PEX 8548 RDK Interoperability Test Report

Interoperability Lab

Version 1.0

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1 PURPOSE

This test report details interoperability procedures and results for the PEX 8548 switch RDK (Rapid Development Kit).

2 PRODUCT INFORMATION

The ExpressLaneTM PEX 8548 device offers 48-lane PCI Express switching capability conforming to the latest revision of the PCI Express Base specification. This device enables users to add scalable high bandwidth, non-blocking interconnects to a wide variety of applications including servers, storage systems, communications platforms, blade servers, and embedded-control products. The PEX 8548 can be used as a fan-out, aggregation, or peer-to-peer switch, and is equally suited for fabric backplane applications.

3 SCOPE

3.1 Test Phases

There are three test phases as defined below:

Phase 1: Motherboards and System BIOS Testing – This phase ensures the PEX 8548 RDK is properly detected and works with different motherboard chipsets, CPUs, BIOS, and drivers.

Phase 2: Endpoints Testing – This phase consists of testing with endpoint devices, such as video adapter cards, Ethernet network cards, storage controllers and TV tuners.

Phase 3: Chip-to-chip Interoperability and WHQL Certification – This phase tests multiple PEX 8548 RDKs, and other bridge or switch RDKs. Microsoft WHQL certification for a selected video card is done as well.

One or more of the following Microsoft operating system may be used as the software platform:

- Windows XP Professional
- Windows Server 2003
- Windows Server x64 for 2003
- Windows Vista

Note: It is not possible to test every combination of endpoints, BIOS versions, motherboard chipsets and drivers. However, the test cases below are selected carefully to ensure the widest interoperability coverage of our RDKs. Refer to the test checklists attached for the exact configurations and actual test results.

3.2 Test Omissions and Assumptions

The following RDK features are not tested as part of interoperability.

1. Hot-Plug Tests - Hot-Plug functionality of the switch RDK has been successfully tested by the validation teams. At this time, however, most system BIOS, device drivers and operating systems (including Windows Vista) have not together fully support seamless

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hot-plug at the interoperability level. The interoperability lab will retest this key function as better support becomes available.

2. Power Management Tests: Power management is tested as part of Microsoft's WHQL certification.

3. Serial EEPROM Tests – In-depth serial EEPROM tests are tested as by the validation teams. For interoperability, the EEPROM functions are used and tested within the context of the PEX Device Editor software.

4. JTAG Header - JTAG is not used for interoperability.

5. Targeted WHQL Certification – WHQL certification is done using one (1) selected video card as an endpoint. System certification and qualifying other endpoints, such as ethernet cards, SCSI and FC HBAs are outside the scope of this document.

6. Linux and other UNIX flavors - there are no industry-standard test suites available for Linux PCI-Express components. Also, Linux flavors require building and compiling separate drivers specific for the application.

4 PRETEST REQUIREMENTS

4.1 Collateral

The following items are required to complete the tests.

1. PEX 8548 RDKs - See Hardware Reference Manual
2. SDK 2.1: - Low-Level Application Software for Bridge/Switch Devices
3. System Platforms: - See Motherboards and Systems List.
4. Video Adapters:
   - ATI VisionTek 9250 PCI
   - Matrox Millenium P650 PCI-Express
   - Nvidia NVS 440 PCI-Express
   - Nvidia GeForce MX4000 PCI
   - ATI Radeon Pro x1600 PCI-Express (WHQL certification only)
5. Ethernet Adapters:
   - Intel Gigabit Ethernet PCI-Express (Ophir)
   - Intel Gigabit Ethernet PCI-X
   - Broadcom Nextreme PCI-Express
   - Broadcom Nextreme PCI-X
   - SysKonnect 9E21D PCI-Express
   - SysKonnect 9S21D PCI-X
6. SCSI HBAs: - LSI Logic 22320 PCI-Express
7. FC HBAs: - Qlogic QLA2462 PCI-X

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- Qlogic QLA2432 PCI-Express
- Emulex LPE11002 PCI-Express

8. TV tuners: - Hauppauge Win TV 2000 TV Tuner
9. Other RDKs - PEX 8114BB Forward Bridge
   - PEX 8111 Forward Bridge
   - PEX 8533 Switch

4.2 Other Documentation

The test procedures assume the tester has fully read the following documentation first:

1. Hardware Reference Manuals
2. PEX SDK Release Notes
3. PEX 8XXX -- PLX Switches/Bridges RDK Interoperability Design Note
4. Installations guides of the endpoints. See the manufacturers' latest product updates.

4.3 Software and Identification Information

Proper interoperability testing requires documenting test environments and setups. Some key information include: software and driver versions, system BIOS settings, RDK configurations (jumpers and switch settings), PCBs identifications, chip markings and auxiliary software utilities.

Use the attached Software and Hardware Identification Information sheet and completely fill out the exact hardware and software used.

4.4 System BIOS Settings

Modern PC test system have system BIOS that allows configuring specific settings. These settings, ranging from video displays to power management allow taking advantage of powerful hardware features.

It is critical that the System BIOS is properly configured. RDKs may not work at all or work in an unpredictable, if the settings are incorrect or suboptimal. See the Design Note PEX 8XXX -- PLX Switches/Bridges RDK Interoperability for more information.

To access the system BIOS, reboot the system and either hit the ESCAPE key or F1 key or F2 key or DELETE key (different BIOS have different access keys) BEFORE the Windows operating system loads. Verify that the BIOS parameters are set to the values below.

After changing the BIOS parameters, remember to SAVE THE SETTINGS (typically select the F10 key). Reboot the system to reinitialize the BIOS which then loads Windows normally.

System #	Bios Revision	Category/Subcategory and Parameter Settings
1	Phoenix Award BIOS v6.00PG 7100NMS V3.7 123104	PnP/PCI Configuration → Primary Graphic Adapter [First PCIE] → Maximum Payload Size [128] Cell Menu → PCI-E Spread Spectrum [Disabled] → PCIE Clock [100]
2	Phoenix Server 3 BIOS V6.; X6DAE-G BIOS Revision 1.2	Advanced --> Default Primary video --> PCI-e x16 → PCI-Exp x4 Slot #4 --> Option ROM Scan [Enabled] → Enable Master [Enabled] → Latency timer [Default] --> Advanced Chipset Control --> PCI-e x16 BIOS workaround [Enabled]
3	Award AX8 BIOS 11 Version: 11K8T890-8237	Advanced Chipset Features → Init Display First [PCI Ex] → PnP/PCI configurations → Max Payload Size [128]
4	Phoenix Award BIOS V6.00PG NVIDIA BIOS V4.9x 4/26/2005-NF-CK804-6A61FS02C-00	Advanced Chipset Features → System Performance [Optimal] → PCI-E Spread Spectrum [Disabled] Integrated Peripherals → Init Display First [PCI Express]
5	AMI BIOS SE7520BD2.86B. P.08.20.0072	Advanced → PCI configuration → Dual Mode Video [Disabled] Integrated Peripherals → Init Display First [PCI Express]
6	AMIBIOS, P5GDC-V Deluxe ACPI BIOS Revision 1011.006	Advanced → Chipset → Graphic Adapter Priority [PCI-Express/ Int–VGA] → PEG buffer length [Auto] → Link latency [Auto] → PEG Root control [Auto] → Slot Power [Auto]
7	Phoenix AWARD BIOS V6.00PG 2/10/05-i925x-W83627-6A79FA19C-20	Advanced Chipset Features → PCI Express Root Port Function → PCI Express Port 1 [Auto] → PCI Express Port 2 [Auto] → PCI Express Port 3 [Auto] → PCIE Compliancy Mode [v1.0a] → Init Display First [PCIEx] PnP/PCI Configurations → Maximum Payload Size [128]

8	Phoenix AWARD BIOS V6.00PG; P8SGA BIOS Revision 1.1; 03/29/2005-Grantsdale-6A79DSX9C-00	Advanced → Advanced Chipset Control → PEG/PnP chip VGA Control [PEG Port] → PnP/PCI Configurations → Init display First [PCI-Exp] → Maximum Payload Size [128] → PCI-Express Root Port Function → PCI Express Port 1 [Auto] → PCI Express Port 2 [Auto] → PCI Express Port 3 [Auto] → PCI Express Port 4 [Auto] → PCI E Compliancy Mode [v1.0a] → Process & Clock Option → Spread Spectrum [Disabled]
9	Phoenix AWARD BIOS V6.00PG; V3.8 07/21/2005	Advanced Chipset Features → LDT & PCI Bus Control → LDT configuration [ENABLED] → Upstream LDT Bus Width [16 bit] → Downstream LDT Bus Width [16 bit] → LDT Bus Frequency [800 MHz] → PCI Reset Delay [Disabled] → Spread Spectrum [Disabled] Integrated Peripherals → Init Display First [PCI-E] PnP/PCI configuration → Maximum Payload Size [128]
10	Phoenix Award BIOS Revision 6.00PG; 1/23/2006-i955-W627EHF-6A79IA1AC-16	Advanced Chipset Features → PCI Express Root Port Function → PCI Express Slot 1 [Auto] → PCI Express Slot 2 [Auto] → PCI Express Compliancy Mode [v1.0a] → PEG Force x1 [Disable] → Init Display First [PCI-e] PnP/PCI Configuration → Maximum Payload Size [128]
11	Phoenix AWARD BIOS V6.00PG; Intel I945 BIOS 8I945P-G2 F10	MB Intelligent Tweaker [MIT] → PCI-E Overvoltage Control [Normal]

12	Phoenix Award BIOS V6.00PG; 04/25/2005-M1695+M1567-6A7400-AC-00	Integrated Peripherals → Init Display First [PCI Express] PnP/PCI Configurations → PCI BAR Above 4 GB [Enabled] → Maximum Payload Size [128] Frequency/Voltage control → Programming Clock Generator [Enabled] → CPU Clock [200] → PCI-E Clock [100] → Spread Spectrum [Disabled]

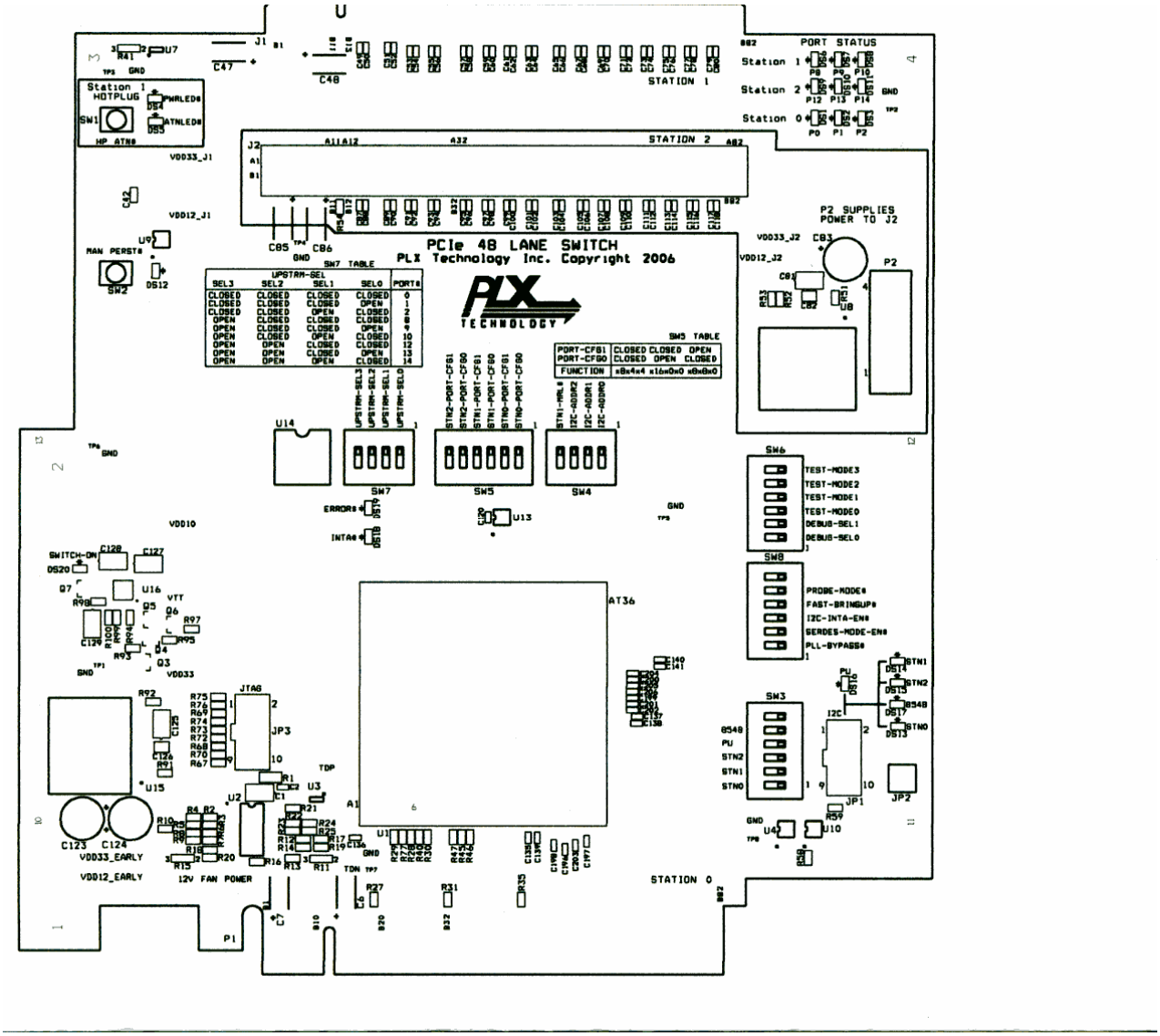
14	AMI BIOS WPLI751.86P 10/13/2005 SMBIOS v2.3	Chipset → Northbridge configuration → Integrated Graphics Options → Primary Video Device [External PEG] → PCI Express configuration → Northbridge PCI Express → PEG Port [Auto] → PEG Scrambler Bypass [Disabled] → PEG Force x1 [Disabled] → PEG Link Disabled [Disabled] → PEG Isoch Flush Page [Enabled] → PEG Active State PM [Disabled] → PEG Endpoint Active State PM [Disabled] → SERR # on Non-Fatal Error [Disabled] → HNR Stability Algorithm [Enabled] → Southbridge PCI Express → PCI Express PME SC1 Enabled [Enabled] → PCI Express (1-6) [Enabled] → Root Port ASPM [L1/L0s] → DMI Active State PMI [L0s] → VCI for HD Audio [Enabled] → Northway Training W/A [Auto] → Northway S4 W/A [Disabled] → Select System/Device Setup → Select Port to Control [All Ports] → Device Control Register → Correctable Error Reporting [Enabled] → Non-Fatal Error Reporting [Enabled] → Fatal Error Reporting [Enabled] → Unsupported Req Error Reporting [Enabled] → Root Control Register → Correctable Error Reporting [Enabled → Non-Fatal Error Reporting [Enabled] → Fatal Error Reporting [Enabled] → PME Interrupt Enabled [Enabled] → PCI Express Wake [Enabled] → PCI Express SCI [Enabled] → Completion TimeOut (CTD) [Enabled] → VC1/TC MAP [TC7] → Remove Non-POR TCs from VC0 [Enabled] → LOCK PCIe Credits Registers [Disabled]

15	Phoenix Ltd 6.00 PG 10/11/2005 SMBIOS 2.2	PnP/PCI configurations → Init Display First [PCI Express] → Maximum ASPM supported [Los & L1] →Maximum Payload Size [128\ Frequency → Spread Spectrum [Disabled] → Auto Detect PCI Clock [Enabled]
17	DELL Bios Revision A07 (03/15/06)	Onboard Devices → Integrated NIC → On x/ PXE Video → Primary Video Power Management → Suspend Mode → S3 Maintenance → SERR DMI Message → Off POST Behavior →POST Hotkeys → Setup & Boot Menu
18	Intel BIOS CV92510A.86A.0477	Advanced → PCI Express Configuration → PCIE x16 Link Retrain [Enabled] → Link Stability Algorithm [Enabled] → Compliance Test Pattern [Enabled] → Video Configuration → PCIE Graphics [PEG]
19	AMI BIOS 2.58 ver 08.00.12 Build Date 03/14/06 AMMT_B14	Chipset --> PCI Express Configuration --> PCIE GFX1 Link Width [x16] --> PCIE GFX2 Link Width [x16] --> PCIE SB Paylad [64 bytes] --> PCIE GFX Core Payload [64 bytes] --> PCIE Relaxed Ordering 'rules [Disabled] --> Hide Unused PCIE P2P Bridges [Disabled] --> NB-SB PCIE Link ASPM [Disabled] --> GFX PCIE Link ASPM [L0&L1] ---> GPP PcIE Link ASPM [L0&L1] --> GFX0 Slot Power Limit, W [75] --> GFX1 Slot Power Limit, W [25] --> GPP Slot Power Limit, W [25] Power --> Video Power Down Mode [Disabled]
20	AMI BIOS 080014 11/3/2006	Chipset --> NorthBridge Configuration ---> Memory Configuration ---> Power Down control [Auto] ---> Alternate VID [VID] --> Radeon Xpress x00 Configuration --> Internal Graphics Configuration --> Primary Video Controller [PCIE/IGFX/PCI] --> Video Display Devices [AUTO] --> PCI Express Configuration --> Dual Slot GFX Configuration [AUTO] --> OnBoard Marvell NIC [Enable]

22	Intel BIOS SN94510J.86A.0097.2006.1101.1459,11/1/2006	Advanced → Primary Video Adaptor → Ext PCIE Graphics (PEG) → Compliance Test Pattern → Disabled
24	Award BIOS F6, 10/12/2006	Advance BIOS Features --> Init Display First --> PEG MB Intelligent Tweaker (M.I.T) --> PCI Express Frequency (Mhz) --> [AUTO] --> PCI-E Overvoltage Control --> [Normal]
25	AMI BIOS v02.58	Advanced --> Chipset --> Boot Graphic Adapter Priority [PCI Express/PCI] -- >PEG Buffer Length [AUTO] --> Link Latency [AUTO] --> PEG Root Control [AUTO] --> PEG Link Mode [AUTO] --> High Priority Port Select [Disabled] --> Onboard Devices Configuration --> PCI- LAN [Enabled]

4.5 Physical Layouts of RDKs

4.5.1 Main Switch Board



Unless specified otherwise, default settings are used for all interoperability testing.

4.5.2 Breakout Boards

The breakout cards provide optional hardware connections to support x8x4x4 and x8x8 downstream configurations. Figure 1 below shows the side views.

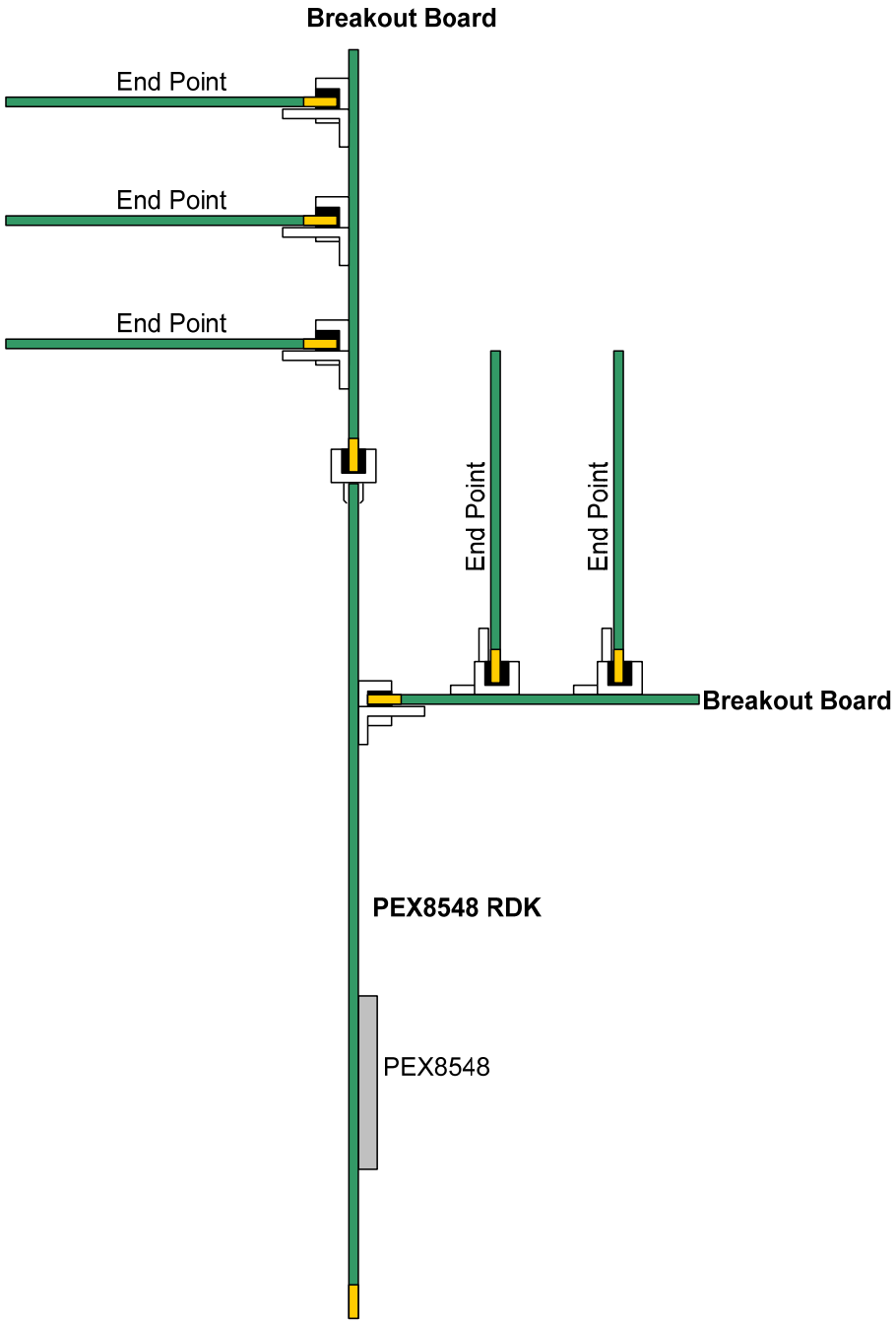


Figure1: x8x4x4 and x8x8 Configuration

Figure 2 below shows the front layout views of two types of breakout boards.

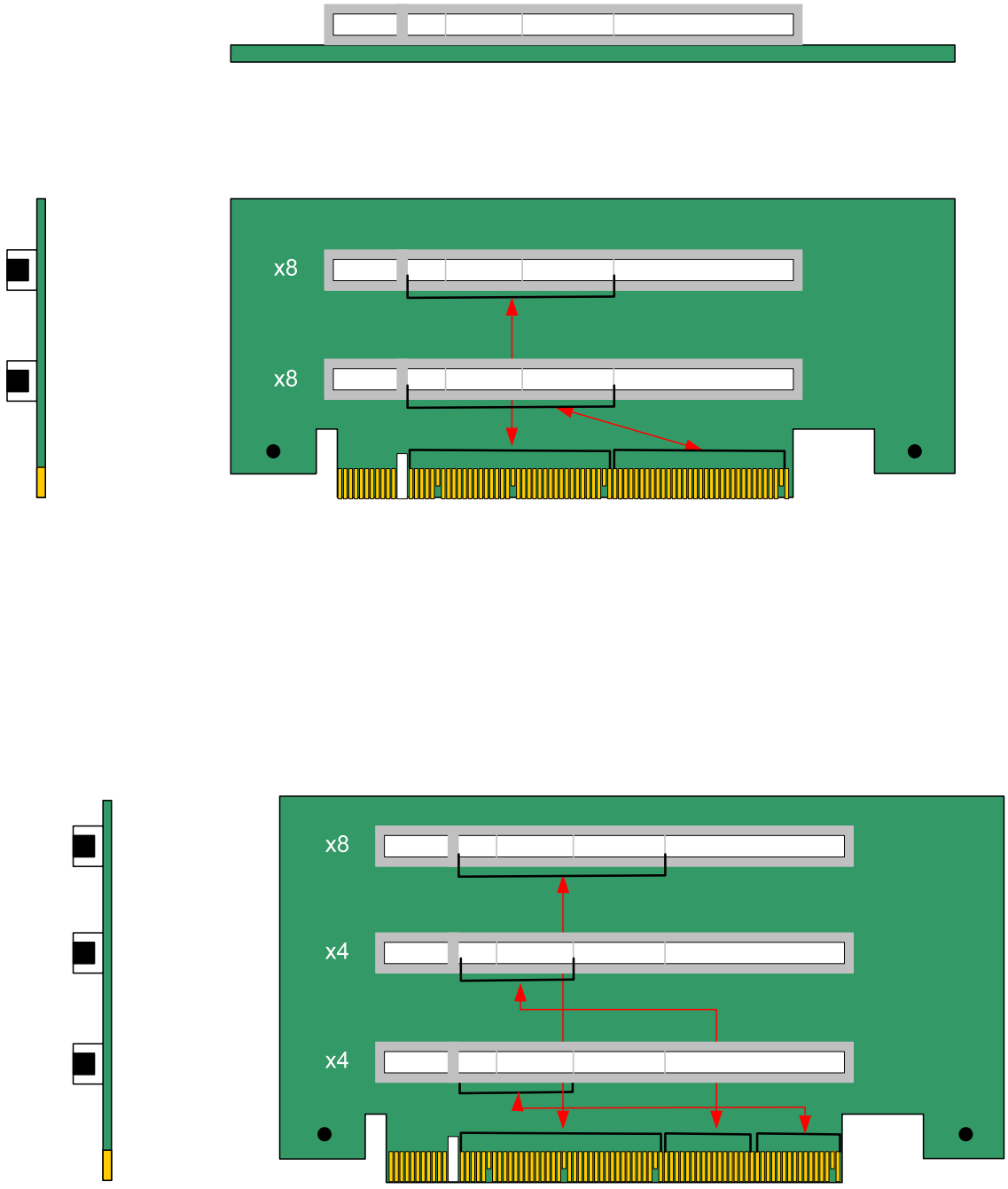


Figure 2: Breakout Add-In Card Front Views

5 TEST DESCRIPTIONS AND PROCEDURES

Test the following categories in the default modes.

5.1 Motherboards and System BIOS

The goal is to ensure that the RDKs and SDKs, together, perform fundamental functions interfacing with motherboard root complexes. Root complexes include Northbridge and/or Southbridge chipsets and system interrupt controllers.

In this phase, only the PEX 8548 RDK is tested in motherboard slots. No endpoints are used. The focus is the root complex interface and BIOS/motherboard detection of the PLX hardware only.

The general methodology is:

1. Reserve the test system. See the attached list of Motherboards and System BIOS.
2. The PC should already be preconfigured with the necessary hardware and software:
   - Windows operating system (Windows XP or Windows Server 2003 or Windows 64-bit Server 2003 or Windows Vista)
   - Formatted and partitioned internal ATA hard disk with at least 40 Gigabytes
   - At least 1 Gigabytes of memory and a Pentium 4 or equivalent CPU
   - PEX SDK software
3. Install the RDK board (using its default switch and jumper settings) into the system and connect the power connector.
4. Boot up the system into Windows and check that the RDK is correctly detected and enumerated.
5. Run the interoperability procedures against motherboards, chipsets, BIOS, endpoints (video adapters, ethernet adapters, SCSI/FC HBAs or TV tuners).
6. Record all findings and work with engineering groups to resolve problems found.

Tests for the Forward RDK apply similarly to the Reverse RDK. Unless specified otherwise, the test descriptions below apply to both boards.

5.1.1 Visual Link-Up Tests

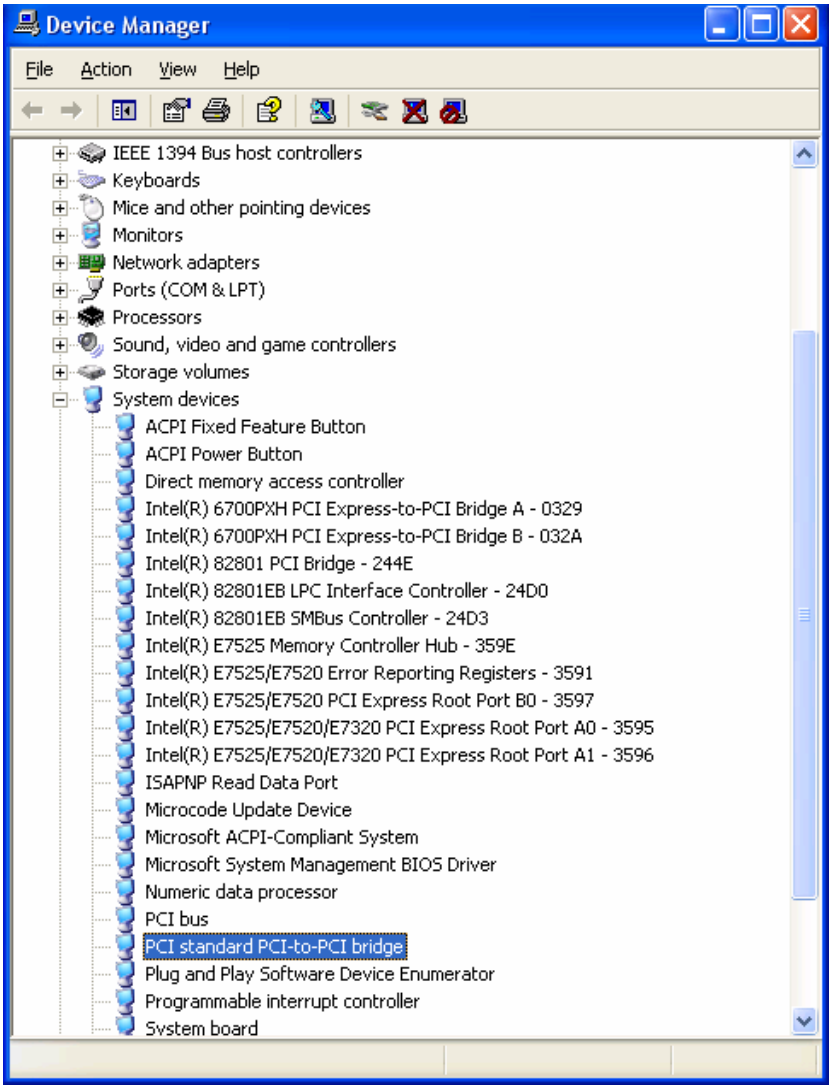
See the Hardware Reference Manual of the bridge or switch product for exact locations and functions of the LEDs.

1. Select a test system that has PCI-Express slots. See the Motherboards and System BIOS list.
2. Make sure the system is fully powered OFF first.
3. Install the RDK into an available PCI-Express slot. Connect the power connector.
4. Turn on the system and monitor the RDK's LEDs. When lighted green, these indicators show CLOCK FREQUENCY LEDs or LINKUP, LANE GOOD or port status. Verify the LEDs against their functional assignments from the Hardware Reference Manual. Refer to the silkscreen table stamped on the PCB to quickly change and set the switches and jumpers.

5.1.2 Device Manager Detection Tests

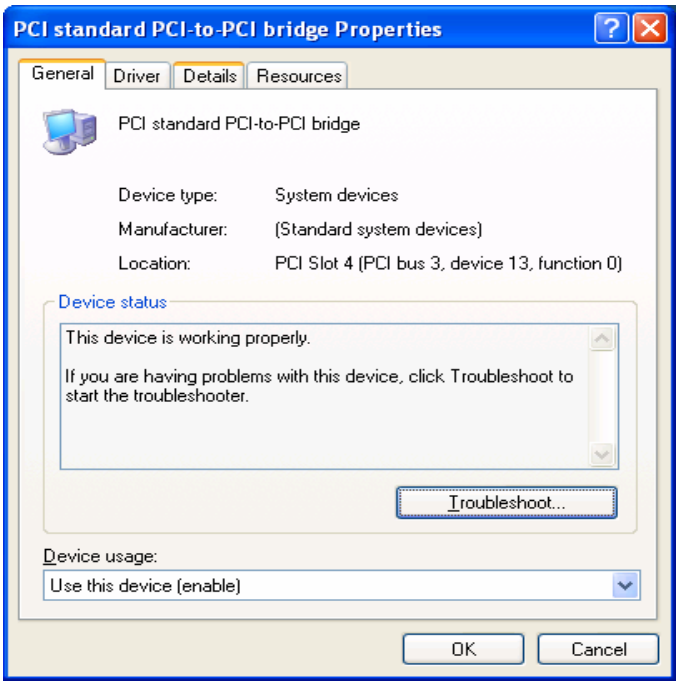
These tests verify RDK detection at the operating system level.

1. Go into Control Panel → System → Device Manager. Select the View tab, right click to choose DEVICE BY TYPE.
2. Under “System Devices”, verify that a category called “PCI standard PCI-to-PCI bridge” appears.



Move the cursor over the “PCI standard PCI-to-PCI bridge” item, and right click. A small menu box appears.

Select “Properties” and then a screen below displays.

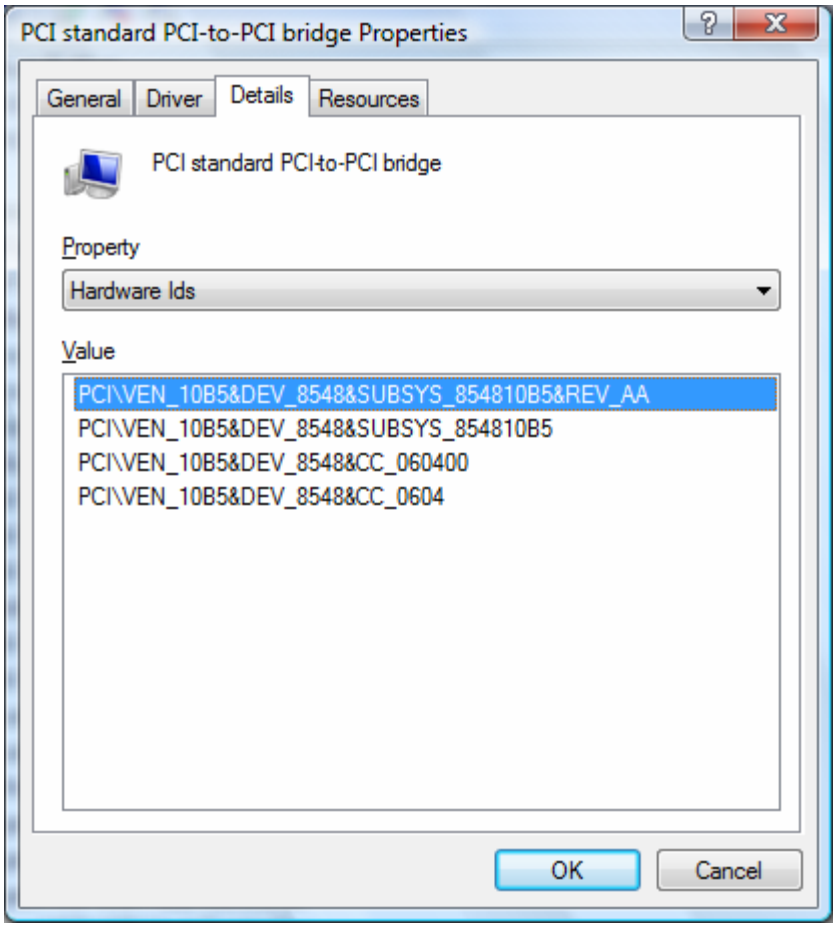


This window shows the “PCI standard PCI-to-PCI device” and lists its routing information in the LOCATION field:

- PCI slot number
- Bus number,
- Device number
- Function number.

Record this information before proceeding further. Next, move the cursor to the “Details” tab (the third tab), and click it.

The next screen shows the following product information.



Verify that the vendor ID is 10B5 and the chip ID is 8548.

5.1.3 Slot Tests

Different PC systems support different numbers and types of PCI-Express slots, ranging from x1 to x2, x4, x8 or x16 lane widths.

Test all different lane widths that the system supports. Note that if there are multiple slots having the same lane widths, select and test with one slot only. For example, if the system has multiple x1 slots, then test with one x1 slot only.

The recommended sequence is to test the x1 slot first, then x2 then x4 and so on.

1. Make sure the system is fully powered OFF.
2. Insert the RDK into the PCI-Express x1 slot if the RDK is the Forward board. Insert into the PCI-X slot if the RDK is the Reverse board.
3. Run the following tests for each slot:
    a. Visual Link-Up tests
    b. Device Manager tests
4. Record all findings.
5. Repeat the above for x2, x4, x8 and x16 slots, if they are available.

5.1.4 PEX Device Editor Tests

The PEX Device Editor is a graphical interface provided as part of the SDK software to configure, control, and get status of the RDK hardware.

The PEX Device Editor portal serves two key functions:

1. Examine low-level device information (such as Dev ID, Bus, Device Number, Link width, port),
2. Read and write configuration registers, memory-mapped register, execute block reads

Even though the GUI offers other tools, such as comparing EEPROM images and loading them, interoperability testing does not cover these advanced features.

To begin, go into Programs → PLX PEXSDK → PEX Device Editor.

A. Detection

See highlighted item in the above. On the left pane is a smaller box showing the detected device. Check the device ID, Bus, Device Number, Linkwidth and port. Record this information and compare it against the slot number /bus number/ device number/ function number recorded earlier from the Device Manager Tests.

Note: The PEX Device Editor software should display all the upstream and downstream ports it found during the enumerated process. Count the total times these ports are displayed. This number should equal to the total number of ports of the RDK.

B. EEPROM Tests

Run the following tests only if the EEPROM is enabled (set by jumpers or switches on the board). Skip these tests if the EEPROM is not used.

1. Block Read PCI/PCIe Configuration Registers

a. Look at the middle box of the screen above, labeled “PCI/PCIe Configuration Registers”.
b. Type in “0” in the PCI/PCI-Express Address category.
c. Click on Block Read. This process reads the CSR (Configuration Status Registers) and then displays the offset addresses [typically from 0000 to xxxx] and data.
d. Check to ensure the first byte shows “8548”. Change the offset addresses and the block size to read different ranges. There is no need to verify all the bytes displayed. The goal is just to be able to read and dump the EEPROM contents for display only.

2. Block Read Memory-Mapped Registers

a. Look at the right box of the screen above, labeled “Memory Mapped Registers”. Type in “0” in the Memory Mapped Register.
b. Click on Block Read.
c. Check to ensure the first byte shows “8548”.

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d. Change the offset addresses and the block size and you can read different ranges. There is no need to verify all the bytes displayed. The goal is just to be able to read and dump the EEPROM contents for display only.

5.2 Endpoints

This category requires testing both the PEX 8548 RDK and a specified endpoint together as a unit. An endpoint can be a video adapter, an ethernet adapter or a SCSI Host Bus Adapter.

Select and test the endpoints behind the switch or bridge in all provided port modes (x1, x4, x8, x16). Depending on whether the device is a bridge or a switch, FORWARD and REVERSE modes may apply. See the list of Endpoint Devices and Connectivity Kits.

The general methodology for testing endpoints is as follows:

1. Insert the RDK into one of the PCI-Express slot. Connect external power to board.
2. Connect one (1) endpoint device to the PCI-Express slot of the RDK. Reboot the system and install device drivers for the endpoint. Some endpoints such as video adapters have embedded drivers as part of the operating system in which case no drivers may be needed. However, it is highly recommended to use the latest manufacturer-supplied drivers from the CD or by downloading the latest drivers from the internet.
3. Reboot the system. Check the device driver under CONTROL PANEL → DEVICE MANAGER.
4. Run specific tests related to the endpoint. For example, if the device is an Ethernet adapter card, connect to a specific internet website, such as www.plxtech.com. If the device is a video adapter card, check for visual displays on the screen monitor.

SPECIAL NOTE: Do not connect multiple endpoint devices to the PEX 8548 RDK. The focus is to qualify each endpoint component independently and individually. As a result, test with only one (1) endpoint at a time only. Testing multiple endpoints is done in fully-loaded configurations, which are part of phase 3.

5.2.1 Video Adapter Tests

Standard PC systems have embedded graphics support or come with an existing video adapter. PCI-Express video cards present a new class of video devices to the BIOS and operating system that must be redetected and reenumerated along with the existing video devices.

In most cases, PCI-Express video devices can coexist with other video devices. However, the system BIOS may require disabling the embedded graphics support and/or removing the existing video card in order for the PCI-Express video card to work.

1. Make sure the system is completely powered OFF.
2. Perform the following steps:
   a. Select a PCI-Express video card from the list of video cards to be tested.
   b. Insert the RDK into a free (unpopulated) motherboard's PCI-Express slot.
   c. Connect the Power Connector to the RDK.
   d. Insert the video card in any one of the PCI-Express slot of the RDK.

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e. Connect one end of the monitor cable to the output connector of the video card. Some video cards require special DVI-OUT adapters to convert between 15-pin SVGA and DVI-OUT connections. Use the adapters as appropriate.

Some motherboards support primary and secondary graphics, depending on the PCI or PCI-Express modes. Reverify the proper settings in the system BIOS (see System BIOS settings list) before running the tests below.

A. Video display on the monitor

Turn on the monitor and the system. Check for visual display. Be default, the Windows OS should load standard VGA driver automatically or detects a new device and requests for a driver.

Note: If no manufacturer's video drivers are available, Windows automatically loads the generic "standard video adapter" driver.

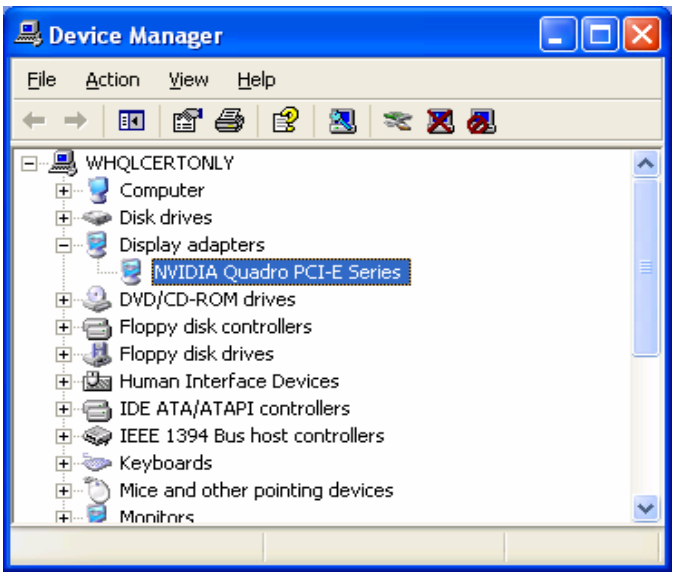
B. Driver installation& updates

Manufacturer-supplied drivers allow enhanced performance beyond standard video driver supplied by the Windows operating system. If available, always install the driver software.

C. Driver detection

Check Device Manager → Display Adapters to make sure the new driver is loaded. There should be no yellow bangs, or red crosses next to the driver name. Otherwise, there are either resource conflicts or the driver does not detect or load properly or the driver is disabled.

The following screen shows how a Nvidia video card is detected and displayed.



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If it is necessary to update drivers from the CD or the internet, right-click the item and select “UPDATE DRIVER”.

5.2.2 Ethernet Adapter Tests

Standard PC systems have embedded graphics support or preinstalled ethernet adapters. Some PCI-Express endpoints may only work by disabling the embedded graphics support and/or removing the existing adapter completely.

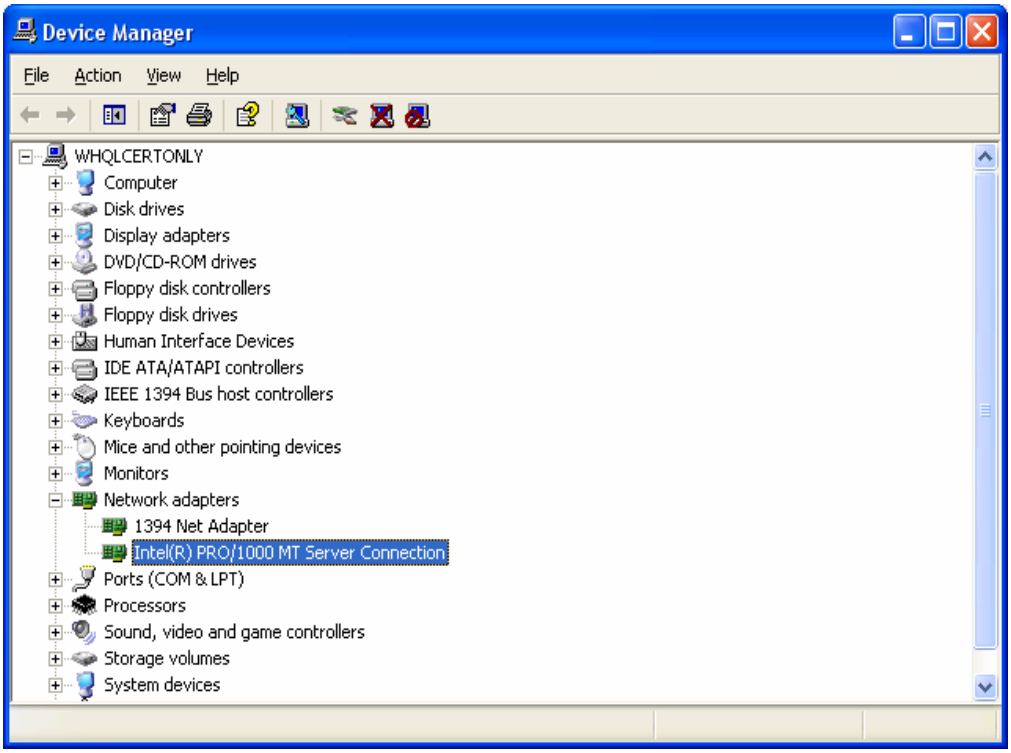
A. Driver installation

Manufacturer-supplied drivers allow enhanced performance beyond standard network card driver supplied by the Windows operating system. If available, always install the driver software.

B. Driver detection & updates

Check Device Manager → Network Adapters to make sure the new driver is loaded. There should be no yellow bangs, or red crosses next to the driver name. Otherwise, there are either resource conflicts or the driver does not detect or load properly or the driver is disabled.

The following screen shows how an Intel network adapter card is detected and displayed.



To update drivers from the CD or the internet, right-click and select “UPDATE DRIVER”.

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C. *Web-page access*

Open the Internet Explorer browser. Type an internet URL address, such as www.plxtech.com . Check to see if the website is accessible. Within the website, click on several different links such as company or products information ensure network downloads are accessible.

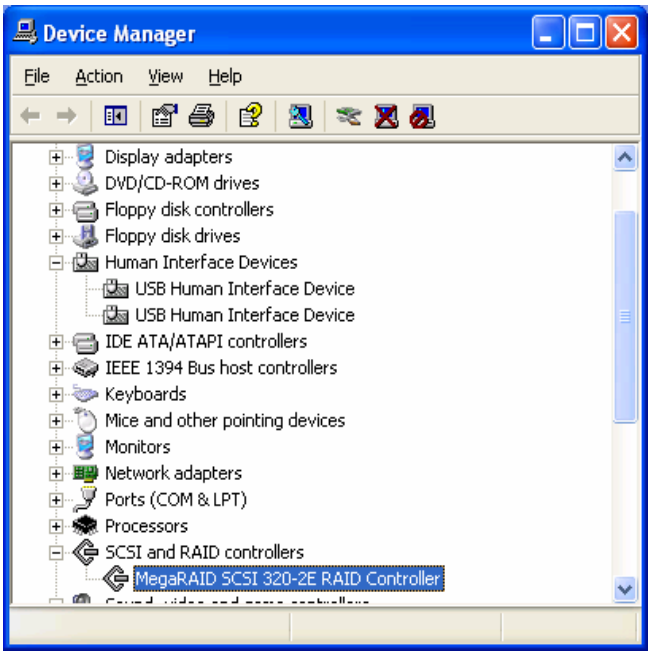
5.2.3 SCSI or Fibre-Channel HBA Tests

A. *Driver installation*

Manufacturer-supplied drivers allow enhanced performance beyond standard SCSI or Fibre-channel storage controller driver supplied by the Windows operating system. If available, always install the driver software.

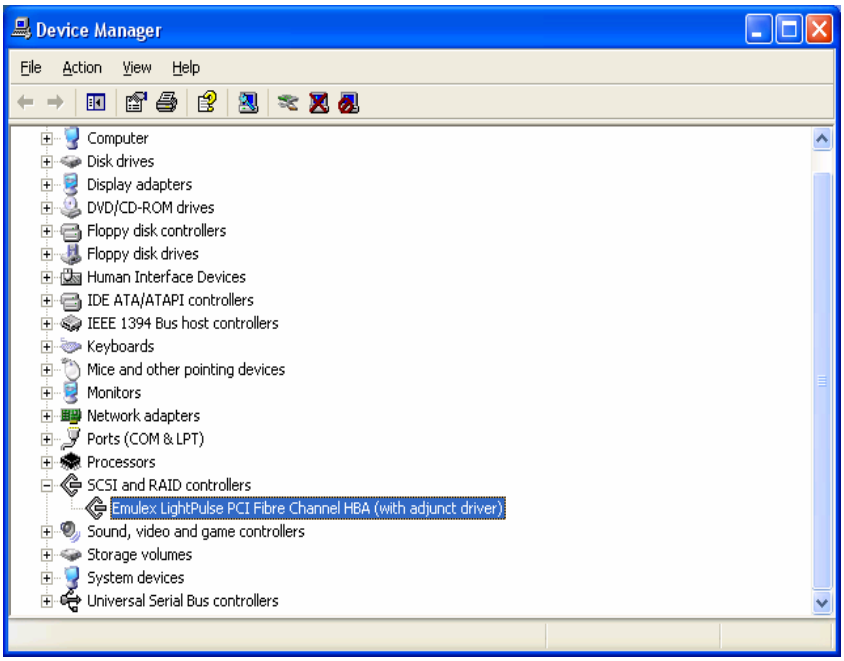
B. *Driver detection*

Check Device Manager → SCSI and RAID controllers to make sure the new driver is loaded. There should be no yellow bangs, or red crosses next to the driver name. Otherwise, there is either resource conflicts or the driver does not detect or load properly. The following screen illustrates the LSI Logic SCSI Raid Controller detection.



If the Fibre-channel HBA is used, the driver installation and detection is similar to the SCSI HBA. It is also displayed in the same SCSI and RAID controller category.

The following screen illustrates the Emulex Fibre-channel HBA detection.



C. Read/Write data files

Modern HBAs have their own BIOS. After powering up the system, the SCSI or Fibre-channel BIOS together with the system BIOs automatically enumerate and display the connected devices. For example, if an LSI Logic MegaRaid adapter is installed, the BIOS displays its own BIOS version, lists SCSI/FC devices detected and momentarily pauses with the CTRL-M prompt to allow the user to configure HBA's BIOS settings.

Refer to the manufacturer's documentation to set the HBA BIOS properly. The Windows operating system does not detect and enumerate properly if the HBA BIOS settings are set incorrectly.

Once the HBA BIOS is set up correctly, Windows should also detect the HBA, its connected drives and assign them drive letters. Refer to Microsoft's DISK MANAGEMENT utility to partition and format the drives.

One formatted the drives are available to read and write files. Run tests below.

1. Create special directories within the SCSI or Fibre-channel drives, say TEMP.
2. Copy some directories from the internal ATA drives over to the SCSI or Fibre-channel drives.
3. Switch to the SCSI or Fibre-channel drive and verify that the new folders and files are fully copied over.

D. Automated Stress Tests

1. Use Microsoft WHQL tests to run stress tests. Stress tests continuously run read/write operations and log errors for later review. This is ideal for long-term or overnight testing.

2. Load the HCT 12.1 into the test system. Select either the SCSI or Fibre-channel adapter category. Select STRESS TESTS and launch the RUN TESTS option.
3. Record all test results and observations.

5.2.4 TV Tuner Cards

TV tuners cards are devices emulating TV devices or other display devices such as cameras or camcorders through adapter cards. TV tuners typically offer both video and sound features and may have sophisticated download and uploading features through TV antennas or satellites or networked sources.

Interoperability testing focuses on simple capture and display features only

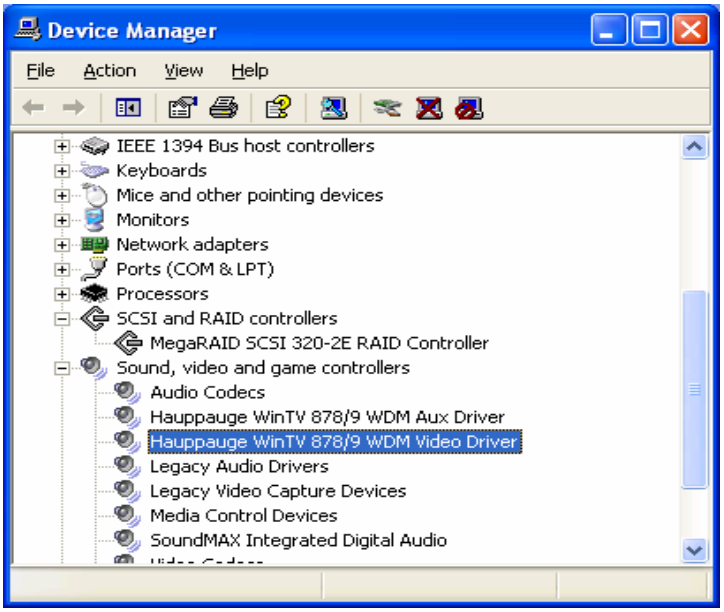
TV tuner cards install similarly to video cards or ethernet card or SCSI/FC cards. However, TV tuner cards require an external power source, so use the correct adapter and connect to power jack on the back of the card.

A. Driver installation

Install the manufacturer-supplied drivers for Windows from the CD. For more updated drivers, download from the internet at the vendor's website. For example, the Win TV 2000 TV tuner driver downloads are available at www.hauppauge.com in the Support section.

B. Driver detection

Check Device Manager → Sound, video and game controllers to make sure the new driver is loaded properly. There should be no yellow bangs, or red crosses next to the driver name. Otherwise, there are resource conflicts or the driver is disabled or does not load properly. The following screen shot illustrates the Win TV 2000 TV tuner card.



C. Video Capture and Display

TV tuners require video capture and display software. For example, Hauppauge TV tuners requires proprietary Hauppauge WinTV 2000 software. Do not mix and match video capture and display software from other TV tuner vendors. They may not be compatible.

1. Install the Win TV 2000 software from the CD. The software may have separate video and audio components, resulting in multiple detection passes by Windows.
2. Once fully installed, the application resides in PROGRAMS, as a Micrsoft application software. Launch it by double-clicking the application.
3. A new screen box appears as below.

4. Click on the first button (TV Mode) and the camera starts the capture.

Record all results and observations.

5.3 WHQL Certification and Other Advanced Tests

This phase focuses on running Microsoft WHQL DCT tests, chip-to-chip and board-to-board interoperability.

WHQL tests are highly dependent on the exact type and configurations of the system and endpoints. As a result, only run the WHQL test suite a certified, dedicated system only. There is no need to run WHQL tests across all systems.

Use a prequalified video adapter as an endpoint. Collect and log the following information using the WHQL Certification checklist:

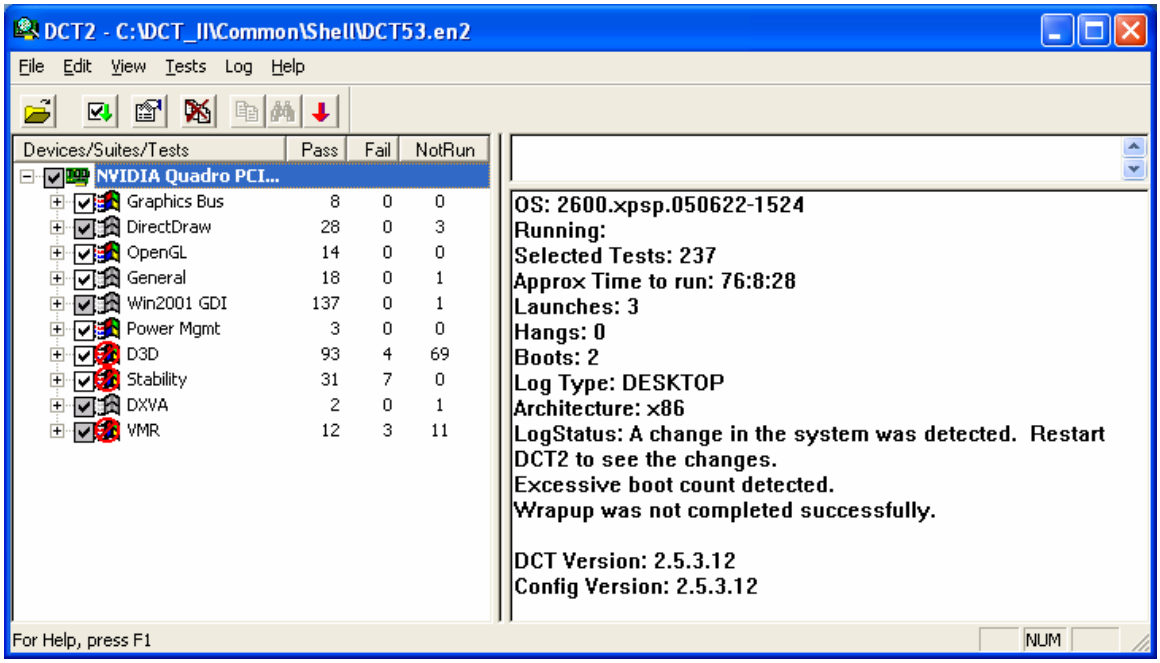
- System information – CPU, CPU speed, front side bus, memory size, chipsets, operating system and version
- Endpoints information – serial number and model of the card, PCB revision, date code, driver name and version

5.3.1 Video Adapter Certification

The WHQL-certified system should be preinstalled with DCT 5.3 (Display Compatibility Software which runs video adapter tests). DCT 5.3 test suite is identified by the DCT II logo installed on the desktop of the machine.

1. To begin, click the "DCT II" logo. All tests, logs and status information are saved in the c:\DCT_II folder. If this is the first time the board is installed, the software executes an overall detection phase to register all the installed component classes of the entire system.
2. Connect the to-be-certified video card to the PEX 8548 RDK. DCT 5.3 allows running automated tests with different video categories. Set the test suite in the automated more and let the test run. The entire test suite runs for approximately 3 days if there are no problems. If there are failures, test logs automatically record them for further analysis.
3. Record all test results and observations.

Analyzing WHQL results requires consideration experience. Consult an experienced engineer to interpret test results. The following is a sample illustration.



A. Auto mode

1. Under "Tests" menu, click Select Auto. Use this mode to run all test categories without user intervention. All categories should be checked automatically.
2. Click on "Tests" again, and select "Run Selected Tests". Once the tests are completed, the left pane shows the numbers of instances of Pass, Fail, Not Run.
3. For all logged failures, rerun those tests without the switch or the bridge board. Testing without the RDK serves as a base reference.
4. Check the Microsoft website or the video card manufacturer's website to see if the problem is already known or a waiver is in place.

PLX Technology, Inc, 870 W. Maude Avenue, Sunnyvale, CA 94085, Phone 408-774-9060, Fax 408-774-2169

5. Compare failures for those tests run with and without the RDK. If there is a difference, then alert the applications engineer.

B. Manual mode

Only use this mode for debugging purposes or to verify fixes. To run manual tests, do the following:

1. Under "Tests" menu, click specific tests which have failures.
2. Under the same tab, select the "Run Manual Tests". This mode only runs those tests that are previously checked and starts the log for those tests only. Use this mode for debugging or to rerun specific tests.

5.3.2 Chip-to-Chip Interoperability

These section tests multiple RDKs together in a single motherboard slot.

A. PEX 8548 Switch RDK and PEX 8114 Forward Bridge RDK

1. Select a target system. Make sure the system is completely powered OFF.
2. Insert the PEX 8548 RDK into a free (unpopulated) motherboard PCI-X or PCI-Express x1 slot. Use the Catalyst x1 adapter if needed.
3. Connect the PEX 8114 Forward RDK into the top port slot of the PEX 8548 RDK. That is, the PEX 8114 RDK is "on-top" of the PEX 8548 RDK. Use clamp stands, if needed, to secure and hold the RDKs in a secured, stable fashion. Connect power connectors onto the RDKs.
4. Reboot the system and run the following tests:
   a. Visual Link-Up Tests
   b. Device Manager Tests
   c. Video adapter Tests (connect the card to the PEX-8114 RDK slot)
5. Record all test results and observations.

B. PEX 8548 Switch RDK and PEX 8111 Forward Bridge RDK

Use the same procedures as with testing the PEX 8114 Forward Bridge RDK above.

5.3.3 Board-to-Board Interoperability

This section tests multiple RDKs in different motherboard slots.

A. PEX 8548 Switch RDK and PEX 8518 Switch RDK

1. Select a target system. Make sure the system is completely powered OFF.
2. Insert the first PEX 8548 Switch RDK into a free (unpopulated) motherboard PCI-Express x1 slot. Use the Catalyst x1 adapter if needed.
3. Insert the second PEX 8518 Switch RDK into a separate system that has a free PCI-Express x1 slot.
4. Connect the power connector to each RDK.
5. Reboot the system and run the following tests:
   a. Visual Link-Up Tests
   b. Device Manager Tests
6. Record all test results..

B. PEX 8114 Forward Bridge RDK and PEX 8548 Switch RDK

Repeat the same procedures in section A above.

C. PEX 8533 Switch RDK and PEX 8548 Switch RDK

Repeat the same procedures in section A above.

5.3.4 Fully-Loaded Configurations

This test loads as many different types of endpoints as possible into the RDK slots and stresses the board by running simultaneous traffic. Typically, video adapters, ethernet adapters, and SCSI or Fibre-channel adapters are used together.

Fully-loaded configurations use multiple endpoints together, which individually have been qualified and passed with the RDK already. That is, the endpoints selected should have passed Phase 2 of the Endpoints tests.

1. Select and record the exact name and model of the selected endpoint (see Endpoints and Connectivity Kits list).
2. Fully load all the slots of the PEX 8548 RDK with endpoints. As a minimum, populate the RDK with one video adapter, one Ethernet adapter and one SCSI or FC controller adapter
3. Connect the video monitor to the video adapter endpoint, the Ethernet cable to the Ethernet endpoint and SCSI/FC disk drives to the SCSI/FC controller endpoint.
4. Power up the system and run the following tests:
    a. Visual Link-Up Tests
    b. Device Manager Tests
    c. Endpoints Tests
        - Video adapter tests
        - Ethernet adapter tests
        - SCSI/FC adapter tests
5. Record all observations and results.

SPECIAL NOTE: Do not test each endpoint at a time. All endpoints (which should already qualified individually in the Endpoints Test Section) must be connected to the PEX 8548 RDK at the same time and tested together as a unit.

5.3.5 Breakout Boards Tests

Breakout boards are optional, add-in cards that allow testing more connected endpoints branched from a single RDK slot. The breakout boards have additional PCI-Express slots and offer different lane sizes and enable flexible ports/slots configurations.

Test the following breakout boards configurations.

A. X8X8 Downstream Configuration

Power off the system. Insert the x8x8 breakout board into the top slot of the PEX 8548 RDK (Station 1). Select one (1) endpoint (a video card or storage controller or a network card) into one slot of the breakout board. Mount the vice grip to the setup to secure the endpoints against the PEX 8548 RDK.

Power on the system and check that Windows properly detect the PCI-e switch and its connected endpoints. If necessary, install the video drivers and the NIC card drivers.

Reboot the system and run the Device Manager Tests. Depending on the endpoint selected, run tests from sections 5.2.1 thru 5.2.4 above. Record all test findings and results.

Add another endpoint (either a network card, a SATA controller or another video card) to any remaining slot of the breakout board. Reboot the system and run the Device Manager Tests. Depending on the endpoint selected, run tests from sections 5.2.1 thru 5.2.4 above. Record all test findings and results.

B. X8X4X4 Downstream Configuration

Power off the system . Insert the x8x4x4 breakout board into the top slot of the PEX 8548 RDK (Station 1). Select one (1) endpoint (a video card or storage controller or a network card) into one slot of the breakout board. Mount the vice grip to the setup to secure the endpoints against the PEX 8548 RDK.

Power on the system and check that Windows properly detect the PCI-e switch and its connected endpoints. If necessary, install the video drivers and the NIC card drivers.

Reboot the system and run the Device Manager Tests. Depending on the endpoint selected, run tests from sections 5.2.1 thru 5.2.4 above. Record all test findings and results.

Add another endpoint (either a network card, a SATA controller or another video card) to any remaining slot of the breakout board. Reboot the system and run the Device Manager Tests. Depending on the endpoint selected, run tests from sections 5.2.1 thru 5.2.4 above. Record all test findings and results.

6 TEST RESULTS

Before testing begins, log all the equipment, and setup information. See the Software and Hardware Identification Information checklist attached. During testing, take detailed notes of all observations, symptoms, workarounds or other useful information for the follow-up or debug process.

6.1 Attachment A – Software and Hardware Identification Information

Fill in the table below with exact labels, versions used by the hardware and the software.

	Version	Other Identification Information
PEX SDK	2.1	
RDK (board+chip)		
-PEX 8548 RDK	- Board Serial No: 0011 Chip markings: PEX8548-AA25BI 0639 ES G66071.1 KOREA EEPROM version: s1a0	P/N: 90-0062-100-A SMT 031879-0011
-PEX 8548 RDK	- Board Serial No: 0018 Chip markings: PEX8548-AA25BI 0639 ES G66071.1 KOREA EEPROM version: s1a0	P/N 90-0062-100-A SMT 031879-0018
-PEX 8548 RDK	- Board Serial No: 0024 Chip markings: PEX8548-AA25BI 0639 ES G66071.1 KOREA EEPROM version: s1a0	P/N 90-0062-100-A SMT 031879-0024
Operating Systems		
- Windows XP Professional	- Standard with Service Pack 2 (volume license) with latest updates	- see MSDN product keys
- Windows Server 2003	- Standard version (volume license)	- see MSDN product keys
- Windows Server 2003 Enterprise	- Standard x64 version (volume license)	- see MSDN product keys
- Windows Vista	- Final Release (January 2007)	- see MSDN product keys
WHQL test suites		
- DCT II - HCT (stress tests)	- DCT ver. 5.3 - HCT ver 12.1	

6.2 Attachment B – Motherboards and System BIOS

Product Name: PEX 8548 RDK

Date: January 2007

Test Category	**System Number** (Refer to Motherboards and Systems List) : Fill in Pass or Fail (P or F) **For explanation details, refer to the Note Number after P or F below.** **NA = Not Available NT = Not Tested**																				
	1	**2**	**3**	**4**	**5**	**7**	**8**	**9**	**10**	**12**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**24**	**26**
Visual Link-Up Test	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
Slot Tests	P1	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
Device Manager Detection Tests																					
Devices By Connection	P	P	P	P2	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
PEX Device Editor Tests																					
Detection	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
Read Configuration Registers	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
Read Memory-mapped Registers	p	p	p	p	p	p	p	p	p	p	p	p	p	p	p	p	p	p	p	p	p

Notes: (Explain clearly below if there are any failures in the test cases in the matrix above.)

1. P1 The system BIOS expects and accepts only graphic adapters in the two x16 PCI-e slots. The system works without problem using the PEX 8548 and a graphics card combination(ATI Radeon x700 series).

2. P2 The first time that the PEX 8548 RDK is installed and rebooted, system enumeration shows the system is out of system resources (with the exclamation point). Upon the second reboot, the sytem correctly enumerates all resources.

3. P3 There is only one x16 PCI-Express slot in this system.

6.3 Attachment C - Video Adapters

Test Category	**System Number** (Refer to Motherboards and Systems List) : Fill in Pass or Fail (P or F) **For explanation details, refer to the Note Number after P or F below.** **NA = Not Available NT = Not Tested**																		
	1	**2**	**3**	**4**	**5**	**7**	**8**	**9**	**10**	**12**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**
Video Adapter Tests																			
Nvidia NVS 440																			
Video display on the monitor	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
Driver installation	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
Driver detection	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
Matrox Millenium P650																			
Video display on the monitor	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
Driver installation	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
Driver detection	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
ATI x1600 Radeon																			
Video display on the monitor	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
Driver installation	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
Driver detection	p	p	p	p	p	p	p	p	p	p	p	p	p	p	p	p	p	p	p

6.4 Attachment D - Ethernet Adapters

Test Category	System Number (Refer to Motherboards and Systems List) : Fill in Pass or Fail (P or F) For explanation details, refer to the Note Number after P or F below. NA = Not Available NT = Not Tested																		
	1	2	3	4	5	7	8	9	10	12	14	15	16	17	18	19	20	21	22
Ethernet Adapter Tests																			
Dlink DGE560T (Marvell chipset)																			
Driver installation	P	P	P	P	P2	P	P	P	P	P	P	P1	P	P	P	P	P	P	P
Driver detection	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
Web-page access	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
Intel Pro/1000 PT Dual Port Server																			
Driver installation	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
Driver detection	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
Web-page access	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
Broadcom Nextreme Gig-E (BCM5751 chipset)	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
Driver installation	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
Driver detection	p	p	p	p	p	p	p	p	p	p	p	p	p	p	p	p	p	p	p
Web-page access																			

Notes: (Explain clearly below if there are any failures in the test cases in the matrix above.)

1. P1 System hangs at powerdown with RDK and network card as endpoint. There is no problem during normal operations.

2. P2 Must use a x1 Catalyst adapter since all slots are x8 lane width in this system. This is most likely a system limitation.

6.5 Attachment E - SCSI/FC HBAs and TV Tuners

Test Category	**System Number** (Refer to Motherboards and Systems List) : Fill in Pass or Fail (P or F) **For explanation details, refer to the Note Number after P or F below.** **NA = Not Available NT = Not Tested**																		
	1	**2**	**3**	**4**	**5**	**7**	**8**	**9**	**10**	**12**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**
SCSI/FC Storage Controller Tests																			
LSI Logic 22320																			
Driver installation	P	P	P1	P	P	P	P	P3	P	P	P	P1	P	P	P	P	P	P	P
Driver detection	P	P	P	P	P	P	P	P3	P	P	P	P	P	P	P	P	P	P	P
Read/Write data files	P	P	P	P	P	P	P	P3	P	P	P	P	P	P	P	P	P	P	P
Qlogic QLA-2432																			
Driver installation	P	P	P	P	P	P	P	P	P	P	P	P2	P	P	P	P	P	P	P
Driver detection	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
Read/Write data files	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
TV Tuner Tests																			
Hauppauge Win TV																			
Driver installation	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
Driver detection	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
Video capture	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P

Notes: (Explain clearly below if there are any special notes, exceptions or failures in the test cases in the matrix above.)

1. P1 – The system does not have sufficient resources for all downstream ports of the RDK. The user must disable other resources in order for the operating system to detect and enumerate the newly added devices properly.

2. P2 - There are no problems during normal operations. However, the system locks up during powering down. There is a system bluescreen and no keyboard or mouse response. CTL-ALT-DEL does not work and requires a hard reset. To recover, the user needs to power up without the Qlogic controller and then system successfully powers down as expected.

3. P3 - The endpoint device draws high current and the system does not provide sufficient power. As a result, the endpoint can only run in the PCI-Express slot of the RDK that uses the external power (P2 hard disk power source).

6.6 Attachment F - WHQL Certification and Other Tests

Test Category	**System Number** (Refer to Motherboards and Systems List) : Fill in Pass or Fail (P or F) **For explanation details, refer to the Note Number after P or F below.** **NA = Not Available NT = Not Tested**																		
	1	**2**	**3**	**4**	**5**	**7**	**8**	**9**	**10**	**12**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**
WHQL Certification Video Adapter Card Name & Model: _ATI Radeon x1600 Pro C3D 3050 PCI-Express_____	PASS. Use a single dedicated, Dell 670 WHQL-certified system . See full results in WQHL Precert: Video Adapter section.																		
Chip-to-Chip Interoperability																			
Configuration#1: 8111 Forward Rev4 & 8548																			
PEX Device Editor Detection	P	P														P			
Device Manager Detection	P	P														P			
Video Card (as endpoint) detection	P	P														P			
Configuration #2: _ 8114BB Forward & 8548																			
PEX Device Editor Detection	P	P														P			
Device Manager Detion	P	P														P			
Video Card (as endpoint) detection	p	p														P			
Board-to-Board Interoperability																			
Configuration #1 : _8518_& 8548_____	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
Configuration #2: 8114 Forward & 8548	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
Configuration #3: _ 8533 & 8548___	p	p	p	p	p	p	p	p	p	p	p	p	p	p	p	P	p	p	p

Test Category	**System Number** (Refer to Motherboards and Systems List) : Fill in Pass or Fail (P or F) **For explanation details, refer to the Note Number after P or F below.** **NA = Not Available NT = Not Tested**																		
	1	**2**	**3**	**4**	**5**	**7**	**8**	**9**	**10**	**12**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**
Fully-loaded Configuration																			
Video adapter: _Nvidia NVS 440_____	P											P				P			
Storage adapter: SIIG SATA II PCIe RAID 3132	P											P				P			
Ethernet adapter: _SysKonnect 9E21D_____	p											p				p			
Breakout Boards Tests																			
X8X8 Downstream Configuration (list endpoints used)																			
X8 Slot _SysKonnect SK 9E21D NIC_____	P											P				P			
X4 Slot _Nvidia NVS 440_video card_____	P											p				P			
X8X4X4 Downstream Configuration (list endpoints used)																			
X8 Slot _Nvidia NVS 440 video card_____	P											P				P			
X4 Slot _SysKonnect SK 9E21D NIC_____	P											P				P			
X4 Slot _SIIG SATA II PCIe RAID 3132	p											p				p			

6.7 Attachment G - WHQL Certification (Video Adapter as Endpoint)

Manufacturer: ATI Radeon x1600 Pro C3D 3050 **Other Notes:** DCT 5.3 Test Suite
Type (PCI or PCI-e): PCI-Express interface
Board Revision: 1600-PRB 12812
Driver version: ver 8.3.3.0.0 12-16-2006
System # (see ref): Dell Precision 670
System Information: CPU Xeon 2.8 GigaHertz
Memory size 1 Gigabytes
Operating System Windows XP Professional SP2

Test #	Test Category	Pass/Fail Results	Notes
1	Graphics Bus	PASS	Run in automated mode
2	DirectDraw	PASS	Run in automated mode
3	OpenGL	PASS	Run in automated mode
4	General	PASS	Run in automated mode
5	Win2001 GDI	PASS	Run in automated mode
6	Power Management	PASS	Run in automated mode
7	D3D	PASS	Run in automated mode
8	Stability	PASS	Run in automated mode
9	DXVA	PASS	Run in automated mode
10	VMR	PASS	Run in automated mode

7 TEST EQUIPMENT

7.1 Motherboards and System BIOS

System #	Motherboard	Root Complex	CPU	BIOS	PCI Express Slots	Operating System
1	**MSI** K8N Neo4 Platinum SLI; 512MB SDRAM DDR 266/333/400	Nvidia NForce 4 SLI	AMD	**Phoenix Award** v6.00PG 7100NMS V3.0 123104	2- x16	Windows XP Pro SP2
2	**SUPERMICRO** X6DAE-G; 512MB SDRAM DDR 266/333	Intel E7525 TumWater	INTEL	**Phoenix Server 3** v6; X6DAE-G BIOS Revision 1.2	1- x16 1- x4	Windows XP Pro SP2 Windows Server 2003
3	**ABIT** AX-8; DDR 400	VIA K8T890/VT8237	INTEL	**Phoenix Award** BIOS 1.0	1- x16 3- x1	Windows XP Pro SP2
4	**NVIDIA** NF4-CRB; 512MB SDRAM DDR 266/333	Nvidia NForce 4	AMD	**Phoenix Award** v6.00PG NVIDIA BIOS V4.9x 4/26/2005- NF-CK804-6A61FS02C-00	1- x16 2- x1	Windows XP Pro SP2
5	**INTEL** SE7520BD2; 512MB SDRAM DDR 266/333, DDR2 400	Intel E7520 Lindenhurst	INTEL	**AMI** v2.53; SE7520BD2 22 86B.P.03.10.0052	1- x8 1- x4	Windows 2003 Server
7	**ABIT** AA8; 1G DDR2 SDRAM 400/533	Intel Alderwood, 800Mhz FSB; Intel 925X and ICH6R Express	INTEL	**Phoenix AWARD** v6.00PG 2/10/05-i925x- W83627-6A79FA19C-20	1- x16 3- x1	Windows XP Pro SP2
8	**SUPERMICRO** P8SGA; 512MB DDR 400 SDRAM	Intel Pentium 4, 800Mhz FSB; Intel 915G Chipset	INTEL	**Phoenix Award** BIOS v6.00PG; P8SGA BIOS Revision 1.1; 03/29/2005	1 x16 3- x1	Windows XP Pro SP2
9	**MSI** RS480M2-IL	ATI SB400 IXP400	AMD	**Phoenix Award** v6.00PG; W8093AMSv30B9	1- x16	Windows XP Pro SP2
10	**ABIT** AW8; 1GB SDRAM DDR2 800/667/533	Intel 955	INTEL	**Phoenix Award** v6.00PG; 5/23/05-i955-W627EHF- 6A79IA1AC-10	1- x16 2- x1	Windows XP Pro SP2
12	**ULI** EV9567	ULI EV9567	INTEL	**Phoenix Award** v6.00PG	1- x16 2- x4	Windows XP Pro SP2
14	**Intel** Lakeport	Intel TK53tWJ RU	INTEL	**AMI** WPLI751.86P 10/13/2005 SMBIOS v2.3	1- x16 2- x1	Windows XP Pro SP2
15	**Winfast** 761GXK8MC	SIS SIS964	AMD	**Phoenix** 6.00 PG 10/11/2005 3 PCI, 1 AGP, 1 PCI-e x16	1- x16	Windows XP Pro SP2

System #	Motherboard	Root Complex	CPU	BIOS	PCI Express Slots	Operating System
17	**Dell** Precision Workstation 470	Intel E7525 Tumwater	INTEL	**DELL** Revision A07 (03/15/06)	1- x16 1- x4	Windows XP Pro SP2
18	**INTEL** D925EXCV2 1GB SDRAM	Intel 925	INTEL	**INTEL** CV92510.86A.047	1-x16 1-x4	Windows XP Pro SP2
19	**AMD** Athlon 64 X2 dual 2.21Ghz Core processor 4200+ 2GB SDRAM	AMD North bridge RD580 Southbridge SB450	AMD	**AMI** ammt_a14.rom	2- x16 2- x1	Windows XP Pro SP2 Windows Vista
20	**AMD** Athlon 64 X2 dual 2.21Ghz Core processor 4200+ 3.2GB SDRAM	AMD North bridge RS690 South bridge SB600	AMD	**AMI** 080014 11/3/2006	1-x16 1-x4	Windows XP Pro SP2 Windows Vista
21	**HP** Workstation XW 8200 5GB SDRAM	Intel E7525	INTEL	**HP** 786B8 v2.10 5/31/2006	1- x16 1- x1	Windows Server 2003 Windows Server x64 for 2003
22	**INTEL** D945PVS 512MB SDRAM	Intel 945	INTEL	**Intel** SN94510J.86A.0097.2006.110 1.1459,11/1/2006	2- x1 1- x16	Windows XP Pro SP2
24	**Gigabyte** GA-965P-S3	Intel Northbridge 965P Southbridge: ICH8	INTEL	**Phoenix Award** F6, 10/12/2006	1- x16 3- x1	Windows XP Pro SP2
26	**ASUS** P5W64 WS	Intel Northbridge 975X Southbridge ICH7R	INTEL	**AMI** v02.58	4- x16	Windows XP Pro SP2

7.2 Endpoint Devices and Connectivity Kits

Device Category	Product Manufacturer	Model Name/Number	Product Details	System Interface	Software Drivers and/or Drivers
Graphic adapters	ATI	FireMV 2400	ATI controller; 128 MB DDR; two VHDCI connectors; half height	PCI	Embedded
	ATI	VisionTek Radeon 9250 (Xtasy)	ATI controller; 128 MB DDR graphics accelerator at 400 MHz; VGA, DVI- I, TV-Out	PCI ; 64 bit memory interface	V5.8
	3D Fuzion	GeForce MX 4000	Nvidia controller 128 MB DDR; VGA, S-video out; 275 MHz core clock; Dual RAMDACs 350MHz	PCI;	Nvidia NVDVD v 2.0
	Kaser	GeForce 6600	Nvidia CineFX 30 engine; 256 MB ; Duall 400 MHz RAMDACs; OpenGL support	PCI-Express	Nvidia version N.5.II.I
	ATI	Diamond Stealth S60 ; S60PCI64	Radeon 7000; DVI/TV-Out; 64 MB DDR; dual monitor display	PCI	Stealth Viper v 6.1
	Mad Dog Multimedia	Mad Dog multimedia Prowler V042605	ATI Radeon 7000; 64 MB graphic accelerator	PCI	ATI Catalyst software suite, Direct X and OpenGL support
	Kaser	Radeon x300SE	ATI Radeon (VPU) ; 128 MB system memory; 15 VGA conneceotr; S-Video/composite connector, DVI connector	PCI-Express	International Installation CD ver A5.7.1
	PNY Technologies	GeForce 6600	Nvidia SLI Ready and CineFX 3.0 Engine; 300 MHz core clock, 128-bit DDR memory interface 256 MB DDR; VGA + DVI+HDTV/S-Video Outputs	PCI-Express	Verto GDRV-7777
	ATI	Diamond Stealth Radeon X300SE	ATI Radeon; 128 MB /Mo Hypermemory; requires 420 W power supply or higher; Dual monitor Display	PCI-Express	ATI Catalyst drivers v 6.0
	ATI	ATI 7000	64 MB DDR, TV-OUT 64-bit	PCI	ATI Catalyst drivers v6.4
	Nvidia	Quadro NVS-280	Microsoft-certified component; integrated component of Dell Precision 670	PCI-Express	Nv4-disp.dll Ver 6.14.0010.6127
	Nvidia	PCI-Express 6200	GEForce 6 Series Turbocache	PCI-Express	ForceWare Release 80 Ver 84.21
	Nvidia	Quadro NVS-440	256 DDR3 memory, 4 x DVI-I , 1920x1200; BIOS ver 5.43.02.88.03	PCI-Express	Drivers CD ver 81.67
	Matrox	Millenium P650 P65-MDDE128F	128 MB	PCI-Express	Matrox Parhelia Series & Matrox P-Series
	Connect 3D	ATI Radeon X1600 series. C3D 3050	512MB GDDR2+DVI+TV	PCI-Express	CD=Connect 3D, Graphics card driver Version 10.4
	VisionTek	VT-X1300PCI256	DVI out, VGA out, PS2 half height PCI 3.3v graphics card	PCI	Visiontek2D/3D Accelerator driver install CD. V6.7
Ethernet Cards	HP	Broadcom NetXtreme	Gigabit PCI-E	PCI-Express	Broadcom NetXtreme Ethernet drivers v 8.1
	Broadcom	BCM95708A0804F long low profile	Single port. 10/100/1000Base-T	PCI-Express	

Device Category	Product Manufacturer	Model Name/Number	Product Details	System Interface	Software Drivers and/or Drivers
	Broadcom	BCM5751PKFBG	Single port. 10/100/1000Base-T SP#393626-001 Short low profile card.	PCI-Express	
	Dlink	DGE-560T	Gigabit PCI-E Ethernet adapter; support 10/100/1000 Mbps transfer rate; low-profile; 256 MB memory	PCI-Express	Wired Ver 1.00
	Dlink	DGE-530T	10/100/1000MBps Gigabit Desktop Adapter; IEEE 802.3, 802.3u Fast Ethernet, 802.3ab gigabit and 802.3x flow control802.1Q VLAN support	PCI	Wired Ver. 4.00
	SysKonnect	SK-9E21D SK-9E22	10/100/1000Base-T Adapter; autodetect, 802.3ab, u, ad, 802.1pq; ACPi 2.0 compatible; up to 133 MHz Bus Speed; PCI 2.3 compliant Dual-port version	PCI-Express	Installation CD V 4.33
	Intel	Pro/1000 Dual Port PT	Gigabit copper for servers	PCI-Express	Intel Ophir drivers
	Intel	Pro/1000 MT Server Adapter	Gigabit copper connection for servers; low-profile; IEEE 802.3ab, 802.1Q, 802.1p and 802.3x compliant	PCI/PCI-X	Intel Pro/1000 drivers
TV Tuner Cards	LifeView	TV Tuner	Fly TV Platinum Gold; 713 xBDA Analog Capture	PCI-X	AMCAP software
	Hauppauge	TV Tuner	Hauppauge TV GO with Win TV 2000 TV Viewer Application	PCI	Win TV 2000 application; WDM ver 3.49 for 878-based boards
HBAs & Storage Controller	Qlogic	QLA-2462	PCI-X Gigabit Fibre Channel adapter	PCI-X	SAN Surfer Management Suite (SMS) ver 2006
	Qlogic	QLA-2432	PCI-Express Gigabit Fibre channel adapter; using FW 4.00.12	PCI-Express	SAN Surfer Management Suite (SMS) ver 2006
	Emulex	LP1050EX-F2	PCI-Express Single Port Fibre Channel adapter	PCI-Express	CD- Technical Information and Drivers 04-334 07/2004 FC1061802-00R
	Emulex	LP11002	PCI-Express Dual Port Fibre Channel adapter	PCI-Express	Windows 2003 Server Driver 5.2.41a1-1b
	SIIG	SATA II PCIe RAID	SATA II PCIe RAId adapter ; compliant to PCI-e base spec 1.0a; low-profile; uses Silicon Image SIL 3132	PCI-Express	SIIG SATA II PCIe RAID v12.3.1
	LSI Logic	LSI22320	Ultra-320 SCSI Host Bus Adapter	PCI-Express	Driver 1.20.18 for Win XP
Connectivity Devices and Kits	DLink	DGS-1008D	8-port gigabit switch; 10/100/1000Mbps switched ports; IEEE 802.3 flow control for full duplex	Not applicable	Not applicable
	Linksys	EXHUB12S	Stackable Ethernet 100Base TX-12-Port Hub	Not applicable	Not applicable