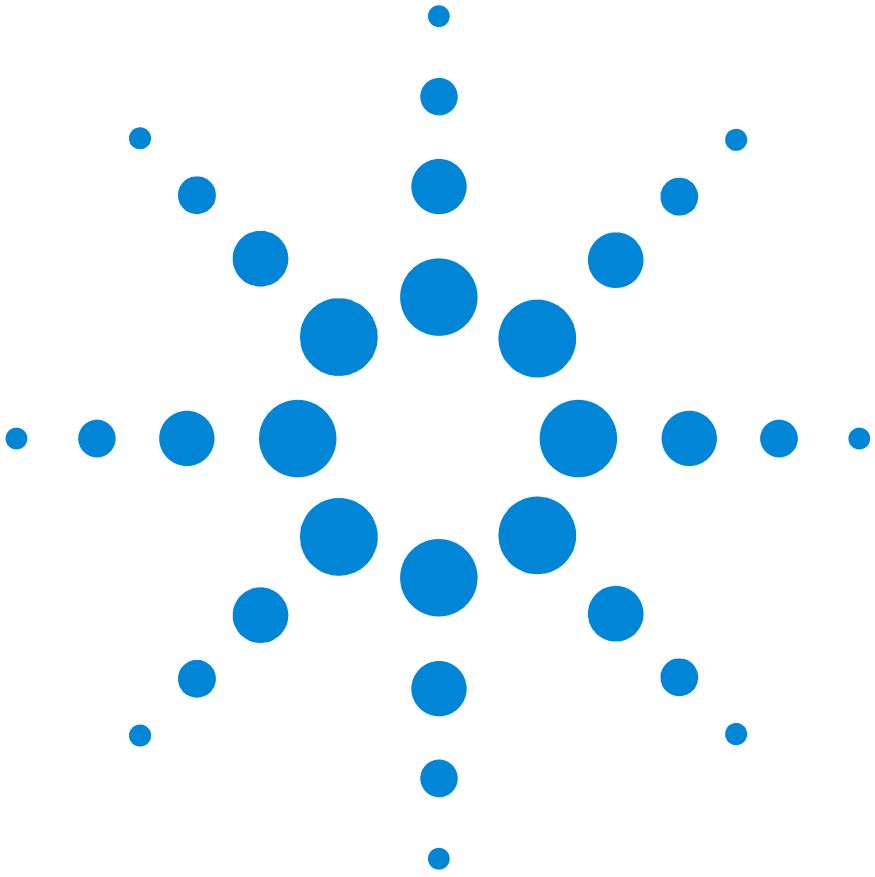


Agilent E2969A Protocol Compliance Test Card for PCI Express

User Manual

Agilent Technologies

Important Notice

Manual Part Number

E2969-91020

Revision

Revision 1.0, March 2004

Printed in Germany

Agilent Technologies,
Deutschland GmbH
Herrenberger Str. 130

71034 Boeblingen, Germany

Warranty

The material contained in this document is provided "as is," and is subject to being changed, without notice, in future editions. Further, to the maximum extent permitted by applicable law, Agilent disclaims all warranties, either express or implied, with regard to this manual and any information contained herein, including but not limited to the implied warranties of merchantability and fitness for a particular purpose. Agilent shall not be liable for errors or for incidental or consequential damages in connection with the furnishing, use, or performance of this document or of any information contained herein. Should Agilent and the user have a separate written agreement with warranty terms covering the material in this document that conflict with these terms, the warranty terms in the separate agreement shall control.

Technology Licenses

The hardware and/or software described in this document are furnished under a license and may be used or copied only in accordance with the terms of such license.

Restricted Rights Legend

If software is for use in the performance of a U.S. Government prime contract or subcontract, Software is delivered and licensed as “Commercial computer software” as defined in DFAR 252.227-7014 (June 1995), or as a “commercial item” as defined in FAR 2.101(a) or as “Restricted computer software” as defined in FAR 52.227-19 (June 1987) or any equivalent agency regulation or contract clause. Use, duplication or disclosure of Software is subject to Agilent Technologies’ standard commercial license terms, and non-DOD Departments and Agencies of the U.S. Government will receive no greater than Restricted Rights as defined in FAR 52.227-19(c)(1-2) (June 1987). U.S. Government users will receive no greater than Limited Rights as defined in FAR 52.227-14 (June 1987) or DFAR 252.227-7015 (b)(2) (November 1995), as applicable in any technical data.

Safety Notices

CAUTION

A CAUTION notice denotes a hazard. It calls attention to an operating procedure, practice, or the like that, if not correctly performed or adhered to, could result in damage to the product or loss of important data. Do not proceed beyond a CAUTION notice until the indicated conditions are fully understood and met.

WARNING

A WARNING notice denotes a hazard. It calls attention to an operating procedure, practice, or the like that, if not correctly performed or adhered to, could result in personal injury or death. Do not proceed beyond a WARNING notice until the indicated conditions are fully understood and met.

Specific Cautions

Do not use the test card for any other purposes or in any other way than described in this manual.

The test card may become hot during use. Do NOT touch any of the components on the test card. Do NOT place the test card on flammable surfaces during or after operation.

Trademarks

Windows®, Windows 2000®, and Windows XP® are U.S. registered trademarks of Microsoft Corporation.

Safety Symbols on the E2969A:

Indicates that antistatic precautions should be taken.

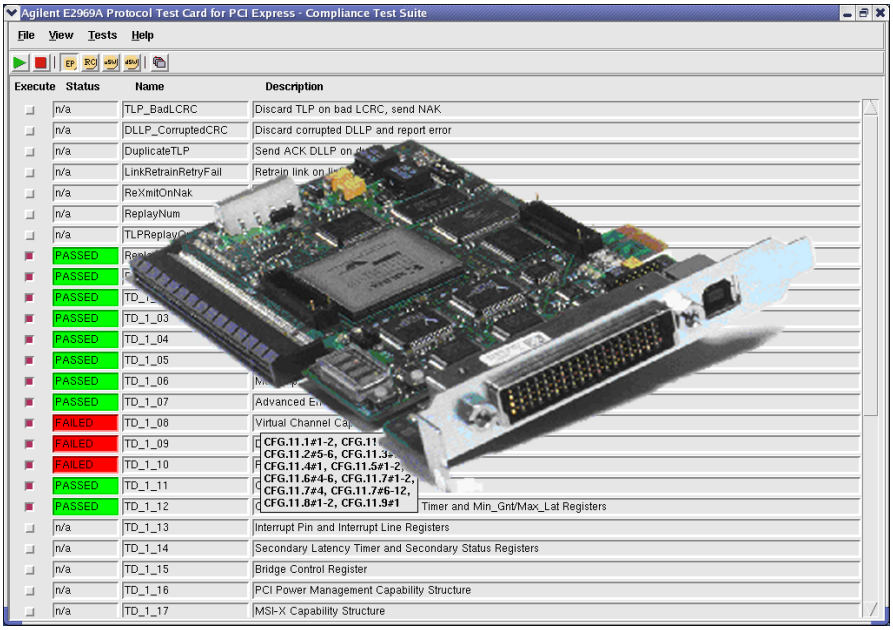
Indicates hot surfaces, please do not touch.

This product complies with the relevant legal directives.

Contents

Introduction

The Agilent E2969A protocol test card (PTC) is a combination of software and plug-in card that can be used for PCI Express compliance tests.



The PTC performs tests to verify and ensure compliance with PCI Express as defined by the PCI-SIG.

The card runs on a PCI Express x1 lane at 2.5 Gbit/s. It is plugged into one of the PCI Express slots of the target platform.

As an R&D engineer, you can use the PTC to validate the functional compliance of your PCI Express-based designs, including chips, add-in cards or systems.

The PTC provides a set of automated pre-programmed compliance tests for testing both transaction layer and data link layer as well as power management and configuration space. Furthermore, it monitors the

behavior of the DUT (device under test) in response to certain error conditions.

For more detailed analysis, the PTC provides a connector to Agilent's E2960 protocol analyzer. With the analyzer, you can monitor and analyze captured PCI Express traffic between an adapter card and a system, for example.

Further features include

- Field-upgradeable FPGA-based card
- USB 2.0 interface for programming and topology simulation mode
- Can act either as a PCI Express standalone add-in card, or as a PCI Express interposer card for x1 operation (not supported by the current release)
- Card controller via PCI Express or via an external host (not supported by the current release)

Test Modes

The protocol test card provides three test modes:

- Add-In-Card test mode
- Known Endpoint test mode
- Topology test mode

The test software provides a list of tests for each of these modes. You can select the mode and execute the tests from the graphical user interface.

NOTE The current version of the PTC only supports the Add-In-Card test mode. Known Endpoint test mode and Topology test mode will be supported by one of the next releases.

Add-In-Card Test Mode

In the Add-In-Card test mode, the PTC acts as a switch device between the target platform and another PCI Express add-in card (DUT). The DUT is plugged into the PCI Express slot on top of the PTC.

NOTE Though this slot is capable of accepting up to x16 cards, only x1 links are supported.

The tests in this mode check the correct behavior of the add-in card. The test software communicates with the PTC using PCI Express commands and performs various tests with the DUT.

In this mode it is necessary to power the PTC through the external power connector. Any standard ATX Power Connector can be used for this purpose.

Known Endpoint Test Mode

In the Known Endpoint test mode, the PTC behaves like a known endpoint device.

This mode is used for system testing. No other card can be plugged into the PTC in this mode. The PTC itself acts as known endpoint.

NOTE The current release does not yet include Known Endpoint tests.

Topology Mode

The Topology mode is used to test BIOS settings.

Controlled by software running on an external host connected through USB, the PTC pretends to behave like a variety of PCI Express devices. No other card can be plugged into the PTC in this mode.

All configuration accesses are handled via the software connected through the USB link. No other accesses or transactions are supported in this mode.

NOTE The current release does not yet include Topology Mode tests.

Installation

Test setups using the Agilent E2969A protocol test card (PTC) include the following components:

- Test card plugged into the target platform
- PTC software running on the target platform providing a graphical user interface used for controlling the tests and monitoring the test results
- Software utilities running on an extra administration PC connected to the test card through USB

This chapter shows how to install these components and verify their operation.

Prerequisites

The PTC supports the PCI Express Specification 1.0a only.

It is intended to be used standalone or as part of Intel's Product Development Kits (PDKs) for PCI Express Technology. The PTC integrates into the PDK Software environment and tests.

For the Add-In-Card test mode, the PTC must be plugged into a target platform, for example, the one provided with the Intel PDK.

PCI Express traffic must be scrambled as described in the PCI Express specification. Unscrambled data transfer is not supported.

The target platform must fulfill the following prerequisites:

- Red Hat Linux 9 installed, running the uniprocessor kernel
- “Kernel Development” package installed, including the Tk GUI toolkit for Tcl, with shared libraries
- at least one free PCI Express slot that can be configured to run as x1 PCI Express connection
- CD-ROM drive available

The administration PC must fulfill the following prerequisites:

- Windows 2000 installed
- USB connector available
- CD-ROM drive available

Installing the Software

The PTC comes with two software packages.

- Linux Software with the PCI Express compliance tests
- Windows Software for USB connection to update and check the card (administration utilities)

Both software packages are on the shipped CD.

Target Platform Software

The tests for PCI Express compliance run on the target platform itself and use the operating system Red Hat Linux 9.

Before installing the PTC software on the target platform, check the following:

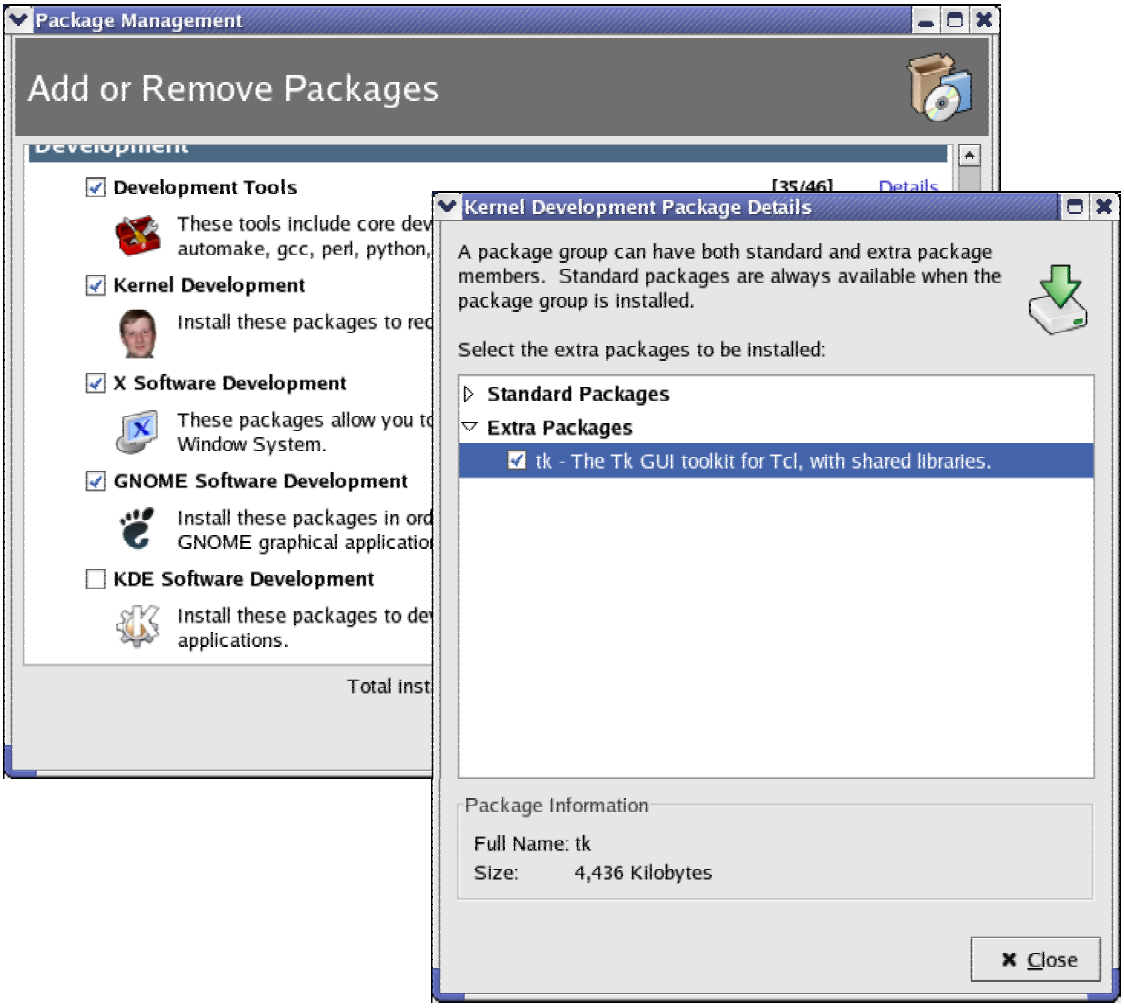
- Has the Red Hat Linux 9 operating system been installed properly?

  If not, proceed by installing the operating system. This software can be downloaded from
  http://ftp.redhat.com/pub/redhat/linux/9/en/iso/i386

  During installation, be sure to install the “Kernel Development” package, including the Tk GUI toolkit for Tcl, with shared libraries.

- At an existing installation of Red Hat Linux 9, check whether the “Kernel Development” package has been installed.

  Select “Add or Remove Packages” and look for the “Kernel Development” package in the “Development” group.



- When booting an existing installation of Red Hat Linux 9, be sure to start the uni-processor kernel.

  To check this at a running system, open a terminal window and type **`uname -a`**. If the output shows **`SMP`**, the multi-processor kernel has been started.

To install the target platform software:

1 Power up the target platform.

2 When Linux is being booted, start the uni-processor kernel.

At a multi-processor system, you are queried to select the kernel.

3 Log in to the system as **root**.

4 Open a terminal window to start installation.

5 Enter **mount /mnt/cdrom** to mount the CD-ROM drive.

6 Insert the PTC CD and enter the following command in the terminal window: **tar xvzf /mnt/cdrom/ptcgui-1.0.0.tar.gz**.

7 Enter **cd ptcgui-1.0.0**.

In this directory, you will find the files `install.sh` and a `README.TXT`. Check the readme file for latest information.

8 Enter **./install.sh** to start the installation.

The target platform software (graphical user interface) for controlling the tests is now ready to run.

After installation, make sure that the directory `/usr/local/bin` is included in your `path` variable.

NOTE The installation and the program itself can only be run by the root user. If you want other users to execute the tests, you have to manually set the necessary permissions on `/dev/ttpi_proxy_device`, `usr/local/bin/ptcgui.tcl`, and `/usr/local/lib/ptcgui/*`

NOTE No uninstall script is available for the target platform software. To uninstall the program, you have to manually delete all installed files. The files are installed in the following directories:

- `/usr/local/bin`
- `/usr/local/lib`
- `/usr/local/lib/ptcgui`
- `/dev`

Administration Utilities

The administration utilities must be installed on an administration PC running Windows 2000. The utilities communicate with the PTC through a USB connection.

NOTE Be sure to install the software *before* connecting the administration PC and the PTC with the USB cable.

To install the software on the administration PC:

1 Log in to the PC.

You need administrator rights to install the software.

2 On the CD, look for the zip file named `ptc-<version>.zip` and unpack it into a single directory on the hard disk.

The directory contains several batch files and one executable.

3 Run `install.bat`.

   This installs the USB device driver and .INF file.

4 Connect the PC with the PTC through the USB cable and power up the PTC (which means, power up the target platform).

The card should now be detected automatically (depending on the system speed this may take a while).

Installing the Hardware

CAUTION

The test card may become hot during use. Do NOT touch any of the components on the test card. Do NOT place the test card on flammable surfaces during or after operation.

To install the PTC in the target platform:

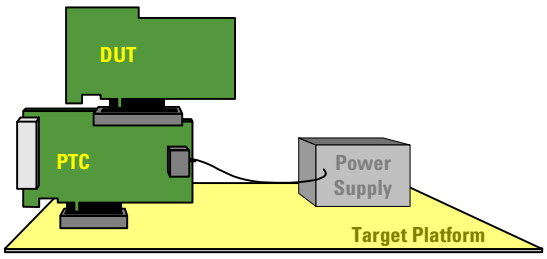
1 Power down the target platform.

2 Plug the test card into a free PCI Express slot.

   This slot must be configured to run as a x1 PCI Express connection.

   For the Add-In-Card test mode, it is necessary to power the PTC through the external power connector.

3 Connect the external power connector of the PTC to any free standard ATX Power Connector in the target platform.



Next, proceed to check the installation as described in the following section.

NOTE As described above, the test card is usually powered through a standard ATX Power Connector provided by the target platform. If you attempt to connect the test card to an external power supply, only use power supplies that adhere to the industry standard ATX power supply specifications.

Testing the Installation

After installing hardware and software as described above, you should test the installation before starting to test your devices. This section provides some hints:

- When powering up the target platform, watch the four-digit display on the test card. The numbers indicate the states of the internal link state machine.

  After some state switching, the four-digit should settle showing “xx10”.

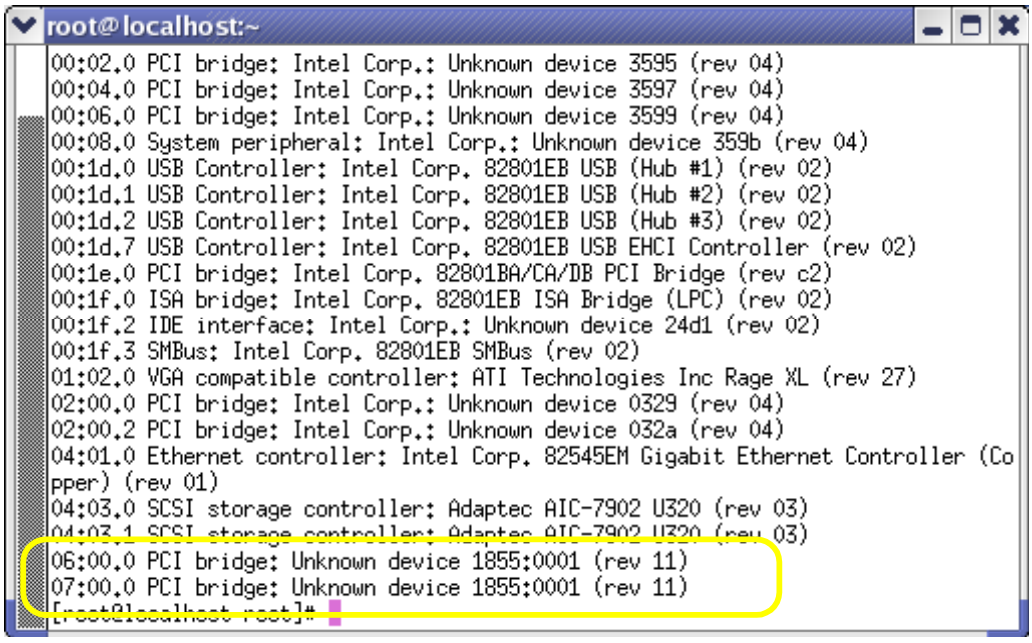
  The two digits on the right indicate the state of the link between the test card and the target platform. The digits “10” show that the link could be established.

If the display settles at any other number, an error has occurred (see *"Troubleshooting" on page 4-1*).

The left two digits indicate the state of the line between the test card and an add-in card plugged into the test card. If there is no card plugged onto the test card, this state is not relevant.

- While Linux boots up, make sure to start the uni-processor kernel and log in as root.

  Open a terminal window and enter **`lspci`** to get a list of all PCI devices found in the system. This list should contain two unknown devices with the vendor ID 1855, indicating the two bridges contained in the PTC:



- To test the communication between the PTC and the administration PC, connect both devices using the USB cable and use `PTC_STATUS.BAT` to retrieve a status message.

Working with the PTC

Using the PTC to test your devices requires different steps, described in this chapter:

- You have to set up the test hardware (plug your DUT onto the PTC).
- You have to launch the test software, connect to the DUT and execute the test.

Additionally, you may use the administration tools to check for firmware and FPGA versions, or to download new firmware images.

Setting up the Test Hardware

For setting up the test in Add-In-Card test mode, you have to plug the DUT (add-in card) into the PCI Express slot on top of the protocol test card.

CAUTION

The test card may become hot during use. Do NOT touch any of the components on the test card. Do NOT place the test card on flammable surfaces during or after operation.

To plug the add-in card onto the PTC:

1 Power down the target platform.

2 Plug the DUT on top of the PTC (already plugged in the target platform).

3 If required, connect the DUT to an external power supply.

The PCI Express power lines are routed through the PTC from the bottom connector to the top connector. Thus, the external power is only necessary if required by the DUT.

The test card is now plugged in between the target platform and the DUT.

4 Power up the target platform

5 When powering up the target platform, watch the numeric display on the test card.

The numbers indicate the states of the internal link state machine. After some state switching, the four-digit display should show “1010”.

The two digits on the right indicate the state of the line between the test card and the target platform. The digits on the left are for the line between the test card and the DUT. The digits “10” show that the line has been established successfully.

If the display settles at any other numbers, an error has occurred (see *“Troubleshooting” on page 4-1*).

6 To check whether the PTC is recognized correctly by the target platform, use the `lspci` Linux command to create a list of PCI devices in the system.

Using the Test Software

After setting up the test hardware, running the test is quite easy.

To start the test software:

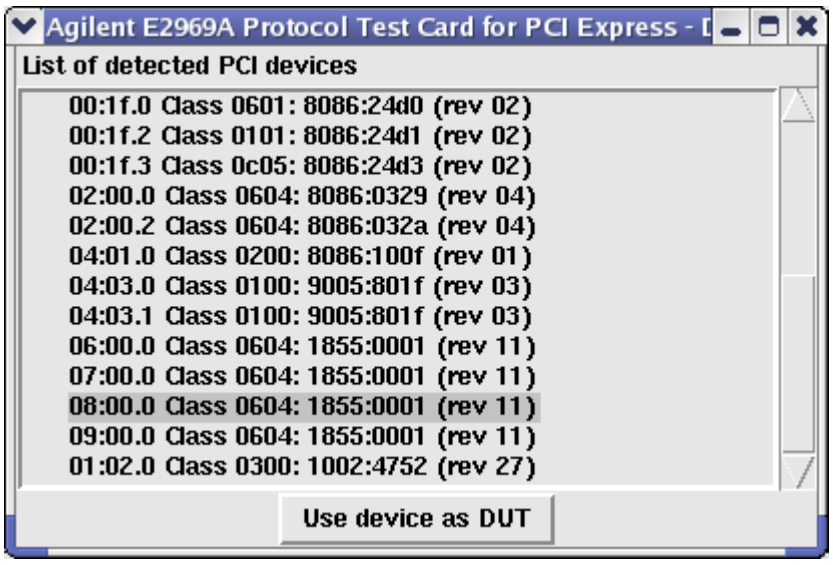
1 On the Linux desktop, press Alt+F2 to open a command window.

2 Enter **`ptcgui.tcl`** to start the test software.

To select the device to be tested:

1 Select the *View – Options* menu item.

2 In the Options dialog, click the *Choose from list* button.



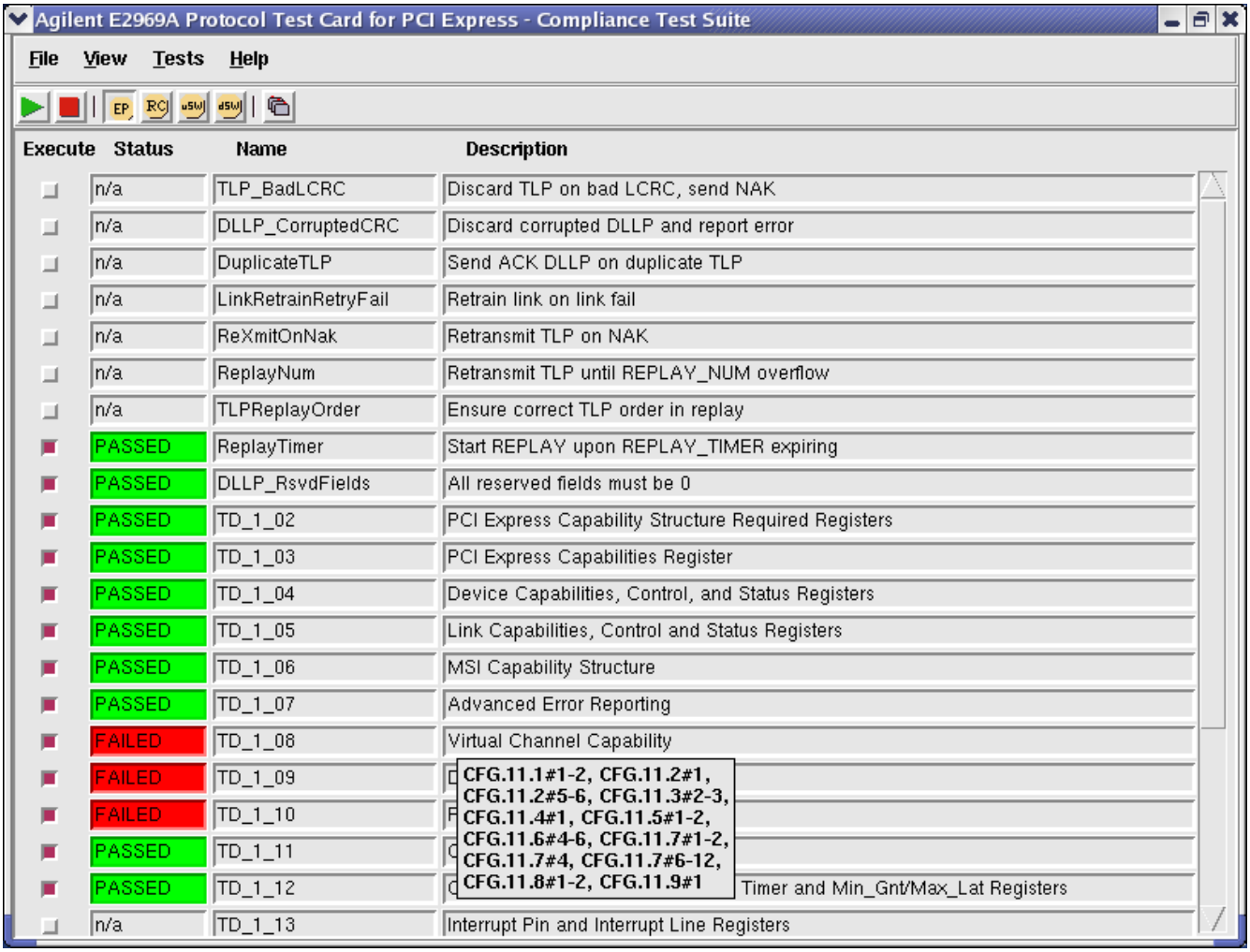
3 From the list of detected PCI Express devices, select your DUT and click the *Use device as DUT* button.

To select the tests to be executed:

1 In the main window, select the checkboxes in the *Execute* column to determine the tests to be executed.

2 Click the run button  .

The pass/fail results are shown for each test.



The tests are named and programmed as specified in the “PCI Express Architecture Switch Compliance Checklist for the PCI Express Base 1.0a Specification” and the “PCI Express Architecture Configuration Space Test Considerations” published by the PCI-SIG.

The name of each test is shown in the *Name* column, the individual rules addressed by the test are shown as a tool tip, when you place the mouse pointer over the description of the test.

If you need more details about a failed test, check the report:

♦ Select the *View – Report* menu item.

The report shows more details about test execution and test results.

NOTE To help you find the cause for any failed tests, the PTC provides a connector to Agilent's E2960 protocol analyzer. With the analyzer, you can monitor and analyze captured PCI Express traffic between the add-in card and the target platform, for example.

Administering the PTC

Several administration utilities are provided to ease the work with the PTC. They can be used when the PTC and the administration PC are connected via USB.

- PTC_UPDATE.BAT is used to update the firmware and the FPGA images on the card. Use this batch file to install new software packages loaded from the Agilent website.
- INSTALL.BAT installs the software, unpacks all zips files and installs the driver to connect to the PTC. This batch file is only used during installation.
- PTC_STATUS.BAT prints a few status lines on the screen to help identify the internal versions of firmware and FPGA images for the PTC. These numbers are intended to be used for debugging and support purposes.
- PTCDIAG.EXE returns the firmware and FPGA image version:
  - ptcdiag -v returns the firmware version
  - ptcdiag -V 0x610000 returns the build date of the FPGA image

NOTE The firmware version is also briefly displayed on the four-digit display when the PTC powers up (for example, “V114” means version 1.14).

Troubleshooting

This chapter provides troubleshooting suggestions that help you to resolve general problems in setting up the target platform and testing devices.

If the PTC does not link to the target platform properly (Digital display of PTC is not "XX10")

Description

When the target platform powers up, the four-digit display on the test card indicates the state of the internal link state machine.

The two digits on the right indicate the linking state of the PTC and the target platform. If the display settles at any other numbers than "XX10", an error has occurred. See *"Appendix" on page 5-1* for a list of all possible states of the internal link machine.

Possible Actions

Please try the following:

- Make sure that the PCI Express slot of the target platform is configured as a x1 PCI Express connection.
- To make sure that the linking problem is not caused by the DUT, check the linking state of the PTC only:

  Power down the target platform, pull out the DUT and power up the system again.

CAUTION

The PTC may become hot during use. Do NOT touch any of the components on the test card. Do NOT place the test card on flammable surfaces during or after operation.

If the PTC is still not linked correctly, proceed with the next step in this list.

- Check whether the PTC was found by the target platform:

  Open a terminal window and enter **`lspci`** to get a list of all PCI devices connected to the target platform.

  The list should display two unknown devices, indicating the two bridges contained in the PTC (see *"Testing the Installation" on page 2-8*).

  If the two required entries are not in the list, the PTC may not be plugged in correctly. Power down the target platform, take out the PTC and try to plug it in correctly.

- Disable the SSC (Spread Spectrum Clocking) mode in the BIOS settings.

If the PTC does not link to the DUT properly (Digital display of PTC is not "1010")

Description

When powering up the target platform, the four-digit display on the test card indicates the state of the internal link state machine.

The two digits on the left hand side indicate the linking state of the PTC and the DUT. If the display settles at any other numbers than "1010", an error has occurred.
See *"Appendix" on page 5-1* for a list of all possible linking states.

Possible Actions

Please try the following:

- Make sure the DUT applies to the PCI Express Specification 1.0a. PCI Express Specification 1.0 devices are *not* supported by the PTC.
- If possible, check the functionality of the DUT:

  Power down the target platform, remove the PTC, plug the DUT directly in the target platform, and power up the system again.

CAUTION

The test card may become hot during use. Do NOT touch any of the components on the test card. Do NOT place the test card on flammable surfaces during or after operation.

If the DUT is working properly, proceed with the next step in this list.

- To exclude malfunctions of the FPGA on board the PTC, you can set up the PTC so that it simply passes the electrical signal from the target platform through to the DUT—without any modification of the signal by the FPGA.

  To do so, power down the target platform, set the DIP switches to pass-through-mode (see *"Appendix" on page 5-1*) and power up the system again.

NOTE Before you continue testing, power down the target platform again and reset the DIP switches.

If the test software does not start

Description If the command for starting the test software was entered properly, but the GUI is not started, make sure that the "Kernel Development" package of Red Hat Linux 9 is installed, including the Tk GUI toolkit for Tcl.

Possible Actions To check for the Tk GUI toolkit and—if necessary—install it:

1. In the start menu (red hat), select "System Settings – Add or Remove Packages".
2. In the "Development" group look for "Kernel Development" and click *Details*.
3. If not done already, select "Tk GUI toolkit" and click *Update*.

If the DUT cannot be selected

Description If the device to be tested cannot be selected from the *Options* dialog, the DUT is either not plugged in correctly, or you are not logged in as root user.

Possible Actions Please try the following:

- Check whether the DUT is properly plugged into the PTC.
- Reboot the system and log on as root user.

If all tests fail

Possible Actions

If all tests executed by the PTC software fail and you are not sure, whether this is a problem of the DUT, check the following:

- Determine whether the link between the PTC and the target platform and the link between the PTC and the DUT have been established successfully (see above).
- Make sure the uni-processor kernel is started:

  Open a console window and type **`uname -a`**.

  If the output shows `SMP`, the multi-processor kernel has been started. Reboot the target platform and make sure to select the uni-processor kernel when queried in the booting process.

- Make sure that the Linux driver for the PTC is installed.

  Open a console window and type **`lsmod`**.

  If the output shows both `complib` and `ttpi_proxy`, the driver is installed. Otherwise you can load the driver subsequentially:

  Open a console window and enter the following two commands

  - **`insmod/lib/modules/2.4.20-8/misc/complib.o`**
  - **`insmod/lib/modules/2.4.20-8/misc/ttpi_proxy.o`**

  The Linux driver is now installed.

Still not working? / Other problems

If your problems are not described here, please visit
http://www.agilent.com/find/pci_express
for more information, or find your local support using
http://www.agilent.com/find/assist .

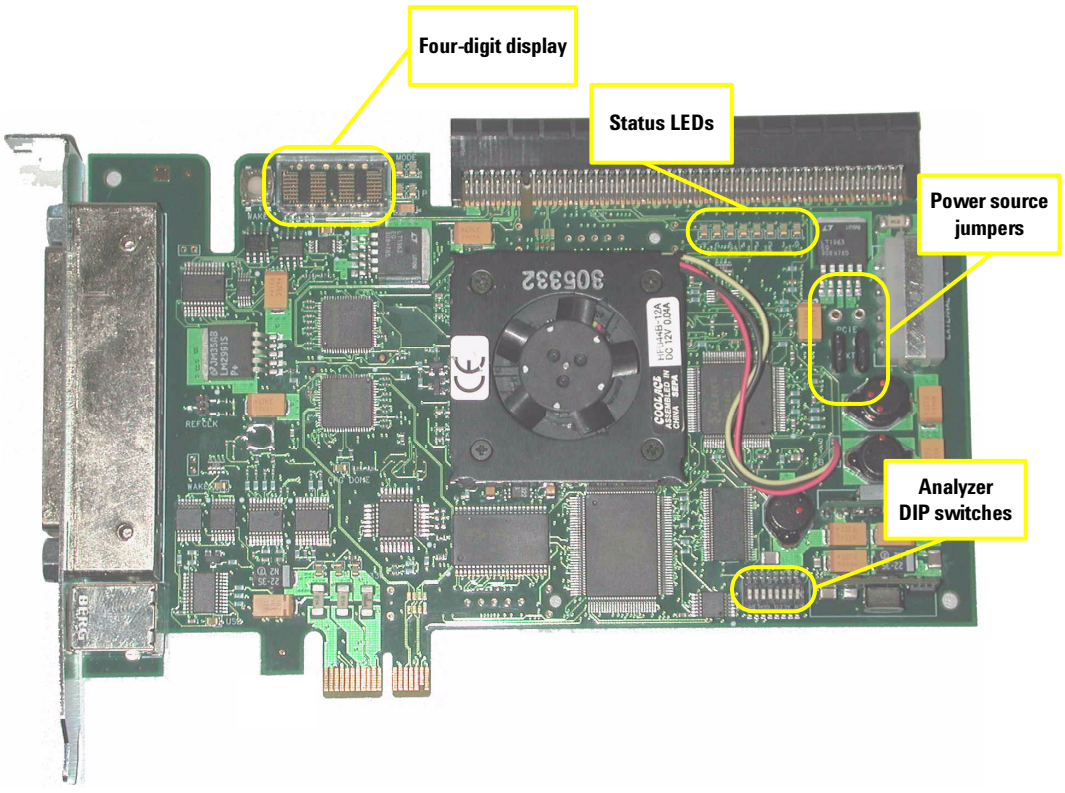
What should I do before calling the support?

Before calling, it is a good idea to run the batch file “PTC_STATUS.BAT” on the administration PC which is connected to the PTC through USB. It prints a few status lines on the screen to help identify the internal versions of the firmware and FPGA images for the PTC.

Appendix

Hardware Description

On the Agilent E2969A protocol test card, there are a number of control elements that you may use in certain test and troubleshooting situations.



Four-Digit Display

This four-digit numeric display indicates the states of the internal link state machine.

The two digits on the left represent the downstream link of the test card, the link between the test card and the add-in card plugged onto it.

The two digits on the right represent the upstream link of the test card, this is the link between the test card and the target platform.

When all links have been established successfully during boot up, the display shows “1010”. All other numbers indicate an error.

The following table shows the link states represented by the individual numbers:

Number in display	Link state
00	Detect.Quiet
01	Detect.Active
02	Polling.Active
03	Polling.Compliance
04	Polling.Configuration
05	Polling.Speed1
06	Polling.Speed2
07	Configuration.Linkwidth.Start
08	Configuration.Linkwidth.Accept
09	Configuration.Lanenum.Wait
0A	Configuration.Lanenum.Accept

Number in display	Link state
0B	Configuration.Complete
0C	Configuration.Idle
0D	Recovery.RcvrLock
0E	Recovery.RcvrCfg
0F	Recovery.Idle
10	L0
11	L0S
12	L123.Send.Idle
13	L1.Idle
14	L2.Idle
15	L2.Transmit.Wake
16	Disabled.Entry
17	Disabled.Idle
18	Disabled
19	Loopback.Entry
1A	Loopback.Active
1B	Loopback.Exit
1C	Loopback.Exit.Timeout
1D	Hot.Reset.Entry
1F	Hot.Reset

Status LEDs

The following table shows the meaning of the LEDs, when they are on:

Number of LED	Information	
0	Link up	upstream port towards target platform
1	Link activity	
2	(not used)	
3	(not used)	
4	Link up	downstream port towards DUT
5	Link activity	
6	(not used)	
7	FPGA is correctly loaded (LED is flashing)	

Power Source Jumpers

The two jumper on the PTC select the power source to be used *by the PTC*. The power *for the DUT* is always drawn from the system under test.

Both jumpers have to be set either up or down. Upward setting selects system under test for power supply, downward setting selects external power supply. For a detailed description, see “Power Distribution” below.

CAUTION

Do not change the jumpers while the test card or the target platform are powered.

Analyzer DIP Switches

The connector on the front plate of the PTC allows to connect the PTC to an Agilent E2960 protocol analyzer. The analyzer can be used to monitor the PCI Express traffic at one of the following points:

- between the target platform and the PTC (at the bottom connector)
- between the PTC and the add-in card plugged onto the test card (at the upper connector)

Of the eight DIP switches as shown in the picture above, the two switches on the left control these settings. All other DIP switches are for internal use only. Do NOT change their position.

The meaning of these two switches is as follows:

Switch 1	Switch 2	Meaning
0	0	The analyzer monitors communication between the PTC and the target platform.
0	1	Pass-through mode: PCI Express traffic between the target platform and the add-in card is simply passed through the PTC. The analyzer monitors communication between the add-in card and the target platform.
1	0	The analyzer monitors communication between the PTC and the add-in card.
1	1	For internal use only.

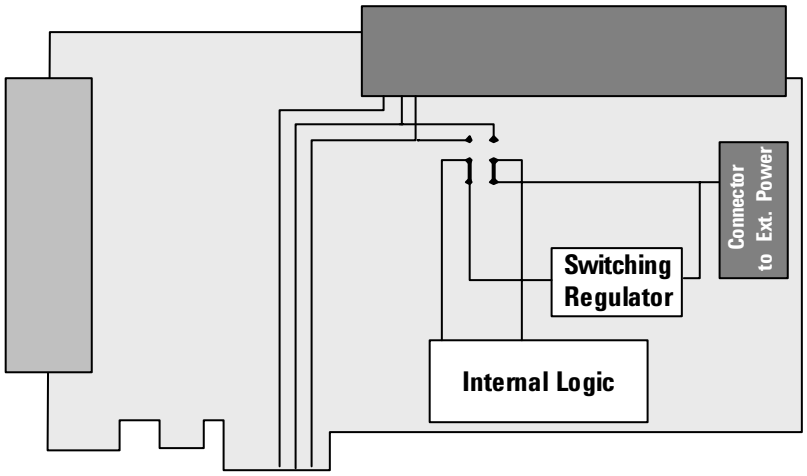
Power Distribution

The following picture shows an overview of how the power is distributed on the PTC.

The PTC can be powered by two sources alternatively:

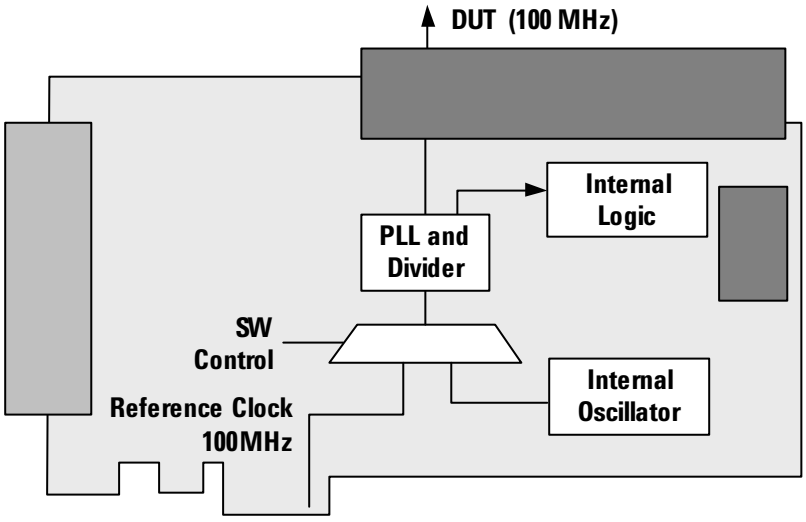
- by an external power supply (default)
- by the target platform through the PCI Express connector just as any other PCI Express card.

The following figure shows the power distribution in both cases:



Clock Distribution

The following figure shows an overview of the clock distribution.



The clock is generated using the system-provided 100 MHz PCI Express reference clock. However, there is also the possibility to use the internal clock oscillator if for some reason the system clock cannot be used. The reference clock and the internal clock are used for the internal logic of the PTC as well as for providing the clock to the DUT plugged onto the PTC.

To change the clock source use the administration tool `ptcdiag` on the administration PC connected to the PTC through USB.

To switch to the internal clock, enter the command: `ptcdiag -w 0xd818 0`

To switch back to the PCI Express reference clock, enter the command: `ptcdiag -w 0xd818 1`

After the next power down, the PCI Express reference clock will be used again automatically.

NOTE The PTC can be used with or without SSC in the target system.

Technical Specifications

General Specifications

Supported Protocol:	PCI Express Specification Version 1.0a
Lane width and speed:	PCI Express x1 link at 2.5 GB/s
Storage:	–10°C to 70°C
Operating Temperature:	0°C to 55°C
Mechanical Dimension:	Short card, occupying one slot.
Signal Loading:	PCI Express compliant
Power consumption:	Consumes less than 12W from PCIE-slot Compatible with 3.3 / 12V PCIE – x slot

PCI Express High Speed Parameters

In some parameters the PTC slightly differs from the PCI Express specification.

Differential Receiver Output Specification

Parameter	PTC Value	PCI Express Spec
Maximum Time for transition to a valid electrical idle	40 ms	20 UI
Electrical Idle differential peak output voltage	Initially 1.4 Volts, after 30 µs below 20 mV	20 mV

Differential Receiver Input Specification

Parameter	PTC Value	Spec requirement
AC Peak Common Mode Voltage	100 mV	150 mV
Powered Down DC Input Impedance	50 Ohms	200 kOhms
Electrical Idle Detect Threshold	Electrical Idle is simulated in turning off the receivers at the PTC	Between 65 and 175 mV

Agilent Technologies

DECLARATION OF CONFORMITY

According to ISO/IEC Guide 22 and CEN/CENELEC EN 45014

CE

Manufacturer's Name:	Agilent Technologies Manufacturing GmbH & Co. KG
Manufacturer's Address:	Digital Verifications Solutions (DVS) Herrenberger Str. 130 D-71034 Boeblingen

Declares under sole responsibility that the product as originally delivered

System Name:	Computer Verification Tools and Software products incl. options	
System Number:	E2920	
Product Names:	E2925B	PCI-Bus Exerciser/Analyzer; 32bit; 33 MHz
	E2926B	PCI-Bus Exerciser/Analyzer; 64bit; 33 MHz
	E2927A	PCI-Exerciser/Analyzer; 32/64bit; 66MHz
	E2928A	PCI-Exerciser/Analyzer; 32/64bit; 33/66MHz
	E2940A	Compact PCI Exerciser / Analyzer
	E2922A/E2922B	PCI-X Master Target Card; 64 bit; 133 MHz
	E2929A/E2929B	PCI-X Exerciser and Analyzer; 64 bit; 133 MHz
	E2969A	PCI Express Protocol Test Card
	E2991A	External Power Supply

complies with the essential requirements of the following applicable European Directives, and carries the CE marking accordingly:

- The Low Voltage Directive 73/23/EEC, amended by 93/68/EEC
- The EMC Directive 89/336/EEC, amended by 93/68/EEC

and conforms with the following product standards:

EMC (Technical Construction File)

The product herewith complies with the requirements of the EMC Directive 89/336/EEC (including 93/68/EEC) and carries the CE Marking accordingly (European Union).

Against: EMC test specification EN 55011:1998 (Group 1, Class A)
As detailed in Electromagnetic Compatibility (EMC) Certificate of Compliance No. 00-143
Assessed by: CETECOM GmbH, D-45219 Essen

	Standard	Limit
EMC	IEC 61326:1997+A1/1998 / EN 61326:1997+A1/1998	
	CISPR 11:1997 / EN 55011:1998	Group 1 Class A
	IEC 61000-4-2:2001 / EN 61000-4-2:2001	4kV CD, 8kV AD
	IEC 61000-4-3:2001 / EN 61000-4-3:2001	3 V/m, 80-1000 MHz
	IEC 61000-4-4:1995+A1:2000+A2:2001 / EN 61000-4-4:2002	0.5kV signal lines, 1kV power lines
	IEC 61000-4-5:2001 / EN 61000-4-5:2001	0.5 kV line-line, 1 kV line-ground
	IEC 61000-4-6:2001 / EN 61000-4-6:2001	3V, 0.15-80 MHz
	IEC 61000-4-8:2001 / EN 61000-4-8:2001	30A/m
	IEC 61000-4-11:2001 / EN 61000-4-11:2001	1 cycle/100%
	Canada: ICES-001:1998	
	Australia/New Zealand: AS/NZS 2064.1	
Safety	IEC 61010-1:2001 / EN 61010-1:2001	
	Canada: CSA C22.2 No. 1010.1:1992	
	USA: UL 3111-1:1994	

Supplemental Information:

The product was tested in a typical configuration with Agilent Technologies test systems.

2004-March-11
Date

Hans-Martin Fischer
Name
Product Regulations Representative
Title

For further information, please contact your local Agilent Technologies sales office, agent or distributor.
Authorized EU-representative: Agilent Technologies Deutschland GmbH, Herrenberger Strasse 130, D-71034 Boeblingen, Germany

Revision: E Issue Date: 2004-March-11

Printed in Germany March 2004

E2969-91020

Agilent Technologies