BIOS Testing for PCI Express 3.0 Test procedure using the Agilent U4305A Protocol Test Card

User Guide

Revision 1.0

March 27th 2013

Revision History

Version	Date	Summary of Changes	Contributors
0.1	April 18th 2012	Initial Draft	Gordon Getty
0.7	June 4th 2012	Minor updates	Gordon Getty
0.9	August 20th 2012	Added instruction to run simple test case at all 3 link speeds	Gordon Getty
0.91	September 25th 2012	Update relating to booting to OS when running tests	Gordon Getty
1.0	March 27th 2013	Release version	

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1. Overview

The PCI Express 3.0 Platform test considerations document defines a series of tests to verify compliance of system BIOS to the PCI Express Base specification.

This document outlines the test procedure for running the tests implemented on the Agilent U4305A Protocol Test card for PCI Express 3.0.

IMPORTANT NOTE: This document is intended to provide the procedure for testing a **PCI Express 3.0** system for compliance using the Agilent U4305A PTC.

If the intention is to test a PCI Express 2.0 system for compliance, then please refer to the BIOS testing for **PCI Express 2.0** Test procedure using the Agilent U4305A Protocol Test Card.

2. Hardware Requirements

1.1 Agilent U4305A Protocol Test Card for PCI Express 3.0 (PTC)

This document is developed using Agilent U4305A Protocol Test Card for PCI Express 3.0 (PTC).

Figure 1: U4305A Protocol Test Card for PCI Express 3.0

1.2 Controller PC

A controller system running Windows 7 (32 bit or 64 bit) is required to run the software to control the PTC.

3. Software Requirements

There are 3 software packages required:

1. PCIEPT3_3.0.0.msi available from PCISIG – Install this to C:\
2. Agilent_PCIEPT3_SUPPORT_FILES_v1.0.zip - Agilent Support files for BIOS testing – Extract this to C:\PCIEPT3 –available from www.agilent.com/find/U4305A
3. Agilent Protocol Exerciser for PCI Express version 8.6 available from www.agilent.com Install this package into the default location

Install all 3 packages on the controller PC before connecting the PTC.

NOTE: The software required for testing a PCI Express **2.0** system is **PCIEPT2.msi** and the software required for testing a PCI Express **3.0** system is **PCIEPT3.msi**.

4. Setup Example

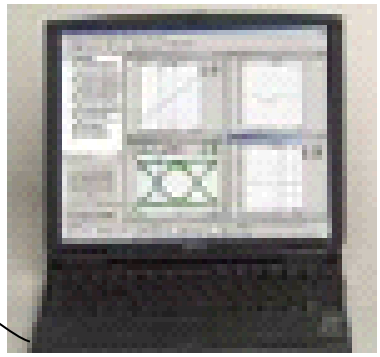

Figure 2: Controller PC

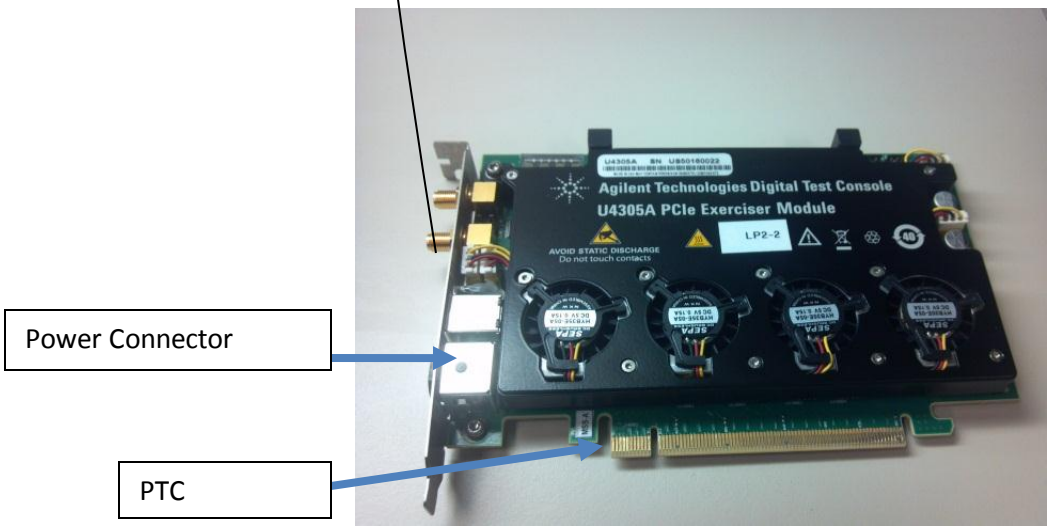

Figure 3: PTC

Connect the USB Cable from the Exerciser to the controller laptop.

4.1 Setup the PTC Hardware

The PTC should be plugged into the system under test (SUT). Connect the power supply to the PTC and check the indicators to confirm it has powered up properly. If not, remove and then reconnect the power supply again. After the PTC has powered up properly, connect the USB cable to the PTC and controller system.

The tests should be run at x1 link width. **Do not** use link width reducers with the PTC since the degradation of the signal integrity may result in link stability issues at 8GT/s.

For the tests to run properly, the system BIOS must fully complete its initialization. It may be necessary to allow the system to reach the OS boot screen prompt, as only booting to an EFI shell may cause some parts of the SBIOS initialization to be bypassed causing test results to be incorrect. However, it is not permitted to actually boot any O/S or run any subsequent programs under that O/S, as this could result in changes to the environment left when the system BIOS initialization competed. Also, the DUTs CMOS settings should be properly configured prior to the test, to ensure full system BIOS initialization will be performed.

5. Running the BIOS test software

5.1 Setting up the initialization files

Prior to running the BIOS test software, there are 2 initialization files that may be edited:

C:\PCIEPT\PtcBios.ini – This file contains information about the link capabilities of the PTC. These should be left as default unless there are problems linking at 8GT/s

This file also includes parameters for establishing the link to the device including equalization settings at 8GT/s. If a link cannot be established on the PTC at 8G (look at the LED display on the card), then these settings may need to be changed.

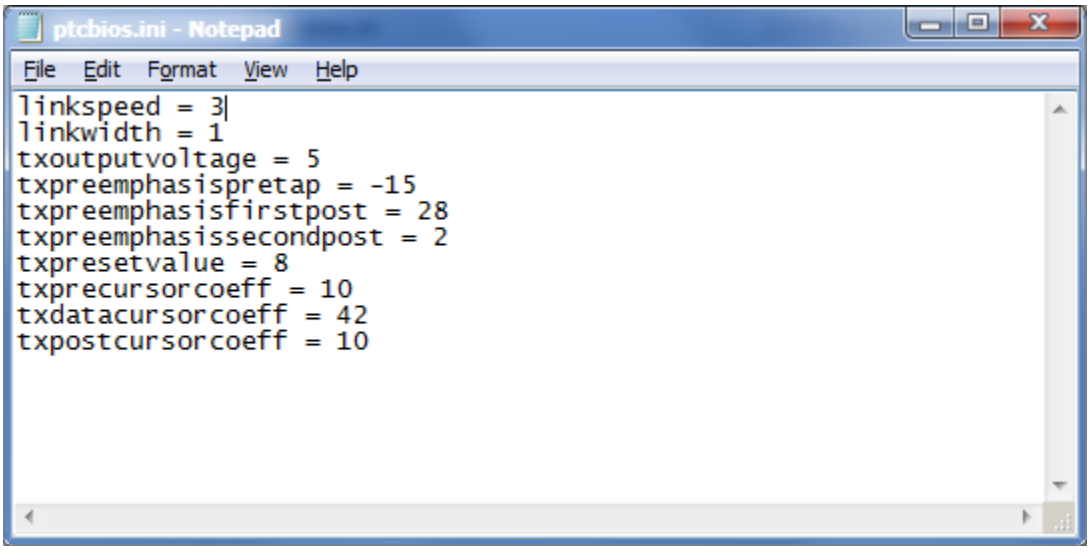

Figure 4: ptcBios.ini contents

linkspeed = 3

linkwidth = 1

txoutputvoltage = 5

txpreemphasispretap = -15

txpreemphasisfirstpost = 28

txpreemphasissecondpost = 2

txpresetvalue = 8

txprecursorcoeff = 10

txdatacursorcoeff = 42

txpostcursorcoeff = 10

C:\PCIEPT3\ini\pcieptapp.ini – This file determines the timeouts for the tests, these can be adjusted if required, especially when testing a system that takes a long period of time to boot.

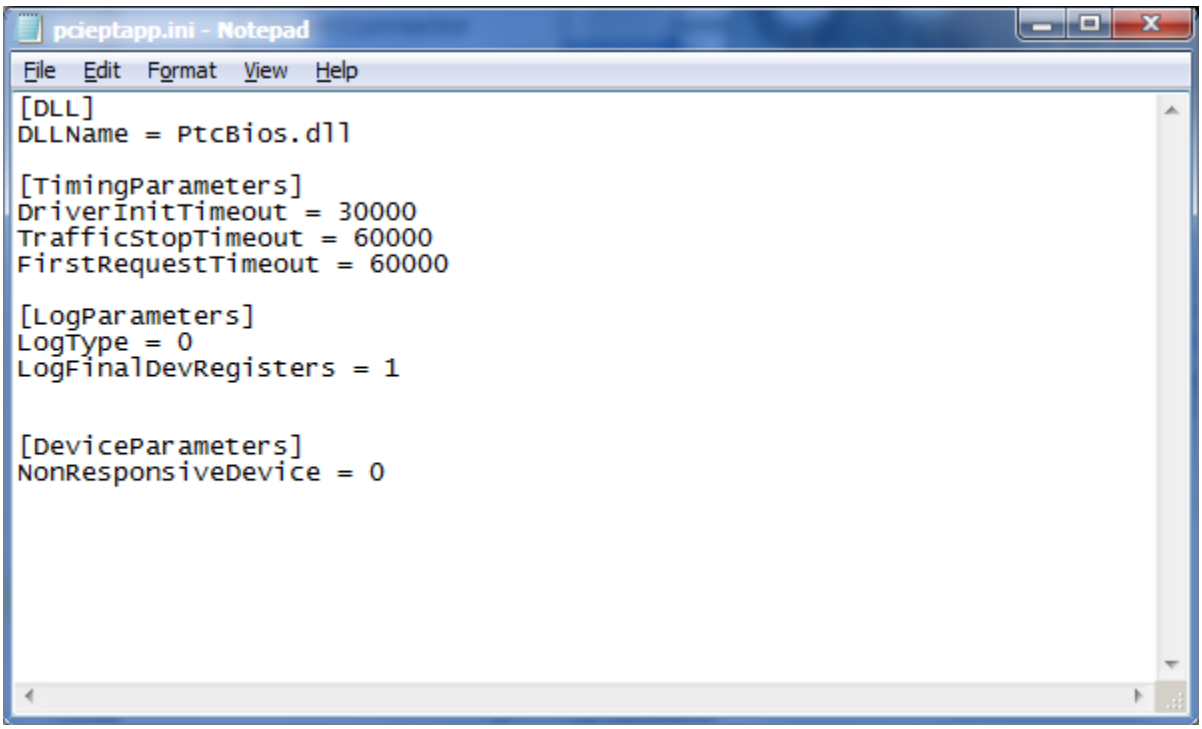

Figure 5: pcieptapp.ini Default Configuration

[DLL]

DLLName = PtcBios.dll – This is the .dll file for the Agilent U4305A Protocol Test Card. This file is installed when the Agilent software is installed

[TimingParameters]

DriverInitTimeout = 30000 – This is the time that the PTC will wait for link training to commence

TrafficStopTimeout = 15000 – This is the timeout after the last traffic to the PTC has run, once the system is at the “OS not found” message, typically there is no traffic after that and the test will finish. On a slow booting system, this number may need to be increased to avoid the test timing out prematurely.

FirstRequestTimeout = 60000 – This is the timeout from the link being established to the first configuration access to the PTC. It may be required to increase this on a system that takes several minutes to boot.

[LogParameters]

LogType = 0 – leave as default

LogFinalDevRegisters = 1 – leave as default

[DeviceParameters]

NonResponsiveDevice = 0 – leave as default

5.2 Running the software

From the start menu, select All Programs -> PCIEPT3 -> PCIEPTapp.exe

This will open the BIOS test GUI from which the tests can be selected.

When running the application, you will be asked if you want to run in offline mode, choose No.

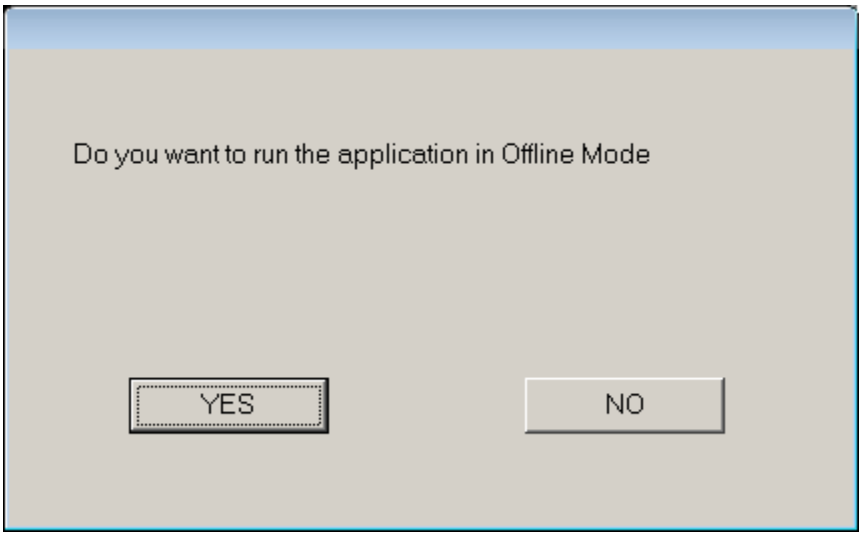

Figure 6: Online/Offline Dialog

Figure: choose No

A blank console window will show up, this will show information later while the tests are running. Do not close this window since it will close the application.

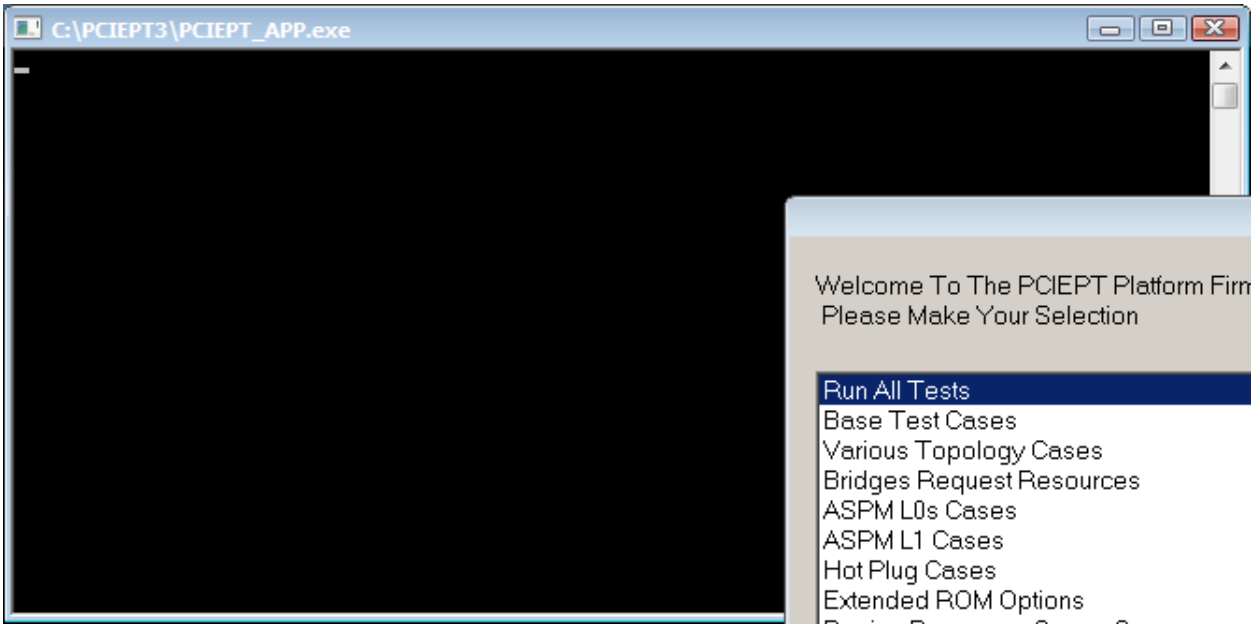

Figure 7: Console Window

The main test choice GUI will show up now:

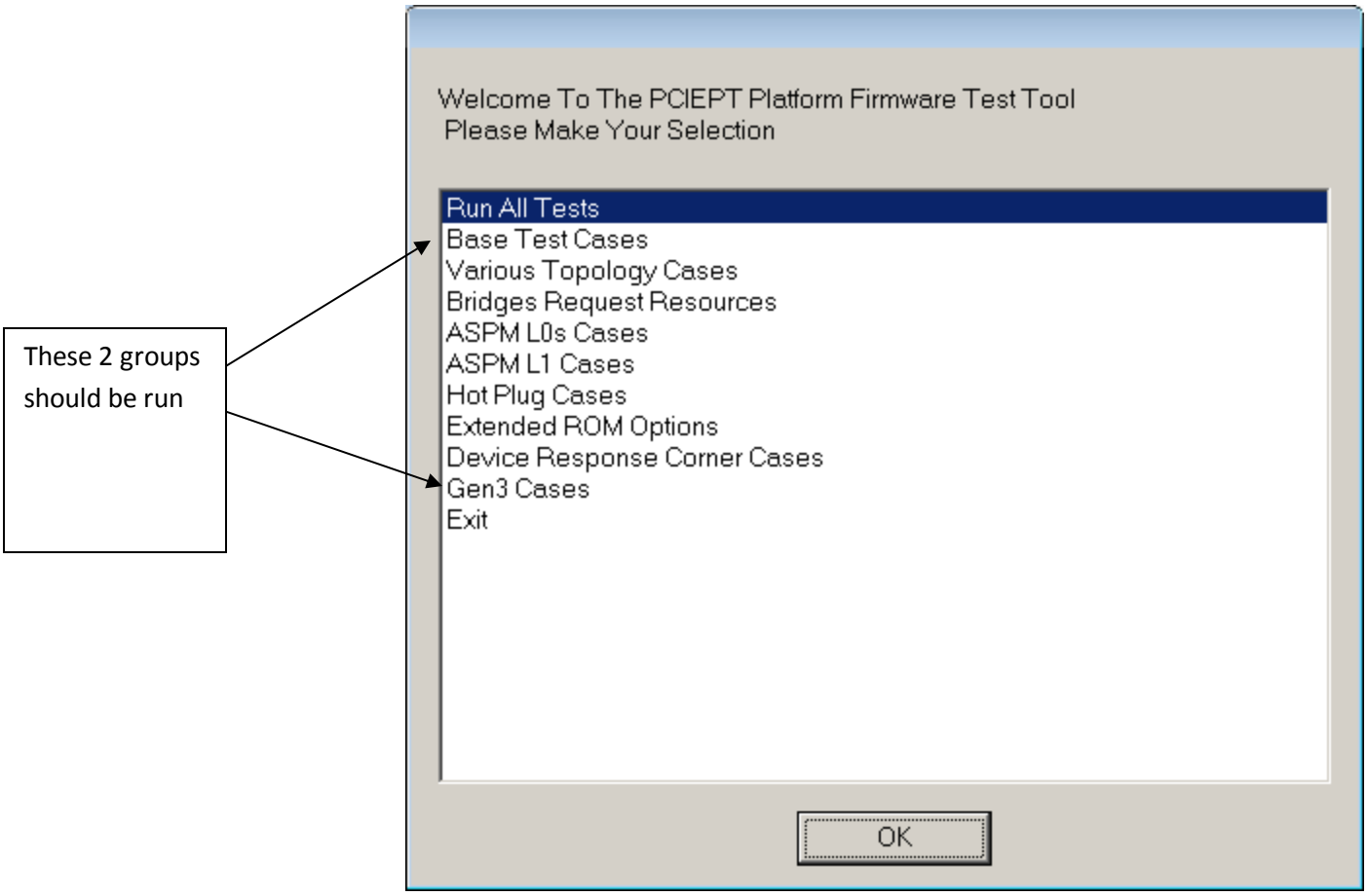

Figure 8: Main Selection Window

There are 2 groups of tests that should be run on a PCI Express 3.0 compatible system. The groups “Base Test Cases”and “Gen3 Cases”. The procedure for running each is the same.

Select the group of tests to be run and choose OK:

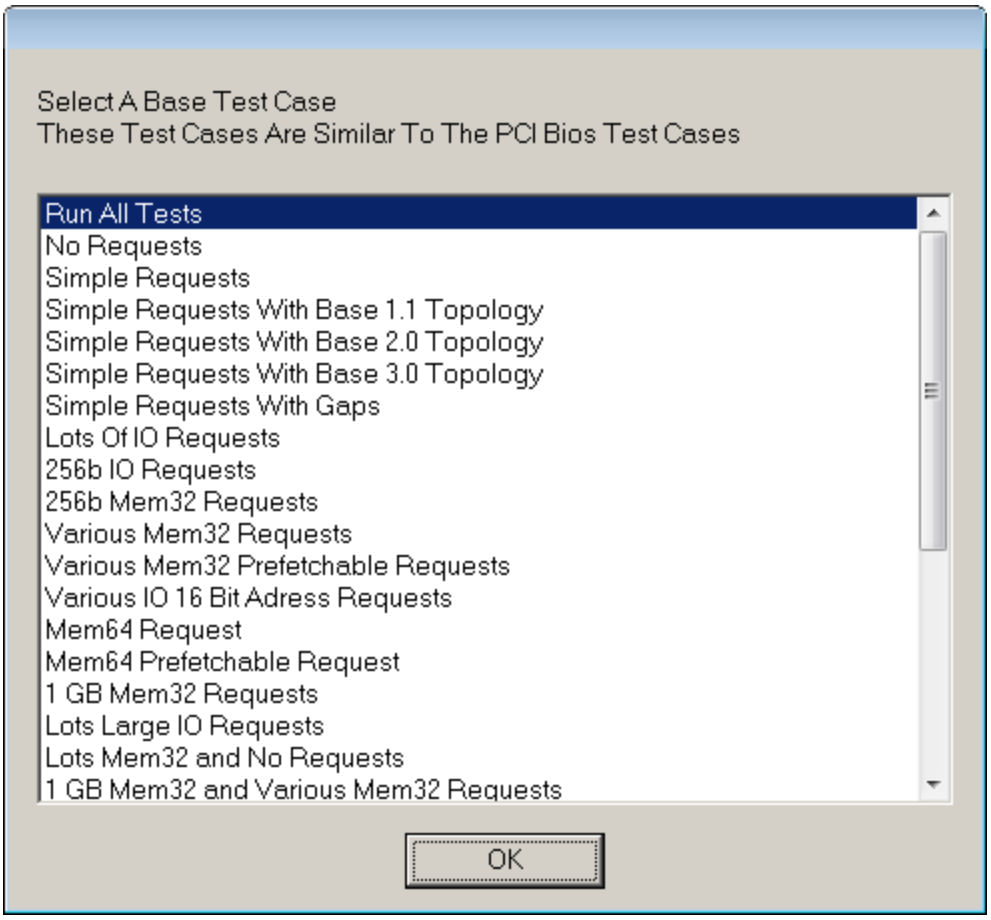

Figure 9: Base Test Cases List

Then choose run all tests and press OK. At this point, watch the console window very carefully and follow the prompts. It is important to wait until “Link Training Started”appears in the console window before powering on the DUT. See below:

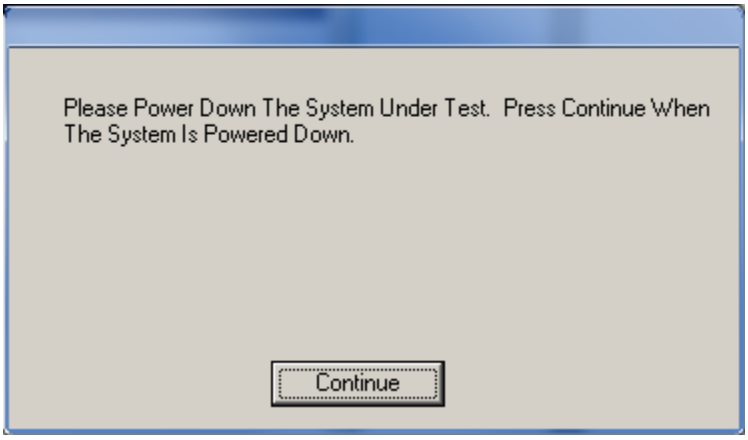

Figure 10: Power off DUT when instructed

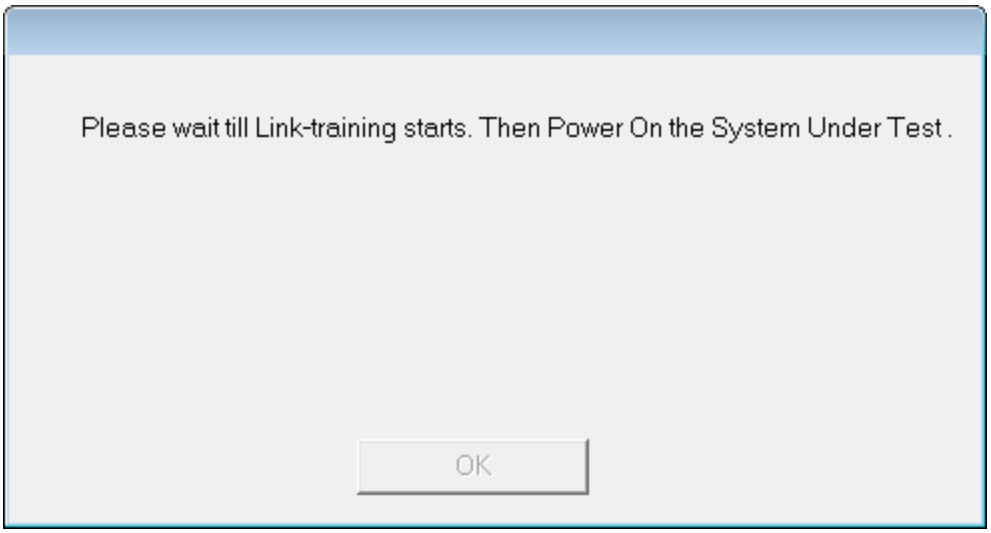

Figure 11: Make sure to wait until Link training starts on console window before powering on system

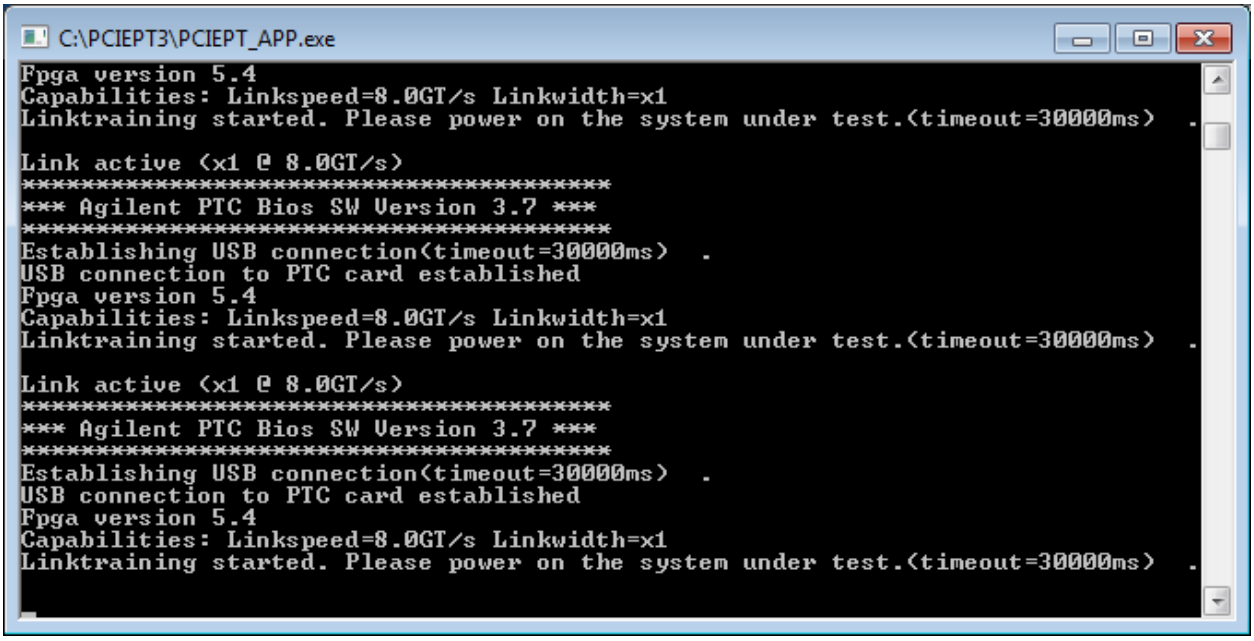

Figure 12: Console WIndow when ready

After the message appears, power on the DUT, you should see the link state show as active at the appropriate speed within a few seconds. Some systems may take some time for this to appear. If the system is slow in booting, it may be necessary to increase the timeout in the .ini file. The default is 30 seconds. When the link is active the display will show:

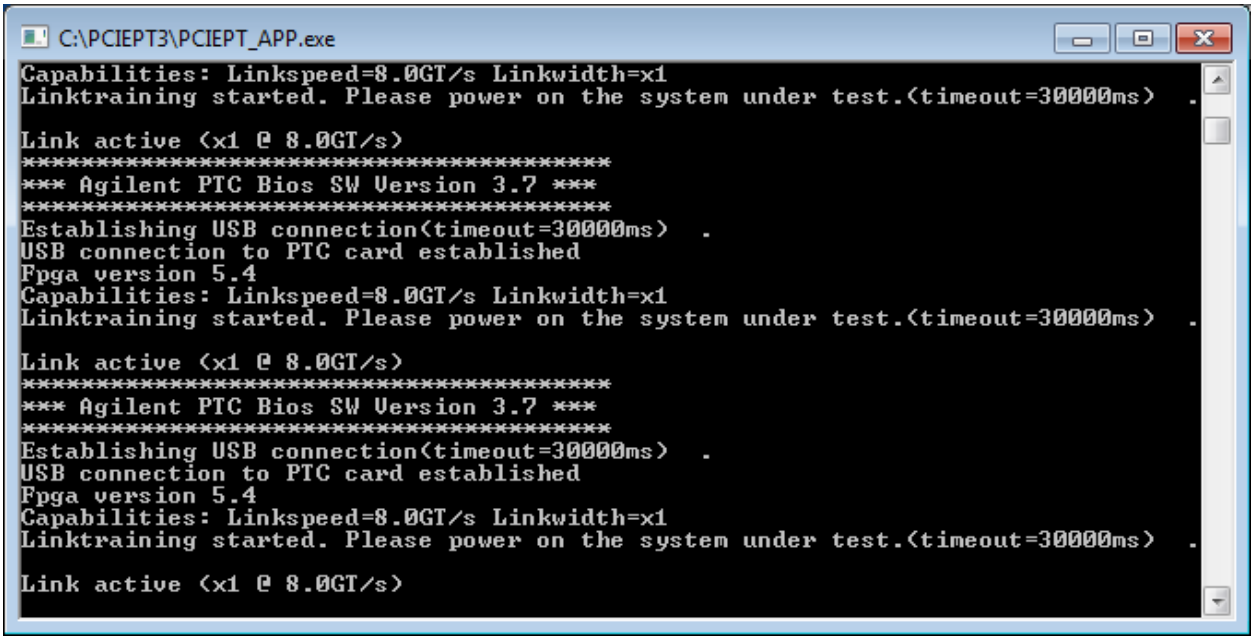

Figure 13:Link is active, this would show as 3X1 on PTC display

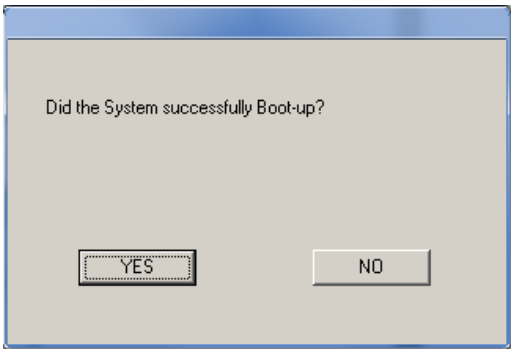

Figure 14: When the test is finished, check if the system booted properly or not

When answering the prompt, ensure that the system BIOS has successfully completed its initialization. The system should have reached the OS boot screen prompt. Some suggested methods to check for successful system BIOS completion are: a) Post Code indicates successful completion; b) listening for audio indications of success; c) not hearing any error beeps; d) visible success message is displayed; e) not seeing any error text messages displayed. Other methods beyond those listed may be used. Note: If the system does not provide a built-in Post Code display, then an add-in Post Card may be installed to allow the Post Codes to be monitored.

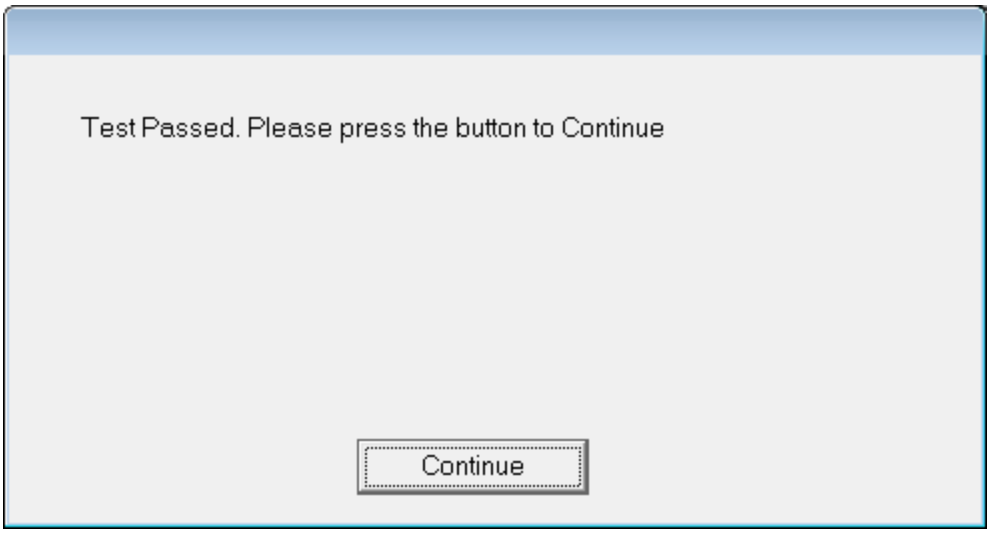

Figure 15: Test Pass or Fail result

A summary of the results up to this point will be shown:

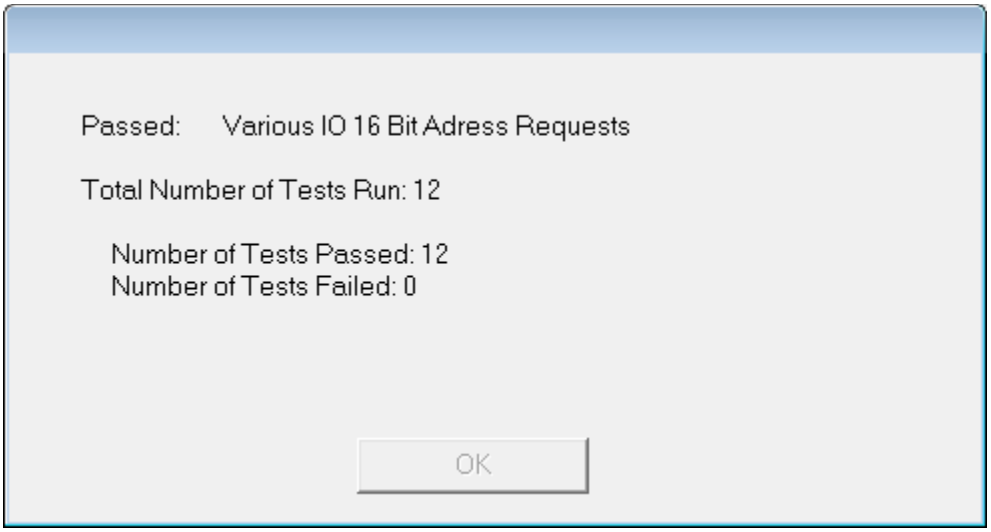

Figure 16: Summary or results of tests run

After finishing this test, the software will proceed and ask to power down the System under test.

Follow the on screen instruction to power off the DUT, if the DUT is already off, then press continue.

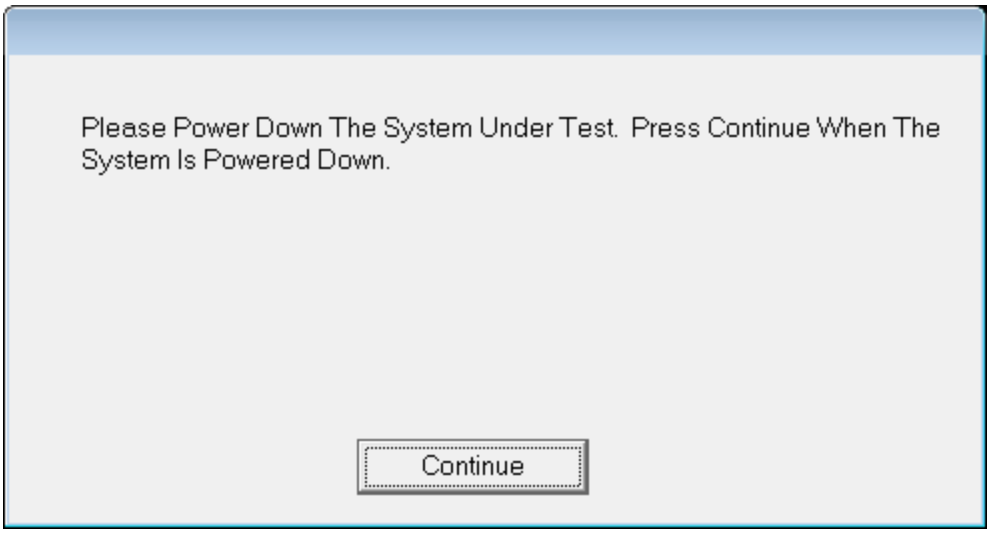

Figure 17: Turn off the DUT when the test is finished

The test software will continue in the same way through all of the other tests. Remember to wait until the Linktraining started shows in the console window before powering on the DUT each time.

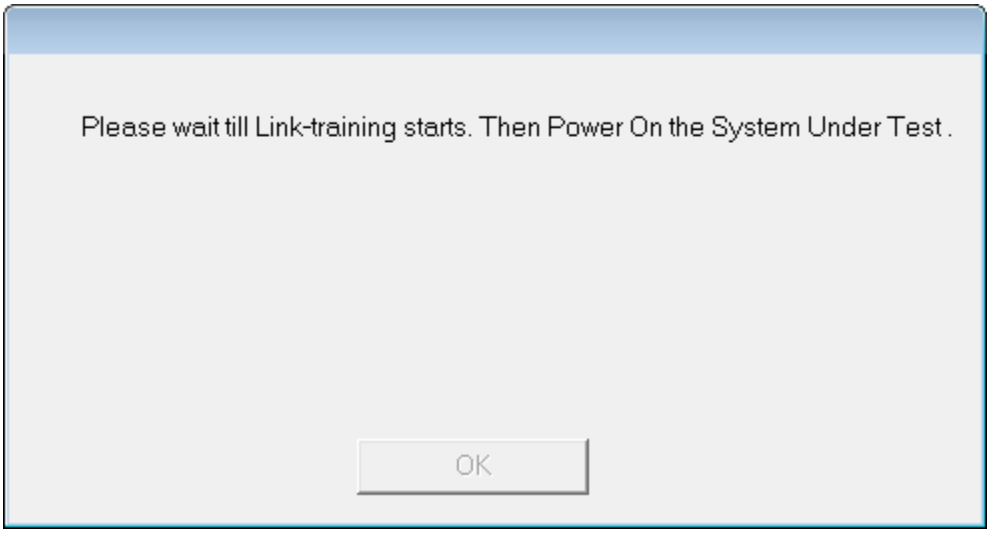

Figure 18: Continue as in previous tests

After all tests have been run, a summary window will show with each of the results. NOTE: it is possible that a test may pass but the DUT was in a hang state, this would be considered a fail for that particular test. Also, some tests will cause the DUT to take longer to boot than others, please be patient before determining that the system has hung.

Repeat the process for all the tests in the Gen 3 test group, select Gen3 cases and then press OK:

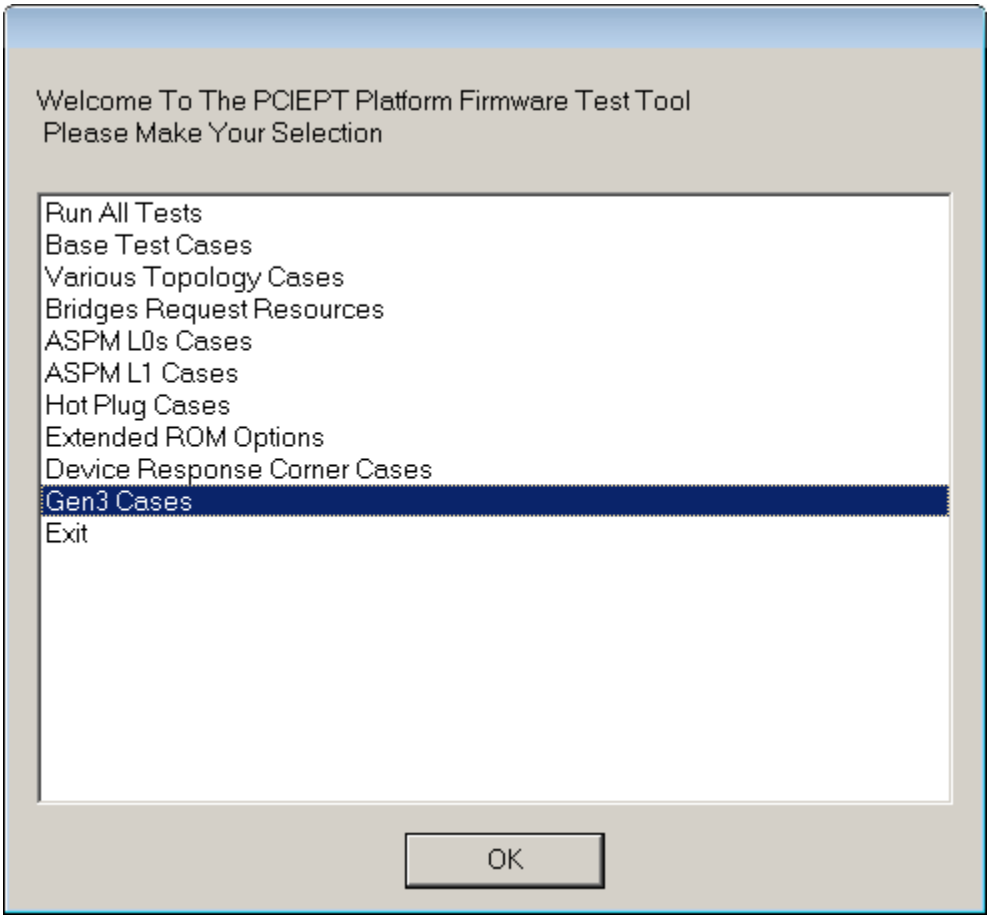

Figure 19: Choose Gen 3 tests from the main menu

Next press “Run all Tests”and press OK:

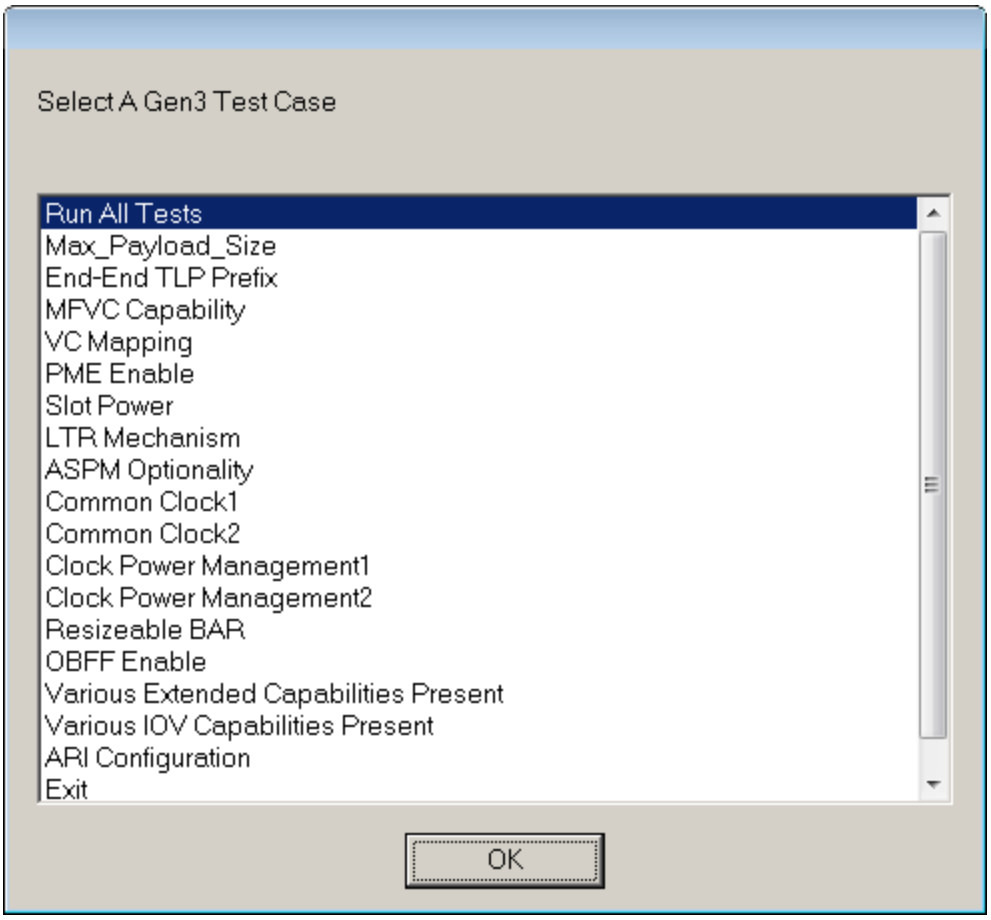

Figure 20: Gen 3 test list

The test software will run through the tests as before and show a summary at the end.

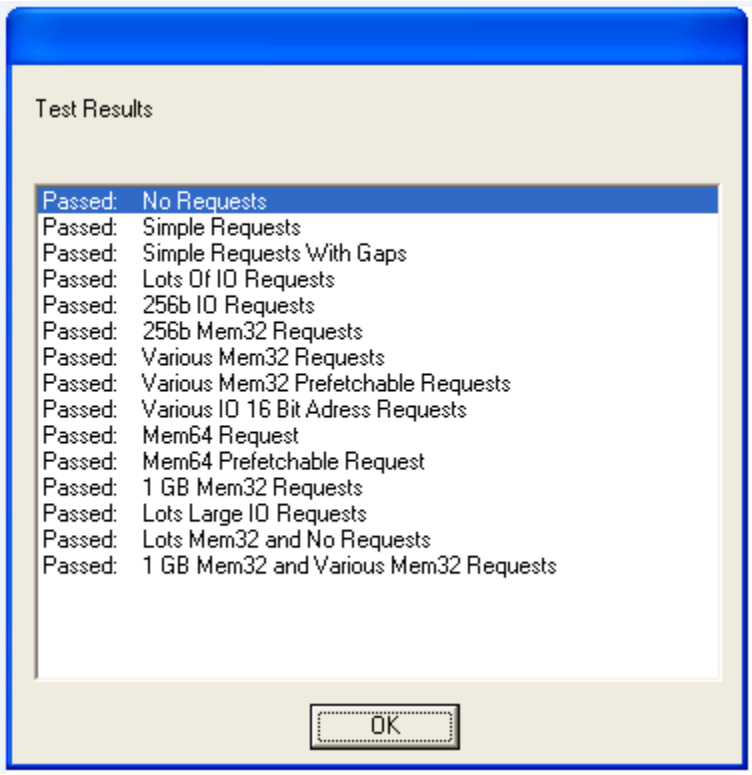

Figure 21:Results Summary Display

After completing both sets of tests, the Simple Case test should be run at 2.5GT/s, 5GT/s and 8GT/s (it should already have been run at 8GT/s)

This should be done by changing the speed in the initialization file PtcBios.ini and changing the linkspeed field to 1 for 2.5GT/s and 2 for 5GT/s.

A summary of the results will also be written to the logs folder in a file called results.txt. A system is required to pass all tests in the Base Test Cases group **AND** Gen 3 Tests group for it to be considered an overall PASS. Any test failures will result in an overall FAIL.