Keysight N6466A/N6466B MOST Compliance Test Application

KEYSIGHT TECHNOLOGIES

Methods of Implementation

Notices

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MOST Compliance Test Application—At a Glance

The Keysight N6466A/N6466B MOST Compliance Test Application is a MOST test solution that covers the electrical timing parameters for MOST 150 coax, MOST 150 optical, and MOST 50 specifications.

The MOST Compliance Test Application:

- Lets you select individual or multiple tests to run.
- Lets you identify the device being tested and its configuration.
- Shows you how to make oscilloscope connections to the device under test.
- Automatically checks for proper oscilloscope configuration.
- Automatically sets up the oscilloscope for each test.
- Allows you to determine the number of trials for each test.
- Provides detailed information of each test that has been run. The result of maximum 64 worst trials can be displayed at any one time.
- Creates a printable HTML report of the tests that have been run. This report includes pass/fail limits, margin analysis, and screen shots.

Required Equipment and Software

In order to run the MOST automated tests, you need the following equipment and software:

- For the minimum version of Infiniium oscilloscope software, see the N6466A/N6466B release notes.
- N6466A/N6466B MOST Compliance Test Application software and license.
- Probe:
  - For electrical test, you can use one of the following oscilloscope probes:
    - N2750A InfiniiMode 1.5 GHz active differential probe (with 0.1" header socketed tip, solder-in tip, or browser tip).
    - 1130A InfiniiMax1.5 GHz differential probe amplifier and probe head (for example, E2678A socketed probe head with damping resistor).
  - For optical testing, an optical-to-electrical converter (OEC) is required. Keysight does not sell OECs, but you can get them from other vendors.

    MOST150o SP2 extinction ratio testing requires a DC-coupled OEC. Graviton, for example, is a vendor who sells a DC-coupled optical probe.

    All other optical tests can use either an AC-coupled or a DC-coupled optical probe. Keysight has tested using the AC-coupled Hamamatsu C5658 optical-to-electrical converter.
- Infiniium 9000 Series or 90000 Series oscilloscope.

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1 Installing the MOST Compliance Test Application

Installing the Software / 10
Installing the License Key / 11

If you purchased the N6466A/N6466B MOST Compliance Test Application separate from your Infiniium oscilloscope, you need to install the software and license key.

Installing the Software

1. Make sure you have the minimum version of Infiniium oscilloscope software (see the N6466A/N6466B release notes) by choosing **Help > About Infiniium...** from the main menu.
2. To obtain the MOST Compliance Test Application, go to Keysight website: "http://www.keysight.com/find/MOST"
3. The link for MOST Compliance Test Application will appear. Double-click on it and follow the instructions to download and install the application software..

Installing the License Key

1. Request a license code from Keysight by following the instructions on the Entitlement Certificate.

   You will need the oscilloscope's "Option ID Number", which you can find in the **Help > About Infiniium...** dialog box.
2. After you receive your license code from Keysight, choose **Utilities > Install Option License...**.
3. In the Install Option License dialog, enter your license code and click **Install License**.
4. Click **OK** in the dialog that tells you to restart the Infiniium oscilloscope application software to complete the license installation.
5. Click **Close** to close the Install Option License dialog.
6. Choose **File > Exit**.
7. Restart the Infiniium oscilloscope application software to complete the license installation.

2 Preparing to Take Measurements

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Before running the MOST automated tests, you should calibrate the oscilloscope and probe. No test fixture is required for this application. After the oscilloscope and probe have been calibrated, you are ready to start the MOST Compliance Test Application and perform the measurements.

Calibrating the Oscilloscope

If you haven't already calibrated the oscilloscope, see Appendix A, “Calibrating the Infiniium Oscilloscope and Probe,” starting on page 71.

NOTE If the ambient temperature changes more than 5 degrees Celsius from the calibration temperature, internal calibration should be performed again. The delta between the calibration temperature and the present operating temperature is shown in the **Utilities > Calibration** menu.

NOTE If you switch cables between channels or other oscilloscopes, it is necessary to perform cable and probe calibration again. Keysight recommends that, once calibration is performed, you label the cables with the channel on which they were calibrated.

Starting the MOST Compliance Test Application

1 Ensure that the MOST Device Under Test (DUT) is operating and set to desired test modes.

2 To start the MOST Compliance Test Application: From the Infiniium oscilloscope's main menu, choose **Analyze > Automated Test Apps > N6466A/N6466B MOST Test App**.

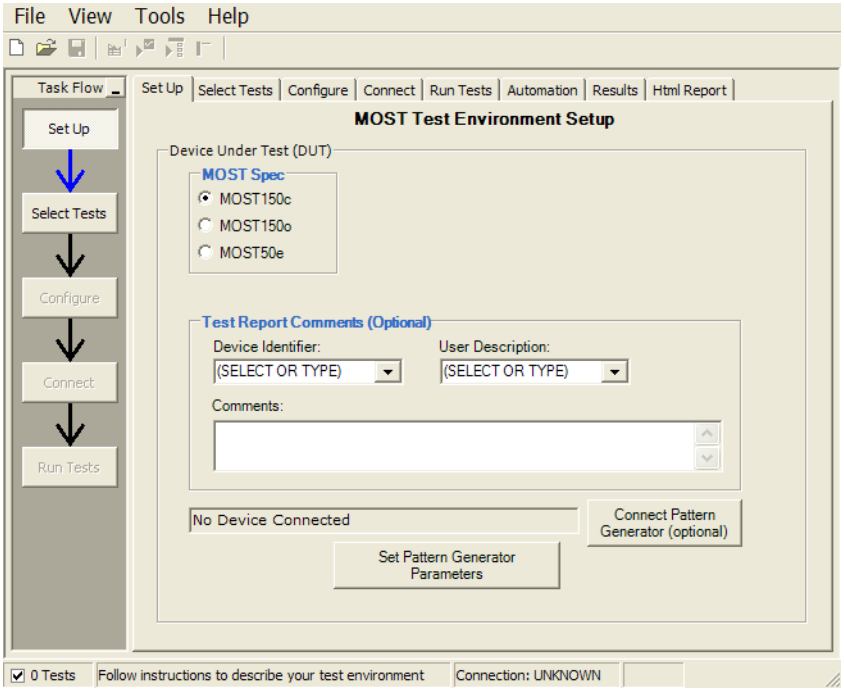

Figure 1 MOST Compliance Test Application Main Window

The task flow pane, and the tabs in the main pane, show the steps you take in running the automated tests:

Set Up	Lets you identify and set up the test environment, including information about the device under test. The **Device Identifier**, **User Description**, and **Comments** are all printed in the final HTML report. Select the Most specification to be tested: ▪ **MOST150c** for MOST150 cable. ▪ **MOST150o** for MOST150 optical. ▪ **MOST50e** for MOST50.
Select Tests	Lets you select the tests you want to run. The tests are organized hierarchically so you can select all tests in a group. After tests are run, status indicators show which tests have passed, failed, or not been run, and there are indicators for the test groups.
Configure	Lets you configure test parameters (for example, channels used in test, voltage levels, etc.).
Connect	Shows you how to connect the oscilloscope to the device under test for the tests that are to be run.
Run Tests	Starts the automated tests. If the connections to the device under test need to be changed while multiple tests are running, the tests pause, show you how to change the connection, and wait for you to confirm that the connections have been changed before continuing.
Automation	Lets you construct scripts of commands that drive execution of the application.
Results	Contains more detailed information about the tests that have been run. You can change the thresholds at which marginal or critical warnings appear.
HTML Report	Shows a compliance test report that can be printed.

3 MOST 150 cPHY Tests

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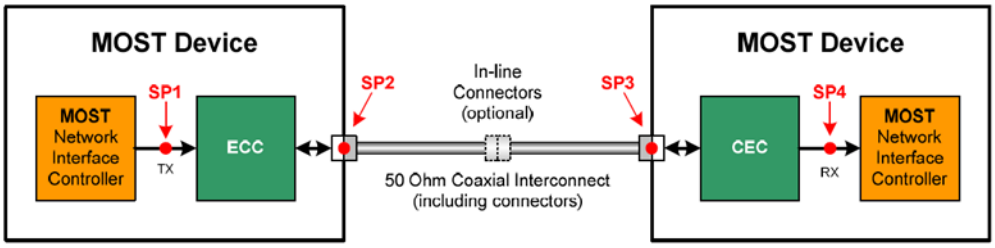


Figure 2 MOST 150 cPhy Simplex Interconnect

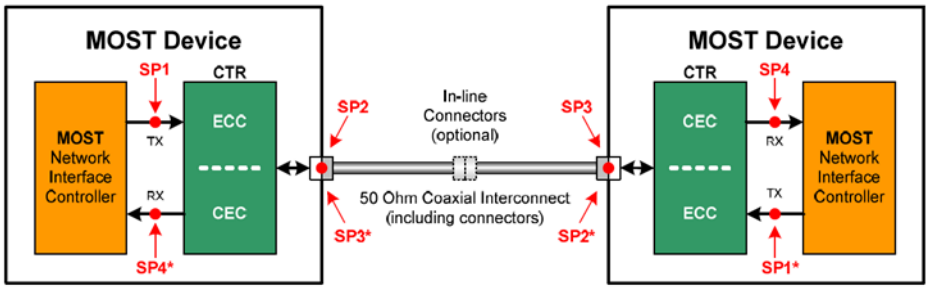


Figure 3 MOST 150 cPhy Duplex Interconnect

MOST 150 cPHY SP1

This section provides the Methods of Implementation (MOIs) for the MOST 150c tests at test point SP1 using a Keysight Infiniium oscilloscope and the N6466A/N6466B MOST Compliance Test Application.

Probing and Connection

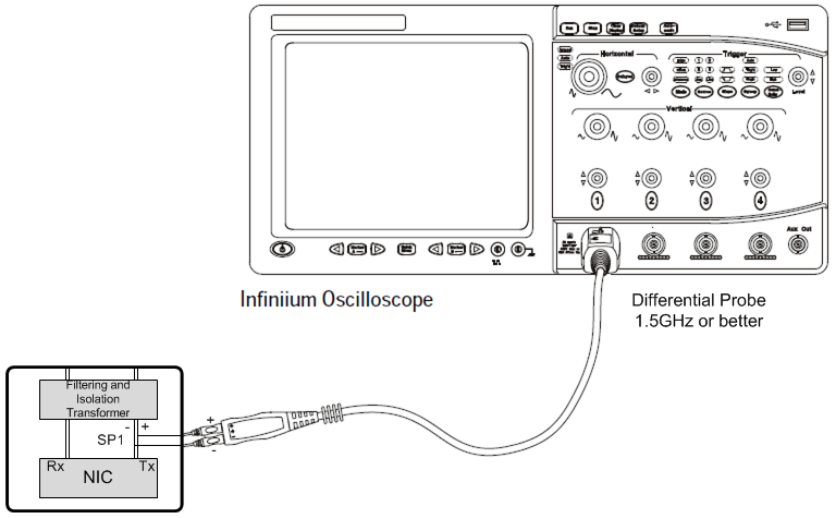


Figure 4 Probing for MOST150c SP1

You can use any of the oscilloscope channels as Pin Under Test (PUT) source channel. You can identify the channels used for each signal in the **Configuration** tab of the MOST Compliance Test Application. (The channel shown in the previous figure is just an example).

Test Procedure

1. Start the automated test application as described in "Starting the MOST Compliance Test Application" on page 15.
2. Ensure that the MOST Device Under Test (DUT) is on and set up for MOST150 testing.
3. Connect the probes to the Pin Under Test (PUT) on the MOST DUT.
4. Connect the oscilloscope probes to the channel of the oscilloscope that you have set up in the **Configuration** tab.
5. In the MOST Test application, click the **Set Up** tab.
6. Select the MOST Spec that you plan to test.
7. Type in or select the **Device Identifier** as well as the **User Description** from the drop-down list. Enter your comments in the **Comments** text box.

8 Click the **Select Tests** tab and check the SP1 tests you want to run. Check the parent node or group to check all the available tests within the group.

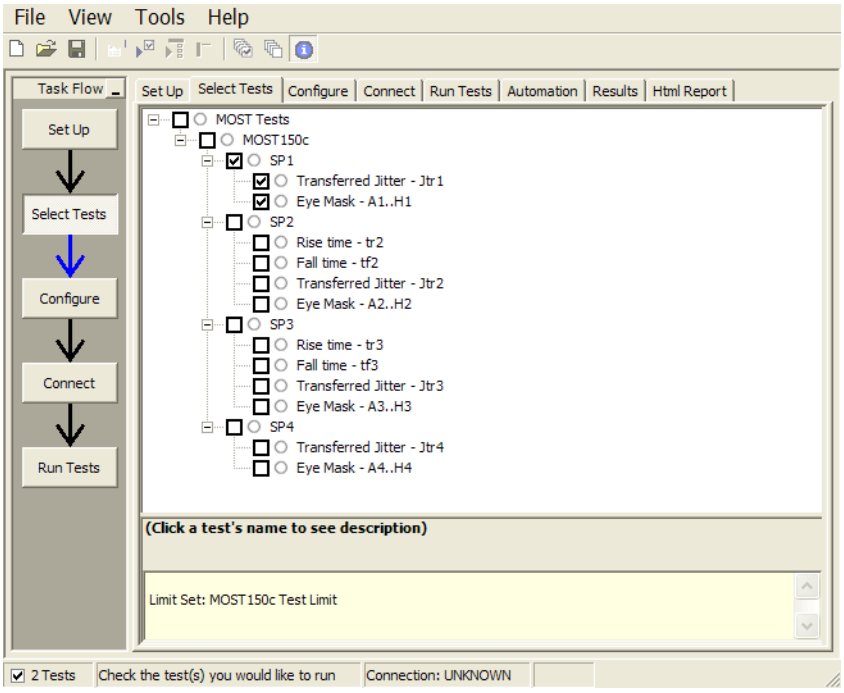


Figure 5 Selecting MOST150c SP1 Tests

- "Transferred Jitter - Jtr1" on page 20
- "Eye Mask - A1..H1" on page 20

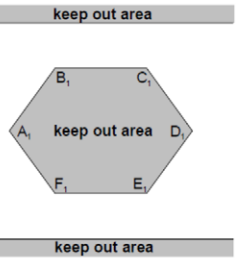
MOST150c SP1 Specification

The MOST 150 cPHY specification defines transferred jitter and eye mask for SP1.

SP1 Parameters	Symbol	Condition	Min.	Typ.	Max.	Unit
Transferred jitter	J_{tr1}	1)	-	-	50	ps RMS
Eye-mask	A_1... H_1	2)	-	-	-	-

Parameter	Amplitude (mV)	Timing (UI)
A_1	0	0.075
B_1	100	0.325
C_1	100	0.675
D_1	0	0.925
E_1	-100	0.675
F_1	-100	0.325
G_1	636	-
H_1	-636	-

Eye-mask



Notes:
1) Using the jitter filter specified in Section 5.2.
2) Using the Golden PLL specified in Section 5.1.

Transferred Jitter - Jtr1

The purpose of this test is to verify that the jitter that is transferred is below 50 ps RMS.

PASS Condition The standard deviation of the jitter is less than or equal to 50 ps.

Measurement Algorithm

1. Obtain sample or acquire signal data.
2. Measure the data rate and set the memory depth to capture 100 frames (3072 bits per frame).
3. Set up clock recovery to constant frequency with semi-automatic data rate set to measurement from step 2.
4. Set TIE Filter to bandpass with start frequency = 10 Hz and stop frequency = 200 kHz.
5. Perform TIE measurement on acquired signal.
6. Compare the standard deviation value with 50 ps.

Eye Mask - A1..H1

The purpose of this test is to verify that the signal at SP1 does not touch the "keep-out" zones of the mask.

PASS Condition The signal does not touch or go into the mask.

Measurement Algorithm

1. Obtain sample or acquire signal data.
2. Measure the data rate and set the memory depth to capture 100 frames (3072 bits per frame).

3 Set up clock recovery to first order PLL. Nominal Data Rate = Value from step 2. Loop Bandwidth = 125 kHz.

4 Fold data and scale eye to fit one eye into the oscilloscope capture screen.

5 Compare the signal to the mask defined for SP1.

MOST 150 cPHY SP2

This section provides the Methods of Implementation (MOIs) for the MOST 150c tests at test point SP2 using a Keysight Infiniium oscilloscope and the N6466A/N6466B MOST Compliance Test Application.

Probing and Connection

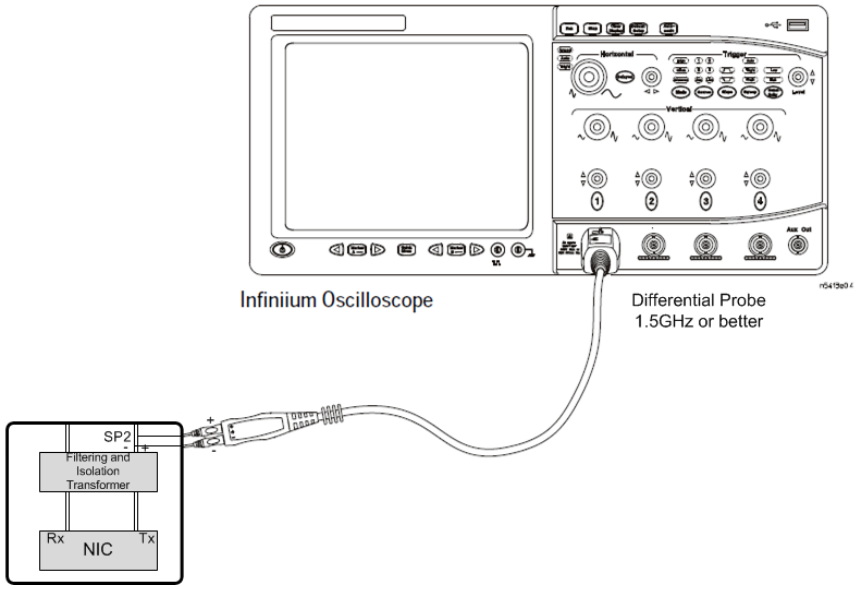


Figure 6 Probing for MOST150c SP2

You can use any of the oscilloscope channels as Pin Under Test (PUT) source channel. You can identify the channels used for each signal in the **Configuration** tab of the MOST Compliance Test Application. (The channel shown in the previous figure is just an example.)

Test Procedure

1. Start the automated test application as described in "Starting the MOST Compliance Test Application" on page 15.
2. Ensure that the MOST Device Under Test (DUT) is on and set up for MOST150 testing.
3. Connect the probes to the Pin Under Test (PUT) on the MOST DUT.
4. Connect the oscilloscope probes to the channel of the oscilloscope that you have set up in the **Configuration** tab.
5. In the MOST Test application, click the **Set Up** tab.
6. Select the MOST Spec that you plan to test.
7. Type in or select the **Device Identifier** as well as the **User Description** from the drop-down list. Enter your comments in the **Comments** text box.

8 Click the **Select Tests** tab and check the SP2 tests you want to run. Check the parent node or group to check all the available tests within the group.

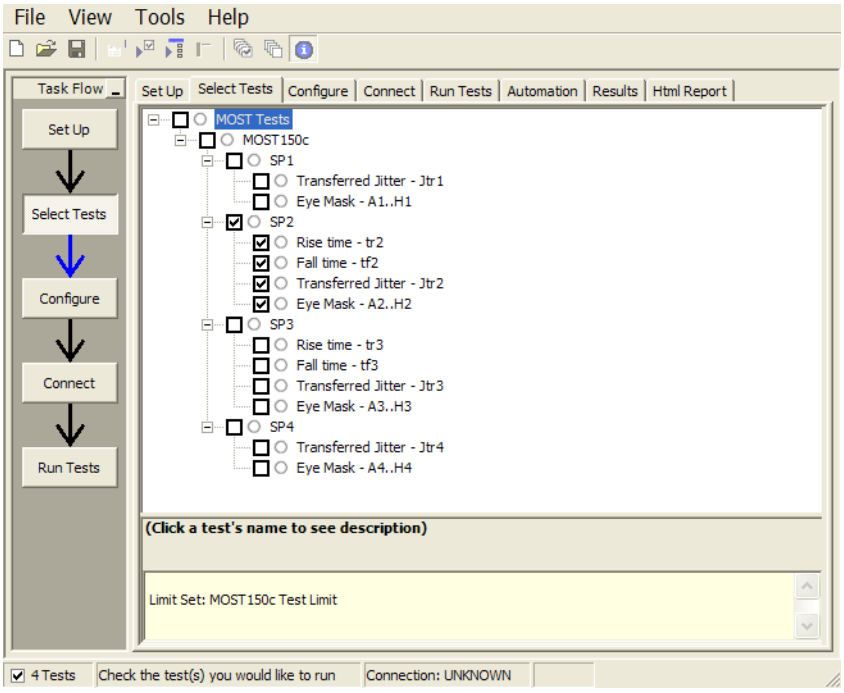


Figure 7 Selecting MOST150c SP2 Tests

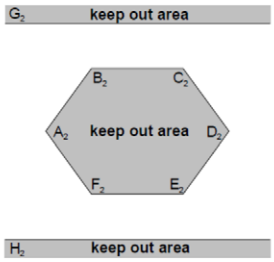
- "Rise Time - tr2" on page 24
- "Fall Time - tf2" on page 24
- "Transferred Jitter - Jtr2" on page 25
- "Eye Mask - A2..H2" on page 25

MOST150c SP2 Specification

The MOST 150 cPHY specification defines rise time, fall time, transferred jitter and eye mask for SP2.

SP2 Parameters	Symbol	Condition	Min.	Typ.	Max.	Unit
Return loss	RL_{SP2}	F = 1 MHz - 450 MHz	18.5	-	-	dB
Rise time	t_{r2}	20% - 80%, 1)	700	-	1400	ps
Fall time	t_{f2}	80% - 20%, 1)	700	-	1400	ps
Transferred jitter	J_{tr2}	2)	-	-	112	ps RMS
Eye-mask	A_2... H_2	2),3),4),5)	-	-	-	-

Parameter	Amplitude (mV)	Timing (UI)
A_2	0	0.150
B_2	125	0.400
C_2	125	0.600
D_2	0	0.850
E_2	-125	0.600
F_2	-125	0.400
G_2	225	-
H_2	-225	-



Notes:
1) The minimum rise and fall times are derived using the maximum frequency for return loss at the coaxial interconnect.
2) Using the jitter filter specified in Section 5.2.
3) Using the golden PLL specified in Section 5.1.
4) The DC offset is removed.
5) The mask parameters include tolerances for overshoot and ringing.

Rise Time - tr2

The purpose of this test is to verify that the rise time, measured between 20% to 80%, is greater than or equal to 700 ps and less than or equal to 1400 ps.

PASS Condition The rise time minimum and maximum values are greater than or equal to 700 ps and less than or equal to 1400 ps.

Measurement Algorithm

1. Obtain sample or acquire signal data.
2. Measure the data rate and set the memory depth to capture 100 frames (3072 bits per frame).
3. Set up rise time measurement for 20% to 80% of the mean maximum and minimum voltage of the signal.
4. Perform rise time measurement on acquired signal.
5. Compare the minimum and maximum measured values are greater than or equal to 700 ps and less than or equal to 1400 ps.

Fall Time - tf2

The purpose of this test is to verify that the fall time, measured between 80% to 20% is greater than or equal to 700 ps and less than or equal to 1400 ps.

PASS Condition The fall time minimum and maximum values are greater than or equal to 700 ps and less than or equal to 1400 ps.

Measurement Algorithm

1. Obtain sample or acquire signal data.
2. Measure the data rate and set the memory depth to capture 100 frames (3072 bits per frame).
3. Set up fall time measurement for 80% to 20% of the mean maximum and minimum voltage of the signal.
4. Perform fall time measurement on acquired signal.
5. Compare the minimum and maximum measured values are greater than or equal to 700 ps and less than or equal to 1400 ps.

Transferred Jitter - Jtr2

The purpose of this test is to verify that the jitter that is transferred is below 112 ps RMS.

PASS Condition The standard deviation of the jitter is less than or equal to 112 ps.

Measurement Algorithm

1. Obtain sample or acquire signal data.
2. Measure the data rate and set the memory depth to capture 100 frames (3072 bits per frame).
3. Set up clock recovery to constant frequency with semi-automatic data rate set to measurement from step 2.
4. Set TIE Filter to bandpass with start frequency = 10 Hz and stop frequency = 200 kHz.
5. Perform TIE measurement on acquired signal.
6. Compare the standard deviation value with 112 ps.

Eye Mask - A2..H2

The purpose of this test is to verify that the signal at SP2 does not touch the "keep-out" zones of the mask.

PASS Condition The signal does not touch or go into the mask.

Measurement Algorithm

1. Obtain sample or acquire signal data.
2. Measure the data rate and set the memory depth to capture 100 frames (3072 bits per frame).
3. Set up clock recovery to first order PLL. Nominal Data Rate = Value from step 2. Loop Bandwidth = 125 kHz.
4. Fold data and scale eye to fit one eye into the oscilloscope capture screen.
5. Compare the signal to the mask defined for SP2.

MOST 150 cPHY SP3

This section provides the Methods of Implementation (MOIs) for the MOST 150c tests at test point SP2 using a Keysight Infiniium oscilloscope and the N6466A/N6466B MOST Compliance Test Application.

Probing and Connection

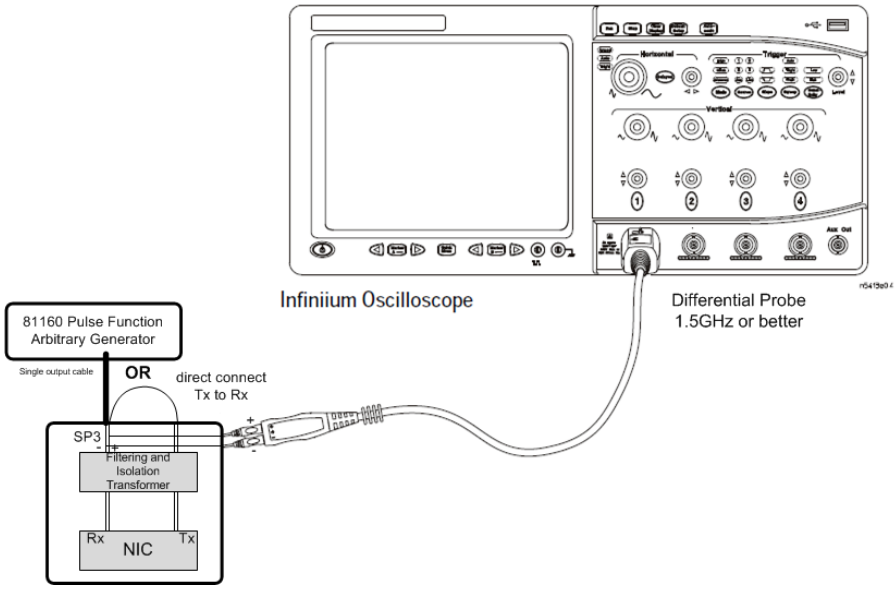


Figure 8 Probing for MOST150c SP3

You can use any of the oscilloscope channels as Pin Under Test (PUT) source channel. You can identify the channels used for each signal in the **Configuration** tab of the MOST Compliance Test Application. (The channel shown in the previous figure is just an example).

Test Procedure

1. Start the automated test application as described in "Starting the MOST Compliance Test Application" on page 15.
2. Ensure that the MOST Device Under Test (DUT) is on and set up for MOST150 testing.
3. Connect the probes to the Pin Under Test (PUT) on the MOST DUT.
4. Connect the oscilloscope probes to the channel of the oscilloscope that you have set up in the **Configuration** tab.
5. In the MOST Test application, click the **Set Up** tab.
6. Select the MOST Spec that you plan to test.
7. Type in or select the **Device Identifier** as well as the **User Description** from the drop-down list. Enter your comments in the **Comments** text box.

8 Click the **Select Tests** tab and check the SP3 tests you want to run. Check the parent node or group to check all the available tests within the group.

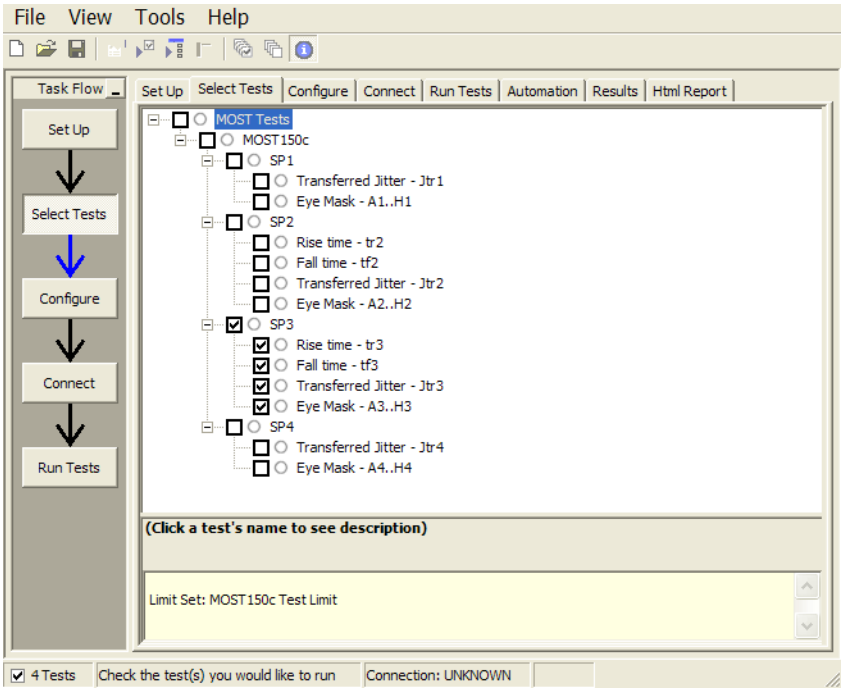


Figure 9 Selecting MOST150c SP3 Tests

- "Rise Time - tr3" on page 27
- "Fall Time - tf3" on page 28
- "Transferred Jitter - Jtr3" on page 28
- "Eye Mask - A3..H3" on page 28

MOST150c SP3 Specification The MOST 150 cPHY specification does not specify electrical tests for SP3, these are information only tests.

Rise Time - tr3

The purpose of this test is to report the rise time value of the signal at SP3 (measured from 20%-80%).

PASS Condition Information only test.

Measurement Algorithm

1 Obtain sample or acquire signal data.

2 Measure the data rate and set the memory depth to capture 100 frames (3072 bits per frame).

3 Set up rise time measurement for 20% to 80% of the mean maximum and minimum voltage of the signal.

4 Perform rise time measurement on acquired signal.

5 Report value as information only.

Fall Time - tf3

The purpose of this test is to report the fall time value of the signal at SP3 (measured from 80% to 20%).

PASS Condition Information only test.

Measurement Algorithm

1 Obtain sample or acquire signal data.

2 Measure the data rate and set the memory depth to capture 100 frames (3072 bits per frame).

3 Set up fall time measurement for 80% to 20% of the mean maximum and minimum voltage of the signal.

4 Perform fall time measurement on acquired signal.

5 Report value as information only.

Transferred Jitter - Jtr3

The purpose of this test is to report the transferred jitter value of the signal at SP3.

PASS Condition Information only test.

Measurement Algorithm

1 Obtain sample or acquire signal data.

2 Measure the data rate and set the memory depth to capture 100 frames (3072 bits per frame).

3 Set up clock recovery to constant frequency with semi-automatic data rate set to measurement from step 2.

4 Set TIE Filter to bandpass with start frequency = 10 Hz and stop frequency = 200 kHz.

5 Perform TIE measurement on acquired signal.

6 Compare the standard deviation value with 112 ps.

Eye Mask - A3..H3

The purpose of this test is to report the eye of the signal at SP3.

PASS Condition Information only test.

Measurement Algorithm

1 Obtain sample or acquire signal data.

2 Measure the data rate and set the memory depth to capture 100 frames (3072 bits per frame).

3 Set up clock recovery to first order PLL. Nominal Data Rate = Value from step 2. Loop Bandwidth = 125 kHz.

4 Fold data and scale eye to fit one eye into the oscilloscope capture screen.

5 Compare the signal to the mask defined for SP2.

MOST 150 cPHY SP4

This section provides the Methods of Implementation (MOIs) for the MOST 150c tests at test point SP4 using a Keysight Infiniium oscilloscope and the N6466A/N6466B MOST Compliance Test Application.

Probing and Connection

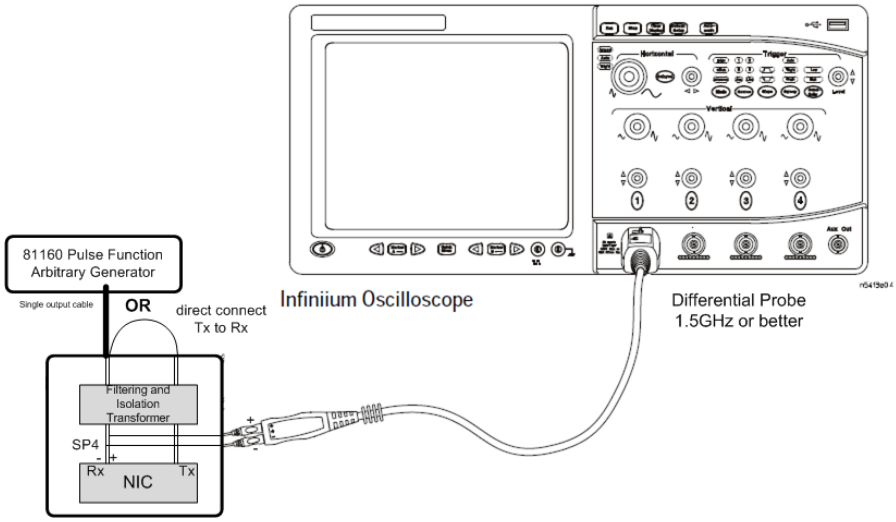


Figure 10 Probing for MOST150c SP4

You can use any of the oscilloscope channels as Pin Under Test (PUT) source channel. You can identify the channels used for each signal in the **Configuration** tab of the MOST Compliance Test Application. (The channel shown in the previous figure is just an example.)

Test Procedure

1. Start the automated test application as described in "Starting the MOST Compliance Test Application" on page 15.
2. Ensure that the MOST Device Under Test (DUT) is on and set up for MOST150 testing.
3. Connect the probes to the Pin Under Test (PUT) on the MOST DUT.
4. Connect the oscilloscope probes to the channel of the oscilloscope that you have set up in the **Configuration** tab.
5. In the MOST Test application, click the **Set Up** tab.
6. Select the MOST Spec that you plan to test.
7. Type in or select the **Device Identifier** as well as the **User Description** from the drop-down list. Enter your comments in the **Comments** text box.

8 Click the **Select Tests** tab and check the SP4 tests you want to run. Check the parent node or group to check all the available tests within the group.

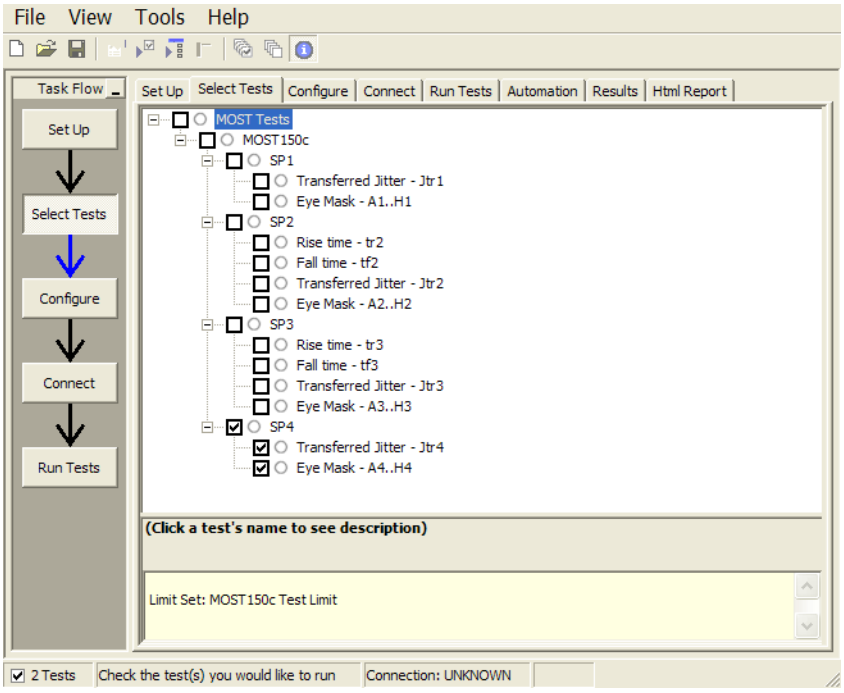


Figure 11 Selecting MOST150c SP4 Tests

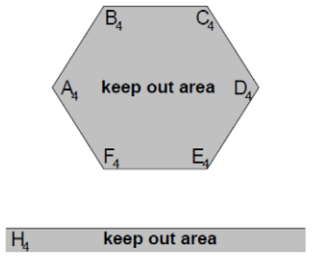
- "Transferred Jitter - Jtr4" on page 32
- "Eye Mask - A4..H4" on page 32

MOST150c SP4 Specification

The MOST 150 cPHY specification defines transferred jitter and eye mask for SP4.

SP4 Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Transferred jitter	J_{tr4}	1)	-	-	230	ps RMS
Eye-mask	A_4…H_4	2), 3), 4)	-	-	-	-

Parameter	Amplitude (mV)	Timing (UI)
A_4	0	0.275
B_4	148	0.425
C_4	148	0.575
D_4	0	0.725
E_4	-148	0.575
F_4	-148	0.425
G_4	636	-
H_4	-636	-



Notes:
1) Using the jitter filter specified in Section 5.2.
2) Using the Golden PLL specified in Section 5.1.
3) The mask parameters include tolerances for overshoot and ringing.
4) The steady-state differential voltage must not be less than that specified in [3].

Transferred Jitter - Jtr4

The purpose of this test is to verify that the jitter that is transferred is below 230 ps RMS.

PASS Condition The standard deviation of the jitter is less than or equal to 230 ps.

Measurement Algorithm

1. Obtain sample or acquire signal data.
2. Measure the data rate and set the memory depth to capture 100 frames (3072 bits per frame).
3. Set up clock recovery to constant frequency with semi-automatic data rate set to measurement from step 2.
4. Set TIE Filter to bandpass with start frequency = 10 Hz and stop frequency = 200 kHz.
5. Perform TIE measurement on acquired signal.
6. Compare the standard deviation value with 230 ps.

Eye Mask - A4..H4

The purpose of this test is to verify that the signal at SP4 does not touch the "keep-out" zones of the mask.

PASS Condition The signal does not touch or go into the mask.

Measurement Algorithm

1. Obtain sample or acquire signal data.
2. Measure the data rate and set the memory depth to capture 100 frames (3072 bits per frame).
3. Set up clock recovery to first order PLL. Nominal Data Rate = Value from step 2. Loop Bandwidth = 125 kHz.
4. Fold data and scale eye to fit one eye into the oscilloscope capture screen.
5. Compare the signal to the mask defined for SP4.

4 MOST 150 oPHY Tests

MOST 150 oPHY SP1 / 36
MOST 150 oPHY SP2 / 40
MOST 150 oPHY SP3 / 48
MOST 150 oPHY SP4 / 52

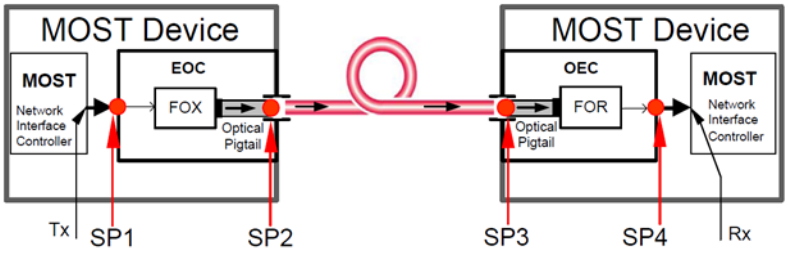


Figure 12 MOST150 oPhy Interconnect

MOST 150 oPHY SP1

This section provides the Methods of Implementation (MOIs) for the MOST 150o tests at test point SP1 using a Keysight Infiniium oscilloscope and the N6466A/N6466B MOST Compliance Test Application.

Probing and Connection

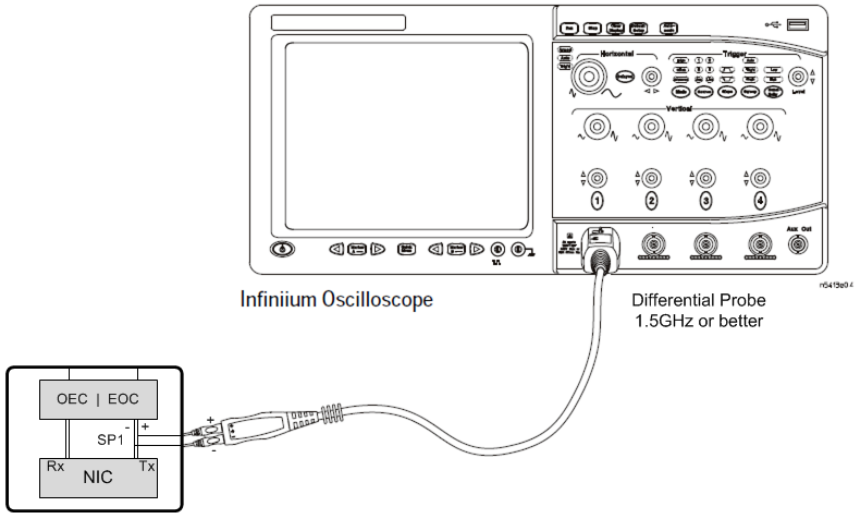


Figure 13 Probing for MOST150o SP1

You can use any of the oscilloscope channels as Pin Under Test (PUT) source channel. You can identify the channels used for each signal in the **Configuration** tab of the MOST Compliance Test Application. (The channel shown in the previous figure is just an example.)

Test Procedure

1. Start the automated test application as described in "Starting the MOST Compliance Test Application" on page 15.
2. Ensure that the MOST Device Under Test (DUT) is on and set up for MOST150 testing.
3. Connect the probes to the Pin Under Test (PUT) on the MOST DUT.
4. Connect the oscilloscope probes to the channel of the oscilloscope that you have set up in the **Configuration** tab.
5. In the MOST Test application, click the **Set Up** tab.
6. Select the MOST Spec that you plan to test.
7. Type in or select the **Device Identifier** as well as the **User Description** from the drop-down list. Enter your comments in the **Comments** text box.

8 Click the **Select Tests** tab and check the SP1 tests you want to run. Check the parent node or group to check all the available tests within the group.

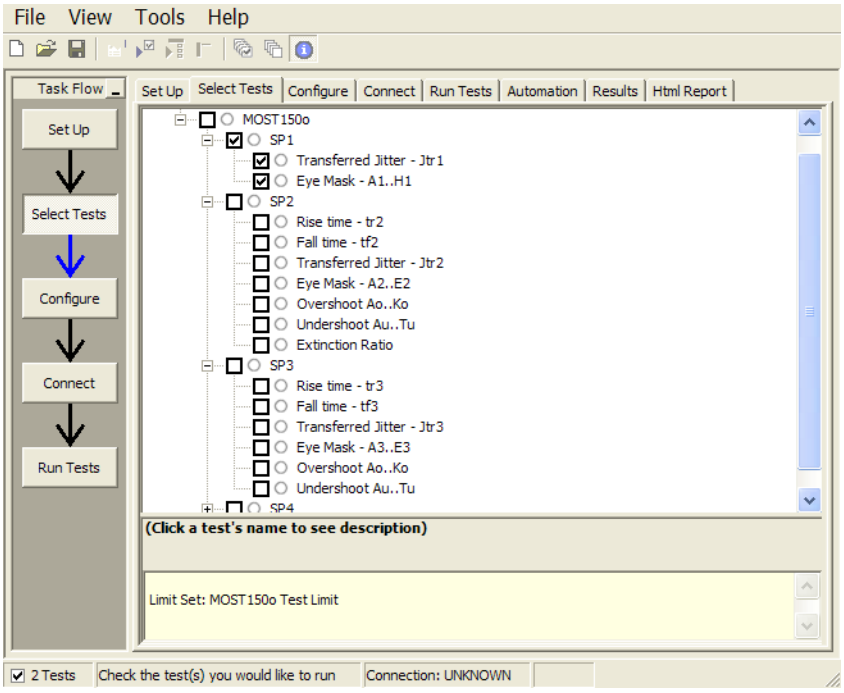


Figure 14 Selecting MOST150o SP1 Tests

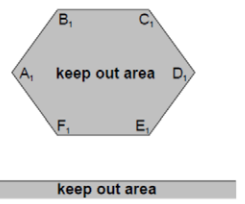
- "Transferred Jitter - Jtr1" on page 38
- "Eye Mask - A1..H1" on page 38

MOST150o SP1 Specification

The MOST 150 oPHY specification defines transferred jitter and eye mask for SP1.

Link Quality SP1	Symbol	Condition	Min.	Typ.	Max.	Unit
Transferred Jitter	Jtr_1	1)	-	-	50	ps RMS
Eye-Mask	A_1... H_1	2)	-	-	-	-

Parameter	Amplitude (mV)	Timing (UI)
A_1	0	0.075
B_1	100	0.325
C_1	100	0.675
D_1	0	0.925
E_1	-100	0.675
F_1	-100	0.325
G_1	636	-
H_1	-636	-



Notes:

1) Using the Jitter-Filter specified in section 5.2.
2) Using the Golden PLL specified in section 5.1.

Transferred Jitter - Jtr1

The purpose of this test is to verify that the jitter that is transferred is below 50 ps RMS.

PASS Condition The standard deviation of the jitter is less than or equal to 50 ps.

Measurement Algorithm

1. Obtain sample or acquire signal data.
2. Measure the data rate and set the memory depth to capture 100 frames (3072 bits per frame).
3. Set up clock recovery to constant frequency with semi-automatic data rate set to measurement from step 2.
4. Set TIE Filter to bandpass with start frequency = 10 Hz and stop frequency = 200 kHz.
5. Perform TIE measurement on acquired signal.
6. Compare the standard deviation value with 50 ps.

Eye Mask - A1..H1

The purpose of this test is to verify that the signal at SP1 does not touch the "keep-out" zones of the mask.

PASS Condition The signal does not touch or go into the mask.

Measurement Algorithm

1. Obtain sample or acquire signal data.
2. Measure the data rate and set the memory depth to capture 100 frames (3072 bits per frame).
3. Set up clock recovery to first order PLL. Nominal Data Rate = Value from step 2. Loop Bandwidth = 125 kHz.
4. Fold data and scale eye to fit one eye into the oscilloscope capture screen.
5. Compare the signal to the mask defined for SP1.

MOST 150 oPHY SP2

This section provides the Methods of Implementation (MOIs) for the MOST 150o tests at test point SP2 using a Keysight Infiniium oscilloscope and the N6466A/N6466B MOST Compliance Test Application.

Probing and Connection

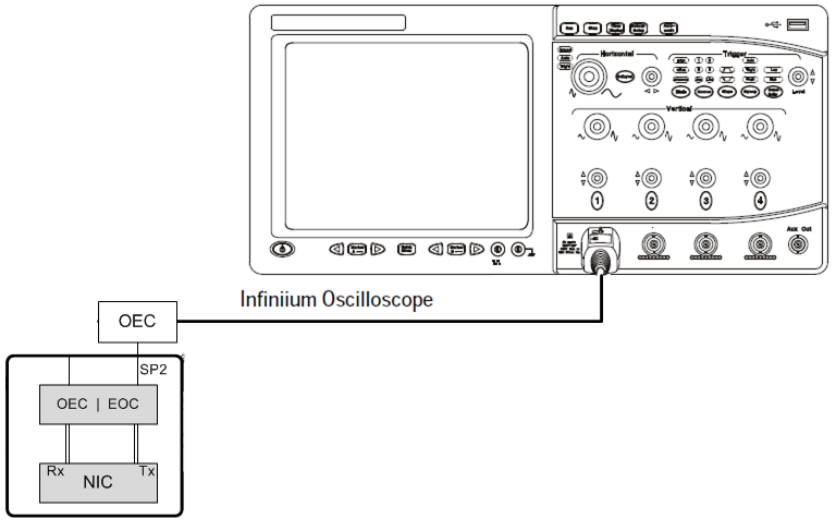


Figure 15 Probing for MOST150o SP2

You can use any of the oscilloscope channels as Pin Under Test (PUT) source channel. You can identify the channels used for each signal in the **Configuration** tab of the MOST Compliance Test Application. (The channel shown in the previous figure is just an example.)

Test Procedure

1. Start the automated test application as described in "Starting the MOST Compliance Test Application" on page 15.
2. Ensure that the MOST Device Under Test (DUT) is on and set up for MOST150 testing.
3. Connect the probes to the Pin Under Test (PUT) on the MOST DUT.
4. Connect the oscilloscope probes to the channel of the oscilloscope that you have set up in the **Configuration** tab.
5. In the MOST Test application, click the **Set Up** tab.
6. Select the MOST Spec that you plan to test.
7. Type in or select the **Device Identifier** as well as the **User Description** from the drop-down list. Enter your comments in the **Comments** text box.

8 Click the **Select Tests** tab and check the SP2 tests you want to run. Check the parent node or group to check all the available tests within the group.

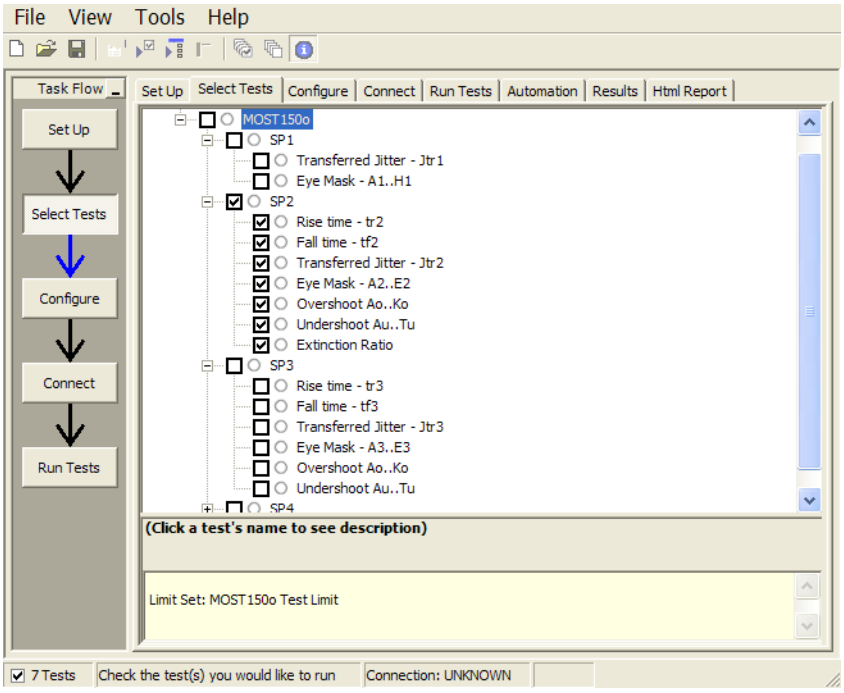


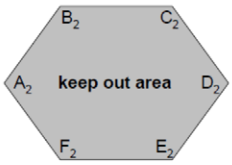
Figure 16 Selecting MOST150o SP2 Tests

- "Rise Time - tr2" on page 44
- "Fall Time - tf2" on page 45
- "Transferred Jitter - Jtr2" on page 45
- "Eye Mask - A2..E2" on page 46
- "Overshoot - Ao..Ko" on page 46
- "Undershoot - Au..Ku" on page 46
- "Extinction Ratio" on page 47

MOST150c SP2 Specification

The MOST 150 oPHY specification defines rise time, fall time, transferred jitter, eye mask, overshoot, undershoot, and extinction ratio for SP2.

Link Quality SP2	Symbol	Condition	Min.	Typ.	Max.	Unit
Center wavelength	λc_2	1)	635	650	675	nm
Spectral Width (RMS)	$\sigma\lambda_2$	2)	-	-	17	nm
Average optical output power	P_{opt2}	3), 4), 5)	-8.500	-	-1.500	dBm
Extinction ratio	r_{e2}	6), 7)	10	-	-	dB
Transition times (rise or fall)	t_{tr2}	8)	-	-	0.500	UI
Transferred Jitter	Jtr_2	9)	-	-	112	ps RMS
Eye-Mask	$A_2 \ldots F_2$	6), 10)	-	-	-	-

Parameter	Amplitude	Timing (UI)	Eye-mask
A_2	$0.5 * (b_1 + b_0)$	0.150	
B_2	$0.8 * (b_1-b_0) + b_0$	0.400	
C_2	$0.8 * (b_1-b_0) + b_0$	0.600	
D_2	$0.5 * (b_1 + b_0)$	0.850	
E_2	$0.2 * (b_1-b_0) + b_0$	0.600	
F_2	$0.2 * (b_1-b_0) + b_0$	0.400	

Notes:

1) Center wavelength λ_{c2} is given with: $\lambda_{c2} = \frac{\sum_{i=\lambda start}^{i=\lambda end} P_i \lambda_i}{\sum_{i=\lambda start}^{i=\lambda end} P_i}$; $\lambda start = 500nm$, $\lambda end = 800nm$; where P_i is the optical power measured at the wavelength λ_i.

2) Spectral width $\sigma\lambda_2$ is given with: $\sigma\lambda_2 = \sqrt{\frac{\sum_{i=\lambda start}^{i=\lambda end} P_i(\lambda_i - \lambda_{c2})^2}{\sum_{i=\lambda start}^{i=\lambda end} P_i}}$; $\lambda start = 500nm$, $\lambda end = 800nm$;

3) The recommendations of IEC 60825-2 - Part 2: "Safety of Optical Fiber Communication Systems" [5] must be taken into account. Laser Class 1 limits must be met in any circumstance. In failure cases, such as when no data transitions are present at the input of the transmitter, the output must be disabled within a time t_{off2} (defined in Table 7-2).
4) Power within a far field angle of 30° (NA = 0.5) and a diameter of 1.0 mm.
5) Losses through the optical pigtail must be kept below 1.5 dB, except integrated pigtail.
6) Measurement of b_0 and b_1 is specified in section 5.3.
7) $r_{e2} = 10 * \log(b_1 / b_0)$
8) Transition times are measured between the 20% - 80% points.
9) Using the Jitter-Filter specified in section 5.2.
10) Using the Golden PLL specified in section 5.1.

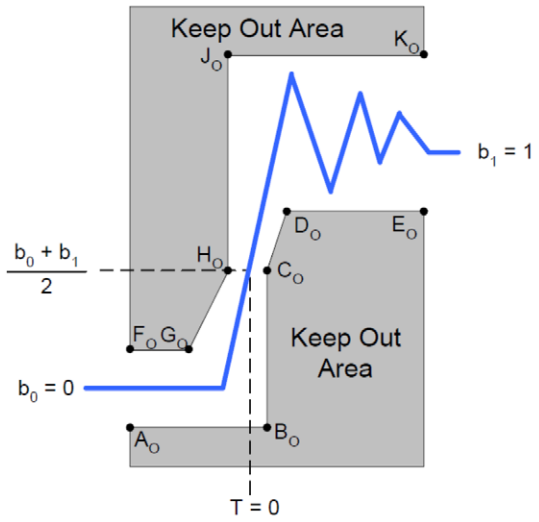


Figure 6-1: SP2 Overshoot Mask

Mask Parameter	Normalized Amplitude	Time (UI)
A_O	-0.200	-0.630
B_O	-0.200	0.100
C_O	0.500	0.100
D_O	0.800	0.350
E_O	0.800	1.370
F_O	0.200	-0.630
G_O	0.200	-0.350
H_O	0.500	-0.100
J_O	1.400	-0.100
K_O	1.400	1.370
Note: All amplitude values are normalized to $b_0 = 0$ and $b_1 = 1$.		

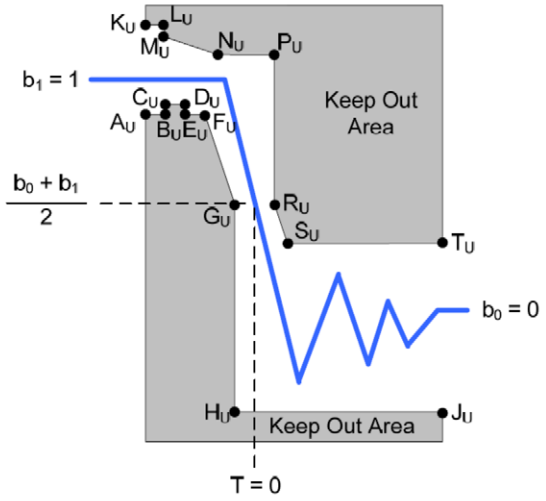


Figure 6-2: SP2 Undershoot Mask

Mask Parameter	Normalized Amplitude (1)	Time (UI) (2)
A_U	0.800	-0.630 - x
B_U	0.800	-0.530 - x
C_U	0.850	-0.530 - x
D_U	0.850	-0.430
E_U	0.800	-0.430
F_U	0.800	-0.350
G_U	0.500	-0.100
H_U	-0.200	-0.100
J_U	-0.200	1.370
K_U	1.400	-0.630 - x
L_U	1.400	-0.530 - x
M_U	1.340	-0.530 - x
N_U	1.150	-0.220 - x
P_U	1.150	0.100
R_U	0.500	0.100
S_U	0.200	0.350
T_U	0.200	1.370

Notes:
1) All amplitude values are normalized to $b_0 = 0$ and $b_1 = 1$.
2) The locations of A_U, B_U, C_U, K_U, L_U, and M_U on the time-axis depend on the nominal pulse width to be measured. In the table this dependency is expressed by the parameter x, which is calculated by: x = nominal pulse width in UI - 2. (For 2UI, x = 0; for 6UI, x = 4)

Rise Time - tr2

The purpose of this test is to verify that the rise time, measured between 20% to 80%, is less than or equal to 0.5 UI.

PASS Condition The rise time maximum value is less than or equal to 0.5 UI.

Measurement Algorithm

1. Obtain sample or acquire signal data.
2. Measure the data rate and set the memory depth to capture 100 frames (3072 bits per frame).
3. Set up rise time measurement for 20% to 80% of the mean maximum and minimum voltage of the signal.
4. Perform rise time measurement on acquired signal.
5. Compare the maximum value to 0.5 UI (UI is defined by the measurement in step 2).

Fall Time - tf2

The purpose of this test is to verify that the fall time, measured between 80% to 20% is less than or equal to 0.5 UI.

PASS Condition The fall time maximum value is less than or equal to 0.5 UI.

Measurement Algorithm

1. Obtain sample or acquire signal data.
2. Measure the data rate and set the memory depth to capture 100 frames (3072 bits per frame).
3. Set up fall time measurement for 80% to 20% of the mean maximum and minimum voltage of the signal.
4. Perform fall time measurement on acquired signal.
5. Compare the maximum value to 0.5 UI (UI is defined by the measurement in step 2).

Transferred Jitter - Jtr2

The purpose of this test is to verify that the jitter that is transferred is below 112 ps RMS.

PASS Condition The standard deviation of the jitter is less than or equal to 112 ps.

Measurement Algorithm

1. Obtain sample or acquire signal data.
2. Measure the data rate and set the memory depth to capture 100 frames (3072 bits per frame).
3. Set up clock recovery to constant frequency with semi-automatic data rate set to measurement from step 2.
4. Set TIE Filter to bandpass with start frequency = 10 Hz and stop frequency = 200 kHz.
5. Perform TIE measurement on acquired signal.
6. Compare the standard deviation value with 112 ps.

Eye Mask - A2..E2

The purpose of this test is to verify that the signal at SP2 does not touch the "keep-out" zones of the mask.

PASS Condition The signal does not touch or go into the mask.

Measurement Algorithm

1. Obtain sample or acquire signal data.
2. Measure the data rate and set the memory depth to capture 100 frames (3072 bits per frame).
3. Set up clock recovery to first order PLL. Nominal Data Rate = Value from step 2. Loop Bandwidth = 125 kHz.
4. Fold data and scale eye to fit one eye into the oscilloscope capture screen.
5. Compare the signal to the mask defined for SP2.

Overshoot - Ao..Ko

The purpose of this test is to verify that the signal at SP2 does not touch the "keep-out" zones of the overshoot mask.

PASS Condition The signal does not touch or go into the mask.

Measurement Algorithm

1. Obtain sample or acquire signal data.
2. Measure the data rate and set the memory depth to capture 100 frames (3072 bits per frame).
3. Set up to trigger on the rising edge of the signal.
4. Scale rising edge triggered data to fit the overshoot mask to the screen and capture 100 acquisitions.
5. Compare the signal to the overshoot mask defined for SP2.

Undershoot - Au..Ku

The purpose of this test is to verify that the signal at SP2 does not touch the "keep-out" zones of the undershoot mask.

PASS Condition The signal does not touch or go into the mask.

Measurement Algorithm

1. Obtain sample or acquire signal data.
2. Measure the data rate and set the memory depth to capture 100 frames (3072 bits per frame).
3. Set up to trigger on the rising edge of the signal.
4. Scale rising edge triggered data to fit the overshoot mask to the screen and capture 100 acquisitions.
5. Compare the signal to the undershoot mask defined for SP2.

Extinction Ratio

The purpose of this test is to verify that the Extinction Ratio at SP2 is greater than 10 dB.

NOTE **Extinction Ratio can only be measured with a DC-coupled optical probe. It cannot be measured with an AC-coupled optical probe.**

PASS Condition The measured high level and low level ratio 10 *Log((B1-DL) / (B0-DL)) is greater than 10 dB.

Measurement Algorithm

1. Measure the voltage of the dark level for dark level calibration by blocking the optical probe input. The mean voltage is DL.
2. Input the MOST signal to the optical probe.
3. Set up to trigger on 5 to 6 UI of the high signal.
4. Measure the high signal with histogram between tOSLS and tOSLE. The mean value is B1.
5. Set up to trigger on 5 to 6 UI of the low signal.
6. Measure the low signal with histogram between tOSLS and tOSLE. The mean value is B0.
7. Calculate the extinction ratio with 10 *Log((B1-DL) / (B0-DL)).

MOST 150 oPHY SP3

This section provides the Methods of Implementation (MOIs) for the MOST 150o tests at test point SP3 using a Keysight Infiniium oscilloscope and the N6466A/N6466B MOST Compliance Test Application.

Probing and Connection

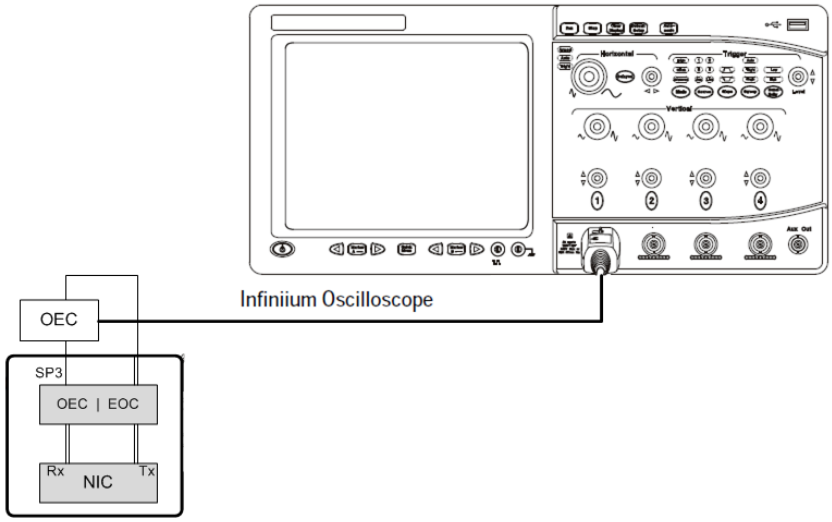


Figure 17 Probing for MOST150o SP3

You can use any of the oscilloscope channels as Pin Under Test (PUT) source channel. You can identify the channels used for each signal in the **Configuration** tab of the MOST Compliance Test Application. (The channel shown in the previous figure is just an example.)

Test Procedure

1. Start the automated test application as described in "Starting the MOST Compliance Test Application" on page 15.
2. Ensure that the MOST Device Under Test (DUT) is on and set up for MOST150 testing.
3. Connect the probes to the Pin Under Test (PUT) on the MOST DUT.
4. Connect the oscilloscope probes to the channel of the oscilloscope that you have set up in the **Configuration** tab.
5. In the MOST Test application, click the **Set Up** tab.
6. Select the MOST Spec that you plan to test.
7. Type in or select the **Device Identifier** as well as the **User Description** from the drop-down list. Enter your comments in the **Comments** text box.

8 Click the **Select Tests** tab and check the SP3 tests you want to run. Check the parent node or group to check all the available tests within the group.

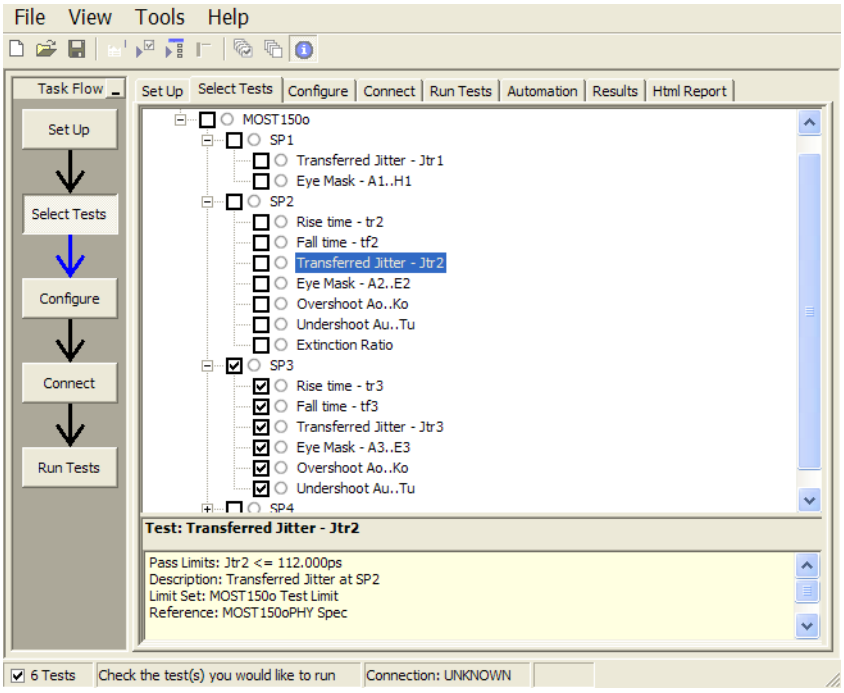


Figure 18 Selecting MOST150o SP3 Tests

- "Rise Time - tr3" on page 49
- "Fall Time - tf3" on page 50
- "Transferred Jitter - Jtr3" on page 50
- "Eye Mask - A3..E3" on page 50
- "Overshoot - Ao..Ko" on page 51
- "Undershoot - Au..Ku" on page 51

MOST150c SP3 Specification The MOST 150 oPHY specification does not specify electrical tests for SP3, these are information only tests.

Rise Time - tr3

The purpose of this test is to report the rise time value of the signal at SP3 (measured from 20%-80%).

PASS Condition Information only test.

Measurement Algorithm

1. Obtain sample or acquire signal data.
2. Measure the data rate and set the memory depth to capture 100 frames (3072 bits per frame).
3. Set up rise time measurement for 20% to 80% of the mean maximum and minimum voltage of the signal.
4. Perform rise time measurement on acquired signal.
5. Report value as information only.

Fall Time - tf3

The purpose of this test is to report the fall time value of the signal at SP3 (measured from 80% to 20%).

PASS Condition Information only test.

Measurement Algorithm

1. Obtain sample or acquire signal data.
2. Measure the data rate and set the memory depth to capture 100 frames (3072 bits per frame).
3. Set up fall time measurement for 80% to 20% of the mean maximum and minimum voltage of the signal.
4. Perform fall time measurement on acquired signal.
5. Report value as information only.

Transferred Jitter - Jtr3

The purpose of this test is to report the transferred jitter value of the signal at SP3.

PASS Condition Information only test.

Measurement Algorithm

1. Obtain sample or acquire signal data.
2. Measure the data rate and set the memory depth to capture 100 frames (3072 bits per frame).
3. Set up clock recovery to constant frequency with semi-automatic data rate set to measurement from step 2.
4. Set TIE Filter to bandpass with start frequency = 10 Hz and stop frequency = 200 kHz.
5. Perform TIE measurement on acquired signal.
6. Compare the standard deviation value with 112 ps.

Eye Mask - A3..E3

The purpose of this test is to report the eye of the signal at SP3.

PASS Condition Information only test.

Measurement Algorithm

1. Obtain sample or acquire signal data.
2. Measure the data rate and set the memory depth to capture 100 frames (3072 bits per frame).
3. Set up clock recovery to first order PLL. Nominal Data Rate = Value from step 2. Loop Bandwidth = 125 kHz.
4. Fold data and scale eye to fit one eye into the oscilloscope capture screen.
5. Compare the signal to the mask defined for SP2.

Overshoot - Ao..Ko

The purpose of this test is to report the overshoot of the signal at SP3.

PASS Condition Information only test.

Measurement Algorithm

1. Obtain sample or acquire signal data.
2. Measure the data rate and set the memory depth to capture 100 frames (3072 bits per frame).
3. Set up to trigger on the rising edge of the signal.
4. Scale rising edge triggered data to fit the overshoot mask to the screen and capture 100 acquisitions.
5. Compare the signal to the overshoot mask defined for SP2.

Undershoot - Au..Ku

The purpose ofthis test is to report the undershoot of the signal at SP3.

PASS Condition Information only test.

Measurement Algorithm

1. Obtain sample or acquire signal data.
2. Measure the data rate and set the memory depth to capture 100 frames (3072 bits per frame).
3. Set up to trigger on the rising edge of the signal.
4. Scale rising edge triggered data to fit the overshoot mask to the screen and capture 100 acquisitions.
5. Compare the signal to the undershoot mask defined for SP2.

MOST 150 oPHY SP4

This section provides the Methods of Implementation (MOIs) for the MOST 150o tests at test point SP4 using a Keysight Infiniium oscilloscope and the N6466A/N6466B MOST Compliance Test Application.

Probing and Connection

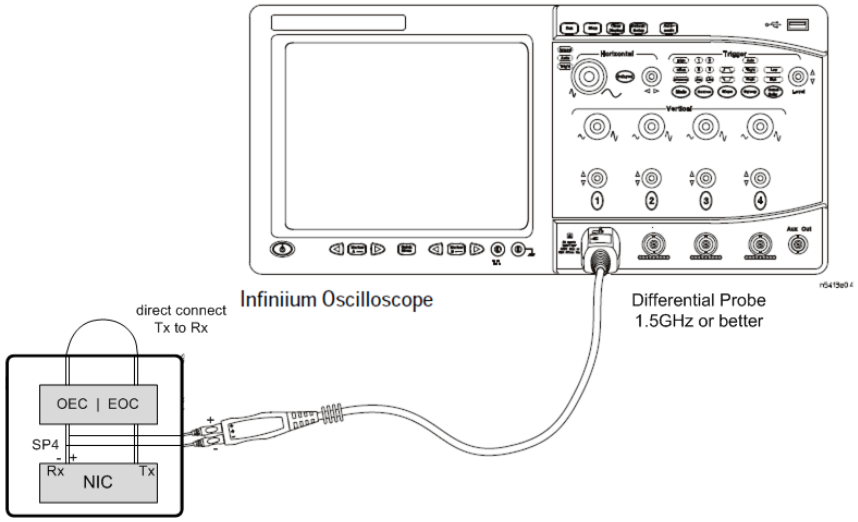


Figure 19 Probing for MOST150o SP4

You can use any of the oscilloscope channels as Pin Under Test (PUT) source channel. You can identify the channels used for each signal in the **Configuration** tab of the MOST Compliance Test Application. (The channel shown in the previous figure is just an example.)

Test Procedure

1. Start the automated test application as described in "Starting the MOST Compliance Test Application" on page 15.
2. Ensure that the MOST Device Under Test (DUT) is on and set up for MOST150 testing.
3. Connect the probes to the Pin Under Test (PUT) on the MOST DUT.
4. Connect the oscilloscope probes to the channel of the oscilloscope that you have set up in the **Configuration** tab.
5. In the MOST Test application, click the **Set Up** tab.
6. Select the MOST Spec that you plan to test.
7. Type in or select the **Device Identifier** as well as the **User Description** from the drop-down list. Enter your comments in the **Comments** text box.

8 Click the **Select Tests** tab and check the SP4 tests you want to run. Check the parent node or group to check all the available tests within the group.

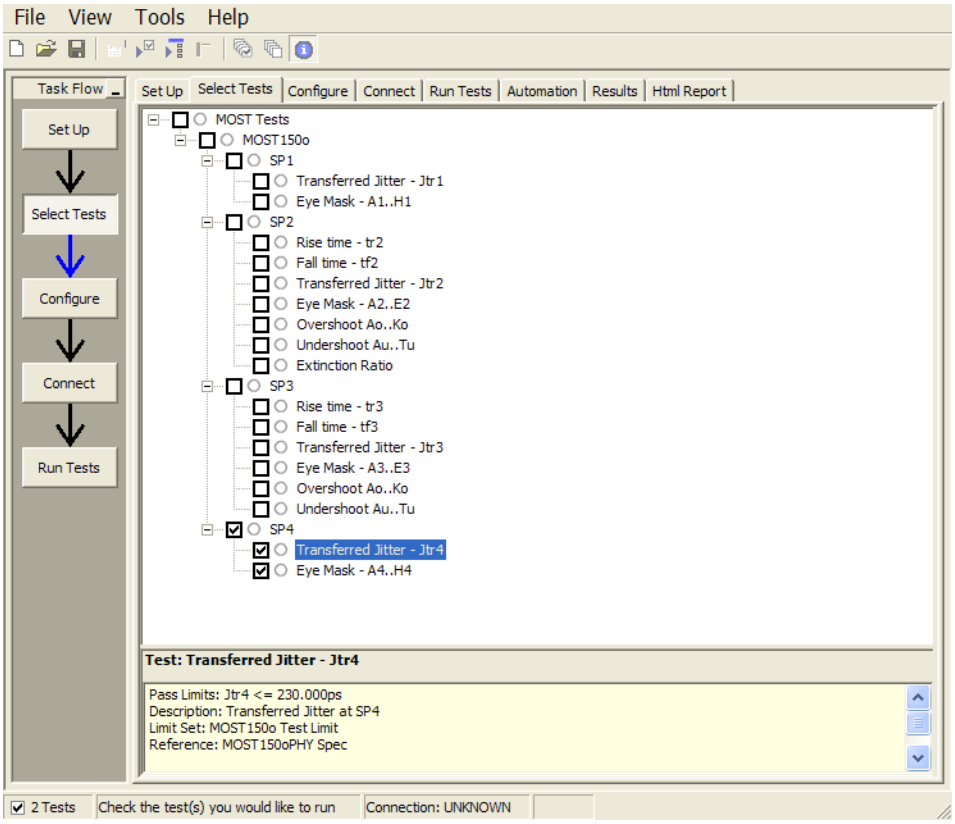


Figure 20 Selecting MOST150o SP4 Tests

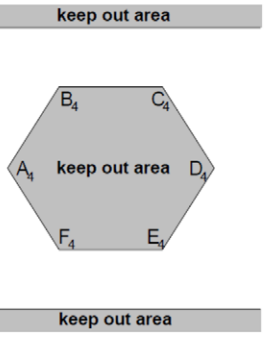
- "Transferred Jitter - Jtr4" on page 54
- "Eye Mask - A4..H4" on page 55

MOST150o SP4 Specification

The MOST 150 oPHY specification defines transferred jitter and eye mask for SP4.

Link Quality SP4	Symbol	Condition	Min.	Typ.	Max.	Unit
Transferred Jitter	Jtr_4	1)	-	-	230	ps RMS
Eye-Mask	A_4…H_4	2), 3), 4)	-	-	-	-

Parameter	Amplitude (mV)	Timing (UI)
A_4	0	0.275
B_4	148	0.425
C_4	148	0.575
D_4	0	0.725
E_4	-148	0.575
F_4	-148	0.425
G_4	636	-
H_4	-636	-



Notes:

1) Using the Jitter-Filter specified in section 5.2.
2) Using the Golden PLL specified in section 5.1.
3) The mask parameters include tolerances for overshoot and ringing.
4) The steady-state differential voltage must not be less than that specified in [3].

Transferred Jitter - Jtr4

The purpose of this test is to verify that the jitter that is transferred is below 230 ps RMS.

PASS Condition The standard deviation of the jitter is less than or equal to 230 ps.

Measurement Algorithm

1. Obtain sample or acquire signal data.
2. Measure the data rate and set the memory depth to capture 100 frames (3072 bits per frame).
3. Set up clock recovery to constant frequency with semi-automatic data rate set to measurement from step 2.
4. Set TIE Filter to bandpass with start frequency = 10 Hz and stop frequency = 200 kHz.
5. Perform TIE measurement on acquired signal.
6. Compare the standard deviation value with 230 ps.

Eye Mask - A4..H4

The purpose of this test is to verify that the signal at SP4 does not touch the "keep-out" zones of the mask.

PASS Condition The signal does not touch or go into the mask.

Measurement Algorithm

1. Obtain sample or acquire signal data.
2. Measure the data rate and set the memory depth to capture 100 frames (3072 bits per frame).
3. Set up clock recovery to first order PLL. Nominal Data Rate = Value from step 2. Loop Bandwidth = 125 kHz.
4. Fold data and scale eye to fit one eye into the oscilloscope capture screen.
5. Compare the signal to the mask defined for SP4.

5 MOST 50 Tests

MOST 50 SP1E / 58
MOST 50 SP2E / 61
MOST 50 SP3E / 64
MOST 50 SP4E / 67

MOST 50 SP1E

This section provides the Methods of Implementation (MOIs) for the MOST 50 tests at test point SP1E using a Keysight Infiniium oscilloscope and the N6466A/N6466B MOST Compliance Test Application.

Probing and Connection

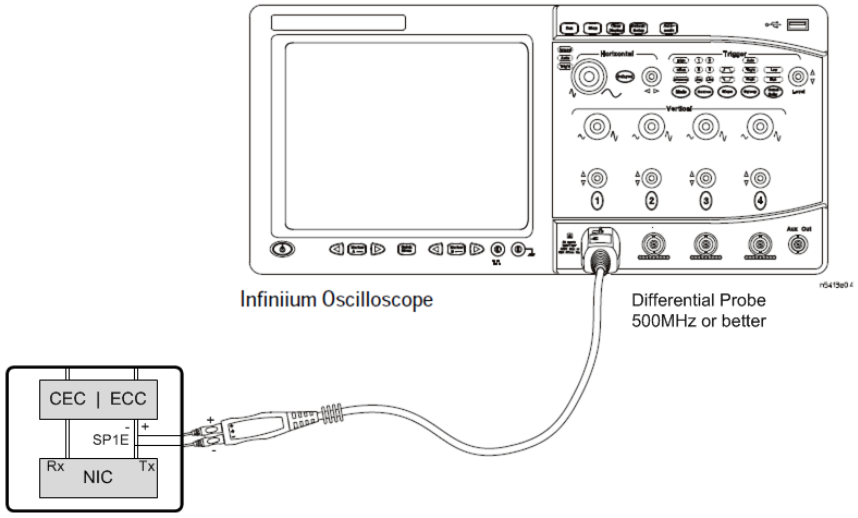


Figure 21 Probing for MOST50 at SP1E

You can use any of the oscilloscope channels as Pin Under Test (PUT) source channel. You can identify the channels used for each signal in the **Configuration** tab of the MOST Compliance Test Application. (The channel shown in the previous figure is just an example.)

Test Procedure

1. Start the automated test application as described in "Starting the MOST Compliance Test Application" on page 15.
2. Ensure that the MOST Device Under Test (DUT) is on and set up for MOST50 testing.
3. Connect the probes to the Pin Under Test (PUT) on the MOST DUT.
4. Connect the oscilloscope probes to the channel of the oscilloscope that you have set up in the **Configuration** tab.
5. In the MOST Test application, click the **Set Up** tab.
6. Select the MOST Spec that you plan to test.
7. Type in or select the **Device Identifier** as well as the **User Description** from the drop-down list. Enter your comments in the **Comments** text box.

8 Click the **Select Tests** tab and check the SP1E tests you want to run. Check the parent node or group to check all the available tests within the group.

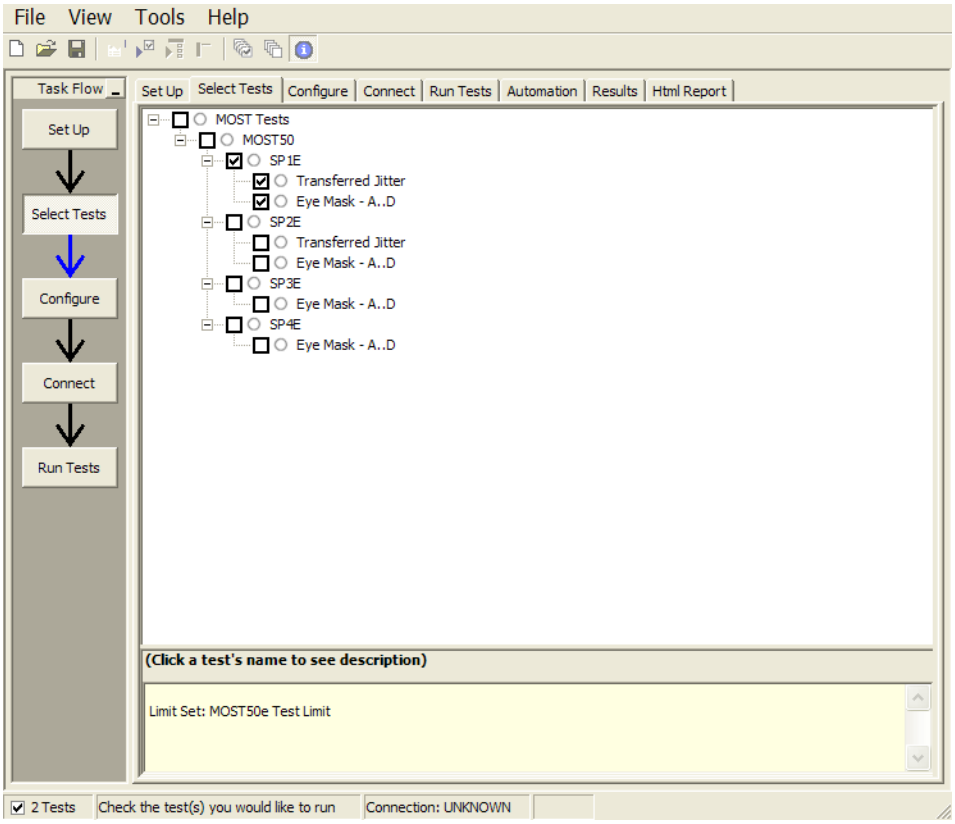


Figure 22 Selecting MOST50 SP1E Tests

- "Transferred Jitter" on page 60
- "Eye Mask - A..D" on page 60

MOST50 SP1E Specification

The MOST 50 ePHY specification defines transferred jitter (140 ps RMS max) and eye mask for SP1E.

Parameter	Voltage (V)	Time (%UI)
Point A	0.00	11.7
Point B	0.00	88.3
Point C	0.20	50.0
Point D	-0.20	50.0
Level 1	1.25	N/A
Level 2	-1.25	N/A

Transferred Jitter

The purpose of this test is to verify that the jitter that is transferred is below 140 ps RMS.

PASS Condition The standard deviation of the jitter is less than or equal to 140 ps.

Measurement Algorithm

1. Obtain sample or acquire signal data.
2. Measure the data rate and set the memory depth to capture 100 frames (3072 bits per frame).
3. Set up clock recovery to constant frequency with semi-automatic data rate set to measurement from step 2.
4. Set TIE Filter to bandpass with start frequency = 10 Hz and stop frequency = 200 kHz.
5. Perform TIE measurement on acquired signal.
6. Compare the standard deviation value with 140 ps.

Eye Mask - A..D

The purpose of this test is to verify that the signal at SP1E does not touch the "keep-out" zones of the mask.

PASS Condition The signal does not touch or go into the mask.

Measurement Algorithm

1. Obtain sample or acquire signal data.
2. Measure the data rate and set the memory depth to capture 100 frames (3072 bits per frame).
3. Set up clock recovery to first order PLL. Nominal Data Rate = Value from step 2. Loop Bandwidth = 125 kHz.
4. Fold data and scale eye to fit one eye into the oscilloscope capture screen.
5. Compare the signal to the mask defined for SP1E.

MOST 50 SP2E

This section provides the Methods of Implementation (MOIs) for the MOST 50 tests at test point SP2E using a Keysight Infiniium oscilloscope and the N6466A/N6466B MOST Compliance Test Application.

Probing and Connection

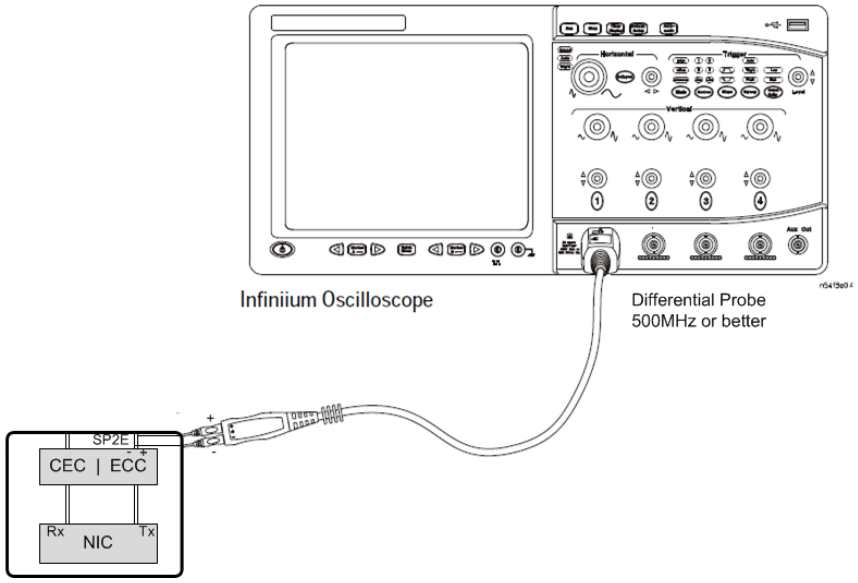


Figure 23 Probing for MOST50 at SP2E

You can use any of the oscilloscope channels as Pin Under Test (PUT) source channel. You can identify the channels used for each signal in the **Configuration** tab of the MOST Compliance Test Application. (The channel shown in the previous figure is just an example.)

Test Procedure

1. Start the automated test application as described in "Starting the MOST Compliance Test Application" on page 15.
2. Ensure that the MOST Device Under Test (DUT) is on and set up for MOST50 testing.
3. Connect the probes to the Pin Under Test (PUT) on the MOST DUT.
4. Connect the oscilloscope probes to the channel of the oscilloscope that you have set up in the **Configuration** tab.
5. In the MOST Test application, click the **Set Up** tab.
6. Select the MOST Spec that you plan to test.
7. Type in or select the **Device Identifier** as well as the **User Description** from the drop-down list. Enter your comments in the **Comments** text box.

8 Click the **Select Tests** tab and check the SP2E tests you want to run. Check the parent node or group to check all the available tests within the group.

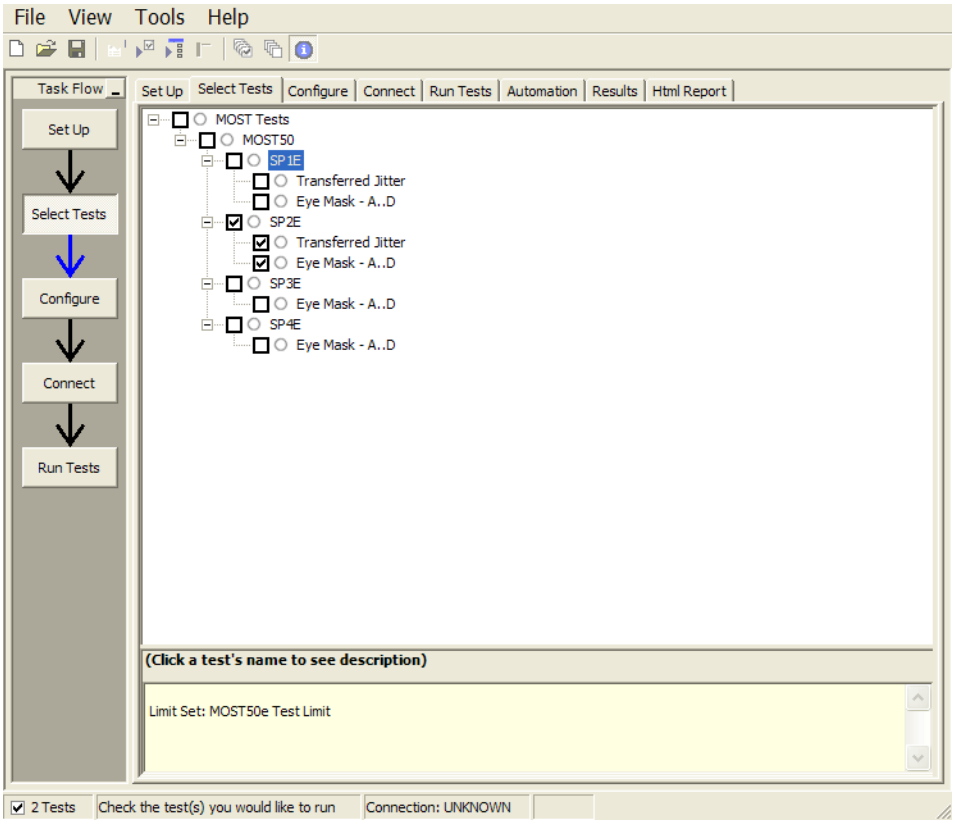


Figure 24 Selecting MOST50 SP2E Tests

- "Transferred Jitter" on page 63
- "Eye Mask - A..D" on page 63

MOST50 SP2E Specification

The MOST 50 ePHY specification defines transferred jitter (150 ps RMS max) and eye mask for SP2E.

Parameter	Voltage (V)	Time (%UI)
Point A	0.00	15.6
Point B	0.00	84.4
Point C	0.30	50.0
Point D	-0.30	50.0
Level 1	1.25	N/A
Level 2	-1.25	N/A

Transferred Jitter

The purpose of this test is to verify that the jitter that is transferred is below 150 ps RMS.

PASS Condition The standard deviation of the jitter is less than or equal to 150 ps.

Measurement Algorithm

1. Obtain sample or acquire signal data.
2. Measure the data rate and set the memory depth to capture 100 frames (3072 bits per frame).
3. Set up clock recovery to constant frequency with semi-automatic data rate set to measurement from step 2.
4. Set TIE Filter to bandpass with start frequency = 10 Hz and stop frequency = 200 kHz.
5. Perform TIE measurement on acquired signal.
6. Compare the standard deviation value with 150 ps.

Eye Mask - A..D

The purpose of this test is to verify that the signal at SP2E does not touch the "keep-out" zones of the mask.

PASS Condition The signal does not touch or go into the mask.

Measurement Algorithm

1. Obtain sample or acquire signal data.
2. Measure the data rate and set the memory depth to capture 100 frames (3072 bits per frame).
3. Set up clock recovery to first order PLL. Nominal Data Rate = Value from step 2. Loop Bandwidth = 125 kHz.
4. Fold data and scale eye to fit one eye into the oscilloscope capture screen.
5. Compare the signal to the mask defined for SP2E.

MOST 50 SP3E

This section provides the Methods of Implementation (MOIs) for the MOST 50 tests at test point SP3E using a Keysight Infiniium oscilloscope and the N6466A/N6466B MOST Compliance Test Application.

Probing and Connection

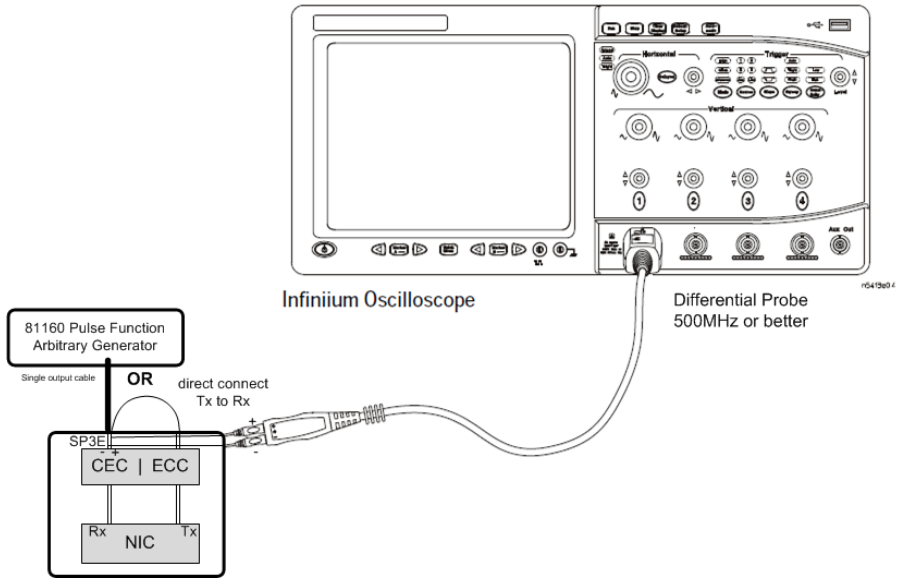


Figure 25 Probing for MOST50 at SP3E

You can use any of the oscilloscope channels as Pin Under Test (PUT) source channel. You can identify the channels used for each signal in the **Configuration** tab of the MOST Compliance Test Application. (The channel shown in the previous figure is just an example.)

Test Procedure

1. Start the automated test application as described in "Starting the MOST Compliance Test Application" on page 15.
2. Ensure that the MOST Device Under Test (DUT) is on and set up for MOST50 testing.
3. Connect the probes to the Pin Under Test (PUT) on the MOST DUT.
4. Connect the oscilloscope probes to the channel of the oscilloscope that you have set up in the **Configuration** tab.
5. In the MOST Test application, click the **Set Up** tab.
6. Select the MOST Spec that you plan to test.
7. Type in or select the **Device Identifier** as well as the **User Description** from the drop-down list. Enter your comments in the **Comments** text box.

8 Click the **Select Tests** tab and check the SP3E tests you want to run. Check the parent node or group to check all the available tests within the group.

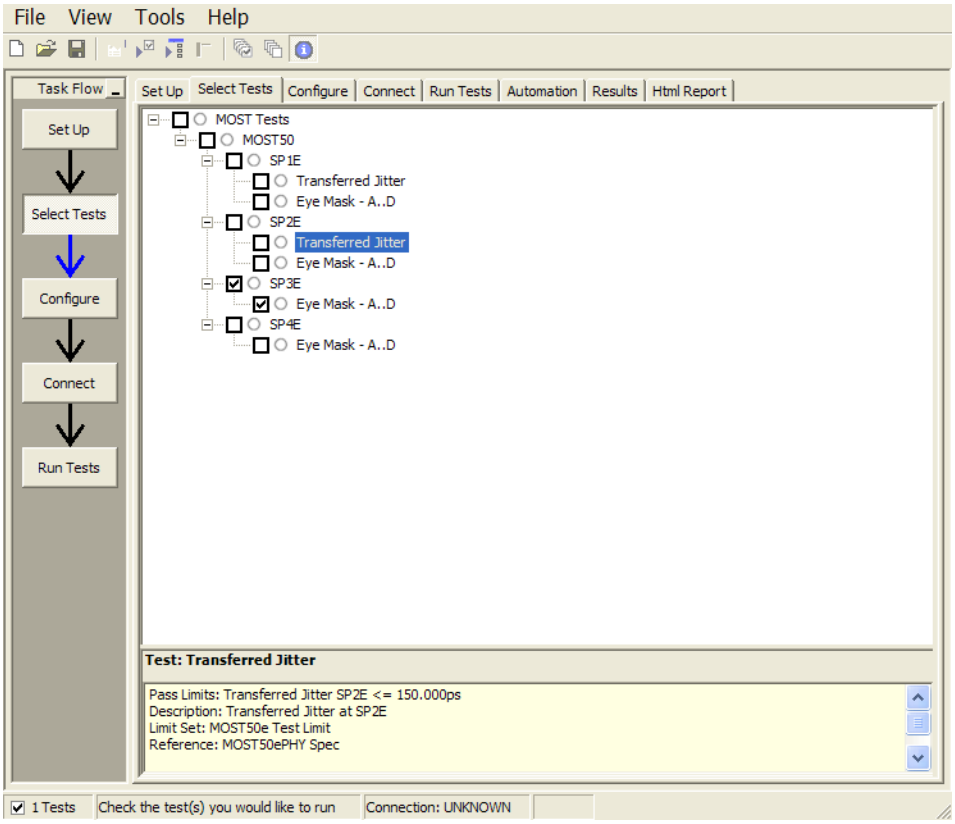


Figure 26 Selecting MOST50 SP3E Tests

- "Eye Mask - A..D" on page 65

MOST50 SP3E Specification

The MOST 50 ePHY specification defines eye mask for SP3E.

Parameter	Voltage (V)	Time (%UI)
Point A	0	23.5
Point B	0	76.5
Point C	0.15	50
Point D	-0.15	50
Level 1	1.25	N/A
Level 2	-1.25	N/A

Eye Mask - A..D

The purpose of this test is to verify that the signal at SP3E does not touch the "keep-out" zones of the mask.

PASS Condition The signal does not touch or go into the mask.

Measurement Algorithm

1. Obtain sample or acquire signal data.
2. Measure the data rate and set the memory depth to capture 100 frames (3072 bits per frame).
3. Set up clock recovery to first order PLL. Nominal Data Rate = Value from step 2. Loop Bandwidth = 125 kHz.
4. Fold data and scale eye to fit one eye into the oscilloscope capture screen.
5. Compare the signal to the mask defined for SP3E.

MOST 50 SP4E

This section provides the Methods of Implementation (MOIs) for the MOST 50 tests at test point SP4E using a Keysight Infiniium oscilloscope and the N6466A/N6466B MOST Compliance Test Application.

Probing and Connection

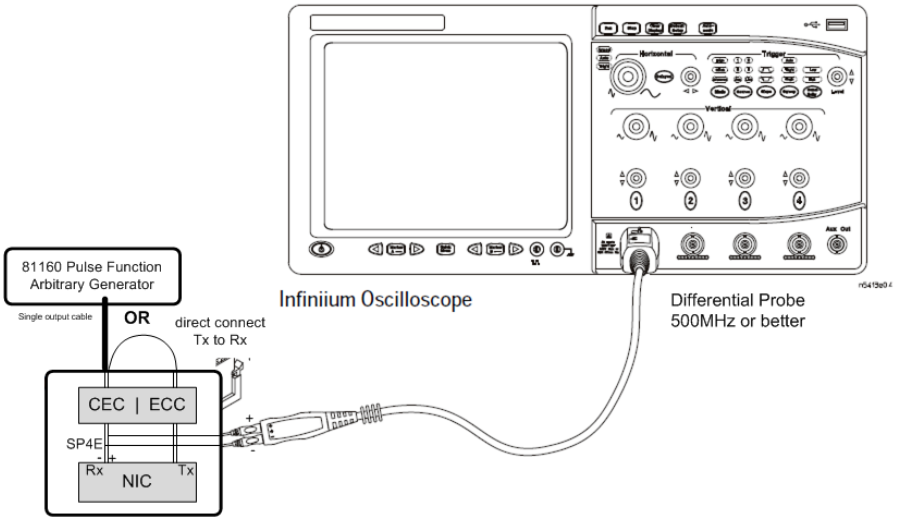


Figure 27 Probing for MOST50 at SP4E

You can use any of the oscilloscope channels as Pin Under Test (PUT) source channel. You can identify the channels used for each signal in the **Configuration** tab of the MOST Compliance Test Application. (The channel shown in the previous figure is just an example.)

Test Procedure

1. Start the automated test application as described in "Starting the MOST Compliance Test Application" on page 15.
2. Ensure that the MOST Device Under Test (DUT) is on and set up for MOST50 testing.
3. Connect the probes to the Pin Under Test (PUT) on the MOST DUT.
4. Connect the oscilloscope probes to the channel of the oscilloscope that you have set up in the **Configuration** tab.
5. In the MOST Test application, click the **Set Up** tab.
6. Select the MOST Spec that you plan to test.
7. Type in or select the **Device Identifier** as well as the **User Description** from the drop-down list. Enter your comments in the **Comments** text box.

8 Click the **Select Tests** tab and check the SP4E tests you want to run. Check the parent node or group to check all the available tests within the group.

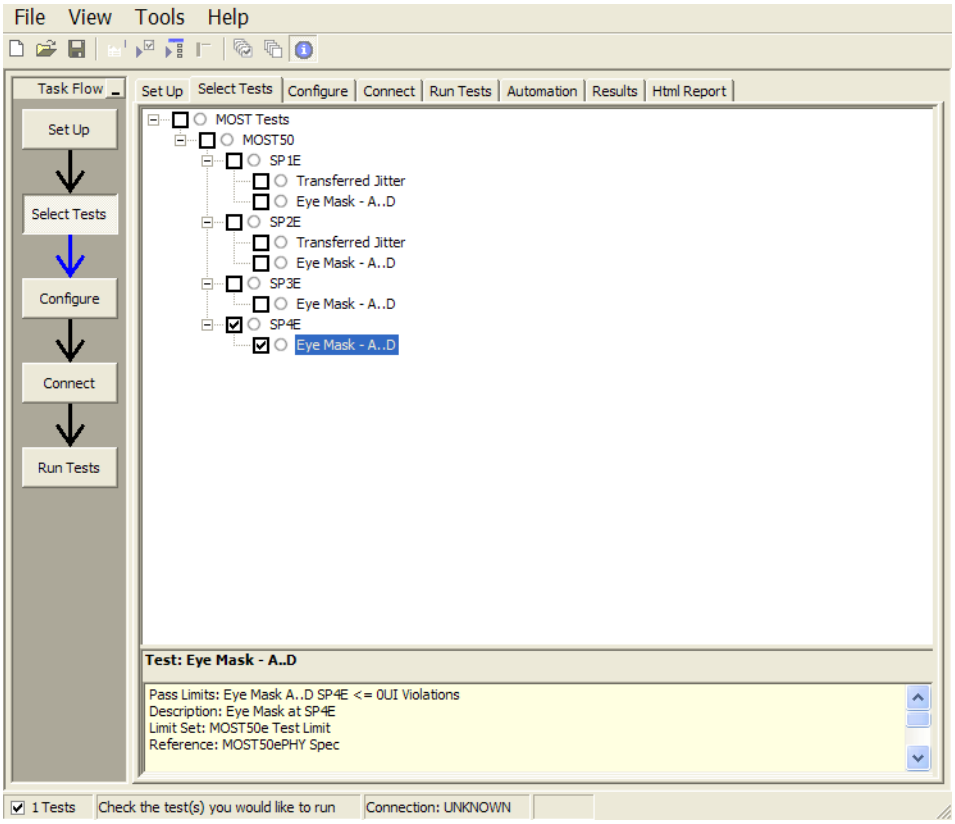


Figure 28 Selecting MOST50 SP4E Tests

- "Eye Mask - A..D" on page 68

MOST50 SP4E Specification

The MOST 50 ePHY specification defines eye mask for SP4E.

Eye Mask - A..D

The purpose of this test is to verify that the signal at SP4E does not touch the "keep-out" zones of the mask.

PASS Condition

The signal does not touch or go into the mask.

Measurement Algorithm

1 Obtain sample or acquire signal data.

2 Measure the data rate and set the memory depth to capture 100 frames (3072 bits per frame).

3 Set up clock recovery to first order PLL. Nominal Data Rate = Value from step 2. Loop Bandwidth = 125 kHz.

4 Fold data and scale eye to fit one eye into the oscilloscope capture screen.

5 Compare the signal to the mask defined for SP4E.

A Calibrating the Infiniium Oscilloscope and Probe

Oscilloscope Internal Calibration / 72
Probe Calibration / 77

This section describes the Keysight Infiniium digital storage oscilloscope calibration procedures.

Oscilloscope Internal Calibration

This will perform an internal diagnostic and calibration cycle for the oscilloscope. For the Keysight oscilloscope, this is referred to as Calibration.

Required Equipment for Oscilloscope Calibration

To calibrate the Infiniium oscilloscope in preparation for running the MOST automated tests, you need the following equipment:

- Keyboard, qty = 1, (provided with the Keysight Infiniium oscilloscope).
- Mouse, qty = 1, (provided with the Keysight Infiniium oscilloscope).
- Precision 3.5 mm BNC to SMA male adapter, Keysight p/n 54855-67604, qty = 2 (provided with the Keysight Infiniium oscilloscope).
- Calibration cable (provided with Keysight Infiniium oscilloscopes). Use a good quality 50 Ω BNC cable.
- BNC shorting cap.

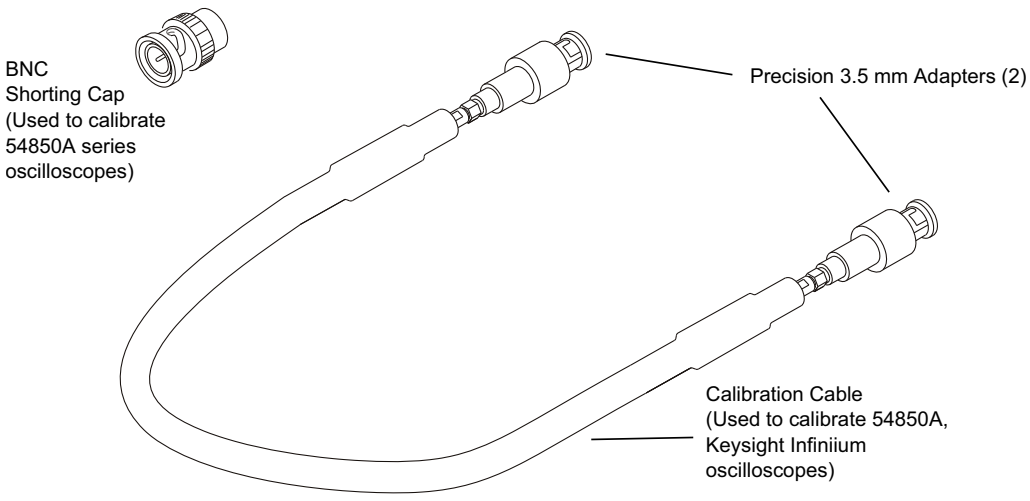


Figure 29 Accessories Provided with the Keysight Infiniium Oscilloscope

Running the Oscilloscope Internal Calibration

This Calibration will take about 20 minutes. Perform the following steps:

1. Set up the oscilloscope with the following steps:
   - **a** Connect the keyboard, mouse, and power cord to the rear of the oscilloscope.
   - **b** Plug in the power cord.
   - **c** Turn on the oscilloscope by pressing the power button located on the lower left of the front panel.
   - **d** Allow the oscilloscope to warm up at least 30 minutes prior to starting the calibration procedure in step 3 below.
2. Locate and prepare the accessories that will be required for the internal calibration:
   - **a** Locate the BNC shorting cap.
   - **b** Locate the calibration cable.
   - **c** Locate the two Keysight precision SMA/BNC adapters.
   - **d** Attach one SMA adapter to the other end of the calibration cable – hand tighten snugly.
   - **e** Attach another SMA adapter to the other end of the calibration cable – hand tighten snugly.

3 Referring to the following figure, perform the following steps:

a Click the **Utilities > Calibration...** menu to open the Calibration dialog box.

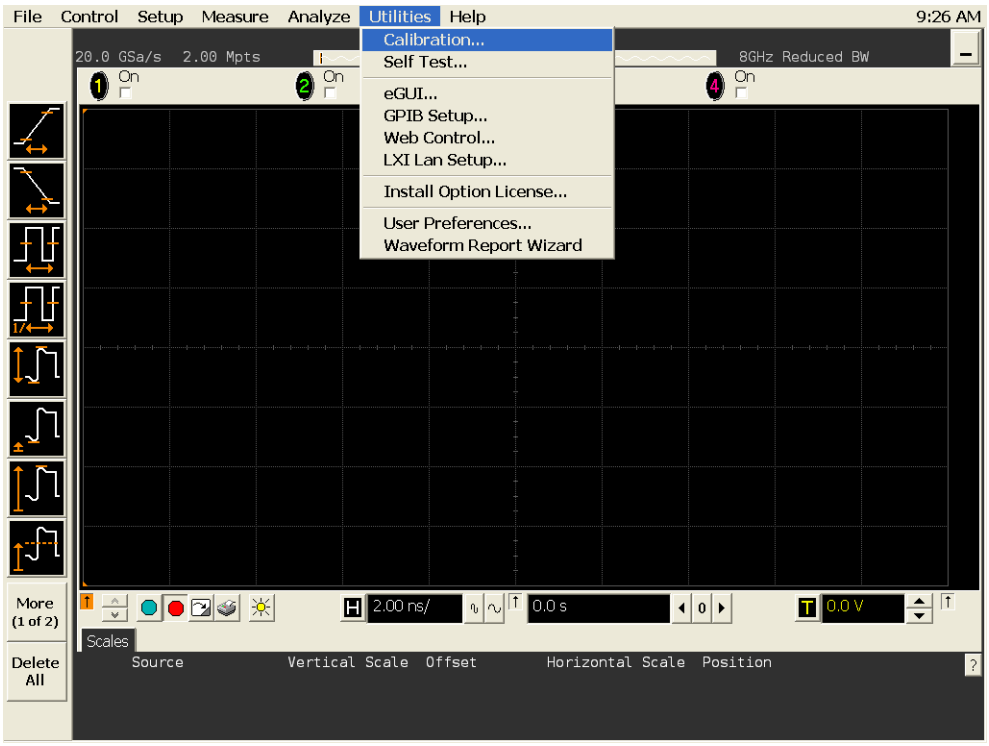


Figure 30 Accessing the Calibration Menu

4 Referring to the following figure, perform the following steps to start the calibration:

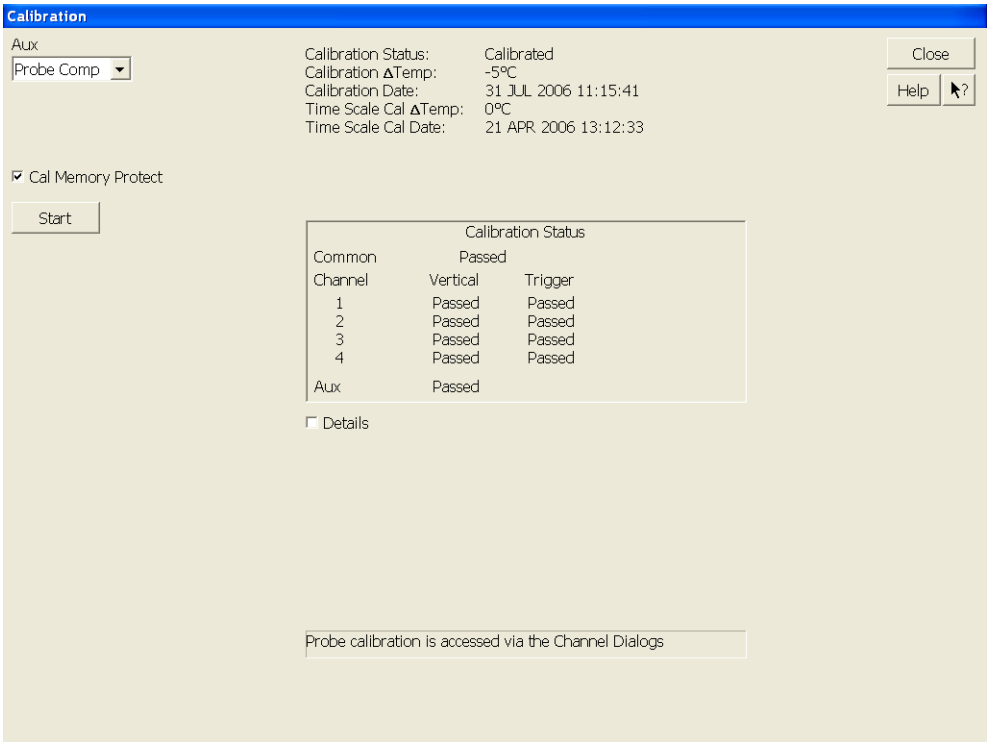


Figure 31 Oscilloscope Calibration Window

a Uncheck the **Cal Memory Protect** checkbox.

b Click the **Start** button to begin the calibration.

c During the calibration of channel 1, if you are prompted to perform a **Time Scale Calibration**, as shown in the following figure, click the **Std+Dflt** button to continue the calibration, using the Factory default calibration factors.

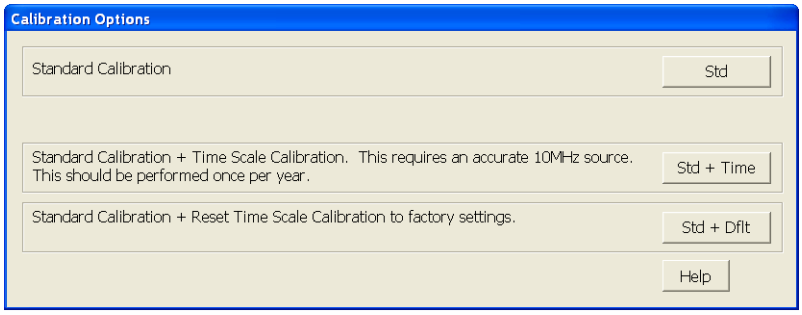


Figure 32 Time Scale Calibration Dialog Box

d When the calibration procedure is complete, you will be prompted with a Calibration Complete message window. Click the **OK** button to close this window.

e Confirm that the Vertical and Trigger Calibration Status for all Channels passed.

f Click the **Close** button to close the calibration window.

g The internal calibration is completed.

NOTE These steps do not need to be performed every time a test is run. However, if the ambient temperature changes more than 5 degrees Celsius from the calibration temperature, this calibration should be performed again. The delta between the calibration temperature and the present operating temperature is shown in the **Utilities > Calibration...** menu.

Probe Calibration

Before performing MOST tests, you should calibrate the probes. Calibration of the solder-in probe heads consist of a vertical calibration and a skew calibration. The vertical calibration should be performed before the skew calibration. Both calibrations should be performed for best probe measurement performance.

Required Equipment for Probe Calibration

The calibration procedure requires the following parts.

- BNC (male) to SMA (male) adapter.
- Deskew fixture.
- 50 Ω SMA terminator.

Connecting the Probe for Calibration

For the following procedure, refer to the following figure.

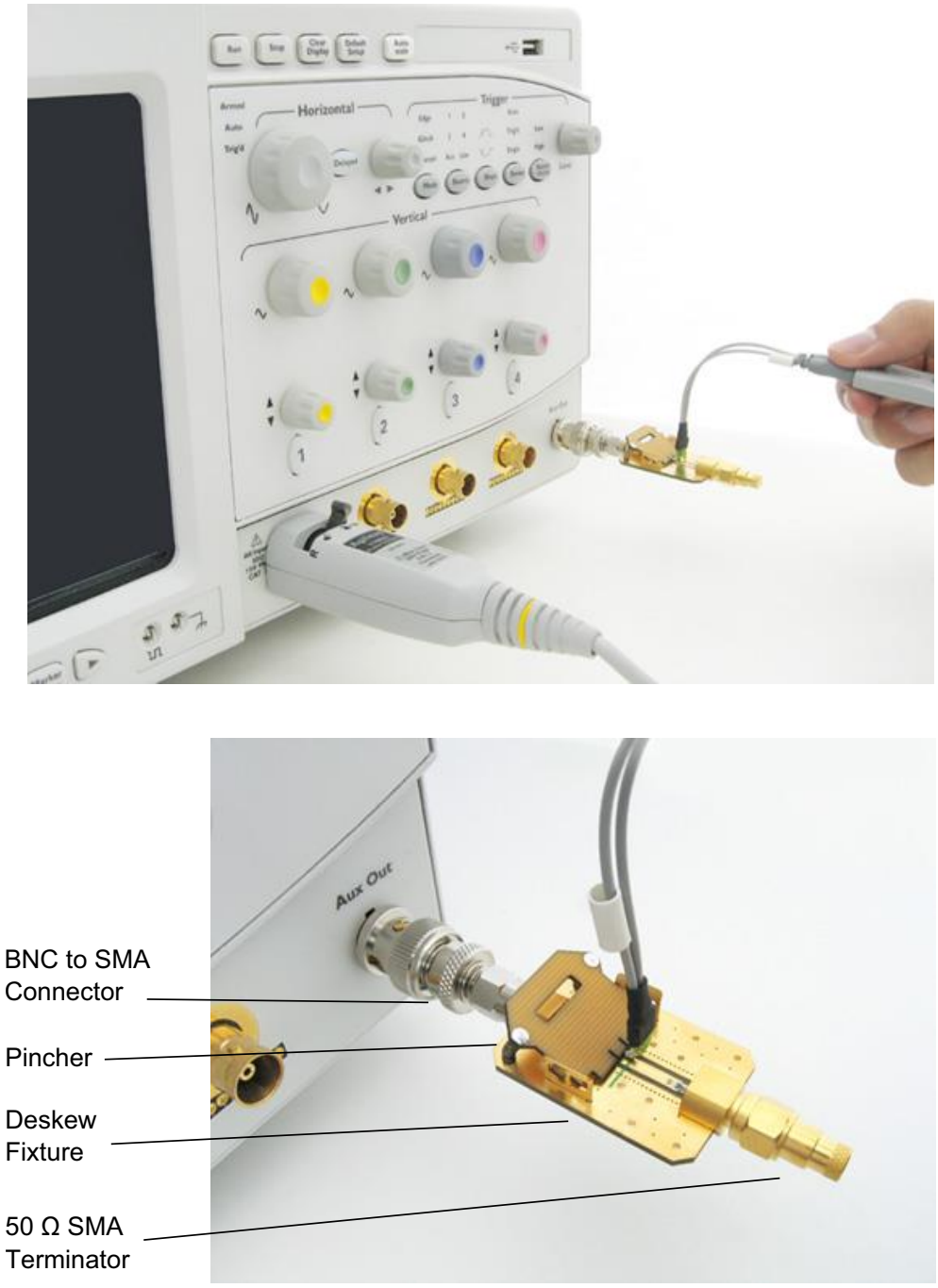


Figure 33 Solder-in Probe Head Calibration Connection Example

1 Connect BNC (male) to SMA (male) adapter to the deskew fixture on the connector closest to the yellow pincher.

2 Connect the 50 Ω SMA terminator to the connector farthest from yellow pincher.

3 Connect the BNC side of the deskew fixture to the Aux Out BNC of the Infiniium oscilloscope.

4 Connect the probe to an oscilloscope channel.

5 To minimize the wear and tear on the probe head, it should be placed on a support to relieve the strain on the probe head cables.

6 Push down the back side of the yellow pincher. Insert the probe head resistor lead underneath the center of the yellow pincher and over the center conductor of the deskew fixture. The negative probe head resistor lead or ground lead must be underneath the yellow pincher and over one of the outside copper conductors (ground) of the deskew fixture. Make sure that the probe head is approximately perpendicular to the deskew fixture.

7 Release the yellow pincher.

Verifying the Connection

1 On the Infiniium oscilloscope, press the **[Auto Scale]** key on the front panel.

2 Set the volts per division to **100 mV/div**.

3 Set the horizontal scale to **1.00 ns/div**.

4 Set the horizontal position to approximately **3 ns**. You should see a waveform similar to that in the following figure.

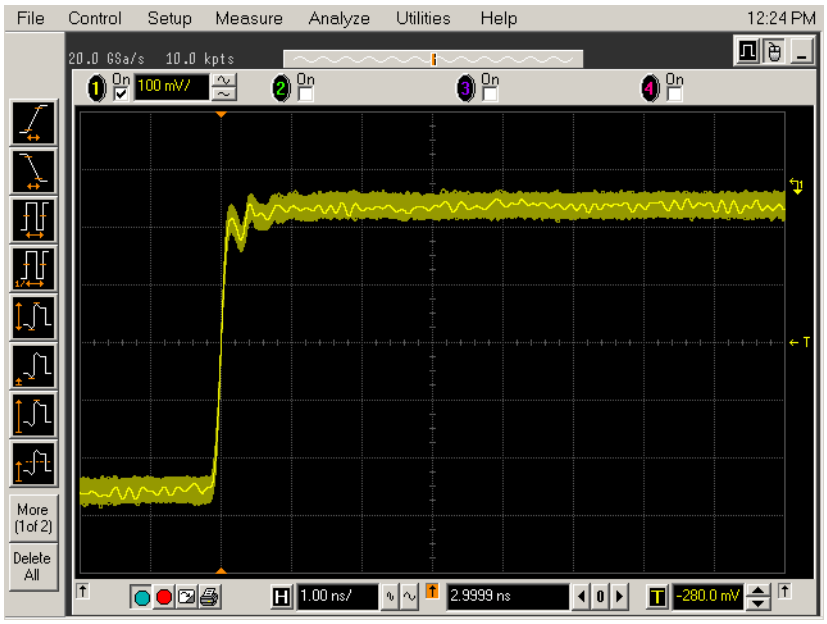


Figure 34 Good Connection Waveform Example

If you see a waveform similar to that of the following figure, then you have a bad connection and should check all of your probe connections.

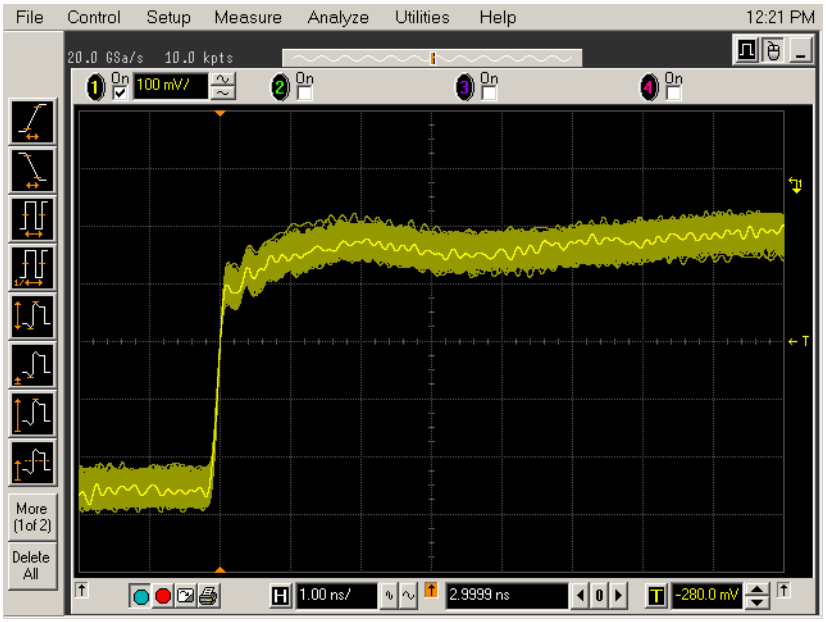


Figure 35 Bad Connection Waveform Example

Running the Probe Calibration and Deskew

1 On the Infiniium oscilloscope in the **Setup** menu, select the channel connected to the probe, as shown in the following figure.

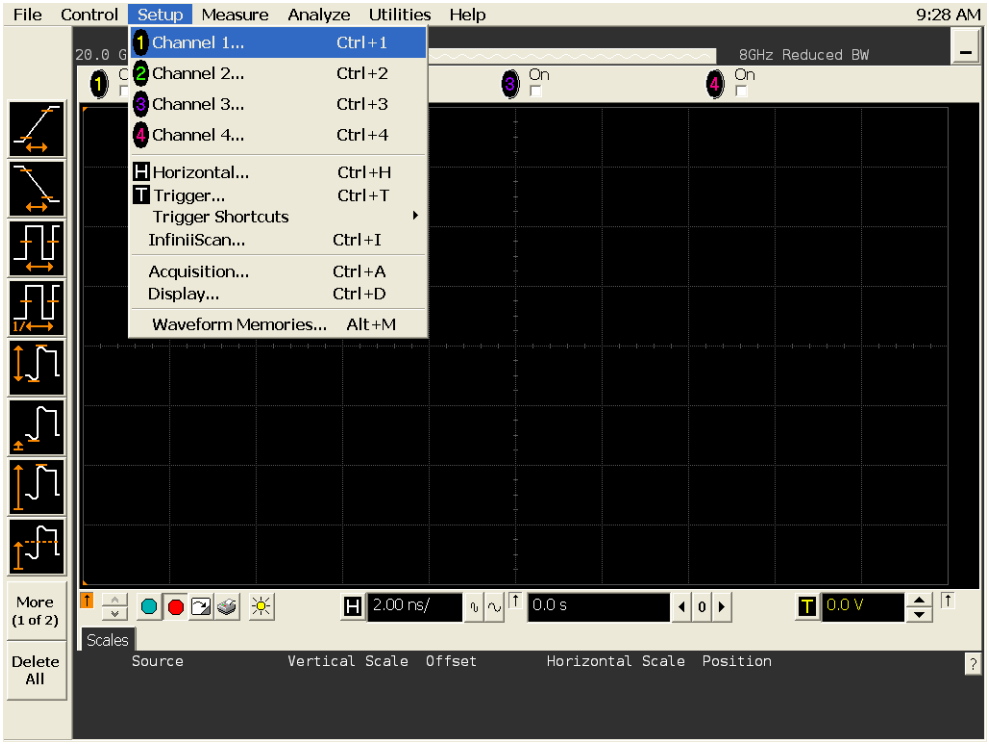


Figure 36 Channel Setup Window

2 In the Channel Setup dialog box, select the **Probes...** button, as shown in the following figure.

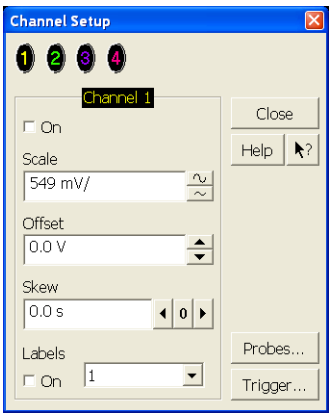


Figure 37 Channel Dialog Box

3 In the Probe Setup dialog box, select the **Calibrate Probe...** button.

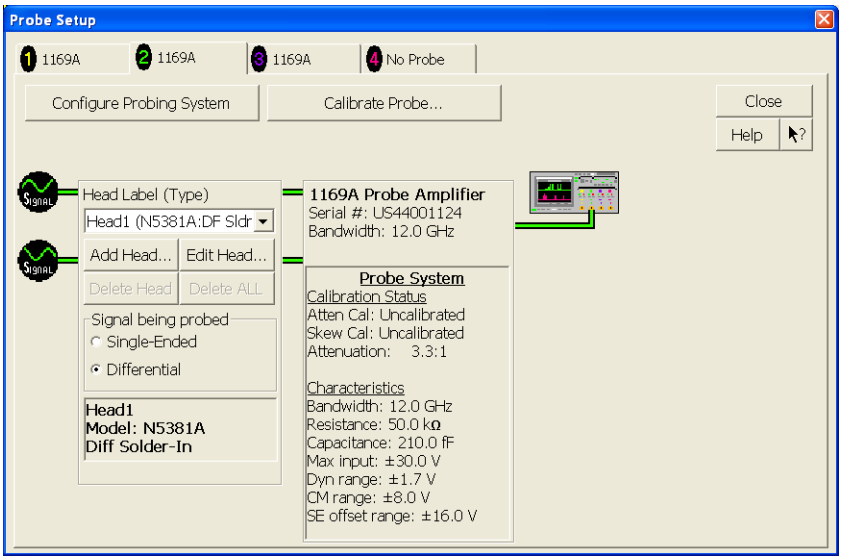


Figure 38 Probe Setup Window

4 In the Probe Calibration dialog box, select the **Calibrated Atten/Offset** radio button.

5 Select the **Start Atten/Offset Calibration...** button and follow the on-screen instructions for the vertical calibration procedure.

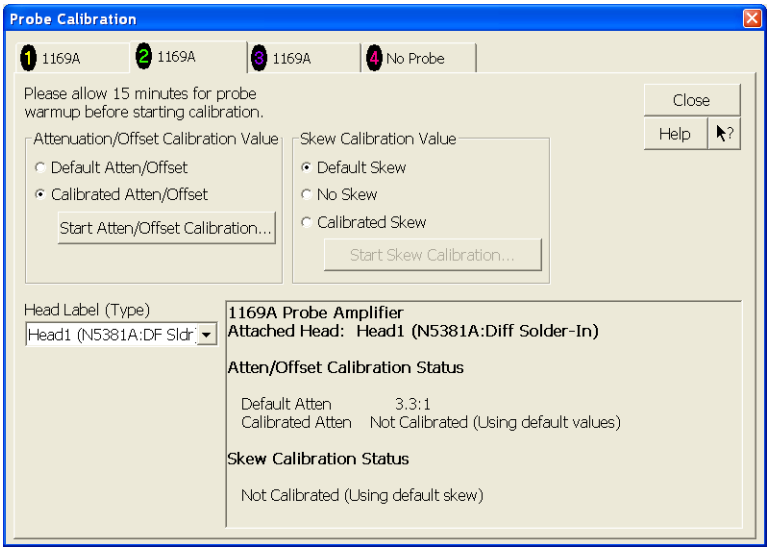


Figure 39 Probe Calibration Window

6 Once the vertical calibration has successfully completed, select the **Calibrated Skew...** button.

7 Select the **Start Skew Calibration...** button and follow the on-screen instructions for the skew calibration.

At the end of each calibration, the oscilloscope will prompt you if the calibration was or was not successful.

Verifying the Probe Calibration

If you have successfully calibrated the probe, it is not necessary to perform this verification. However, if you want to verify that the probe was properly calibrated, the following procedure will help you verify the calibration.

The calibration procedure requires the following parts:

- BNC (male) to SMA (male) adapter.
- SMA (male) to BNC (female) adapter.
- BNC (male) to BNC (male) 12 inch cable such as the Keysight 8120-1838.
- Keysight 54855-61620 calibration cable (Infiniium oscilloscopes with bandwidths of 6 GHz and greater only).
- Keysight 54855-67604 precision 3.5 mm adapters (Infiniium oscilloscopes with bandwidths of 6 GHz and greater only).
- Deskew fixture.

For the following procedure, refer to the following figure.

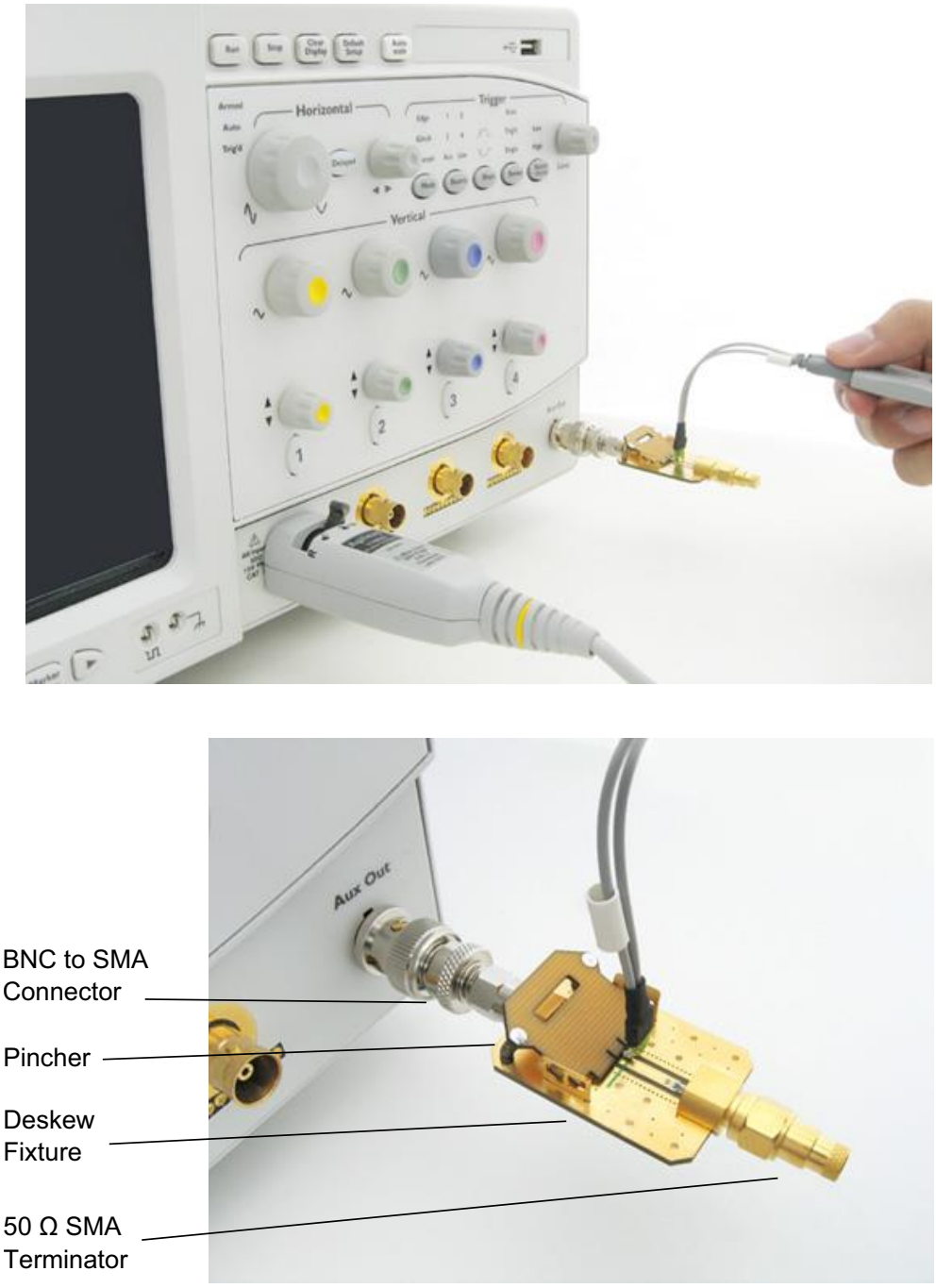


Figure 40 Probe Calibration Verification Connection Example

1 Connect BNC (male) to SMA (male) adapter to the deskew fixture on the connector closest to the yellow pincher.

2 Connect the SMA (male) to BNC (female) to the connector farthest from the yellow pincher.

3 Connect the BNC (male) to BNC (male) cable to the BNC connector on the deskew fixture to one of the unused oscilloscope channels. For infiniium oscilloscopes with bandwidths of 6 GHz and greater, use the 54855-61620 calibration cable and the two 54855-64604 precision 3.5 mm adapters.

4 Connect the BNC side of the deskew fixture to the Aux Out BNC of the Infiniium oscilloscope.

5 Connect the probe to an oscilloscope channel.

6 To minimize the wear and tear on the probe head, it should be placed on a support to relieve the strain on the probe head cables.

7 Push down on the back side of the yellow pincher. Insert the probe head resistor lead underneath the center of the yellow pincher and over the center conductor of the deskew fixture. The negative probe head resistor lead or ground lead must be underneath the yellow pincher and over one of the outside copper conductors (ground) of the deskew fixture. Make sure that the probe head is approximately perpendicular to the deskew fixture.

8 Release the yellow pincher.

9 On the oscilloscope, press the autoscale button on the front panel.

10 Select Setup menu and choose the channel connected to the BNC cable from the pull-down menu.

11 Select the **Probes...** button.

12 Select the **Configure Probe System** button.

13 Select **User Defined Probe** from the pull-down menu.

14 Select the **Calibrate Probe...** button.

15 Select the **Calibrated Skew** radio button.

16 Once the skew calibration is completed, close all dialog boxes.

17 Select the **Start Skew Calibration...** button and follow the on-screen instructions.

18 Set the vertical scale for the displayed channels to **100 mV/div**.

19 Set the horizontal range to **1.00 ns/div**.

20 Set the horizontal position to approximately **3 ns**.

21 Change the vertical position knobs of both channels until the waveforms overlap each other.

22 Select the Setup menu choose **Acquisition...** from the pull-down menu.

23 In the Acquisition Setup dialog box enable averaging. When you close the dialog box, you should see waveforms similar to that in the following figure.

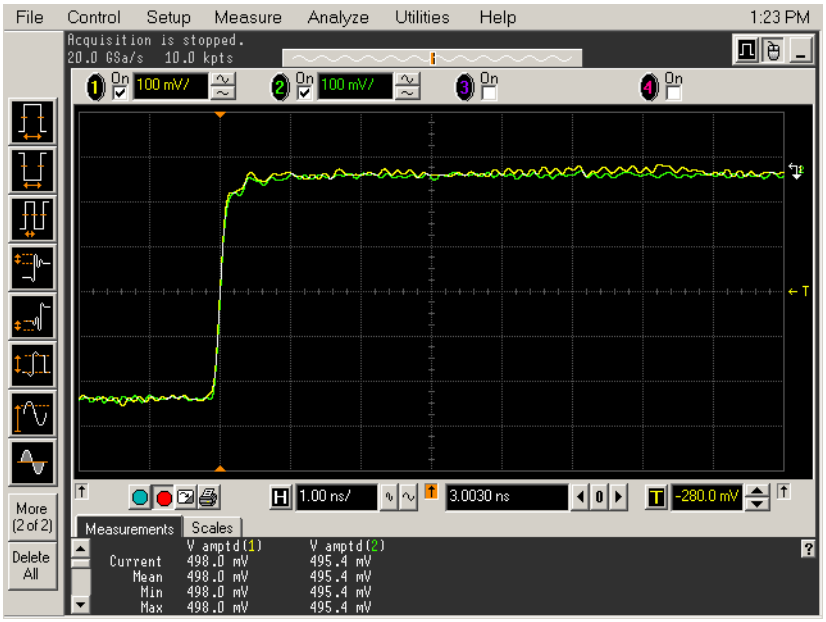


Figure 41 Calibration Probe Waveform Example

NOTE

Each probe is calibrated with the oscilloscope channel to which it is connected. Do not switch probes between channels or other oscilloscopes, or it will be necessary to calibrate them again. It is recommended that the probes be labeled with the channel on which they were calibrated.

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