N4851A/B, N4861A/B MIPI Acquisition/Stimulus Probes

Online Help

Agilent Technologies

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Manual Part Number

Version 04.00.0000

Edition

May 27, 2010

Available in electronic format only

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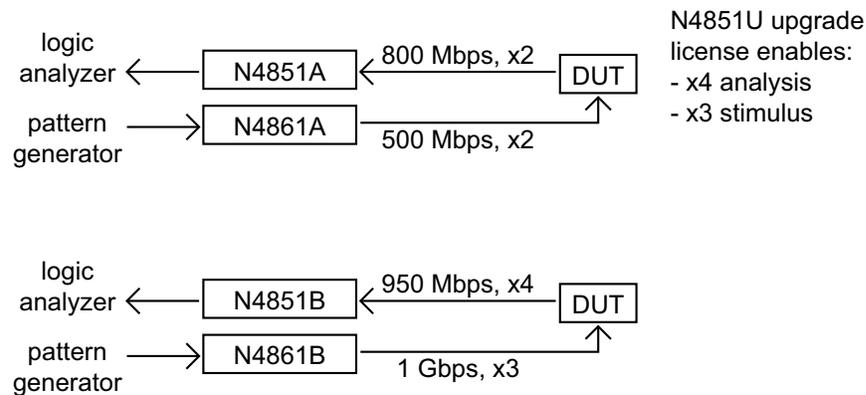
MIPI Acquisition/Stimulus—At a Glance

The Agilent N4851A/B acquisition probe connects an Agilent Technologies logic analyzer between the peripheral and baseband components on a device under test (DUT), to allow decoding and display of MIPI D‑PHY signals. Software is provided to decode the DSI version 1.01 and CSI‑2 protocols.

The Agilent N4861A/B stimulus probe allows you to generate the digital signals, emulating a master IC. The stimulus probe is usually connected to a test platform which contains only one of the two ICs.

The Agilent N4851U upgrade license lets the N4851A acquisition probe support x4 lanes and the N4861A stimulus probe support x3 lanes. (Supported speeds are the same.)

The "B" models support both faster speeds and a greater number of lanes.

logic analyzer ← N4851A ← 800 Mbps, x2 ← DUT
pattern generator → N4861A → 500 Mbps, x2

N4851U upgrade license enables:
- x4 analysis
- x3 stimulus

logic analyzer ← N4851B ← 950 Mbps, x4 ← DUT
pattern generator → N4861B → 1 Gbps, x3

In addition to the acquisition and stimulus probes are tools to help generate stimulus and analyze acquired data. The MIPI DSI Tools include:

- DSI Image Inserter — lets you create a DSI ASCII format file using a BMP file.
- DSI Image Extractor — lets you extract an image from DSI data captured by the logic analyzer.
- DSI Command Sender — lets you write DSI commands to specify initialization data and main packet payload data.

See
- "Using the MIPI Acquisition/Stimulus Probes" on page 4

Using the MIPI Acquisition/Stimulus Probes

For an overview of the MIPI acquisition/stimulus probes, see: "MIPI Acquisition/Stimulus—At a Glance" on page 3

MIPI acquisition and stimulus probes are controlled by a single probe tool in the logic analysis system's user interface. Captured data is decoded by a packet decoder tool. This online help provides quick-reference information for the probe tool and for the decoder tool.

CAUTION **Set the voltage levels correctly**_before_**enabling the N4861A stimulus probe SMA outputs**. If the output voltage level is configured at a level too high for your board, your board may be damaged.

- Chapter 1, "Configuring the Logic Analyzer," starting on page 7
- Chapter 2, "Configuring the Probes," starting on page 9
    - "Analysis Tab" on page 11
    - "Stimulus Tab" on page 13
    - "SelfTest Tab" on page 14
    - "FPGA Update Tab" on page 15
- Chapter 3, "Deskewing the Stimulus Probe Outputs," starting on page 17
- Chapter 4, "Capturing MIPI Data," starting on page 21
- Chapter 5, "Displaying MIPI Data," starting on page 23
- "MIPI DSI Tools" (in the online help)

See Also
- Refer to the printed *Agilent N4851A/B MIPI D-PHY Acquisition Probe User's Guide* for information on physically connecting the acquisition probe to the MIPI link, and for information on how to use a variety of windows to display the captured data.
- "Signal Inserter" (in the online help) for information on preparing data for the pattern generator and the N4861A/B stimulus probe.

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Configuring the Logic Analyzer

The easiest way to configure the logic analyzer is to load one of the provided XML configuration files. Several configuration files are provided with the probe software. When you load a configuration file, it will set up the buses and signals, add a probe tool, and add a packet decoder tool.

To load a configuration file

1 Close the logic analyzer window, if it is open.

2 On the desktop, double-click the shortcut to the default configuration files.

3 Double-click the configuration file which most closely matches your measurement setup.

To load a configuration file without restarting the logic analyzer software

1 Select **File>Open...**.

2 Navigate to the configuration file directory: C:\Documents and Settings\ All Users\Shared Documents\Agilent Technologies\Default Configs\ Agilent\

3 Select the configuration file which most closely matches your measurement setup.

4 Click **Open**.

To modify a configuration file

If you make changes to the configuration, such as rearranging labels or setting properties in the packet decoder tool, it is a good idea to save a new configuration.

The provided configuration file is read-only. If you modify the configuration and want to save your work, select **File>Save As...** and save the configuration with a new name. Although the default configuration files are provided in .xml format, it is usually best to save your modified configuration as an .ala file.

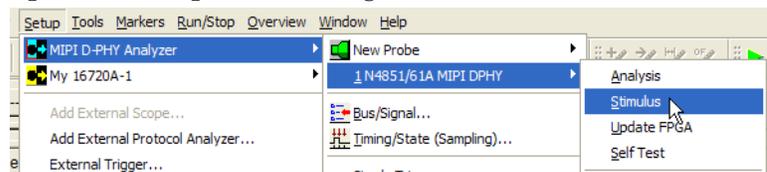**See Also**   • "Loading Saved Data and Setups" (in the online help)

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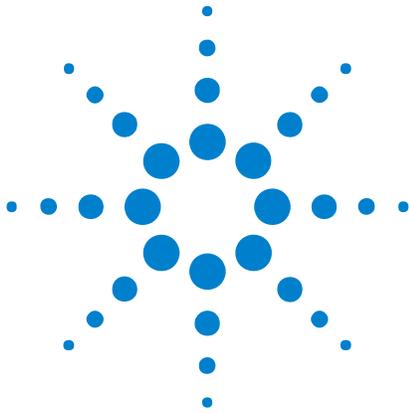
Configuring the Probes

Before you can make any measurements, you need to configure the N4851A/B acquisition probe and N4861A/B stimulus probe for the particular MIPI link you are probing.

1 Make sure the acquisition probe is turned on.

2 Open the Properties dialog.

Once you have configured the probes, remember to select **File>Save As...** and save the logic analyzer configuration.

Things to remember when configuring the N4861A stimulus probe

NOTE	If you have been using the N4851A/B acquisition probe without the N4861A/B stimulus probe, remember to set Target VDD Vth on the Analysis tab.

CAUTION	The "Resistor installed" selections should match your circuit. Setting the value to 50 or 100 Ohms when no resistor is installed will increase the output voltages and could damage your circuit.

CAUTION	Set the voltage levels correctly before enabling the SMA outputs. If the output voltage level is configured at a level too high for your board, your board may be damaged.

See Also
- "Analysis Tab" on page 11
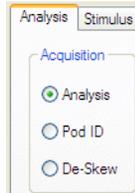- "Stimulus Tab" on page 13
- "SelfTest Tab" on page 14

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Analysis Tab

Use the Analysis tab to to configure the N4851A/B acquisition probe for the type of MIPI link you are probing.

To set the acquisition probe mode

When the acquisition probe is turned on, it enters Analysis mode. You can also choose some other special-purpose modes.

1 Open the Analysis tab.

2 Select the mode you want:

- **Analysis** — used to analyze the device under test. Analysis is the "normal" mode for acquiring activity from the link under test. Most of the graphical elements on the Setup tab which control the probe configuration are available only in Analysis mode.

- **Pod ID** — places a pattern on each pod which identifies its location. Use Pod ID mode if you want the acquisition probe to give you feedback regarding where to plug in the logic analyzer pods. (See To use Pod ID mode (see).)

- **De-Skew** — toggles all bits to the analyzer and can be used to validate that the cables are all connected properly and that the proper setup and hold values in the analyzer cards are set. Use the logic analyzer's eye finder with the De-Skew mode to validate that the proper setup and hold values are set. This should not be necessary during normal use. Use De-Skew mode only when instructed to do so by Agilent.

To configure the protocol mode   Select CSI-2 or DSI.

To configure the clock speed and voltage settings

Bit Rate	Set the HS bit rate which is used by your device under test (DUT).
LP VHigh	For LP VHigh, enter the low-power signaling level (the voltage considered to be "high" when the MIPI D-PHY link is operating in LP mode). The N4851A acquisition probe uses the threshold (LP VHigh / 2) to detect LP mode.

Do not change the voltage thresholds in the logic analysis system's Bus/Signal Setup dialog. The voltage levels of the signals from the N4851A/B acquisition probe to the logic analyzer are always the same and never need to be adjusted. To adjust for the voltage levels on your DUT, use the probe setup dialog.

To configure the bus size   Select the bus size:

- **x1** – acquires data from one lane (Data Lane 0).
- **x2** – acquires data from two lanes (Data Lane 0, 1).
- **x3** – acquires data from three lanes (Data Lane 0, 1, 2).
- **x4** – acquires data from four lanes (Data Lane 0, 1, 2, 3).

The **x3** and **x4** options are available with the N4851B acquisition probe or when the N4851U upgrade license has been installed with the N4851A acquisition probe.

Saving the Configuration   Once you have configured the acquisition probe, remember to select **File>Save As...** and save the logic analyzer configuration.

To use Pod ID mode

There are two strategies for connecting the logic analyzer pods to the acquisition probe:

- You can follow the instructions in the *User's Guide*.
- You can use the acquisition probe's Pod ID mode.

  In Pod ID mode, the acquisition probe generates special signals to aid in connecting the logic analyzer pods.

To turn on Pod ID mode   If at least one pod has been connected correctly:

1 Display the MIPI probe tool.

2 In the Analysis tab, select Pod ID mode.

To use the pod ID signals   1 Open the logic analyzer's Bus/Signal Setup window.

2 Find the signal activity indicators next to the bus/signal names.

3 Examine the activity indicators to determine if the pod is connected to the right place on the acquisition probe. At each connector on the acquisition probe, the "activity" pattern of bits will be a binary value that corresponds to the pod number.

Stimulus Tab

Use the Stimulus tab to configure the N4861A/B stimulus probe for a particular MIPI link.

Voltage and Slew Rate Settings

CAUTION	**Set the voltage levels correctly** *before* **enabling the N4861A stimulus probe SMA outputs**. If the output voltage level is configured at a level too high for your board, your board may be damaged.

Voltage settings   Set the voltage levels which should be present at the receiver. The probe calculates the output voltages which are necessary to achieve those voltages. For more information on those calculations, see the N4861A/B *User's Guide*.

Slew rate   Select the Slew Rate to match the signal characteristics of your circuit. The selections are Fast, Medium, Slow, Slowest. Each setting slows down the slew rate by a factor of about 25% slower than the next highest setting.

Output Enable Control   The SMA outputs will be disabled until this is set to ON. The N4861A/B stimulus probe will not enable the SMA outputs until you have done all of the following:

- Set SMA Outputs to ON.

- Connected Vsense to VDD or some other signal which indicates that the DUT is running (via the N4851A/B acquisition probe).

- Click **Apply** or **OK**.

- Start the DUT running.

This is a protection feature to protect your circuit while changing settings. When the outputs are OFF, the N4861A/B stimulus probe is set to high impedance and all six lights display amber.

If absolutely necessary, you can tell the N4861A/B stimulus probe to ignore this safety check. This is not recommended for routine operation.

Waveform Timing Controls   By default, the N4861A/B stimulus probe issues signals with timings which comply with the MIPI D-PHY specification.

Use the waveform timing controls to adjust those delays. You might want to do this to test the DUT's response to out-of-spec inputs, or to accommodate a DUT which has nonstandard timing requirements.

Most adjustments may be made with 5 ns resolution. The value you enter will be rounded up to the next value permitted by the resolution. To see the resolution, hover the mouse pointer over the value.

SelfTest Tab

Use this tab to test the operation of the N4851A/B acquisition probe and the N4861A/B stimulus probe.

Select the appropriate test, follow the directions listed, and then press **Run Self Test**. The results of the self test will soon be displayed.

If an error occurs during Self Test, select "Enable Log to File" and choose a file name, then run the test again. Refer to the Troubleshooting chapter of the *User's Guide* or call Agilent for assistance.

FPGA Update Tab

You can update the FPGAs in the probe by sending new configurations over the analyzer cables. It takes up to 60 minutes (the FLASH memory erase time is variable) to update the FPGAs. This should only be done when requested by Agilent.

To update the FPGAs, use the Update FPGA tab. At the top of the tab is text indicating the current FPGA version and Probe ID.

Select Module   If both an N4851A/B acquisition probe and an N4861A/B stimulus probe are connected to the logic analysis system, select which one you want to update.

Select FPGA Version   Select from the list of available FPGA versions.

Search for FPGA files   This will search the file system for FPGA files available for the acquisition probe and Update the "Select FPGA Version" list.

Update FPGA   This button will download the currently selected FPGA version.

Calibration Tab

The Calibration tab is only visible when the probe is in "factory" mode.

Calibration typically does not need to be run more than once. Calibration adjusts the internals delays of the acquisition probe to make sure that all input signals are aligned.

To run calibration, disconnect the acquisition probe from the device under test. (No probe should be connected to the 90-pin connector on the input cable on the front of the acquisition probe.) Select Run Calibration and wait for the calibration process to complete.

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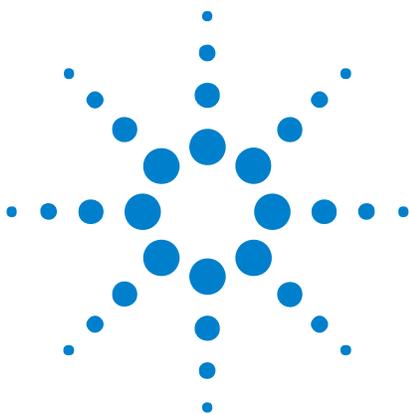
Deskewing the Stimulus Probe Outputs

You should perform this procedure once for each device under test (DUT) or whenever anything about the probing setup changes, for example when using different SMA cables, etc. The deskew values are saved in the probe's non-volatile memory, so they are remembered the next time you use the same probing setup.

1 Connect the N4861A/B stimulus probe to your device under test (DUT) or to your loopback board.

2 Probe the device under test (DUT) or the loopback board with the N4851A/B acquisition probe.

3 Input an external 80 MHz reference clock to the N4861A/B stimulus probe.

4 In the *Agilent Logic Analyzer* application, open a MIPI D-PHY configuration.

5 Set the analysis probe options:

  a Choose **Setup > (analyzer module name) > (MIPI D-PHY probe name) > Analysis**.

  b In the Analysis tab, set the **Bit Rate** to 800 Mbps.

  c Set the **Bus Size** to **x3**.

 **d** For **Mode**, select either **CSI-2** or **DSI**.

  e Click **OK**.

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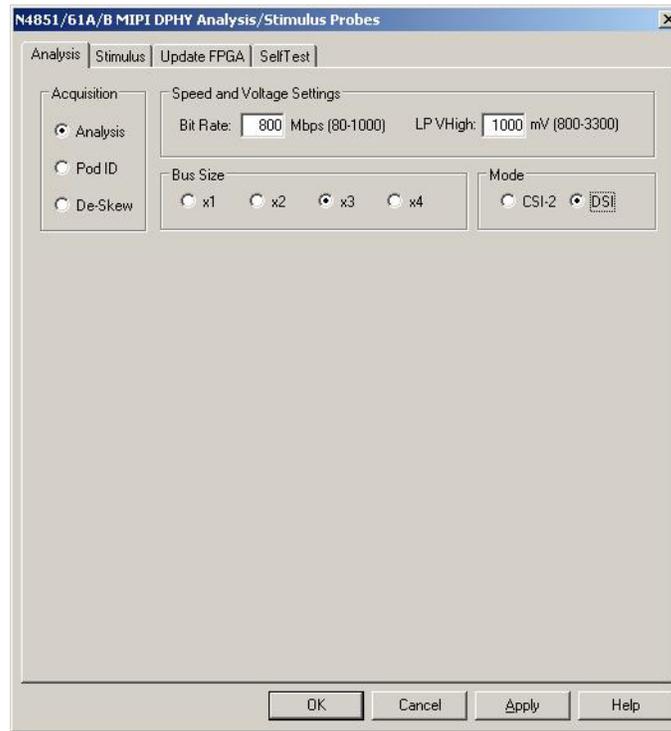
6 Set the stimulus probe options:

a Choose **Setup > (Analyzer Module Name) > (MIPI D-PHY Probe Name) > Stimulus**.

b In the Stimulus tab, note that the **Bus Size** is set to **x3**.

c Note that the **Input Reference Clock Information** shows that an 80 MHz reference clock should be provided.

d Check **Ignore Target VDD Safety Check**.

e Select **SMA Outputs** to **ON**.

f Click **Deskew Outputs**.
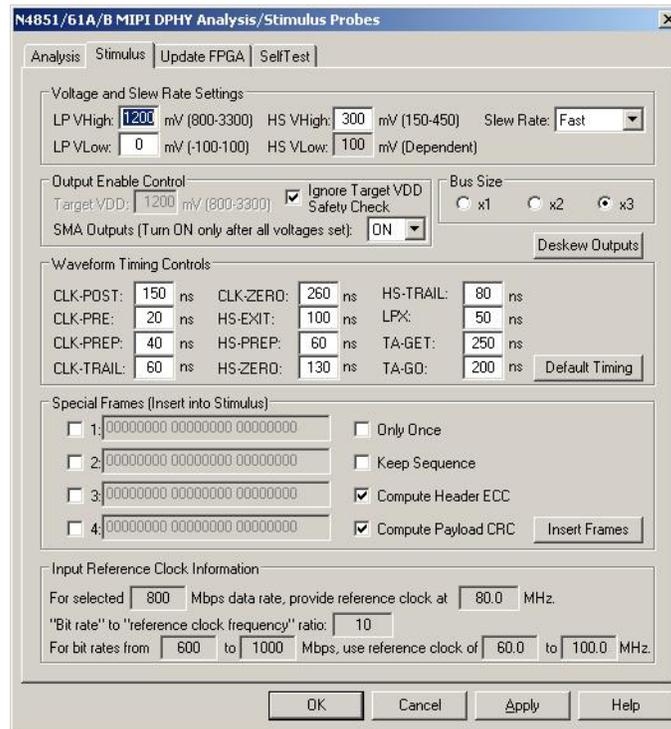
7 In the following dialog:

8 In the following dialog:
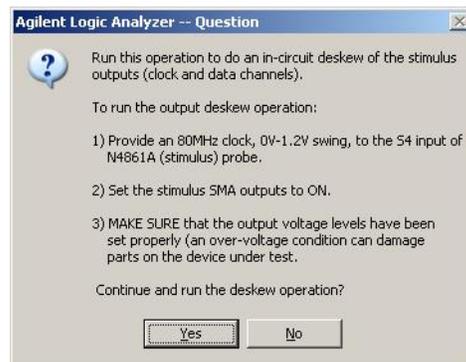
CAUTION   Make sure that the output voltage levels have been set properly. An over-voltage condition can damage parts on the device under test.
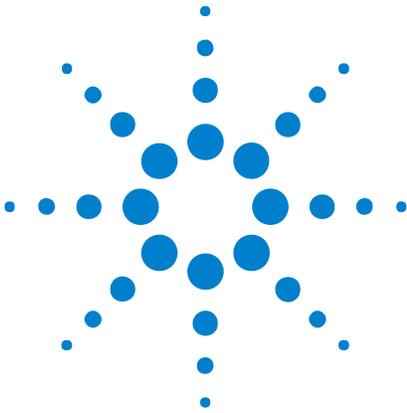

Click **Yes** to continue.

8 In the following dialog:
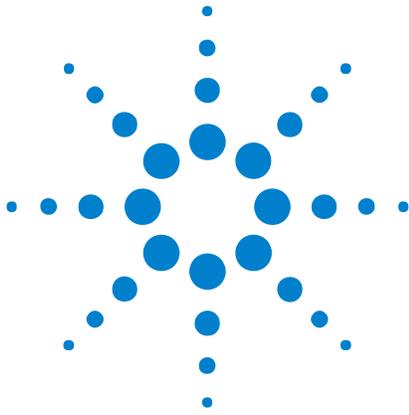
Click **OK**.

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Capturing MIPI Data

The basic steps for capturing data are:

1 Configure the logic analyzer and acquisition probe for the link you are probing.

2 Set up a logic analyzer trigger.

3 Run the logic analyzer.

See Also • See the *Agilent N4851A/B MIPI D-PHY Acquisition Probe User's Guide* for more information.

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Displaying MIPI Data

To view the decoded data:

1 On the logic analyzer's Overview display, make sure there is a MIPI decode tool between the logic analyzer module and the listing window.

2 Open the Listing window.

See Also • "To configure the packet decoder protocol" on page 24

• "To select which columns to display (Bus Options tab)" on page 25

• See the *Agilent N4851A/B MIPI D-PHY Acquisition Probe User's Guide* for more information.

To configure the packet decoder protocol

The Protocol Select tab in the Packet Decode Properties dialog is configured when you load one of the supplied configuration files.

The Protocol Select tab should look like this:

See Also • "To select which columns to display (Bus Options tab)" on page 25

To select which columns to display (Bus Options tab)

1 Open the Decode tool.

2 Select the Bus Options tab.

3 Select which buses you would like to see in the decoded listing.

4 Select **Apply** to apply the settings to the decoded listing.

5 Select **Close** to close the MIPI decode tool.

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