IO Libraries Suite 14.0 is required for Windows 98SE or Windows Me. If you need an earlier version of Keysight IO Libraries, go to http://www.keysight.com/find/iolib to locate the version you need.

a If the IO icon is displayed, click the icon and select **About Keysight IO Control** to display the version. The version must be 15.0 or greater.

b If the IO icon is not displayed, a version of the IO Libraries Suite may still be installed. To verify this, check for Keysight Connection Expert in the Start menu, or the Start Screen (Windows 8).

c If found, launch the Keysight Connection Expert and select **View > Keysight IO Control** to place a check mark next to the Keysight IO Control selection.

d If Keysight Connection Expert is not found in the Start menu or the Start Screen (Windows 8), no version of Keysight IO Libraries is installed. In this case, or if the installed version is not 15.0 or greater, you must install the newer version (see Step 2).

2 **Install Keysight IO Libraries Suite (as required).** If version 15.0 or greater of the Keysight IO Libraries is not installed on your PC, install the IO Libraries Suite. Otherwise, go to Check IO Control operation.

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Check IO Control operation

When the Keysight IO Libraries Suite is installed, an IO Control is created. When the IO Control is active, it is displayed as an IO icon on the Windows taskbar. If the IO Control is deactivated, SICL/VISA applications that are running with the 82351A will be unable to open sessions.

By default, the IO Control is always active after the Keysight IO Libraries Suite is installed and the IO icon is displayed. However, there may be times when IO Control can get deactivated and the IO icon is not displayed. There are two ways to hide the IO icon:

- **Hide Keysight IO Control.** Click the IO icon and select **Hide Keysight IO Control** from the drop down menu. Alternately, you can uncheck the **View > Keysight IO Control** in Connection Expert. This will hide the IO icon, but will not deactivate the IO Control.
- **Click Exit.** Click the IO icon and select **Exit** from the drop down menu. A dialog box explaining the consequences of removing the IO appears, click **Yes** to hide the IO icon and deactivate the IO Control.

If the IO icon is not displayed, either the IO icon display has been turned off and/or the IO Control (and associated **iprocsvr.exe**) is not active. In this case, launch the Keysight Connection Expert and select **View > Keysight IO Control** to place a check mark next to the Keysight IO Control selection to restart the IO Control and display the IO icon.

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Install IO Libraries Suite (if 82351A was installed first)

If you installed the 82351A before installing the Keysight IO Libraries Suite software, follow these steps to install and configure the IO Libraries Suite and the necessary drivers for your card.

1 Install the Keysight IO Libraries Suite as described in Chapter 1, "Step 2: Installing Keysight IO Libraries Suite".

2 If the Connection Expert utility does not recognize your 82351A and display it as a **PCIe-GPIB Interface**, you may need to use **Windows Device Manager** to associate the correct drivers with your card. Follow the steps below:

   a Start the **Windows Device Manager** as follows: Select **Start > Control Panel > System > Hardware > Device Manager**. For Windows 8, right-click the bottom-left corner of the Desktop and select **Device Manager**.

   b Find the **PCI Simple Communications Controller** in the **Device Manager**, and select **Update Driver...**

   c Allow Windows to find and install the driver automatically. You are not require to insert a CD.

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3
Specifications and Characteristics

This chapter describes product technical specifications that include general requirement and general characteristics for Keysight 82351A PCIe-GPIB interface card.

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General Requirements

Before installing Keysight 82351A PCIe-GPIB interface card, ensure your PC meets the following requirements. Table 3-1 shows the general requirements for installing the 82351A.

Table 3-1 General requirements

Software/Hardware	Requirement
Minimum system requirements	Windows XP/Vista/7/8/Server 2008 R2
Software required	Keysight IO Libraries Suite 15.0 and above
PCIe BUS slot	3.3 V PCIe, 32 bits
Support standards	PCIe rev. 1.0a IEEE 488.1 and IEEE 488.2 compatible

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General Characteristics

All characteristics are typical performance value and are not warranted. Table 3-2 shows the general characteristics of the 82351A.

Table 3-2 General characteristics

General characteristics	Requirement
Power	Backplane +3.3 V PCIe
Connectors	Standard 24-pin (IEEE-488) +1.5 V PCIe
PCIe Slot	PCIe 1x, PCIe 4x, PCIe 8x
GPIB transfer rate	1.4 MB/s
Maximum instrument connection	14 instruments – daisy chain via GPIB
Buffering	Built-in
Configuration	Plug and Play
Dimension (Width x Depth x Height)	120.8 mm (W) x 158.0 mm (D) x 21.6 mm (H)
Weight	0.082 kg
Warranty	1 year
Safety and EMC	IEC 61010-1:2001 / EN61010-1:2001 IEC 61326:2002/EN61326:1997+A1:1998 +A2:2001+A3:2003 Pollution Degree 2 This product is rated for indoor use only.

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4
General Information

This chapter provides general information for the *Keysight 82351A PCIe- GPIB Interface User's Guide* and guides you how to access the related documentation for 82351A.

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Accessing an Electronic Copy of This Guide

There are two ways you can access an electronic (.pdf) version of this guide, as follows. You will need Adobe Acrobat Reader Version 3.0 or later to view the electronic version.

- **Access from the IO Control.** After the Keysight IO Libraries Suite is installed, the IO icon appears on the Windows taskbar notification area. To access an electronic version of this guide, click the IO icon, then click **Documentation** and then click *82351A PCIe- GPIB Users Guide*.
- **Access from the Web.** To access an electronic version of this guide, click the IO icon, then click **Documentation**, then **Interface Manuals**, and then click *82351A PCIe- GPIB Users Guide*.

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Related Documentation

Suggested documentation you can use for 82351A operation follows. After the Keysight IO Libraries Suite has been installed on your PC, online help of the *Keysight IO Libraries Suite Connectivity Guide, VISA User's Guide, and SICL User's Guide* are available. Click the IO icon on the Windows taskbar notification area and then click **Documentation**.

Table 4-1 Documentation for 82351A operation

Product	Related Documentation
Keysight IO Libraries Suite	For additional information on the Keysight IO Libraries Suite, see the *Keysight IO Libraries Suite Connectivity Guide* and the *Keysight IO Libraries Suite Online Help.*
VISA	To develop and use VISA applications, see the *Keysight VISA User's Guide* and the *VISA Online Help*.
VISA COM	To develop and use VISA COM applications, see the *VISA COM Online Help*.
SICL	For SICL I/O applications, see the *Keysight SICL User's Guide for Windows* and the *SICL Online Help*.
Keysight T&M Toolkit	To develop test and measurement programs in Visual Studio .NET quickly and easily, use the *Keysight T&M Toolkit* product (Web site at www.keysight.com/find/toolkit).

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Warranty Services

Standard warranty (worldwide)

1 Keysight warrants that this Keysight hardware, accessories, and/or supplies will be free from defects in materials and workmanship for the period specified above. If Keysight receives notice of such defects during the warranty period, Keysight will, at its option, either repair or replace products that prove to be defective. Replacement products may be either new or equivalent in performance to new.

2 Keysight warrants that Keysight software will not fail to execute its programming instructions for the period specified above, due to defects in material and workmanship when properly installed and used. If Keysight receives notices of such defects during the warranty period, Keysight will replace software that does not execute its programming instructions due to such defects.

3 Keysight does not warrant that the operation of Keysight products will be uninterrupted or error free. If Keysight is unable, within a reasonable time, to repair or replace any product to a condition as warranted, you will be entitled to a refund of the purchase price upon prompt return of the product.

4 Keysight products may contain remanufactured parts equivalent to new in performance or may have been subject to incidental use.

5 The warranty period begins on the date of delivery or on the date of installation if installed by Keysight. If customer schedules or delays Keysight installation more than 30 days after delivery, warranty begins on the 31st day after delivery.

6 This warranty does not apply to defects resulting from

- improper or inadequate maintenance, repair, or calibration

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- software, interfacing, parts, or supplies not supplied by Keysight
- unauthorized modification, or misuse
- operation outside of the published environmental specifications for the product
- improper site preparation or maintenance.

7 Keysight makes no other express warranty, whether written or oral, with respect to this product.

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EXCEPT TO THE EXTENT ALLOWED BY LOCAL LAW, THESE WARRANTY TERMS, DO NOT EXCLUDE, RESTRICT OR MODIFY, AND ARE IN ADDITION TO, THE MANDATORY STATUTORY RIGHTS APPLICABLE TO THE SALE OF THIS PRODUCT TO YOU.

Accessories warranty

Keysight offers warranty for product's accessories for up to 3 months from the end-user acceptance date.

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Returning Instrument for Service

Before shipping your instrument for repair or replacement, Keysight recommends that you acquire shipping instructions from the Keysight Technologies Service Center. A clear understanding of the shipping instructions is necessary to secure your product for shipment.

1 Write the following information on a tag and if attach to the instrument.
   - Name and address of owner
   - Instrument model number
   - Instrument serial number
   - Description of the service required or failure indications

2 Remove all accessories from the instrument.

   Do not include accessories unless they are associated with the failure symptoms.

3 Protect the instrument by wrapping it in plastic or heavy paper.

4 Pack the instrument in foam or other shock absorbing material and place it in a strong shipping container.

   Use the original shipping material or order shipping materials from a Keysight Technologies Sales Office. If both options are not available, place 8 to 10 cm (3 to 4 inches) of shock-absorbing and static-free packaging material around the instrument to avoid movement during shipping.

5 Seal the shipping container securely.

6 Mark the shipping container as FRAGILE.

   In the ensuing correspondence, refer to the instrument by its model number and full serial number.

Keysight suggests that you always insure your shipments.

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Contacting Keysight

You can reach Keysight Technologies at this telephone number in the United States:

United States Call Center: 1-800-829-4444

For other locations, contact your country's Keysight support organization. A list of contact information for other countries is available on the Keysight Web site at:

www.keysight.com/find/assist

A list of other Keysight Web sites is as follows.

Table 4-2 Keysight Web sites

URL	Description
www.keysight.com/find/assist	Keysight Technologies "Contact Us" page
www.keysight.com/find/iolib	Update the Keysight IO Libraries Suite software
www.keysight.com/find/ADN	Connectivity resources all in one place
www.keysight.com/find/techsupport	Technical support information, including manuals, application notes, FAQs, and software and firmware downloads
www.keysight.com/find/connectivity	For connection, communication and control of test instruments from your computer, you can find out the latest in connectivity.

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