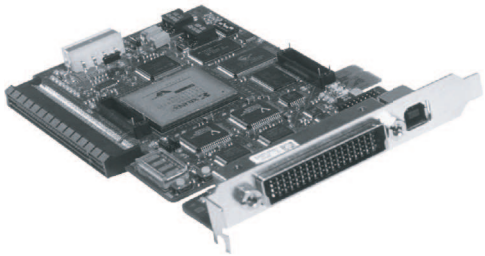
# Agilent Technologies E2969A Protocol Test Card for PCI Express

Datasheet



**The Protocol Test Card is a collaborative development between Agilent and Intel and coincides with the Intel product development solutions for PCI Express**

## Key Specifications

- **Automated pre-canned compliance tests for the Transaction Layer and the Data Link Layer and configuration space**
- **Graphical User Interface**
- **Carefully monitors the behavior of the DUT in response to certain error conditions**
- **Optional connection to E2960 Protocol Analyzer for debugging**
- **Known endpoint and switch functionality**
- **Field upgradeable FPGA-based card**
- **USB 2.0 interface for field upgrade and Topology Simulation mode**
- **x16 Connector allows up to PCI Express x16 add-in cards to be tested**
- **Can act either as a PCI Express standalone test card, or as a PCI Express interposer card for x1 operation with E2960 Series test tools for PCI Express**
- **Card controlled via PCI Express**

## Agilent Technologies E2969A Protocol Test Card for PCI Express

The E2969A is a Protocol Test Card for PCI Express, which performs tests in order to verify and ensure compliance with PCI Express specifications as defined by the PCI Special Interest Group (PCI-SIG). The protocol test card is a collaborative development between Agilent and Intel and coincides with the Intel product development solutions for PCI Express. In addition, the card also guarantees the interoperability of the DUT with other PCI Express devices. It is developed primarily for use by R&D engineers who wish to validate the functional compliance of their PCI Express based designs, including chipsets, add- in cards or systems. The card is simply plugged into a PCI Express slot in the system under test and is ready for use as soon as the software has been installed. The card is used for testing PCI Express 1x at 2.5 Gbit/s. However, the test card has a PCI Express x16 connector allowing up to PCI Express x16 add-in cards to be tested.

The card supports following operating modes:
- Add-in-card test mode
- Known Endpoint Test mode (KEP)
- Topology Simulation mode

The three test modes provide pre-programmed tests which are executed by means of a Graphical User Interface (GUI). The modes can be selected either via the software (in the GUI) or by setting a dipswitch on the card.

The PTC supports the PCI Express Specification 1.0a.

### Benefits

- Cost-effective
- Easy- to-use “push-button” solution
- Pre-programmed tests
- Improves the design quality of products and accelerates time to market
- Allows x1, x4, x8 & x16 cards to be plugged in

## Test Modes

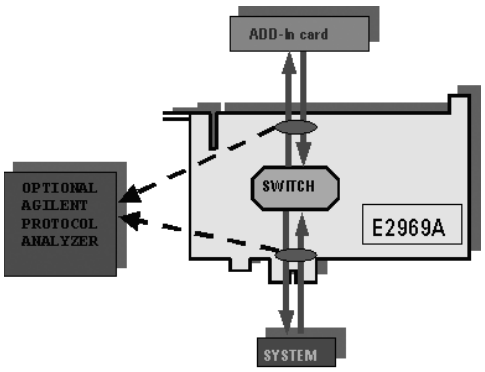



**Figure 1. Add-In Card Test Mode**

In this mode the PTC is inserted between the system and a PCI Express add-in card to be tested. The Protocol Test Card now acts as switch device between the system and the PCI Express add-in card (the Device Under Test, DUT). The DUT is inserted into the PCI Express slot on top of the Protocol Test Card. The top connector is capable of accepting up to x16 PCI Express cards, however, these will be tested in PCI Express x1 mode. The tests in this mode are used to check the correct behavior and functional compliance of the PCI Express add-in card (DUT). The test software communicates commands to the PTC via PCI Express and performs various tests on the DUT. In this mode it is necessary to power the PTC using the external power connector. A standard AT/ATX Power Connector can be used for this purpose.

The GUI of the PTC monitors the behavior of the add-in card, its device drivers and OS in response to a range of inserted errors.

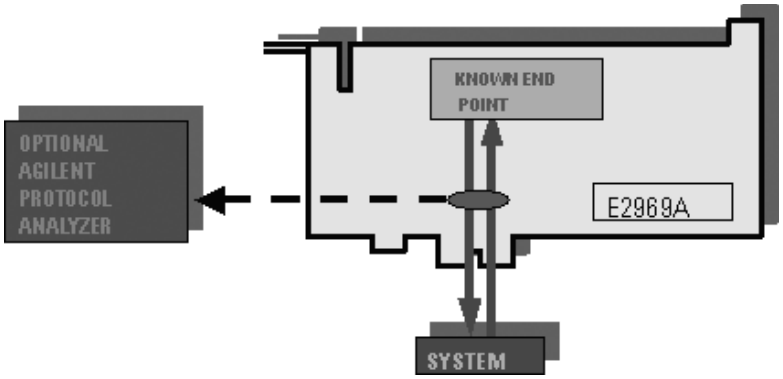



**Figure 2. Known Endpoint Test Mode(KEP)**

In this mode the Protocol Test Card behaves like a known endpoint device. This mode is used for testing chipsets. No other card can be inserted into the Protocol Test Card in this mode. The Protocol Test Card itself acts as a known endpoint. The tests in this mode monitor the behavior of the platform.

**Note: Test to support this mode will be available in July 2004**

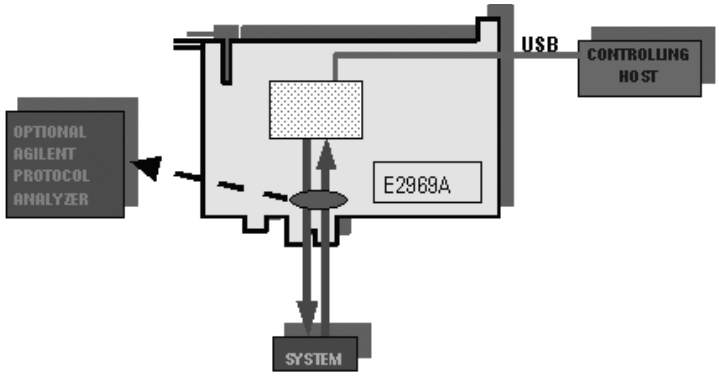



**Figure 3. Topology Simulation Mode**

This test mode is where the Protocol Test Card appears as a complex PCI Express topology. It aids in verifying the PCI Express compliance of the BIOS, and that it is able to detect and initialize a complex PCI Express topology correctly.

**Note: Test to support this mode will be available in May 2004**

## Add-in card tests

**Please refer to the PCI-SIG compliance checklist for PCI Express for complete test descriptions. The current tests available on the Protocol Test Card cover a subset of the tests mentioned in the PCI-SIG compliance checklist for PCI Express.**

**Over time, new tests will be added to the Protocol Test Card. These tests will be available for download from the Agilent website www.agilent.com/find/E2960_series**

## Known Endpoint Tests

**These tests are currently under development and will be available for download from the Agilent website www.agilent.com/find/E2960_series**

**Note: Tests to support this mode will be available from July 2004**

## Topology Simulation Mode

**These tests are currently under development and will be available for download from the Agilent website www.agilent.com/find/E2960_series**

**Note: Tests to support this mode will be available from May 2004**

## Software

The Protocol Test Card is supplied with two different software packages:

- The test software which runs under Linux Software with the PCI Express compliance tests
- Additional tools for checking and updating the Protocol Test Card which runs under Windows via the USB connection.

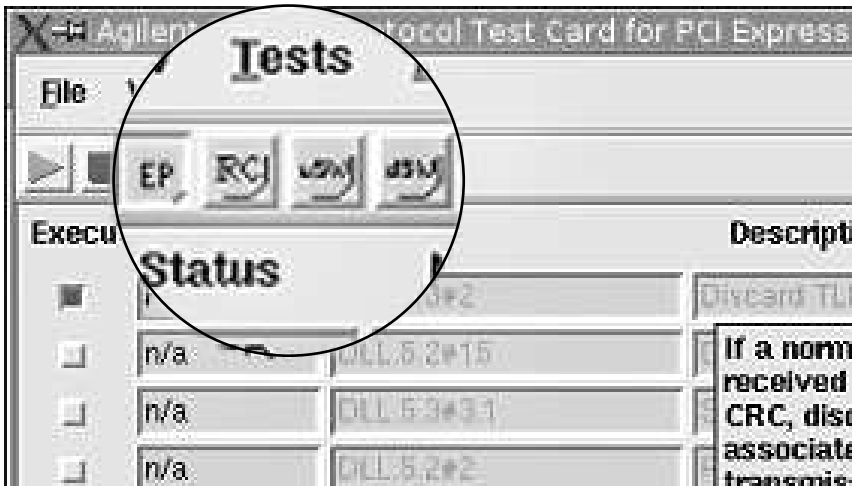



Figure 4. Test mode selection

## Graphical user interface

The Graphical User Interface allows the user to select tests and execute them.
There are two main windows available in the GUI:

All tests in the corresponding mode (add-in card and known end point) are listed with name and description relative to the PCI Express Specification. In the description field, tool tips provide a detailed description of each test. Individual or groups of tests can be selected and are executed using the run button. After running the tests, the GUI shows the status of each test by indicating green for passed and red for failed. For more details on the tests, the report window should be selected.

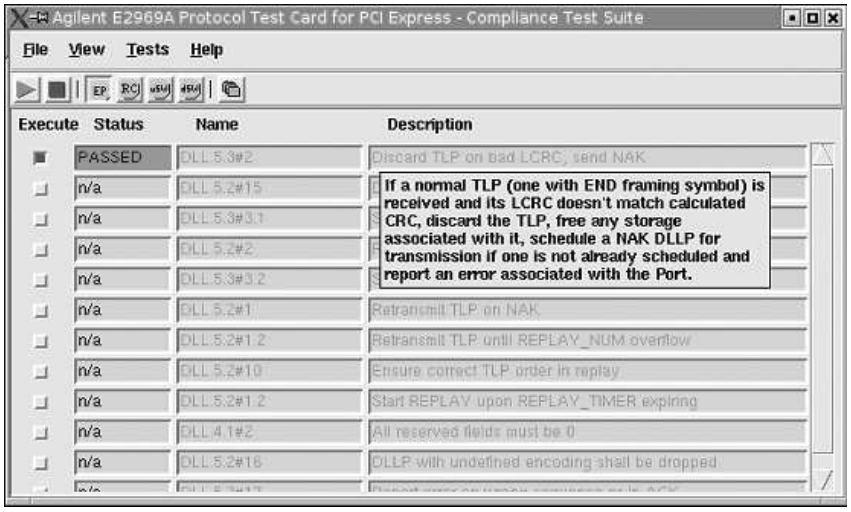



**Figure 5. Main window showing list of compliance tests where individual tests or groups of tests may be selected**

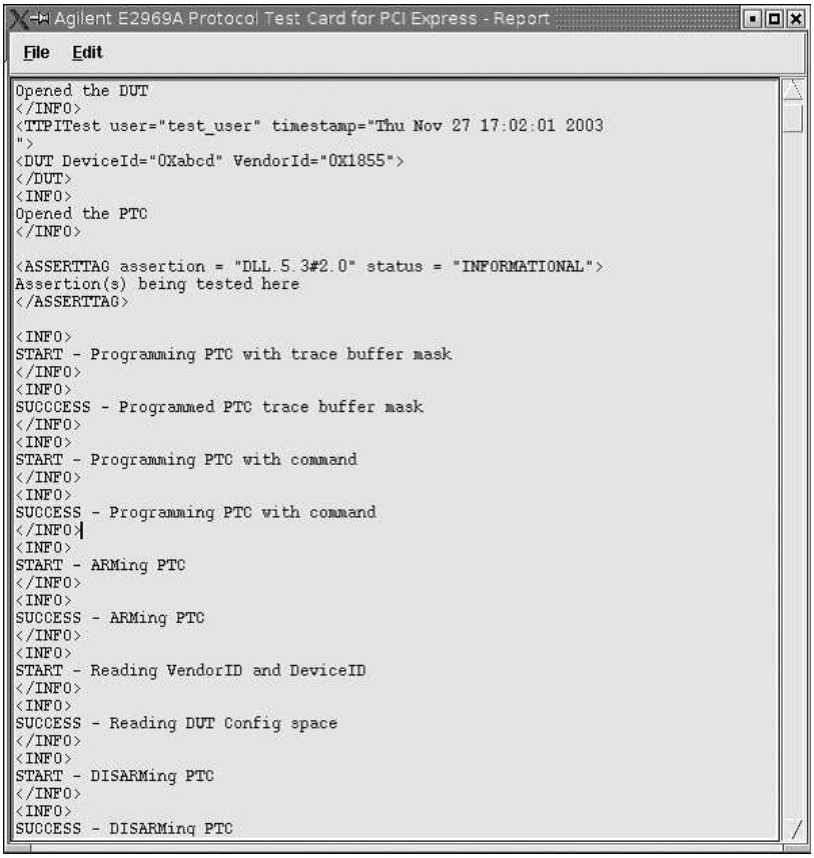



**Figure 6. Report window**
**More detailed results of the selected and executed tests will be displayed in the report window.**

## Specifications

### PCI Express Support

- PCI Express x1
- PCI Express specification version 1.0a
- 2.5Gb/s

### PCI Express High Speed Parameters

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

**Table 1: Differential Transmitter Output Specification**

| Parameter | PTC Value | PCI Express Spec |
|---|---|---|
| Maximum Time for transition to a valid electrical idle | 40 µs | 20 UI |
| Electrical Idle differential peak output voltage | 1.2 V | 20 mV |

**Table 2: 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 detection is not threshold based. | Between 65 and 175 mV |

### Interfaces

- PCI Express x1 edge connector on the bottom to plug into a system
- PCI Express x16 connector on top allowing add-in cards up to x16 to be inserted
- Standard soft touch midbus probe connection on both system and add-in card sides
- Connector for Agilent E2960 Protocol Analyzer for PCI Express
- USB 2.0 connection-used to update the firmware of the card

### Power

- Max power consumption 25 Watt
- Alternative external power connection for standard AT/ATX power supply

### Physical Dimensions

- Occupying one slot
- Storage:-10°C-70°C
- Operating: 0°C-55°C

### System Requirements

### PCI Express System

- Operating System: Red Hat Linux Version 9

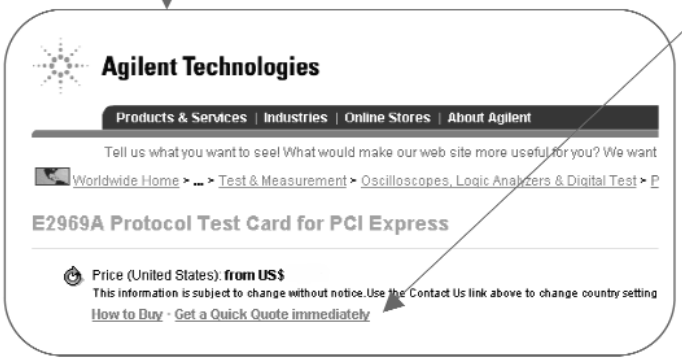
### Jumpers

There are two jumpers to select the power source for the Protocol Test Card. The power for the device under test (in add-in card mode) is always drawn from the system under test.

## Order Guide

**Three ways to get a quote:**

1. Electronic **quick quote**




**How to get a quick quote and how to order:**

1. Enter the following link into your web browser: **www.agilent.com/find/E2969A_PTC**
2. Click on "Get a quick quote immediately".
3. Fill in the form.
4. Submit form.
5. After several minutes you will receive a quote via email.
6. Please contact the Agilent Call Center, as mentioned in the quote, when you wish to place an order. When contacting the Agilent Call Center please provide your individual quote number.

2. Contact the **local Agilent Call Center directly** (contact details are below)

3. Contact your **local Agilent sales representative** for detailed information

Agilent offers a complete selection of test equipment for PCI Express (Protocol Analyzer/Exerciser, Logic Analyzer, Scopes, Chip Tester, Pulse Pattern Generators, etc.). More details can be found at: **www.agilent.com/find/pci_express**

The **Protocol Analyzer** is the complementary tool for the E2969A Protocol Test Card to quickly analyze and find the root cause of potential issues detected with the Protocol Test Card. The E2969A includes a connector for the Protocol Analyzer and a midbus probe footprint for Protocol Analyzers and Logic Analyzers. More details on the Agilent Protocol Analyzer can be found at: **www.agilent.com/find/E2960_series**

| Related Literature | Pub No. |
|---|---|
| · Agilent Technologies' Serial Protocol Tester XC, Brochure | 5989-0159EN |
| · Agilent Technologies' E2960 Series Protocol Exerciser & Protocol Analyzer for PCI Express, Datasheet | 5988-8679EN |
| · Agilent Technologies' Protocol Test Card for PCI Express E2969A, Photo Card | 5988-9502EN |
| · Agilent Technologies PCI-Express Tools from the physical Layer to a fully operating system, Brochure | 5988-7780EN |

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Printed in Germany March 18th 2004
**5989-0878EN**

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