

High Speed Interconnect Tester

Users Guide

Version 1.1

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i. Revision History

Revision	Date	Description
V1.0	4/4/11	Initial Version
V1.1	5/3/11	Change Pre-Emphasis to -15 to 15, added log file section, added pre-emphasis tap definitions, added explanations for status and config window
V1.2	5/25/11	Added Pre-Emphasis pictures

ii. Reference Documents

Document #	Title	Author
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1 Introduction

The Quantum Parametrics' High Speed Interconnect Tester (HSIT) is designed to enable at speed testing of cables, slip-rings, backplane and other interconnects. The HSIT's eight generic DC, low speed and high speed channels are configured through technology specific Connector Saver Modules such as USB, FireWire, HDMI, DisplayPort, SATA, SAS, PCIe, etc... Quantum Parametrics provides a variety of Connector Saver Modules.

1.1 HSIT Components



Figure 1 - HSIT with Connector Saver

1.1.1 HSIT Tester

The High Speed Interconnect Tester (HSIT) is a generic interconnect (cables, slip-rings, backplanes, etc.) tester with:

- eight (8) high speed (600Mb/s to 6.5Gb/s),
- eight (8) lower speed (DC to 1.6Gb/s) and
- eight (8) DC channels

Coupled with a technology specific Connector Saver Modules the HSIT provides both a simple to operate production tester and highly configurable engineering tool.

1.1.2 Configurable Parameters

Configurable Parameters	High Speed SERDES (Differential)							
	Amplitude (mVp-p)	1200	1000	900	800	700	600	400
Data Rate Range	600 Mb/s to 6.125 Gb/s							
Pre-Emphasis	Pre-Tap, Post-Tap1, Post-Tap2					-15 to 15 ²		
Adaptive Equalization (dB)	0 to 15							
DC Gain (dB)	12	9	6	3	0			
LVDS (Differential)								
Amplitude (mVpeak)	100 to 600mV (3mV increments)							
Data Rate Range	150 Mb/s to 1.5 Gb/s							
DC Threshold Levels								
VHT (short)	3.3V to VLT + 200mV							
VLT (open)	0V to VHT - 200mV							

Table 1 - Configurable Parameters

1.1.3 HSIT Application Software

The HSIT application software controls the testing process and logs the test results.

² -15 to 15 equal the % change from VOD

1.1.3.1 Log File

For each test the configuration and results are logged into a log file for tracking purposes. The log file is typically found in the following directory location:

C:\program files\quantum parametrics\ita\logresults\

The log file format is shown below:

Serial/Batch Number: 12345678
Test Result: PASS

Tester GUID: 0x0012BEFFFE2FC6FA
Tester ID:ID: 049-USB3_SAMB
Technology Type: [USB 3.0 StdA to Micro B]

Start Time: 2011-04-08 11:10:03
Stop Time: 2011-04-08 11:10:17

DC Test: PASS
Signal 1 - VBUS Power: PASS
Signal 2 - GND_PWR: PASS
Signal 3 - SDP1_Drain: PASS
Signal 4 - SDP2_Drain: PASS

LSPD Test: PASS
Test Duration: 5 Secs
Test Parameters:
UTP_D - 480Mb/s
Amplitude: 400mV

Test Results:
Chan 1 Continuity: PASS
Signal UTP_D+/-: PASS

HSPD Test: PASS
Test Duration: 5 Secs
Test Parameters:
SDP1 and SPD2 - 5.0Gb/s
Amplitude: 800mV
Pre-EmphTap0: 0dB
Pre-EmphTap1: 0dB
Pre-EmphTap2: 0dB
RxDCGain: 0dB
RxEqualization: 3dB

Test Results:
Chan 1 Continuity: PASS
Signal SDP1+/-: PASS
Chan 2 Continuity: PASS
Signal SDP2+/-: PASS

1.1.4 DC Adaptor

A 12V DC power supply is included to power the HSIT.

1.2 Other Required Equipment

1.2.1 Host Computer

The HSIT application runs on a PC running Microsoft Windows XP or Windows 7. Minimal hard disk space and memory are required.

1.2.2 1394 Interface

The HSIT application communicates with the HSIT instrument via IEEE-1394 (the Backchannel). The host computer must provide a 1394 open host controller interface (OHCI). PCI, PCMCIA, and integrated OHCI are acceptable. The HSIT has three bilingual ports. The Backchannel uses VersaPHY™³ technology for communication between the PC and the HSIT. While VersaPHY is supported by most OHCI implementations, QP has found that the TI TSB82AA2B OHCI IEEE-1394b controller does not support VersaPHY packets.

The HSIT application installation will install custom 1394 drivers. These drivers should allow applications currently using 1394 to continue to use the 1394. Additionally the HSIT application is designed to support multiple HSIT testers operating at the same time.

³ VersaPHY™ is a trademark of Astek Corporation, all rights reserved.

2 HSIT Tour

2.1 Front Panel

The HSIT's front panel has a Connector Saver Module (CSM) opening. The CSMs are designed to adapt the generic HSIT to technology specific connectors. A USB 3.0 Std. A to Micro B CSM is shown in the picture below.



Figure 2 - Front Panel

2.1.1 Example Connector Saver

Most of the HSIT enclosure user interface is provided through the technology specific CSM. The figure below shows an example Connector Saver configuration.

When the CSM is correctly plugged in and power to the HSIT is ON the Active LED is solid green. When the HSIT is selected

(identified, see section 3.6.1) in the software UI the Active LED blinks green to indicate that that HSIT has been selected by the software.

Upon power up, the Testing LED is solid Red, meaning the tester hasn't been configured and pressing the Loaded button will have no effect. After software initialization, a test may be started when the LED is off. After the "Loaded" switch is pressed (or the test is started in the software UI) and through the duration of the test, Testing LED blinks Red. This means a test is running. DO NOT unplug the cable or press the Loaded button. When a test is not running the Testing LED is off, meaning it is safe to load/unload cables.

Upon power up the Pass/Fail LED is off. Also, while testing (the Testing LED is blinking red) the Pass/Fail LED is off. When a test completes: if all tests (DC, Lower Speed, High Speed) pass, the Pass/Fail LED blinks green. If any test (DC, Lower Speed, High Speed) fails, the Pass/Fail LED blinks red.

The user presses the "Loaded" switch when the cable is loaded and a test is ready to begin. When pressed, the HSIT sends a message to the software indicating that a test is ready to be started. This allows tests to be running without the user interacting with the software.

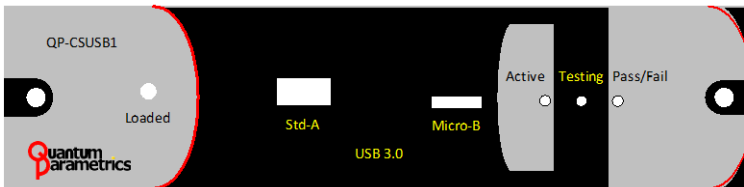


Figure 3 - Example Connector Saver Face Plate

2.1.2 Multi-Connection

Multiple HSITs may be connected to a single host computer to allow multiple cables to be tested at the same time.

2.2 Back Panel



Figure 4 - Back Panel

2.2.1 Backchannel Connectors

The Backchannel connectors provide an IEEE-1394 connection between the HSIT and the PC running the HSIT application. All three (3) ports are bilingual connections and support a maximum data rate of S800 (768.43 Mb/s).

2.2.2 Tester Power

The HSIT is powered by the included 12 volt power supply connected to the back of the tester.

2.2.3 ON – OFF Switch

The ON – OFF switch connects and disconnects the 12 volt power supply from the HSIT internal circuitry.

3 HSIT User Interface

3.1 Start Application

Execute the ITA.exe file. This can be through the Windows Start menu.

3.2 Initial Screen

If no HSITs are connected to the PC when ITA.exe is executed, the “Selected Tester Status” box will display “NO DEVICE.” When one or more HSITs are connected, the following screen will be presented:

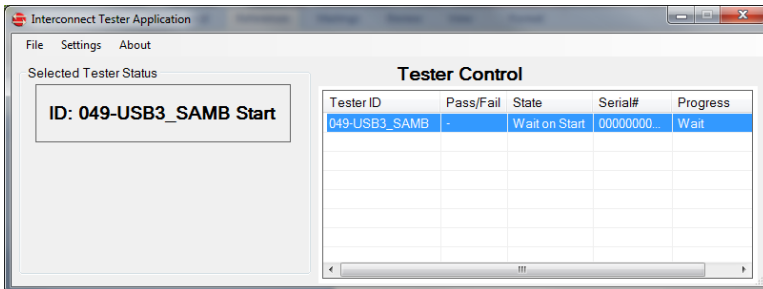


Figure 5 – Initial view after HSIT connection

The “Tester Control” box on the right side of the window shows the testers that are connected. The selected tester’s status is displayed in the “Selected Tester Status” box on the left side of the screen.

3.3 Tester Settings

The Settings menu allows the user to configure non-technology specific tester parameters (see figure below).

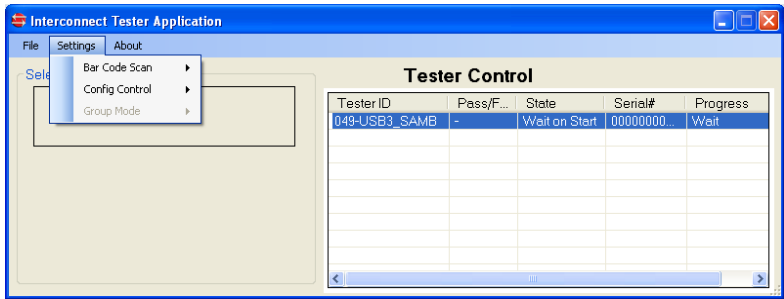


Figure 6 - Tester Settings Menu

3.3.1 Bar Code Scan

HSIT optionally supports a Bar Code Scanner to enter serial numbers. The HSIT application will prompt the user to enter a serial number when a test is started while this mode is enabled. This can be done either by scanning or manually at the prompt.

3.3.2 Configuration Control

By default the HSIT is ready to run a test without any user configuration. However, at times it may be desirable to adjust individual test parameters. This is done by turning the "Config Control" to ON (the menu displays the current status of "Config Control"). This extra step prevents inadvertent changes to test parameters.

3.3.3 Group Mode

By default each HSIT runs as an individual tester. Future revisions of the HSIT application will allow multiple connected testers to be grouped together and started at the same time.

3.4 Status and Configuration

The Status and Configuration window can be accessed by right clicking on the desired tester from the Tester Control window and selecting “Configuration” as in the figure below. Different Connector Saver modules will have different configuration screens. The HSIT application detects the Connector Saver module present. If a module is present, then the HSIT application will load the default Configuration file for that module.

Note: In order to edit Configuration settings, “Config Control” must be set to “On.” (See Section 3.3.2.)

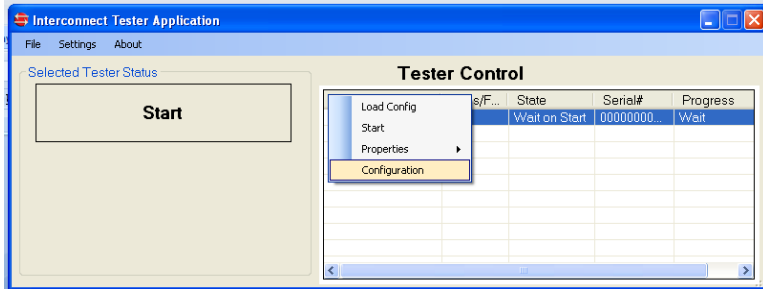


Figure 7 - Accessing the Status and Configuration Window

3.4.1 The Status and Configuration Window

The exact details of the Status and Configuration window change based on the attached CSM. The USB 3.0 Standard A to Micro B Connector Saver example configuration window below shows Connector Saver information, test information, and configurable parameters for that technology.

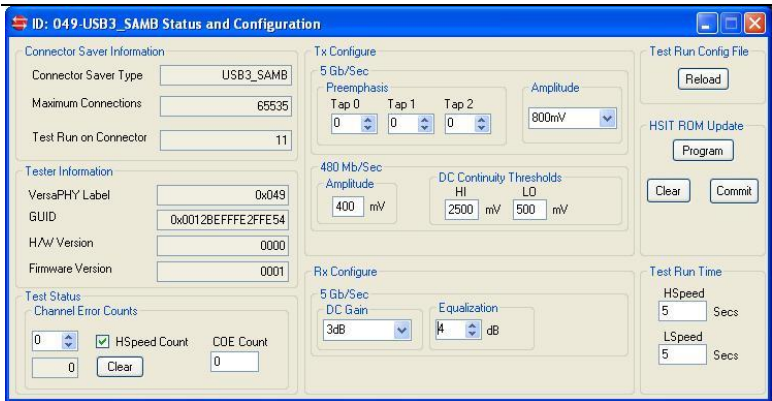


Figure 8 - Tester Status and Configuration Window

3.4.1.1 Connector Saver Information

The Status and Configuration window provides information about the Connector Saver Module (CSM) in the Connector Saver Information area. Specifically it provides the name of the CSM in the Connector Saver Type. This information is read from the CSM and is not editable. The Maximum Connections indicates how many plug/unplug cycles the connectors on the CSM can tolerate before they may cause failures.

3.4.1.2 Tester Information

The Status and Configuration window provides information about the HSIT in the Tester Information area. The VersaPHY Label is a unique name for the HSIT being addressed by the HSIT application. The Global Unique Identifier (GUID) is IEEE-1394 worldwide unique id for this specific HSIT. The H/W and Firmware version indicate the revision of the HSIT and firmware running on it.

3.4.1.3 Test Status

The Status and Configuration window provides information about the specific test being executed in the Test Status area. The **Channel Error Counts** allow the user to select the Low or High speed channel being monitor using the up and down arrows and by selecting or deselecting the **HSpeed Count** box. The error count for the selected channel is displayed in the box next to the clear button. The **Clear** button clears the count for the channel being monitored. The **Continue On Error (COE)** Count field sets the number of errors allowed before the test is stopped regardless of the Test Duration time.

3.4.1.4 Tx Configure

The Tx Config area fields are dependent on the CSM installed. If the CSM requires high speed channels then Preemphasis and Amplitude fields will be present and active. If low speed channels are required then the Amplitude field will be present and active.

Pre-Emphasis – is the % change from the Amplitude (VOD) for the High Speed channels only.

Pre-Tap – de-emphasizes the bit before the transition and emphasizes the remaining bits. A different polarity on pre-tap does the opposite.

Post-Tap1 – emphasizes the bit period immediately after the transition and de-emphasizes the remaining bits.

Post-Tap2 – de-emphasizes the first two bits after the transition and emphasizes the remaining bits. A different polarity on the 2nd post-tap does the opposite.

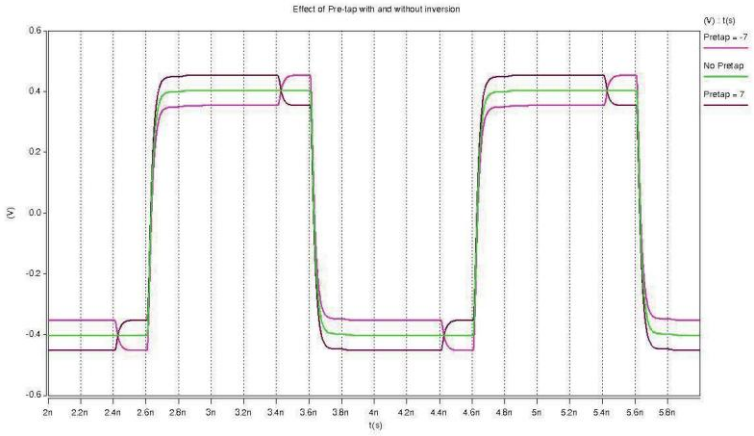


Figure 9 - Effects of Pre-Tap

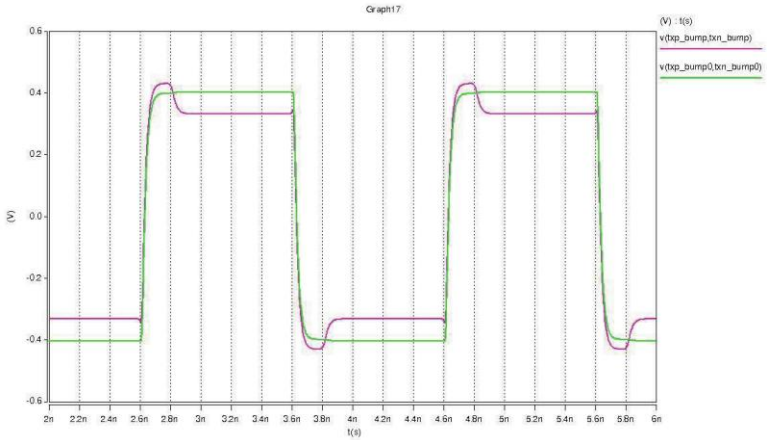


Figure 10 - Effects of Post-Tap 1

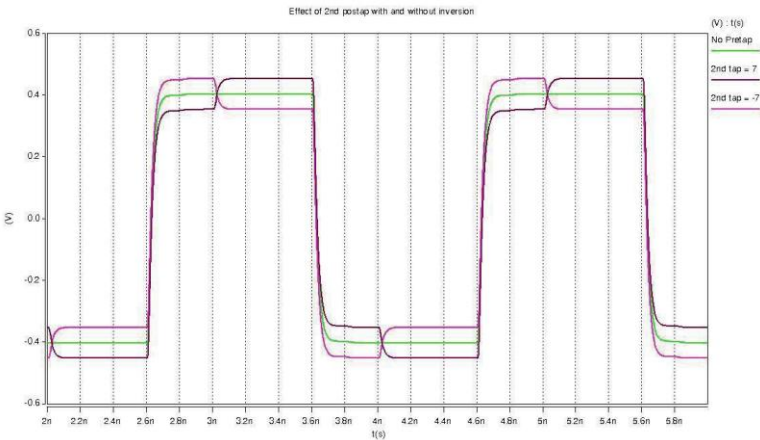


Figure 11 - Effects of Post-Tap 2

Amplitude – adjusts the differential amplitude (VOD). There is a pull down for the available amplitude settings (peak-to-peak differential) for the High Speed channels. For the Low Speed channels the user may type in any value between 100mV to 600mV (peak differential). The settable resolution is 3mV.

3.4.1.5 Rx Configure

The Rx Config area fields are dependent on the CSM installed. If the CSM requires high speed channels then DC Gain and Equalization fields will be present and active.

DC Gain – sets the DC Gain of the equalizer in dB.

Equalization – sets the adaptive equalization level in dB.

3.4.1.6 DC Continuity Thresholds

The HSIT detects the continuity of a signal by applying a signal to one end of a conductor and measures the value at the other end of all connected conductors to determine if the conductor

is connected correctly. The **HI threshold** is the voltage level that will be used to determine if the conductor is connected (shorted) from one end to the other. The **LO threshold** is the voltage level that will be used to determine if the conductor is not connected (open) from one end to the other.

3.4.1.7 Test Run Config File

The Reload button in the Test Run Config File area cause the default configuration file for the connected CSM to be reloaded.

3.4.1.8 HSIT ROM Update

The functions in this area are not supported at this time.

3.4.1.9 Test Run Time

The Test Run Time area allows the user to set the test duration in 1 second increments or select continuous mode (see Section 3.6.2).

3.4.2 Loading Configuration Files

The HSIT application automatically loads a configuration file based on the connected Connector Saver Module. Alternate custom configuration files may also be loaded.

To load a configuration file to a specific tester, right click the desired HSIT device and select "Load Config."

To load a configuration file to all connected testers, click file and select "Load Config."

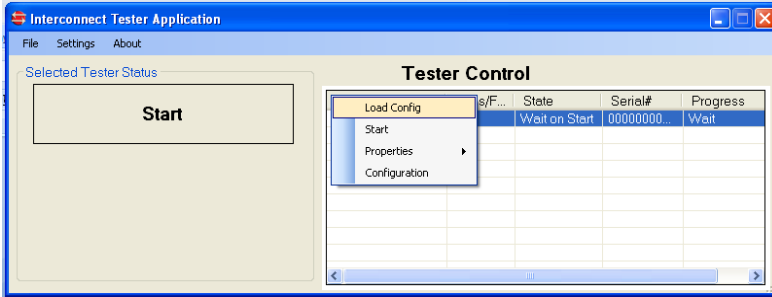


Figure 12 – Load configuration file menu

3.5 Running a Test

While operating an individual tester, a test may be initiated by pressing the “Loaded” button or through the UI by right clicking on the tester and selecting Start.

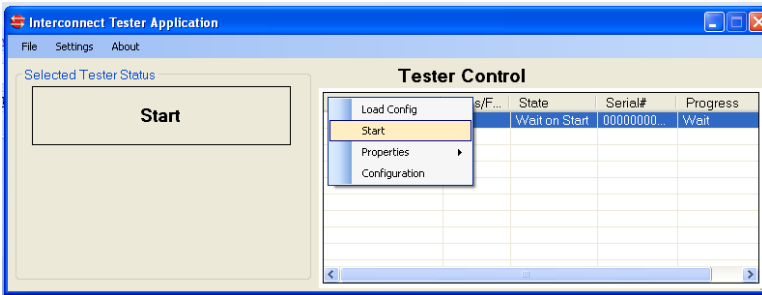


Figure 13 - Starting Test through UI

While waiting for a test to be started the State column indicates “Wait on Start.”

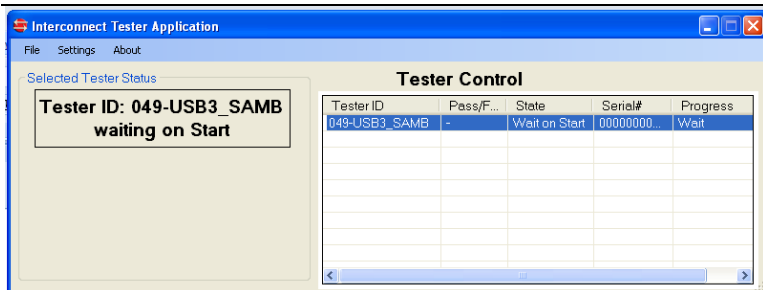


Figure 14 - Waiting for Test Start.

While a test is running the State column will indicate “Running.”
The Pass/Fail status is “Wait.”

3.6 Properties

The “Properties” menu allows the user to find out specific information about the tester and its attached Connector Saver. To access the menu, right click the desired device and select “Properties.”

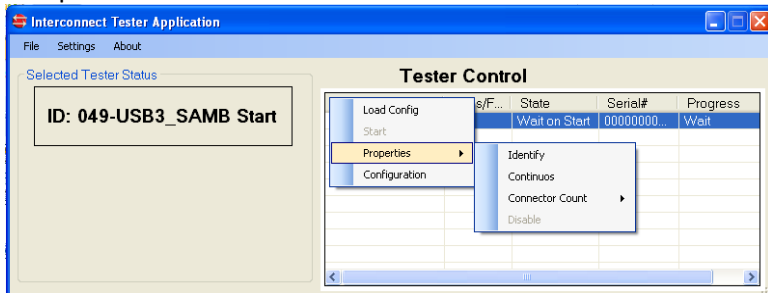


Figure 15 - Tester Properties Menu

3.6.1 Identify

Select “Identify” to cause the associated tester’s Active LED to blink green.

3.6.2 Continuous

Select “Continuous” to turn continuous testing on or off. Continuous mode causes the test to run until manually turned off (Right click the desired device and select “Stop”).

3.6.3 Connector Count

Selecting “Connector Count” will display information regarding the use of the Connector Saver module. “Inserts” displays a running count of the number of times cables have been connected to the HSIT. “Max inserts” shows the maximum number of inserts for the life of the Connector Saver module.

3.6.4 Disable

Feature not currently supported.

How to Contact Astek Corporation (D.B.A. Quantum Parametrics)

Astek may be contacted by phone at:

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