Agilent Technologies
N5393B PCI Express® 2.0 (Gen2) Electrical Performance Validation and Compliance Software for Infiniium Oscilloscopes

Data Sheet

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Verify and debug your PCI Express® designs more easily

Agilent Technologies N5393B PCI Express electrical performance validation and compliance software provides you with a fast and easy way to verify and debug your PCI Express 2.0 and 1.1/1.0a designs for add-in cards and motherboard systems.

The PCI Express electrical test software allows you to automatically execute PCI Express electrical tests, and it displays the results in a flexible report format. In addition to the measurement data, the report provides a margin analysis that shows how closely your device passed or failed each test.

The N5393B PCI Express electrical test software utilizes the prescribed test methods and algorithms as required by the PCI Express Card Electromechanical (CEM) specifications for all current PCI Express Standards. This produces results that are not only consistent with the PCI-SIG's own SigTest utility, but also provides you with a fast and easy means of executing complex two-port motherboard tests and single port add-in card test with total automation.

The PCI Express electrical performance validation and compliance software performs a wide range of electrical tests as per the PCI Express 2.0, 1.0a and 1.1 electrical specifications for add-in cards and motherboard systems as documented in Section 4 of the base specification and Section 4 of the card electromechanical specification.

Tests for PCI Express 2.0 (based on section 4.7.2., Table 4-8) are also included to help you test your products against the next generation of this powerful I/O technology.

In addition to full swing (800 mV) testing, the N5393B also supports testing for low-power, half-swing devices (400 mV) as per the PCI Express Architecture Mobile Graphics Low-Power Addendum to the PCI Express Base Specification Revision 1.0.

1 Peripheral Component Interconnect Special Interest Group
The N5393B PCI Express
electrical test software offers
several features to simplify the
validation of PCI Express designs:

- Automated 1M Unit Interval
  (or greater) testing for highest
  accuracy
- Results consistent with PCI-SIG
  SigTest software utility
- Test setup wizard
  for ease-of-use
- Wide range of electrical tests
- PCI-SIG SigTest clock
  recovery algorithm
- Automated scope measurement
  setup
- Test results report generation
- Pass/fail margin analysis
- Reference clock phase jitter
  analysis (1.1)
- Two-port (explicit clock
  and data) supported for
  motherboard signal quality
  testing
- Support for both full-swing and
  low-power, half-swing devices.

PCI Express compliance testing
To pass signal quality testing at
a PCI-SIG-sponsored compliance
workshop, your product must
successfully pass “Gold Suite”
testing, based on the PCI-SIG
SigTest application. The
SigTest application tests your
device against the minimum
signal-quality performance
requirements for PCI. If you
are developing receivers and
transmitters for add-in boards
and system motherboards, the
N5393B PCI Express electrical
test software helps you execute
all the SigTest tests and
additional oscilloscope already
completed tests. See the list of
tests in Table 3 on page 15 (for
1.1 test coverage).

With the PCI Express electrical
test software, you can use
the same oscilloscope you use
for everyday debugging to perform
automated testing and margin
analysis based on the PCI-SIG-
specified tests.

While SigTest tests provide a
good overview of PCI Express
electrical signal quality, they
address only a small subset of
the electrical compliance
measurements specified in the
PCI-SIG specification. The SigTest
application also provides minimal
reporting capability
with pass/fail indication and
measurement values, and has
limited debugging capabilities to
decipher eye mask violations or
excessive jitter.

For PCI Express 2.0
measurements, the N5393B
software automatically calculates
deterministic jitter and total jitter
at 10^{-12} BER. Random jitter is
also reported for completeness
and a voltage margin “eye”
diagram is included in the final
HTML report. DJ and TJ values
are specified in the PCIe 2.0
specification and are required for
compliance verification.

PCI Express 2.0 supports data rates up to 5.0 GT/s as shown
above (-3.5 dB de-empasis)
**Benefits**

**N5393B benefits**
The N5393B PCI Express electrical test software saves you time by setting the stage for automatic execution of PCI Express electrical tests. Part of the difficulty of performing electrical tests for PCI Express is hooking up the oscilloscope, loading the proper setup files, and then analyzing the measured results by comparing them to limits published in the specification. The PCI Express electrical test software does much of this work for you. In addition, if you discover a problem with your device, robust debug tools are available to aid in root-cause analysis. These debug tools are provided by the Agilent E2688A high-speed serial data analysis software, which you must install on your oscilloscope to use the PCI Express electrical test software.

The N5393B PCI Express electrical test software offers many more electrical tests than the SigTest application. Unlike the SigTest application, the N5393B PCI Express electrical test software automatically configures the oscilloscope for each test, and it provides an informative results report that includes margin analysis indicating how close your product is to passing or failing a particular test assertion. Table 1 shows a side-by-side comparison of the capabilities of the SigTest application and the Agilent N5393B PCI Express electrical test software. A list of the measurements made by the PCI Express electrical test software can be found in Table 3, (Table 3 contains comparison of SigTest vs. Agilent).

<table>
<thead>
<tr>
<th>Capability</th>
<th>Agilent N5393B</th>
<th>PCI-SIG SigTest</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of measurement assertions</td>
<td>16+</td>
<td>4</td>
</tr>
<tr>
<td>Support for PCIe 1.0a, 1.1, 2.0</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Reference clock tests</td>
<td>10 (1.1)</td>
<td>0*</td>
</tr>
<tr>
<td>Automated oscilloscope setup for each measurement</td>
<td>Yes, guided</td>
<td>No, single setup</td>
</tr>
<tr>
<td>Measurement results</td>
<td>Pass/fail with margin analysis</td>
<td>Pass/fail with measured value</td>
</tr>
<tr>
<td>CEM based measurements methodology</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Clock recovery method</td>
<td>PCI-SIG SigTest or 1st/2nd order PLL</td>
<td>PCI-SIG SigTest</td>
</tr>
<tr>
<td>Brick wall filter (2.0 testing)</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Custom HTML report generation</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Support for low power device</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Selectable number of tests performed</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Multi-trial run support</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Debug mode for “what if” analysis</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Compliance test boards supported</td>
<td>CBB1, CBB2, CLB1, CLB2</td>
<td>CBB1, CBB2, CLB1, CLB2</td>
</tr>
</tbody>
</table>

* PCI-Sig offers a separate utility (Clock_Jitter) for analyzing reference clock phase jitter.

Table 1. Comparison of capabilities of the Agilent PCI Express electrical test software and the PCI-SIG SigTest application.
Easy Test Definition

The N5393B PCI Express electrical test software extends the ease-of-use advantages of Agilent’s Infinium 54855A or 80000 Series oscilloscopes to testing PCI Express designs. The Agilent automated test engine walks you quickly through the steps required to define the tests, set up the tests, perform the tests, and view the test results. You can select a category of tests all at once, or specify individual tests. You can save tests and configurations as project files and recall them later for quick testing and review of previous test results. Straightforward menus let you perform tests with a minimum of mouse clicks.

Figure 1. The Agilent N5393B allows you to easily specify the test standard you want to use to test the compliance of your device. This makes test setup easy as only the appropriate tests for the test point you pick are shown on later test selection pages.

Figure 2. The Agilent automated test engine guides you quickly through selecting tests, configuring tests, setting up the connection, running the tests, and viewing the results. Individual tests or groups of tests are easily selected with a mouse click.
The N5393B PCI Express electrical test software provides flexibility in your test setup. It guides you to make connection changes with hookup diagrams when the tests you select require it. All PCI Express electrical compliance tests you perform are based on the official PCI-SIG approved set of test fixtures. The compliance fixtures include the Compliance Base Board (CBB2) for add-in card testing, and the Compliance Load Board (CLB2) for motherboard or system testing. Connection to the compliance test fixtures is selectable between SMA/SMP cables or Agilent InfiniiMax active differential probes.

Figure 3. In configuring the tests, you specify the device to test, its configuration, and how the oscilloscope is connected.

Specify 1 million UI (or more) for your jitter measurements

Show the spectral response of your reference clock in the critical 1.5 - 22-MHz region

Toggle circuit to switch between Gen1 (2.5 GBit/s) and Gen2 (50 GBit/s)

Figure 4. When you make multiple tests where the connections must be changed, you are prompted with connection diagrams and/or photographs.

If more than one test setup connection is required, you will be notified here

You are prompted to make the appropriate connections for the set of tests

Figure 5. The PCI-SIG Compliance Base Board (CBB2) for Gen2 add-in card testing, and the Compliance Load Board (CLB2) for Gen2 motherboard or host system testing.
In addition to providing you with measurement results, the N5393B PCI Express electrical test software provides a report format that shows you not only where your product passes or fails, but also reports how close you are to the limits specified for a particular test assertion. You can select the margin test report parameter, which means you can specify the level at which warnings are issued to alert you to electrical tests where your product is operating close to the official test limit defined by the PCI Express 2.0, 1.0a or 1.1 specifications.

Figure 6. The PCI Express electrical test software results report documents your test, indicates the pass/fail status, the test specification range, the measured values, and shows how much margin you have.

Figure 7. The HTML report provides additional details including test setup conditions, graphical results, and test limits (where appropriate).
Reports with Margin Analysis (continued)

Figure 8. How close you are to passing or failing a test is indicated as a % in the margin field. A result highlighted in yellow or red indicates that the margin threshold level for a warning or failure was detected.

---

<table>
<thead>
<tr>
<th>Pass/Test Name</th>
<th>Spec Range</th>
<th>Measured Value Margin</th>
</tr>
</thead>
<tbody>
<tr>
<td>System Board Tx, Unit Interval</td>
<td>399.08ps to 400.12ps</td>
<td>399.97ps</td>
</tr>
<tr>
<td>System Board Tx, Median to Max Jitter</td>
<td>&lt;= 106.50ps</td>
<td>52.50ps</td>
</tr>
<tr>
<td>System Board Tx, Eye-Width</td>
<td>&gt;= 189.000ps</td>
<td>315.01ps</td>
</tr>
<tr>
<td>System Board Tx, Peak Differential Output Voltage</td>
<td>0.0000 V to 1.0000 V</td>
<td>0.0000 V</td>
</tr>
<tr>
<td>Rx, Unit Interval</td>
<td>399.08us to 400.12us</td>
<td>400.00us</td>
</tr>
<tr>
<td>Rx, Template Tests</td>
<td>Zero Mask Failures</td>
<td>D</td>
</tr>
<tr>
<td>Rx, Median to Max Jitter</td>
<td>&lt;= 80.000ps</td>
<td>80.000ps</td>
</tr>
<tr>
<td>Rx, Eye-Width</td>
<td>&gt;= 7.000Us</td>
<td>7.94Us</td>
</tr>
<tr>
<td>Rx, Peak Differential Output Voltage</td>
<td>0.0000 V to 1.0000 V</td>
<td>0.0000 V</td>
</tr>
<tr>
<td>Rx, Deemphasized Voltage Ratio</td>
<td>4.049 to 3.048</td>
<td>-2.74</td>
</tr>
<tr>
<td>Rx, RMS AC Peak Common Mode Output Voltage</td>
<td>&lt;= 20.0mV</td>
<td>18.1mV</td>
</tr>
<tr>
<td>Rx, Avg DC Common Mode Output Voltage</td>
<td>0.0000 V to 3.0000 V</td>
<td>1.0000 V</td>
</tr>
<tr>
<td>Rx, DC Common Mode Voltage Variation</td>
<td>&lt;= 100.0mV</td>
<td>&lt;= 120.5mV</td>
</tr>
<tr>
<td>Rx, DC Common Mode Line Delta</td>
<td>&lt;= 25.0mV</td>
<td>0.3mV</td>
</tr>
</tbody>
</table>
Reference Clock Measurements

The PCI Express 1.0a specification failed to specify the input bandwidth the reference clock receiver or phase jitter of the reference clock itself. This is important because jitter that lies within the loop bandwidth the receiver PLL for the reference clock will transfer onto the high speed data lines. This hole in the PCI Express specification was corrected in the 1.1 update.

The N5393B includes powerful reference clock evaluation tools including phase jitter. The specification calls for a very specific phase jitter filter that focuses the measurement on the jitter that lies between 1.5 and 22-MHz. The filter also amplifies the jitter 3dB (peaking) within this region. The Agilent N5393B includes proprietary filtering software (patent pending) that exactly implements the filter specified in the 1.1 PCI Express specification.

Utilizing Agilent’s InfiniiMax 1169A high performance differential probes, you can measure your reference clock using the PCI-SIG’s Compliance Load Board (CLB1).

Reference clock tests

- Phase jitter
- Rising edge rate
- Falling edge rate
- Differential input high voltage
- Differential input low voltage
- Average clock period
- Duty cycle
If your device fails a test, you need to determine how it failed. To use N5393B PCI Express electrical test software, you must install Agilent E2688A high-speed serial data analysis software, which provides you with several powerful debugging tools. The 8b/10b decoding feature lets you identify data-dependent errors that result in eye mask violations caused by intersymbol interference (ISI). You can perform 8b/10b decoding to capture and display serial data synchronized with the analog view of a serial data stream.

Figure 11. The 8b/10b decoded symbol information is shown below the appropriate portion of a PCI Express signal using the E2688A software.
Using the E2688A Serial Data Analysis tool you can test for illegal characters in your compliance pattern. You can also use the mask test feature to identify the specific digital patterns that caused a specific failure in the eye diagram when testing under the 1.1 specification (using a first order PLL).

For 2.0 testing you can use a first or second order PLL for clock recovery and apply a TIE brick wall filter (included with the E2688A Series Data Analysis package) to achieve a proper clock filtering.

Figure 12. Check for illegal characters in the compliance pattern (such as SKP’s) using the E2688A Serial Data Analysis tool.
Powerful Debugging Aids (continued)

Figure 14. The E2688A allows you to show the specific waveform that caused an eye diagram failure.

Figure 13. This eye fails after 658K UIs are analyzed.

Figure 14. Here you see the specific waveform (and 10-bit code) that caused the eye failure.
The N5393B PCI Express electrical performance validation and compliance software requires the E2688A high-speed serial data analysis software, one of the PCI-SIG approved compliance test fixtures (CBB or CLB), and at least two SMA cables or InfiniiMax active differential probes. Some of the measurements cannot be made with the PCI-SIG compliance test fixtures and may require you to build or acquire a custom test board, assembly, or other test fixture.

To purchase the PCI Express compliance test fixtures, consult the PCI-SIG Web site and select the PCI-SIG specification order form link at: [www.pcisig.com/specifications/ordering_information](http://www.pcisig.com/specifications/ordering_information)

### Compliance test fixture | Description
--- | ---
CBB | PCI Express Compliance Base Board for testing PCI Express add-in cards
CLB | PCI Express Compliance Load Board for testing PCI Express platforms
CBB2 | Gen 2 PCI Express Compliance Base Board for testing PCI Express add-in cards
CLB2 | Gen2 PCI Express Compliance Load Board for testing PCI Express platforms
Recommended Test Accessories

To complete your test setup, Agilent provides a wide range of cables, adapters, terminations, etc.

Note: While the PCI-SIG does supply Gen2 test fixtures for motherboard and add-in card testing, you will need to obtain SMP cables, adapters and terminators from a vendor of your choice as the SIG does not supply them.

### Add-in card testing

<table>
<thead>
<tr>
<th>Model number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>15442A</td>
<td>Two SMA cables</td>
</tr>
<tr>
<td></td>
<td>One PC power supply</td>
</tr>
<tr>
<td>1810-0118</td>
<td>Six 50 Ω terminators</td>
</tr>
</tbody>
</table>

### System motherboard testing

<table>
<thead>
<tr>
<th>Model number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>15442A</td>
<td>Two SMA cables</td>
</tr>
<tr>
<td>1134A or 1169A</td>
<td>InfiniiMax probe with socketed (E2678A) probe adapter</td>
</tr>
<tr>
<td>1250-1741</td>
<td>Two right angle SMA adapters (f - m)</td>
</tr>
<tr>
<td>1810-0118</td>
<td>Six 50 Ω terminators</td>
</tr>
</tbody>
</table>

### Semiconductor device testing

<table>
<thead>
<tr>
<th>Model number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>15442A</td>
<td>Two SMA cables</td>
</tr>
<tr>
<td>1169A</td>
<td>One InfiniiMax probe with differential solder connection (E2677A)</td>
</tr>
</tbody>
</table>

### Optional (for all types of testing)

<table>
<thead>
<tr>
<th>Model number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>11667B</td>
<td>Power splitter, DC to 26.5 GHz, 3.5 mm (f) connectors</td>
</tr>
<tr>
<td>11636B</td>
<td>Power divider, DC to 26.5 GHz, 3.5 mm (f) connectors</td>
</tr>
<tr>
<td>1250-1159</td>
<td>Three SMA (m - m) adapters</td>
</tr>
<tr>
<td>8493B</td>
<td>Coaxial attenuator (3, 6, 10, 20 or 30 dB), DC to 18 GHz, SMA connector</td>
</tr>
<tr>
<td></td>
<td>Matched cable pair, two 90cm (36 inch) SMA (m - m) cables propagation delay within 25 ps</td>
</tr>
<tr>
<td>1810-0118</td>
<td>SMA (m) 50 Ω termination</td>
</tr>
</tbody>
</table>

Table 2. Recommended test accessories
Oscilloscope Compatibility

The N5393B PCI Express electrical performance validation and compliance software is compatible with Agilent DSO/DSA 90000 Series oscilloscopes with operating system software revision A.01.10 or higher. The Agilent N5393B tool is also compatible with Agilent 80000 Series oscilloscopes with operating software revision A.05.40 or higher. To use it, you must also install Agilent E2688A high-speed serial data analysis software. For oscilloscopes with earlier software revisions, free upgrade software is available at www.agilent.com/find/infiniium_software

<table>
<thead>
<tr>
<th>Data rate</th>
<th>Recommended oscilloscope</th>
<th>Bandwidth of recommended oscilloscope</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.5 Gb/s</td>
<td>DSO91304A</td>
<td>13 GHz</td>
</tr>
<tr>
<td></td>
<td>DSO91204A</td>
<td>12 GHz</td>
</tr>
<tr>
<td></td>
<td>DSO90804A</td>
<td>8 GHz</td>
</tr>
<tr>
<td></td>
<td>DSO90604A</td>
<td>6 GHz</td>
</tr>
<tr>
<td></td>
<td>DSO81304B</td>
<td>13 GHz</td>
</tr>
<tr>
<td></td>
<td>DSO81204B</td>
<td>12 GHz</td>
</tr>
<tr>
<td></td>
<td>DSO81004B</td>
<td>10 GHz</td>
</tr>
<tr>
<td></td>
<td>DSO80804B</td>
<td>8 GHz</td>
</tr>
<tr>
<td></td>
<td>54855A</td>
<td>6 GHz</td>
</tr>
<tr>
<td>5.0 Gb/s</td>
<td>DSO91304A*</td>
<td>13 GHz</td>
</tr>
<tr>
<td></td>
<td>DSO91204A</td>
<td>12 GHz</td>
</tr>
<tr>
<td></td>
<td>DSO81304B</td>
<td>13 GHz</td>
</tr>
<tr>
<td></td>
<td>DSO81204B</td>
<td>12 GHz</td>
</tr>
</tbody>
</table>

*DSA model equivalents are also compatible
Tests Performed

The N5393B PCI Express electrical performance validation and compliance software performs the following tests as per the PCI Express 1.0a and 1.1 electrical specifications for add-in cards and motherboard systems as documented in Section 4 of the base specification (“PHY”) and Section 4 of the card electromechanical specification (“EM”). For reference, the tests performed by the SigTest application are also noted.

For Gen2 testing coverage, the PCI-SIG decided not to create checklist, as was done for Gen1. For test coverage refer to section 4.7.2. Table 4-8 of the PCI Express 2.0 Card Electromechanical Specification.

<table>
<thead>
<tr>
<th>Assertion no.</th>
<th>Description</th>
<th>N5393B</th>
<th>SigTest</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Transmitter tests</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PHY.3.1#26</td>
<td>DC common mode voltage</td>
<td>Y</td>
<td>N</td>
</tr>
<tr>
<td>PHY.3.2#1</td>
<td>De-emphasis on multiple bits same polarity in succession</td>
<td>Y</td>
<td>N</td>
</tr>
<tr>
<td>PHY.3.2#2</td>
<td>Transition bit voltage</td>
<td>Y</td>
<td>N</td>
</tr>
<tr>
<td>PHY.3.3#1</td>
<td>Transmitter eye diagram</td>
<td>Y</td>
<td>N</td>
</tr>
<tr>
<td>PHY.3.3#2</td>
<td>Unit interval without SSC variations</td>
<td>Y</td>
<td>N</td>
</tr>
<tr>
<td>PHY.3.3#3</td>
<td>Minimum D+/D- output rise/fall time</td>
<td>Y</td>
<td>N</td>
</tr>
<tr>
<td>PHY.3.3#4</td>
<td>Jitter median to max deviation</td>
<td>Y</td>
<td>N</td>
</tr>
<tr>
<td>PHY.3.3#5</td>
<td>Maximum RMS AC common mode voltage</td>
<td>Y</td>
<td>N</td>
</tr>
<tr>
<td>PHY.3.3#9</td>
<td>Minimum eye width</td>
<td>Y</td>
<td>N</td>
</tr>
<tr>
<td><strong>Receiver tests</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PHY.3.4#1</td>
<td>Minimum receiver eye diagram</td>
<td>Y*</td>
<td>N</td>
</tr>
<tr>
<td>PHY.3.4#2</td>
<td>AC peak common mode input voltage</td>
<td>Y*</td>
<td>N</td>
</tr>
<tr>
<td>PHY.3.4#6</td>
<td>Jitter median to max deviation input</td>
<td>Y*</td>
<td>N</td>
</tr>
<tr>
<td><strong>System board (connector) tests</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EM.4#4</td>
<td>Minimum jitter</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>EM.4#20</td>
<td>Transmitter path eye diagram</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td><strong>Reference clock (connector) tests</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PHY.3.3#2</td>
<td>Phase jitter</td>
<td>Y</td>
<td>N/A*</td>
</tr>
<tr>
<td>PHY.3.3#1</td>
<td>Rising edge rate</td>
<td>Y</td>
<td>N/A</td>
</tr>
<tr>
<td>PHY.3.3#1</td>
<td>Falling edge rate</td>
<td>Y</td>
<td>N/A</td>
</tr>
<tr>
<td>PHY.3.3#4</td>
<td>Differential input high voltage</td>
<td>Y</td>
<td>N/A</td>
</tr>
<tr>
<td>PHY.3.3#4</td>
<td>Differential input low voltage</td>
<td>Y</td>
<td>N/A</td>
</tr>
<tr>
<td>PHY.3.3#9</td>
<td>Average clock period</td>
<td>Y</td>
<td>N/A</td>
</tr>
<tr>
<td>PHY.3.2#2</td>
<td>Duty cycle</td>
<td>Y</td>
<td>N/A</td>
</tr>
<tr>
<td><strong>Add-in card (connector) tests</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EM.4#13</td>
<td>Minimum jitter</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>EM.4#19</td>
<td>Transmitter path eye diagram</td>
<td>Y</td>
<td>Y</td>
</tr>
</tbody>
</table>

* Note: Receiver tests provided by the N5393A do not validate the receiver’s tolerance or ability to correctly receive data. They validate the signal at the receiver against specified tolerances.

Table 3. PCI Express Electrical tests performed by the N5393B software.
Ordering Information

To purchase a new license for the PCI Express Electrical performance validation and compliance software with an Infiniium Series oscilloscope, please order the following:

<table>
<thead>
<tr>
<th>Model number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>N5393B</td>
<td>PCI Express Electrical Test software for Infiniium 90000 Series, 80000 Series or 54844A oscilloscopes</td>
</tr>
<tr>
<td>Opt 002</td>
<td></td>
</tr>
<tr>
<td>Option 003</td>
<td>High Speed serial Data Analysis Software for Infiniium 90000 Series, 80000 Series, or 548551 Oscilloscope</td>
</tr>
</tbody>
</table>

To add the PCI Express Electrical Performance Validation and Compliance software to an existing Infiniium Series oscilloscope, please order the following:

<table>
<thead>
<tr>
<th>Model number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>N5393B</td>
<td>PCI Express Electrical Test Software for Infiniium 90000 Series, 80000 Series, or 548551 Oscilloscope</td>
</tr>
<tr>
<td>Opt 002</td>
<td></td>
</tr>
<tr>
<td>E2688A</td>
<td>High Speed SDA Software for Infiniium 90000 Series, 80000 Series, or 548551 Oscilloscope</td>
</tr>
</tbody>
</table>

Upgrade to N5393B

To upgrade your existing version of the N5393A to the N5393B, order the following:

<table>
<thead>
<tr>
<th>Model number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>N5393B</td>
<td>Upgrade to N5393B from N5393A PCI Express Electrical test software for Infiniium 90000 Series, 80000 Series, or 548551 Oscilloscopes</td>
</tr>
<tr>
<td>Opt 001</td>
<td></td>
</tr>
</tbody>
</table>

Related literature

<table>
<thead>
<tr>
<th>Publication title</th>
<th>Publication type</th>
<th>Publication number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Infiniium 90000 Series Oscilloscopes and InfiniiMax II Series Probes</td>
<td>Data Sheet</td>
<td>5989-7819EN</td>
</tr>
<tr>
<td>E2688A, N5384A High-Speed Serial Data Analysis with Clock Recovery Software for Infiniium Oscilloscopes</td>
<td>Data Sheet</td>
<td>5989-0108EN</td>
</tr>
</tbody>
</table>
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