



RIGOL

USB 2.0 Signal Compliance Analysis Fixture

User Guide
May.2022



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1 Document Overview

This manual provides the layout and application of four fixtures. These fixtures are used for the USB 2.0 signal quality compliance analysis test.

Four types of fixtures are as follows:

- HS Device Electrical Test Fixture
- HS Device SQ Test Fixture
- HS Host SQ Fixture
- USB-A HS Host SQ Fixture

Application Scenarios for the Fixture:

- High-speed device signal quality compliance test
- High-speed host signal quality compliance test
- Hub upstream high-speed signal quality compliance test
- Hub downstream high-speed signal quality compliance test



TIP


For the latest version of this manual, download it from the official website of RIGOL (<http://www.rigol.com>).

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Format Conventions in this Manual


1. Key


The front panel key is denoted by the menu key icon. For example,  indicates the "Default" key.

2. Menu

The menu item is denoted by the format of "Menu Name (Bold) + Character Shading" in the manual. For example, **DUT** indicates clicking or tapping the "DUT" tab in the current operation interface to enter the basic setting of the DUT.

3. Operation Procedures

The next step of the operation is denoted by ">" in the manual. For example, 

> **Test Selection** indicates that first clicking or tapping the icon , then clicking or tapping **Test Selection**.

2 Fixture Layout

2.1 HS Device Electrical Test Fixture

The layout of the HS Device Electrical Test Fixture is shown in the figure below:

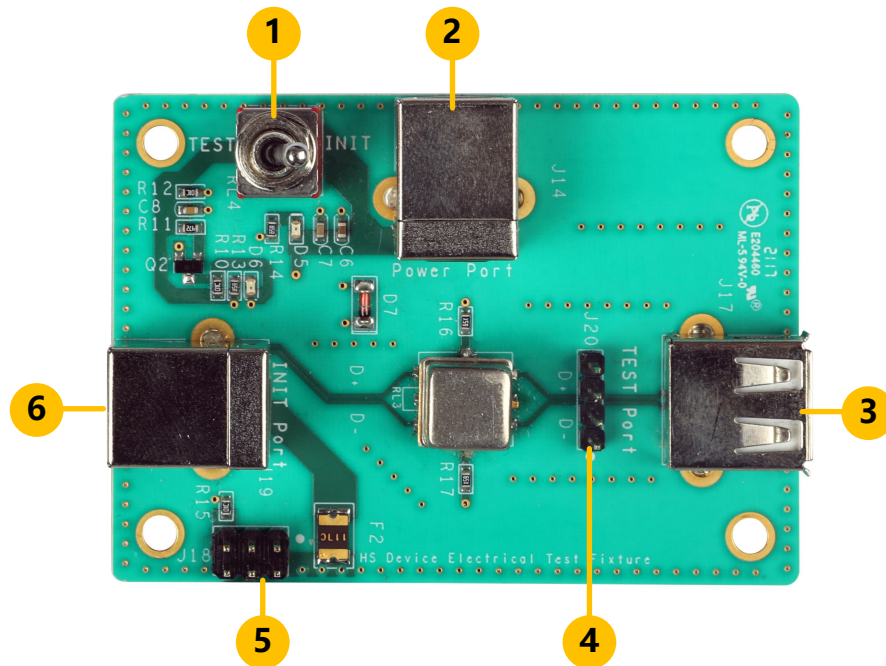


Table 2.1 Description of HS Device Electrical Test Fixture Layout

No.	Description
1	Test switch, used to switch the "Device Initialization" switch to "TEST" or "INIT" position.
2	USB-B(F) connector, used to connect the power source
3	USB-A(F) connector, used to connect the device
4	1x4-pin (golden) connector. The two pin connectors in the middle are used to connect the differential probe; the other two at both sides are for ground connection.
5	2x3-pin (golden) connector. Pin 4/6 provides 5 V power source to the device; Pin 5 provides 5 V power source to the USB-B power source connector. A jumper cap is required to connect Pin 5 and Pin 6.

No.	Description
6	USB-B (F) connector, used to connect the instrument installed with USB test software (XHCI-HSETT)

2.2 HS Device SQ Test Fixture

The layout of the HS Device SQ Test Fixture is shown in the figure below:

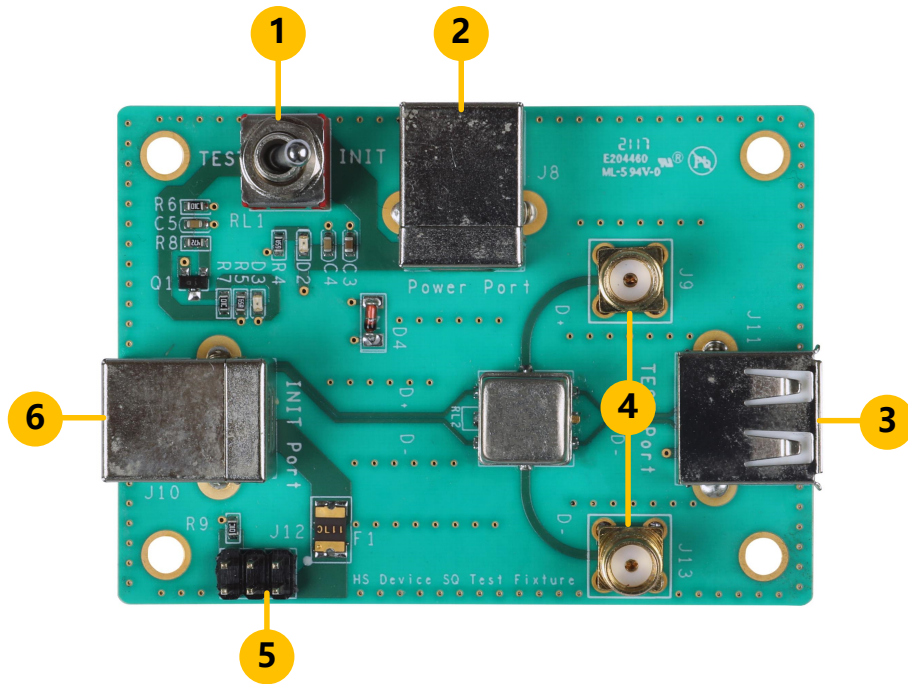


Table 2.2 Description of HS Device SQ Test Fixture Layout

No.	Description
1	Test switch, used to switch the "Device Initialization" switch to "TEST" or "INIT" position.
2	USB-B(F) connector, used to connect the power source
3	USB-A(F) connector, used to connect the device
4	SMA connector
5	2x3-pin (golden) connector. Pin 4/6 provides 5 V power source to the device; Pin 5 provides 5 V power source to the USB-B power source connector. A jumper cap is required to connect Pin 5 and Pin 6.
6	USB-B (F) connector, used to connect the instrument installed with USB test software (XHCI-HSETT)

2.3 HS Host SQ Fixture

The layout of the HS Host SQ Fixture is shown in the figure below:

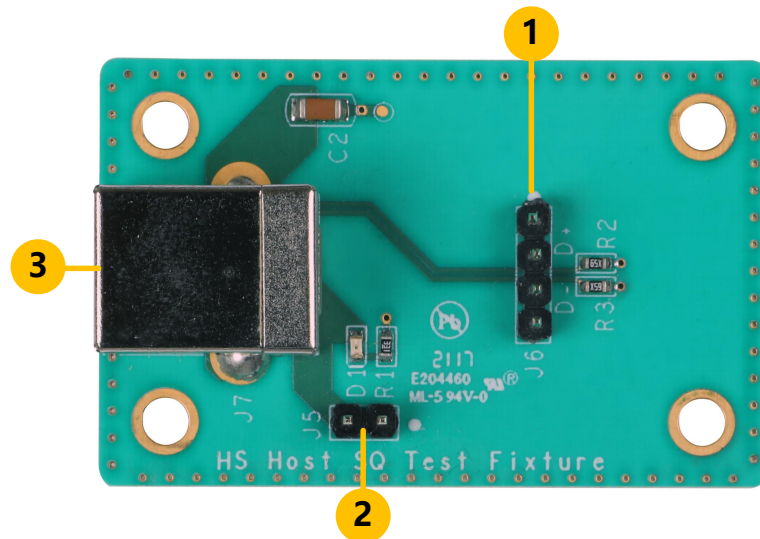


Table 2.3 Description of HS Host SQ Fixture Layout

No.	Description
1	1x4-pin (golden) connector. The two pin connectors in the middle are used to connect the differential probe; the other two at both sides are for ground connection.
2	1x2-pin (golden) connector (voltage test point)
3	USB-B (F) connector, used to connect the instrument installed with USB test software (XHCI-HSETT)

2.4 USB-A HS Host SQ Fixture

The layout of the USB-A HS Host SQ Fixture is shown in the figure below:

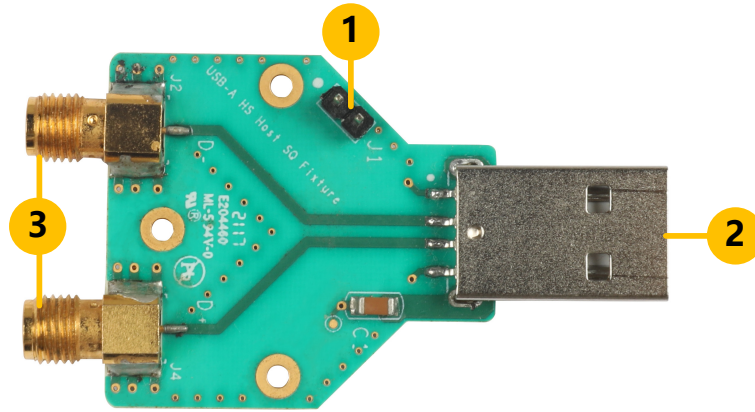


Table 2.4 Description of USB-A HS Host SQ Fixture Layout

No.	Description
1	1x2-pin (golden) connector (voltage test point)
2	USB-A (M), used to connect the instrument (host) installed with USB test software (XHCI-HSETT)
3	SMA connector

3 High Speed (HS) Signal Quality Compliance Test Item

Measuring Item	Minimum	Maximum
SYNC	32 bits	32 bits
Signal Rate	479.76 Mb/s	480.24 Mb/s
EOP Width	39.5 bits (7.5 bits) ^[1]	40.5 bits (8.5 bits) ^[1]
Edge Monotonicity	0	50 mV
Rise/Fall Edge Time	500 ps	N/A
Rising/Fall Edge Rate	N/A	1600 V/us
Paired JK Jitter	-100 ps	100 ps
Paired KJ Jitter	-100 ps	100 ps
Consecutive Jitter	-100 ps	100 ps
Signal Eye Violation Points	0	0

NOTE

[1]: data enclosed by brackets in the EOP Width field are non-start frame data.



4 To Prepare for the Test

Before the test, make the following preparations.

- Prepare one digital oscilloscope that supports the USB 2.0 analysis function.
- Prepare one computer that has a USB 2.0 interface. Make sure that your computer has downloaded the "high-speed electrical test tool" (XHCI-HSETT) software from the website (<https://www.usb.org/document-library/xhsett-x64>) and installed it (XHSETT 1.3.6.8 Installer-x64 Release.exe) to your computer.
- Prepare a device for test.
- Prepare other required test devices: a fixture, a jumper cap (short-circuiting the golden pin connector), a probe, SMA cables, and etc.

4.1 Digital Oscilloscope

You need to prepare one digital oscilloscope that supports the USB2.0 analysis function. According to the requirements of USB Implementers Forum (USB-IF), the digital oscilloscope is required to have a bandwidth of more than 2.0 GHz and a sample rate of over 5 GSa/s. For the digital oscilloscope used for the test, please make sure you have performed the following operations on it.

- Take a 30-minute warm-up for the oscilloscope before use.
- When the ambient temperature variation reaches or exceeds 5°C, perform the self-calibration operation. For detailed operation procedures, refer to relevant contents specified in User Guide.
- Perform the "Function Inspection" and "Probe Compensation" operation on the oscilloscope. For detailed operation procedures, refer to relevant contents specified in User Guide.



NOTE

This manual takes RIGOL DS70000 series as an example in the test connection and test procedures.

4.2 Probe

A differential probe is used for high-speed signal quality compliance test, which includes

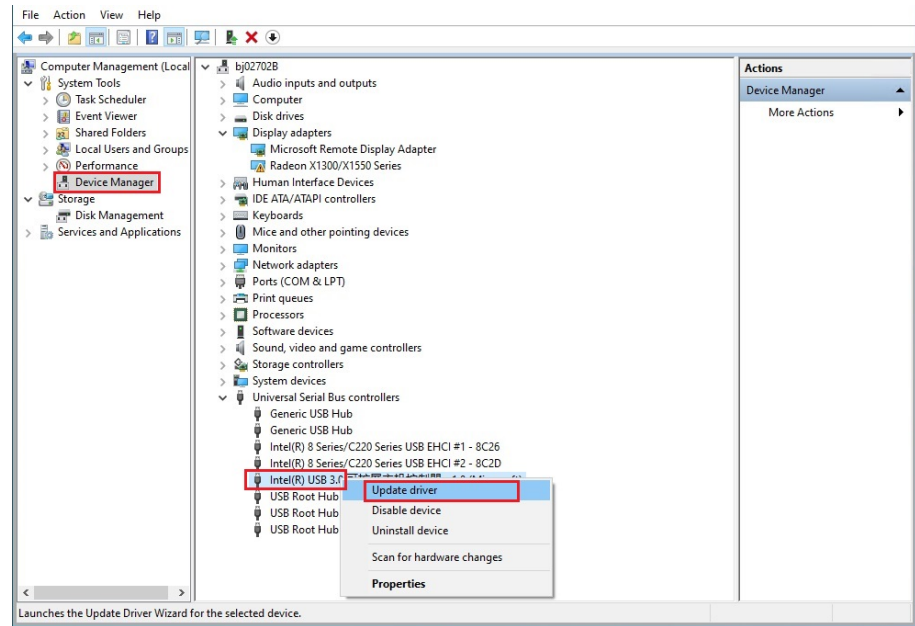
- High-speed device signal quality compliance test
- High-speed host signal quality compliance test
- Hub upstream high-speed signal quality compliance test
- Hub downstream high-speed signal quality compliance test

The different probe is required to be equipped with a bandwidth of 2.0 GHz or above. RIGOL PVA8350 and PVA8700 differential probes are recommended.

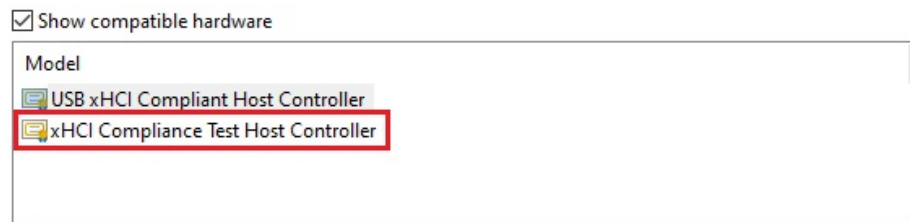
4.3 Driver Installation

After installing the "high-speed electrical test tool" (XHCI-HSETT) software, double-click it to open it directly and you are asked to load the software to the host device. If loaded successfully, the software is available under "USB Compliance (Host/Device) Controllers" in your Device Manager. You can double-click it to open and use it. If your software is not the latest version, it will not appear under this path. You need to update the "xHCI Compliance Test Host Controller" driver according to the following steps.

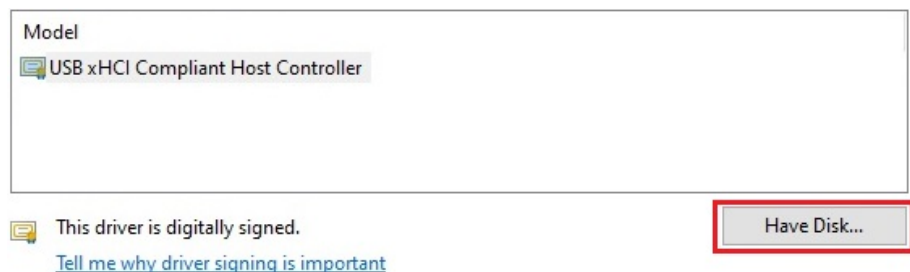
1. Click This PC, and right-click to select "Manage". The "Computer Management (Local)" is displayed. Click "Device Manager" and find the "Universal Serial Bus controllers". Right-click "Intel(R)USB 3.0 eXtensible Host Controller-1.0 (Microsoft)" and select "Update driver", as shown in the figure below.



2. Click "Browse my computer for driver software", then click "let me pick from a list of available drivers on my computer". In the displayed interface, double-click "xHCI Compliance Test Host Controller" to complete the update of the driver.



If "Show Compatible hardware" is checked, and "xHCI Compliance Test Host Controller" is not found under it. You need to install the driver manually. Click **Have Disk...**. The default path is "C:\Program Files\USB-IF Test Suite\Drivers and Firmware\xHCI Host Drivers". If you want to modify the path, make sure that part of the directory path "USB-IF Test Suite\Drivers and Firmware\xHCI Host Drivers" should remain unchanged.



**TIP**

After the driver has been installed, all of the USB interfaces of the host may be disabled (The USB-connected device may be disabled, e.g. the mouse and keyboard may be unable to use). At this time, you can only realize remote control over the computer via remote desktop connection. During the test, do not restart the computer.

5 Fixture Application

5.1 High-speed Device Signal Quality Compliance Test

5.1.1 Test Connection Diagram

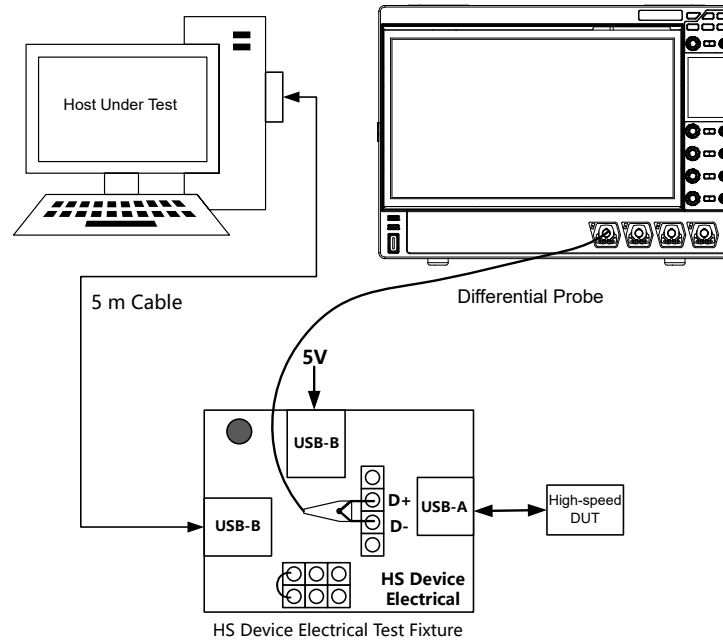


Figure 5.1 Connection Diagram of the High-speed Device Signal Quality Compliance Test (Differential)

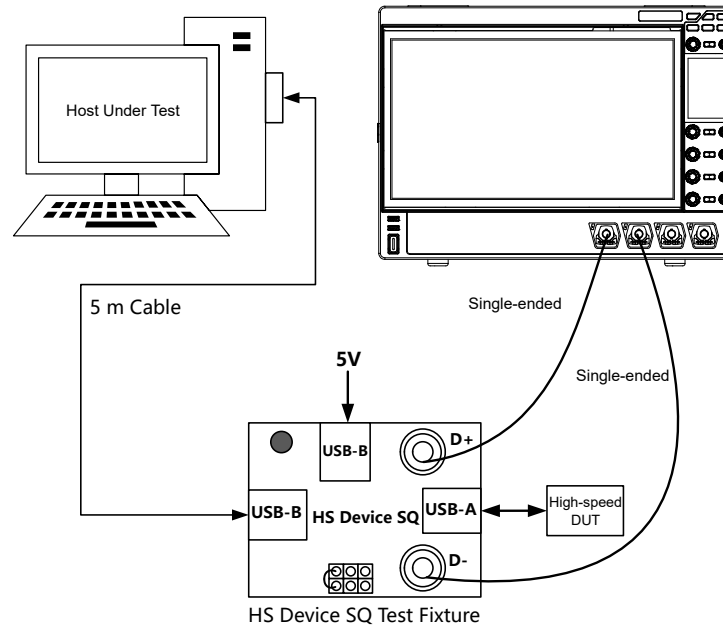


Figure 5.2 Connection Diagram of the High-speed Device Signal Quality Compliance Test (Single-ended)

Table 5.1 Tool List for the High-speed Device Signal Quality Compliance Test

Device	Description
Test Fixture	HS Device Electrical Test Fixture (Differential) HS Device SQ Test Fixture (Single-ended)
Digital Oscilloscope	BW 2.0 GHz or above, sample rate 5 Gsa/s or above, RIGOL DS70000 recommended
High-speed DUT	—
Host Under Test	with USB 2.0 interface
USB-A (M)-USB (M) cable	2 (one is to connect the fixture and the host; the other is to connect the fixture and the power source)
Differential probe or Single-ended	Used to connect the fixture and the oscilloscope
Jumper Cap	Used to short-circuit the golden Pin 5 and Pin 6

5.1.2 Test Procedures

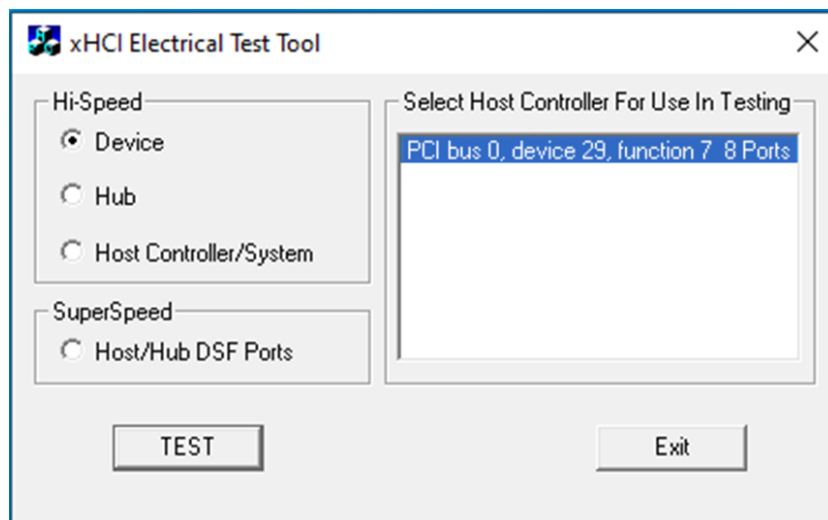
Before the test, prepare the necessary tools for use.



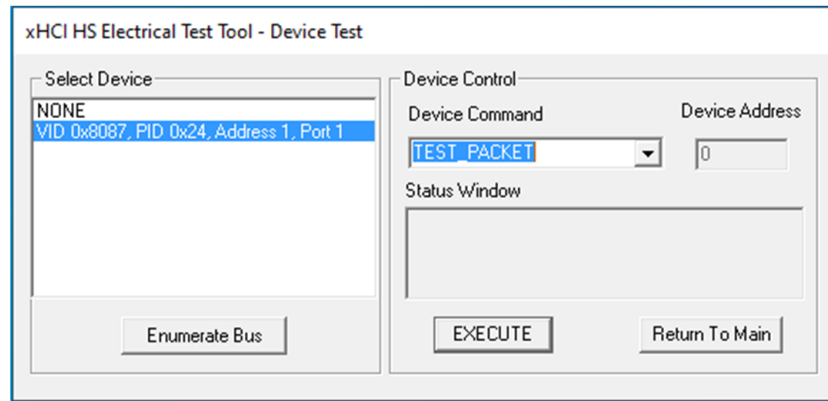
TIP



Before the test, switch the "Device Initialization" switch to "INIT" position.

1. Connect the test devices according to the methods shown in *Test Connection Diagram*. You can select "Differential" or "Single-ended" connection type for test.
2. Switch or install the driver according to descriptions in *Driver Installation*.
3. After the driver has been successfully installed, double-click the "XHCI HSETT" software to open it. Then the Stack Switcher interface is displayed, prompting you to select a specified host controller to load Compliance Driver Stack on. Click "Continue" until it is loaded successfully. Then in the xHCI Electrical Test Tool, select "Device" from "Hi-Speed", then click **TEST** to start testing.



4. Click **Enumerate Bus** to refresh the host port. Select "TEST_PACKET" from "Device Command". Then click **EXECUTE**. The Status Window shows the execution state. If "Operation Successful" is displayed, it indicates that the selected signal is successfully output.



5. At last, switch the "Device Initialization" switch to "TEST" position. Then, the two signal lights of the fixture light up and the signal starts to transmit. Now you can perform the compliance analysis after the oscilloscope acquires the signal.
6. Start testing. The test takes DS70000 series oscilloscope as an example.
 - a. Click or tap  >  to enter the "USB2.0 Compliance test" interface.
 - b. Click or tap the **DUT** tab to enter the DUT setting interface. Select "Device" under the "DUT" menu item and select "High Speed" from the "Signal Type" menu item. Select the desired test point according to the actual situation.



NOTE

When the signal type is "High Speed", you can select "Near End" or "Far End" as the test point according to the test scenario. Whether you select "Near End" or "Far End", it determines the test port of the DUT, as shown in the figure below.

- "Near End" should be selected in the following conditions: no USB cable is available before the the DUT and the host; the test point is located in TP3; Template1 is selected for the eye template according to USB2.0 protocol.
- "Far End" should be selected in the following conditions: A USB cable is available before the the DUT and the host; the test point is located in TP2; Template2 is selected for the eye template according to USB2.0 protocol.

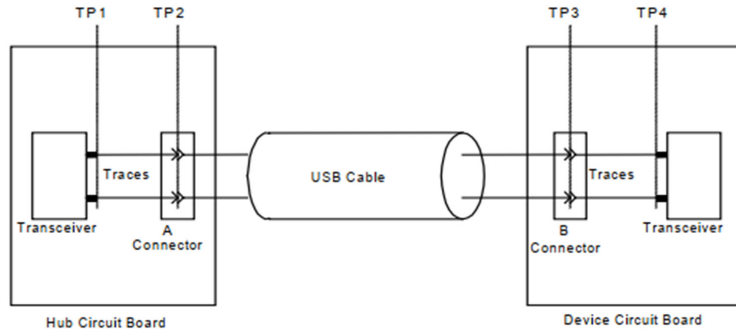
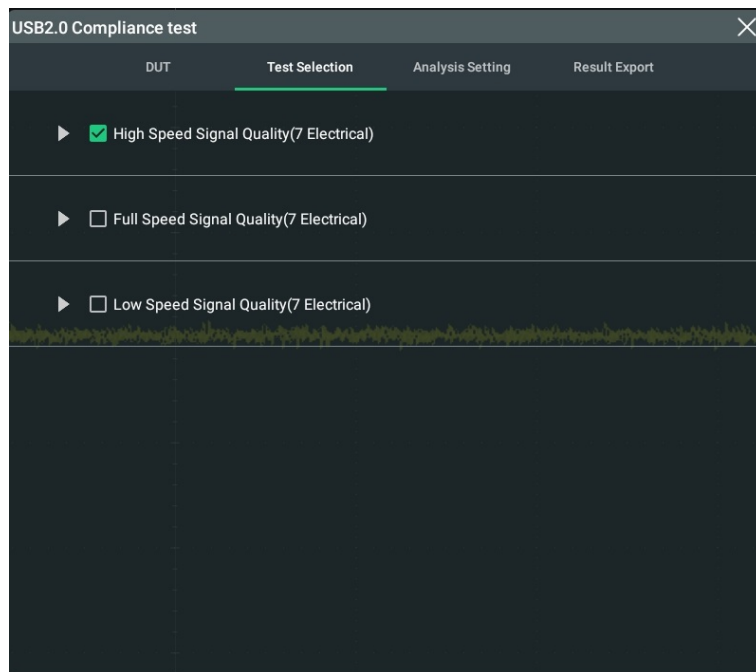
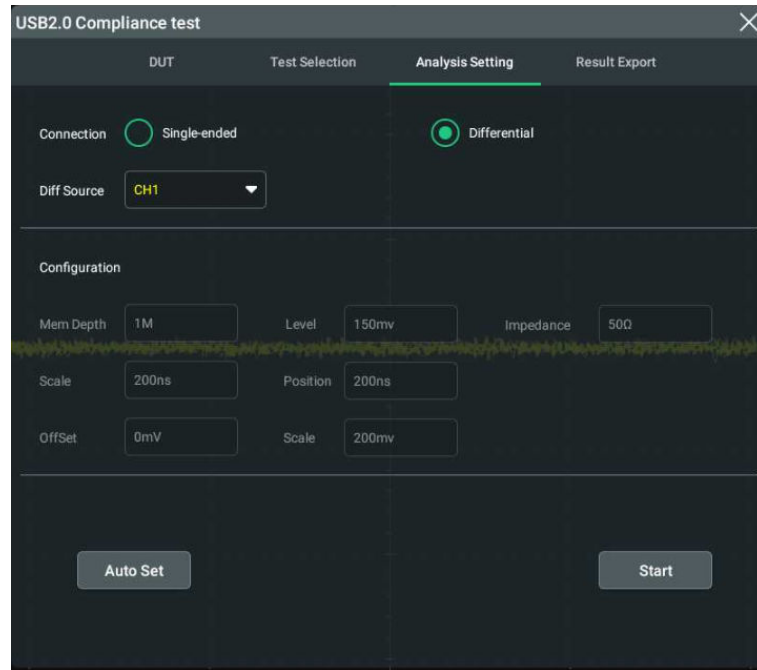


Figure 5.3 USB2.0 Test Model

- c. Click or tap the **Test Selection** tab, as shown in the figure below. Select "High Speed Signal Quality(7 Electrical)".



- d. Click or tap the **Analysis Setting** tab, as shown in the figure below. Select "Single-ended" or "Differential" for the "Connection" menu item. Then select the desired channel source.

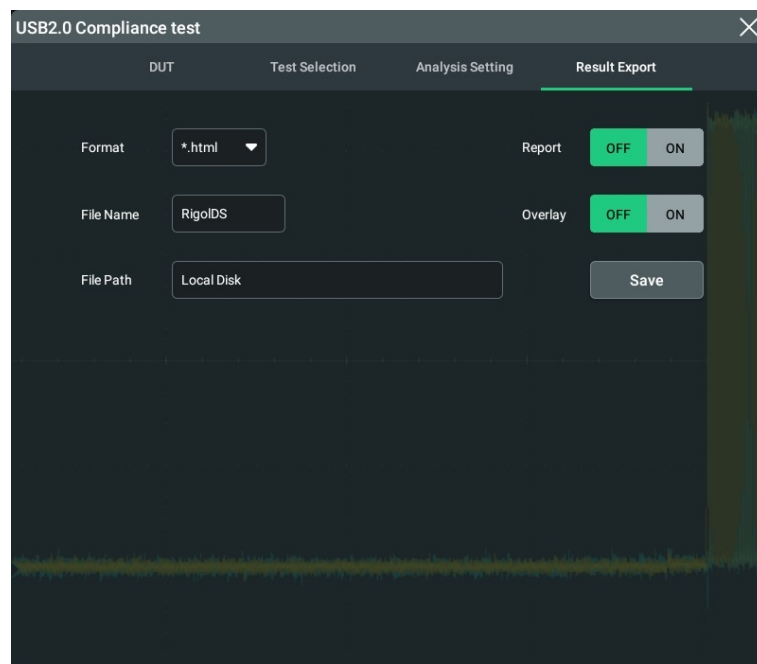


Click or tap **Auto Set**, the oscilloscope starts to set the configuration information automatically. Then click or tap **Start** to start the USB2.0 signal quality compliance analysis test.

NOTE

While testing, ensure that the screen can display the waveforms clearly and only one USB signal waveform can be displayed on the screen.

- e. Click or tap the **Result Export** tab, as shown in the figure below, to set the file storage and save the test report.



7. After the test, to enable the USB interfaces of the host, perform any of the following operations.
- Click **Return to Main** and exit the "Device Test" menu. Then, click **Exit** to exit the test tool software. After the software is closed, the USB interfaces will be reset automatically, and the USB interface of the host under test will be resumed to be available to use.
 - Through remote desktop connection, open the "Device Manager" of the computer. You will see the "USB Compliance (Host/Device) Controllers" is added under "Device Manager". Right-click "xHCI Compliance Test Host Controller" under "USB Compliance (Host/Device) Controllers" to select "Update driver" to update the driver. Then refer to operation procedures in *Driver Installation* to select "USB xHCI Compliant Host Controller" under the Model for the "Show compatible hardware".

5.2 High-speed Host Signal Quality Compliance Test

5.2.1 Test Connection Diagram

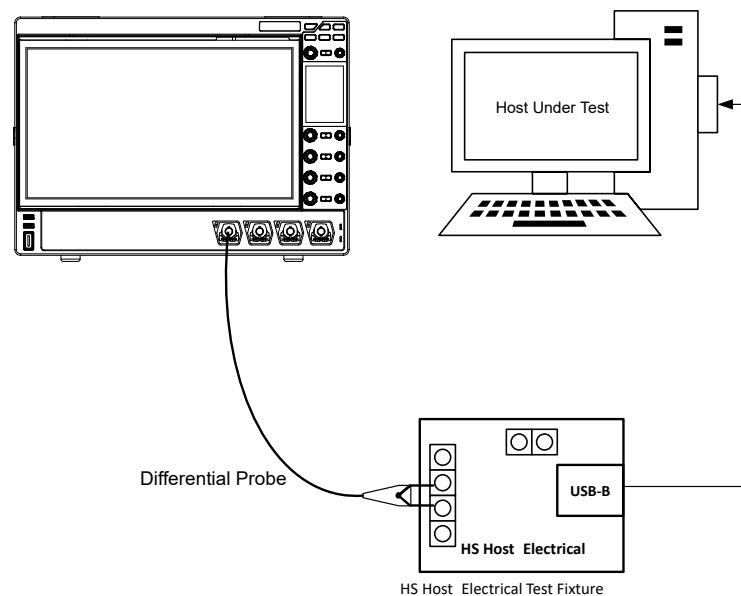


Figure 5.4 Connection Diagram of the High-speed Host Signal Quality Compliance Test (Differential)

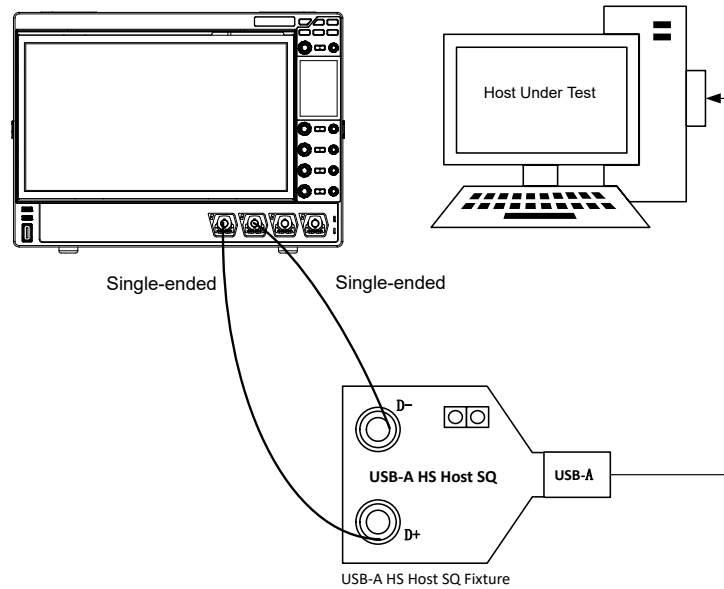


Figure 5.5 Connection Diagram of the High-speed Host Signal Quality Compliance Test (Single-ended)

Table 5.2 Tool List for the High-speed Host Signal Quality Compliance Test

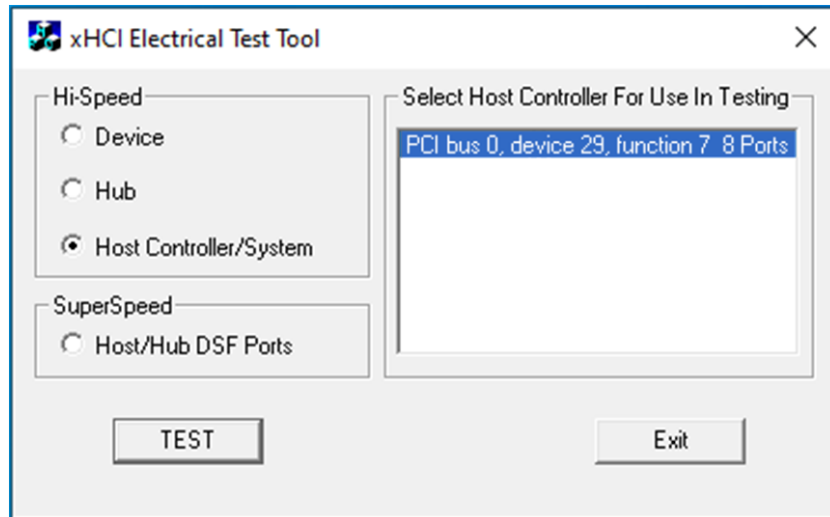
Device	Description
Test Fixture	HS Host Electrical Test Fixture (Differential) USB-A HS Host SQ Test Fixture (Single-ended)
Digital Oscilloscope	BW 2.0 GHz or above, sample rate 5 Gsa/s or above, RIGOL DS70000 recommended
Host Under Test	with USB 2.0 interface
Differential probe or Single-ended	Used to connect the fixture and the oscilloscope

5.2.2 Test Procedures

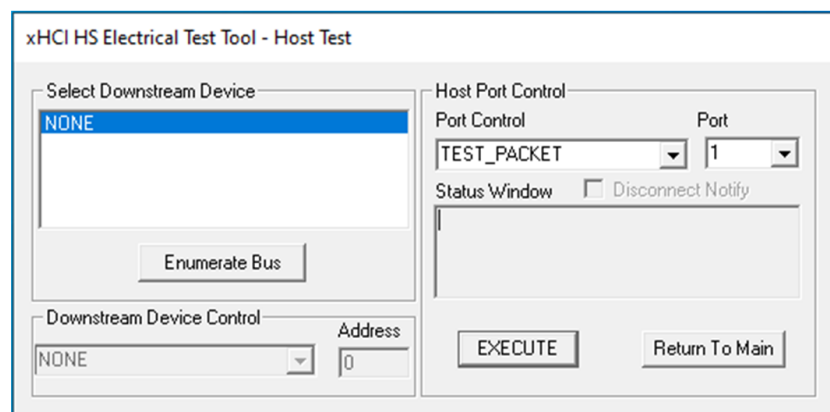
Before the test, prepare the necessary tools for use.

1. Connect the fixture, the oscilloscope, and the DUT according to the methods shown in *Test Connection Diagram*.
2. Switch or install the driver according to descriptions in *Driver Installation*.

- After the driver has been successfully installed, double-click the "XHCI HSETT" software to open it. Then the Stack Switcher interface is displayed, prompting you to select a specified host controller to load Compliance Driver Stack on. Click "Continue" until it is loaded successfully. Then in the xHCI Electrical Test Tool, select "Host Controller/System" from "Hi-Speed", then click **TEST** to start testing.





- Click **Enumerate Bus** to refresh the host port. Select "TEST_PACKET" from "Port Control". Under the "Port", set the port number of the host that is connected to the fixture. For example, if the currently connected host port number is 3, you should set the Port to 3. Then click **EXECUTE**. The Status Window shows the execution state. If "Operation Successful" is displayed, it indicates that the selected signal is successfully output. At this time, you can start the compliance analysis test after the oscilloscope has acquired the signal.

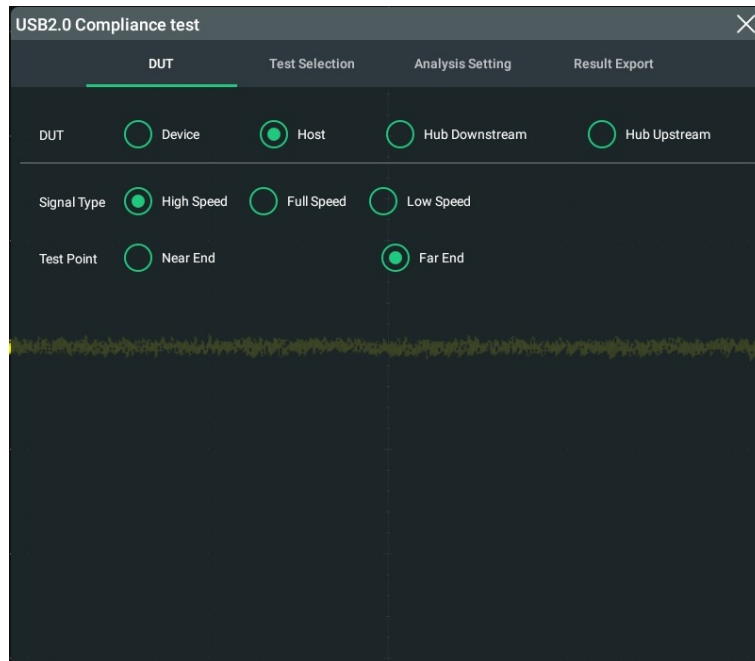


NOTE

The host has multiple ports. If you are not sure which port is connected to the test fixture, you can disconnect other USB devices and only keep the USB connection with the test fixture.

5. Start testing. The test takes DS70000 series oscilloscope as an example.

- a. Click or tap  >  to enter the "USB2.0 Compliance test" interface.
- b. Click or tap the **DUT** tab to enter the DUT setting interface. Select "Host" under the "DUT" menu item and select "High Speed" from the "Signal Type" menu item. Select the desired test point according to the actual situation.



NOTE

When the signal type is "High Speed", you can select "Near End" or "Far End" as the test point according to the test scenario. Whether you select "Near End" or "Far End", it determines the test port of the DUT, as shown in the figure below.

- "Near End" should be selected in the following conditions: no USB cable is available before the the DUT and the host; the test point is located in TP3; Template1 is selected for the eye template according to USB2.0 protocol.
- "Far End" should be selected in the following conditions: A USB cable is available before the the DUT and the host; the test point is located in TP2; Template2 is selected for the eye template according to USB2.0 protocol.

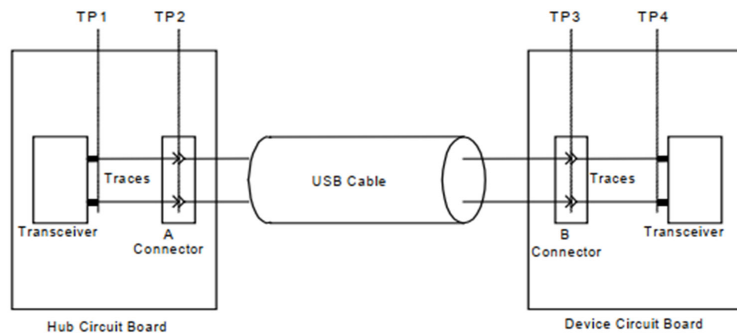
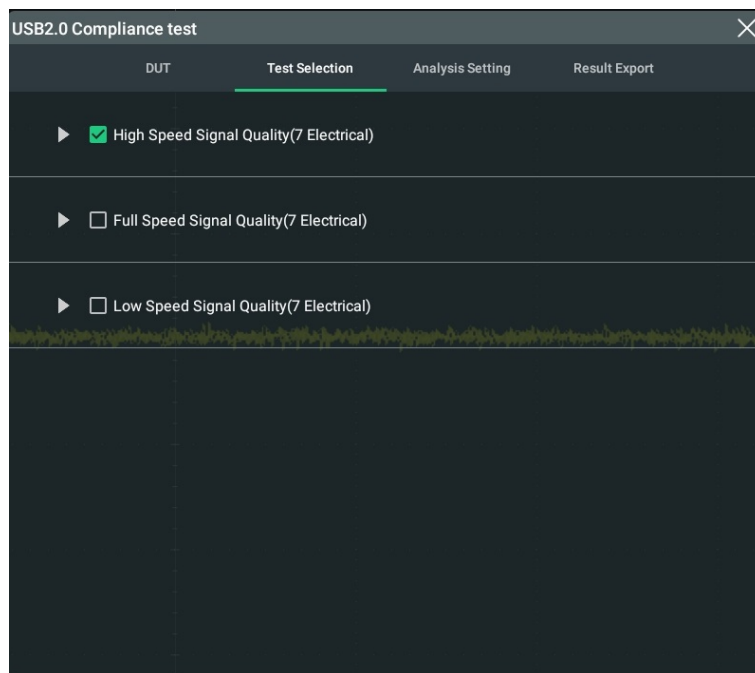
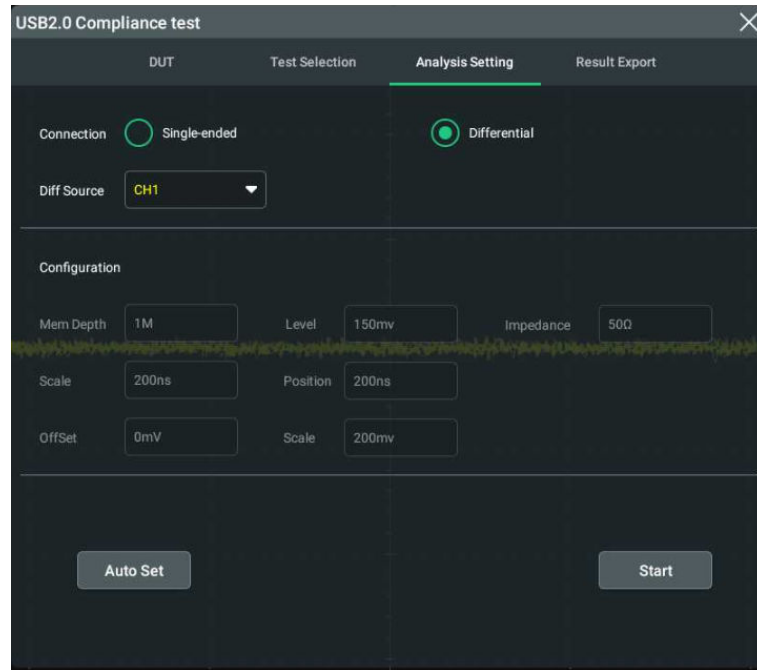


Figure 5.6 USB2.0 Test Model

- c. Click or tap the **Test Selection** tab, as shown in the figure below. Select "High Speed Signal Quality(7 Electrical)".



- d. Click or tap the **Analysis Setting** tab, as shown in the figure below. Select "Single-ended" or "Differential" for the "Connection" menu item. Then select the desired channel source.

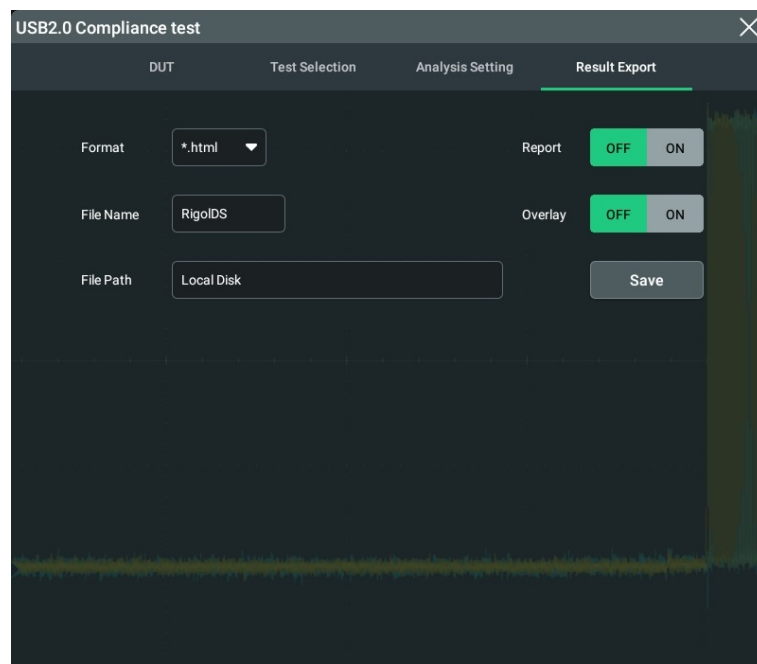


Click or tap **Auto Set**, the oscilloscope starts to set the configuration information automatically. Then click or tap **Start** to start the USB2.0 signal quality compliance analysis test.

NOTE

While testing, ensure that the screen can display the waveforms clearly and only one USB signal waveform can be displayed on the screen.

- e. Click or tap the **Result Export** tab, as shown in the figure below, to set the file storage and save the test report.



6. After the test, to enable the USB interfaces of the host, perform any of the following operations.
- Click **Return to Main** and exit the "Host Test" menu. Then, click **Exit** to exit the test tool software. After the software is closed, the USB interfaces will be reset automatically, and the USB interface of the host under test will be resumed to be available to use.
 - Through remote desktop connection, open the "Device Manager" of the computer. You will see the "USB Compliance (Host/Device) Controllers" is added under "Device Manager". Right-click "xHCI Compliance Test Host Controller" under "USB Compliance (Host/Device) Controllers" to select "Update driver" to update the driver. Then refer to operation procedures in *Driver Installation* to select "USB xHCI Compliant Host Controller" under the Model for the "Show compatible hardware".

5.3 Hub Upstream High-speed Signal Quality Compliance Test

5.3.1 Test Connection Diagram

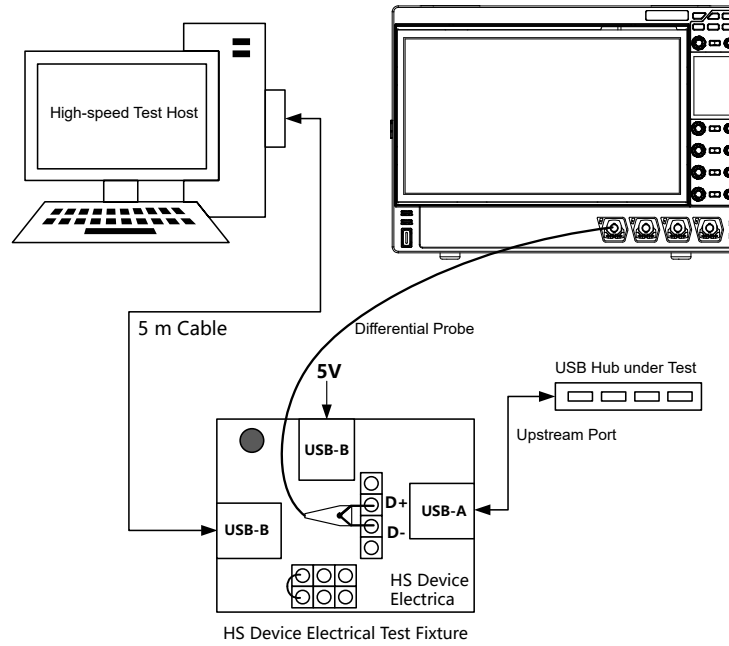


Figure 5.7 Connection Diagram of the Hub Upstream High-speed Signal Quality Compliance Test (Differential)

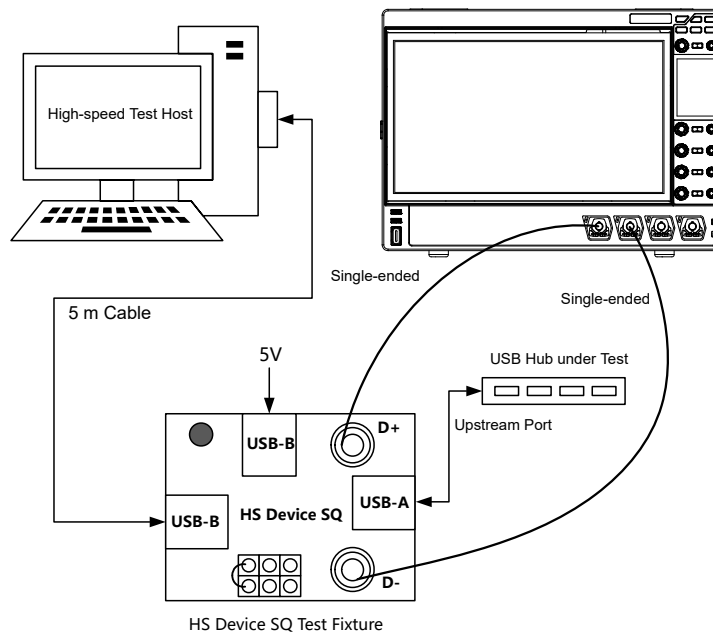


Figure 5.8 Connection Diagram of the Hub Upstream High-speed Signal Quality Compliance Test (Single-ended)

Table 5.3 Tool List for the Hub Upstream High-speed Signal Quality Compliance**Test**

Device	Description
Test Fixture	HS Device Electrical Test Fixture (Differential) HS Device SQ Test Fixture (Single-ended)
Digital Oscilloscope	BW 2.0 GHz or above, sample rate 5 Gsa/s or above, RIGOL DS70000 recommended
USB Hub under Test	Upstream Port USB2.0
High-speed Test Host	with USB 2.0 interface
USB-A (M)-USB (M) cable	2 (one is to connect the fixture and the USB hub; the other is to connect the fixture and the power source)
Differential probe or Single-ended	Used to connect the fixture and the oscilloscope
Jumper Cap	Used to short-circuit the golden Pin 5 and Pin 6

5.3.2 Test Procedures

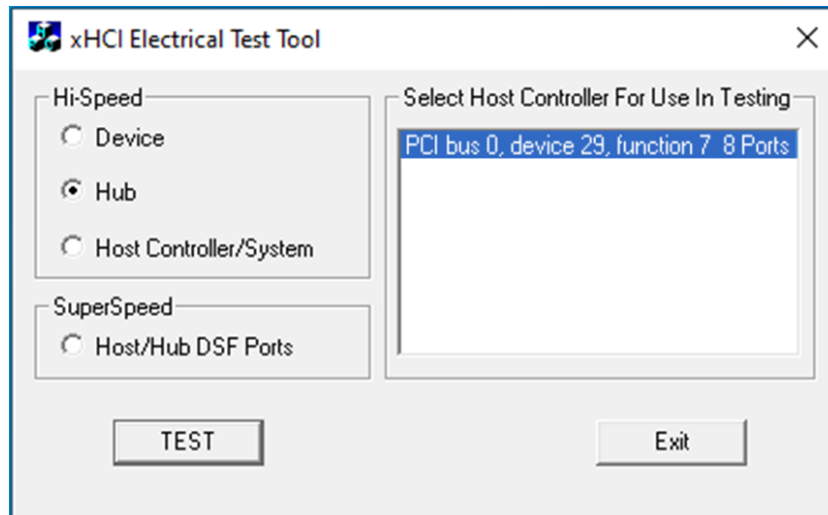
Before the test, prepare the necessary tools for use.

TIP

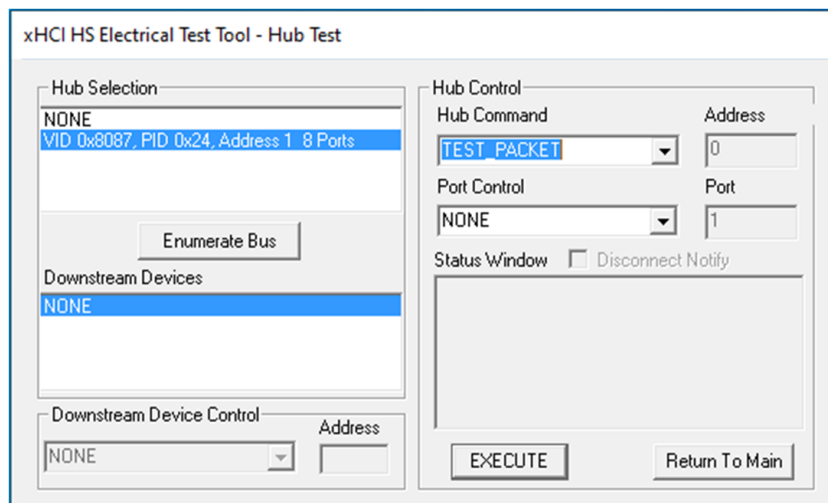
Before the test, switch the "Device Initialization" switch to "INIT" position.





1. Connect the fixture, the oscilloscope, and the DUT according to the methods shown in *Test Connection Diagram*.
2. Switch or install the driver according to descriptions in *Driver Installation*.
3. After the driver has been successfully installed, double-click the "XHCI HSETT" software to open it. Then the Stack Switcher interface is displayed, prompting you to select a specified host controller to load Compliance Driver Stack on. Click "Continue" until it is loaded successfully. Then in the xHCI Electrical Test Tool, select "Hub" from "Hi-Speed", then click **TEST** to start testing.

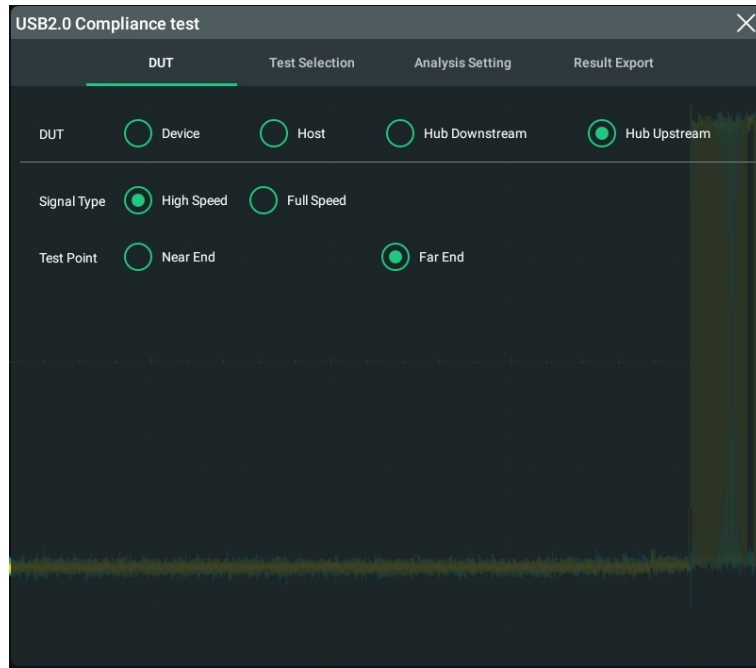


4. Click **Enumerate Bus** to refresh the host port. Select "TEST_PACKET" from "Hub Command". Then click **EXECUTE**. The Status Window shows the execution state. If "Operation Successful" is displayed, it indicates that the selected signal is successfully output.



5. At last, switch the "Device Initialization" switch to "TEST" position. Then, the two signal lights of the fixture light up. Now you can perform the compliance analysis after the oscilloscope acquires the signal.
6. Start testing. The test takes DS70000 series oscilloscope as an example.

- a. Click or tap  >  to enter the "USB2.0 Compliance test" interface.
- b. Click or tap the **DUT** tab to enter the DUT setting interface. Select "Hub Upstream" under the "DUT" menu item and select "High Speed" under the "Signal Type" menu item. Select the desired test point according to the actual situation.



NOTE

When the signal type is "High Speed", you can select "Near End" or "Far End" as the test point according to the test scenario. Whether you select "Near End" or "Far End", it determines the test port of the DUT, as shown in the figure below.

- "Near End" should be selected in the following conditions: no USB cable is available between the DUT and the host; the test point is located in TP3; Template1 is selected for the eye template according to USB2.0 protocol.
- "Far End" should be selected in the following conditions: A USB cable is available between the DUT and the host; the test point is located in TP2; Template2 is selected for the eye template according to USB2.0 protocol.

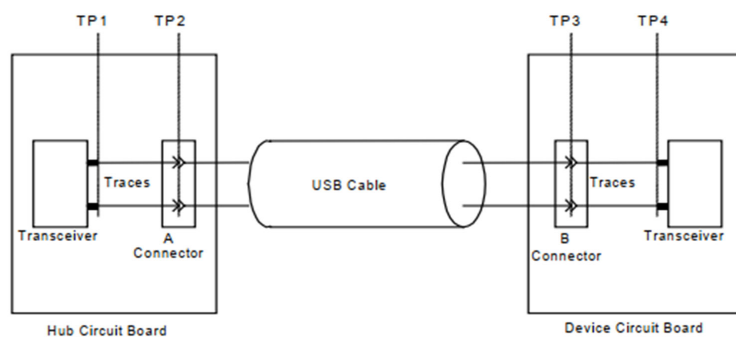
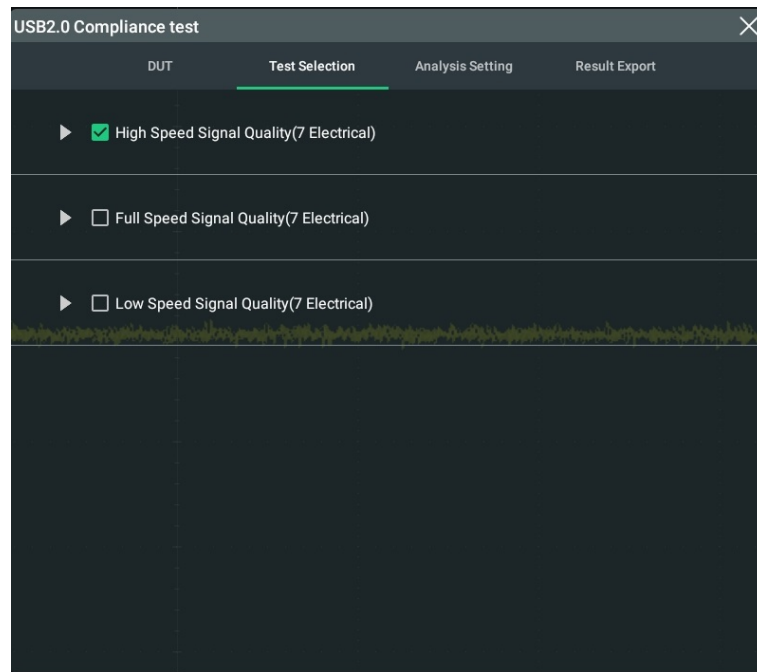
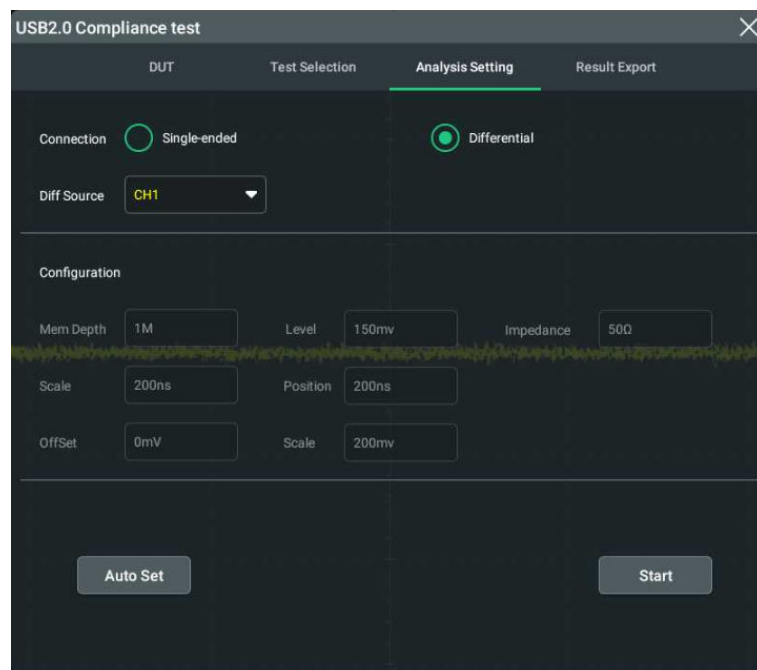


Figure 5.9 USB2.0 Test Model

- c. Click or tap the **Test Selection** tab, as shown in the figure below. Select "High Speed Signal Quality(7 Electrical)".



- d. Click or tap the **Analysis Setting** tab, as shown in the figure below. Select "Single-ended" or "Differential" for the "Connection" menu item. Then select the desired channel source.

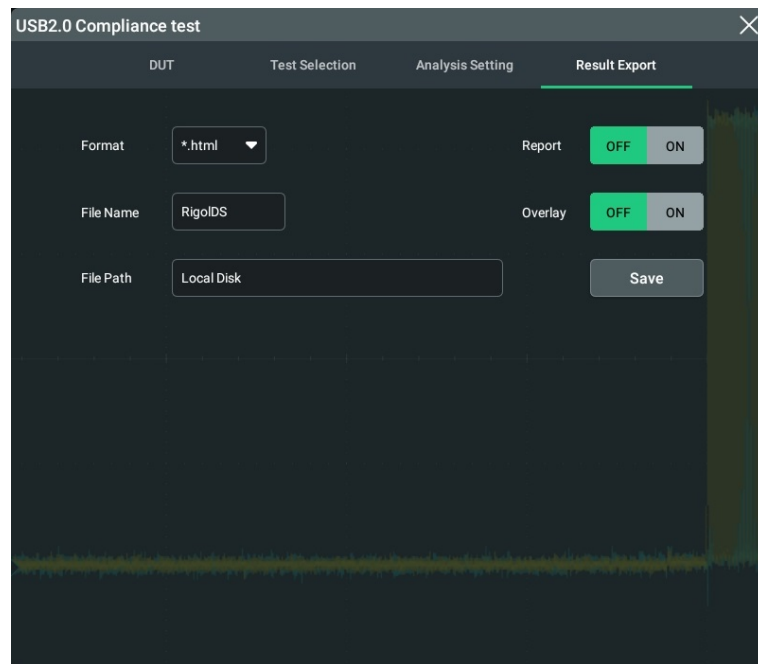


Click or tap **Auto Set**, the oscilloscope starts to set the configuration information automatically. Then click or tap **Start** to start the USB2.0 signal quality compliance analysis test.

NOTE

While testing, ensure that the screen can display the waveforms clearly and only one USB signal waveform can be displayed on the screen.

- e. Click or tap the **Result Export** tab, as shown in the figure below, to set the file storage and save the test report.



7. After the test, to enable the USB interfaces of the host, perform any of the following operations.
- Click **Return to Main** and exit the "Hub Test" menu. Then, click **Exit** to exit the test tool software. After the software is closed, the USB interfaces will be reset automatically, and the USB interface of the host under test will be resumed to be available to use.
 - Through remote desktop connection, open the "Device Manager" of the computer. You will see the "USB Compliance (Host/Device) Controllers" is added under "Device Manager". Right-click "xHCI Compliance Test Host Controller" under "USB Compliance (Host/Device) Controllers" to select "Update driver" to update the driver. Then refer to operation procedures in *Driver Installation* to select "USB xHCI Compliant Host Controller" under the Model for the "Show compatible hardware".

5.4 Hub Downstream High-speed Signal Quality Compliance Test

5.4.1 Test Connection Diagram

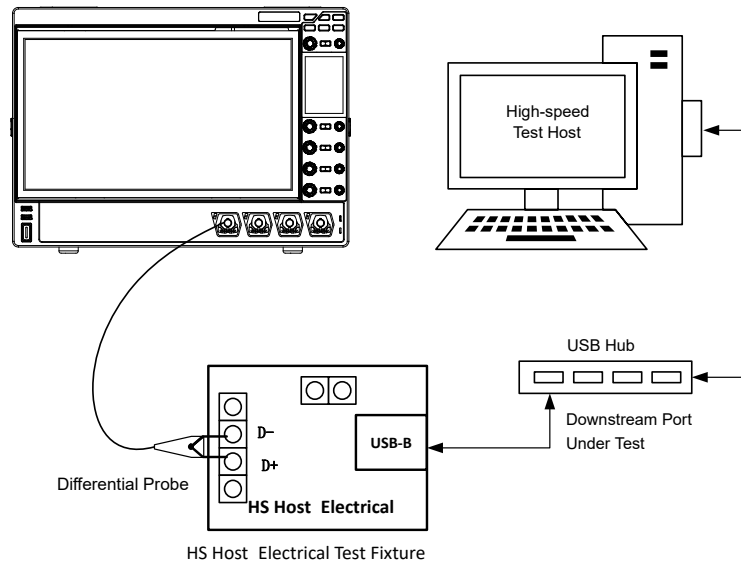


Figure 5.10 Connection Diagram of the Hub Downstream High-speed Signal Quality Compliance Test (Differential)

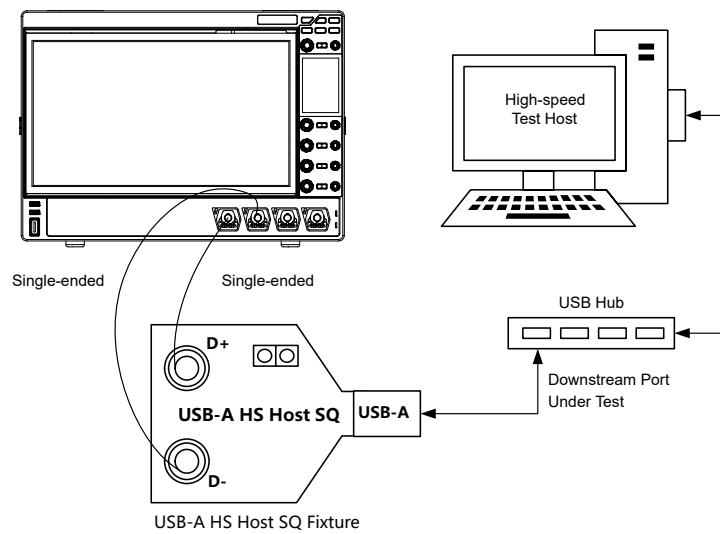


Figure 5.11 Connection Diagram of the Hub Downstream High-speed Signal Quality Compliance (Single-ended)

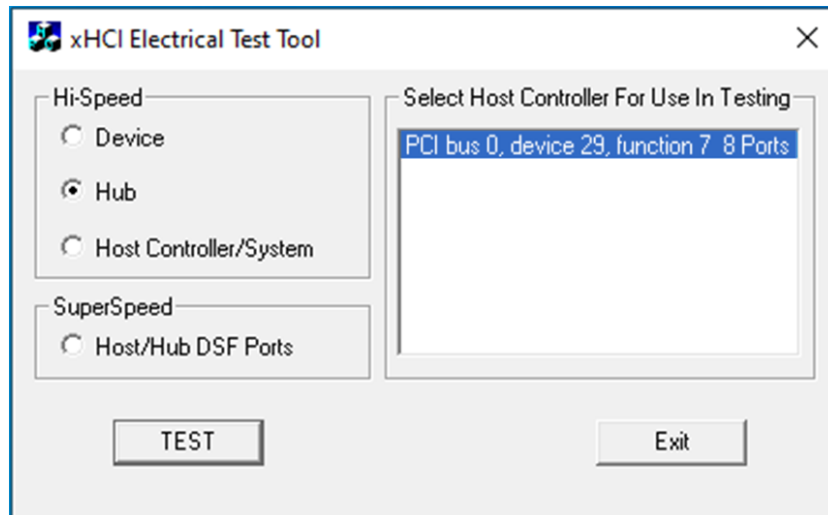
Table 5.4 Tool List for the Hub Downstream High-speed Signal Quality**Compliance Test**

Device	Description
Test Fixture	HS Host Electrical Test Fixture (Differential) USB-A HS Host SQ Test Fixture (Single-ended)
Digital Oscilloscope	BW 2.0 GHz or above, sample rate 5 Gsa/s or above, RIGOL DS70000 recommended
USB Hub under Test	Downstream Port USB2.0
High-speed Test Host	with USB 2.0 interface
Differential probe or Single-ended	Used to connect the fixture and the oscilloscope

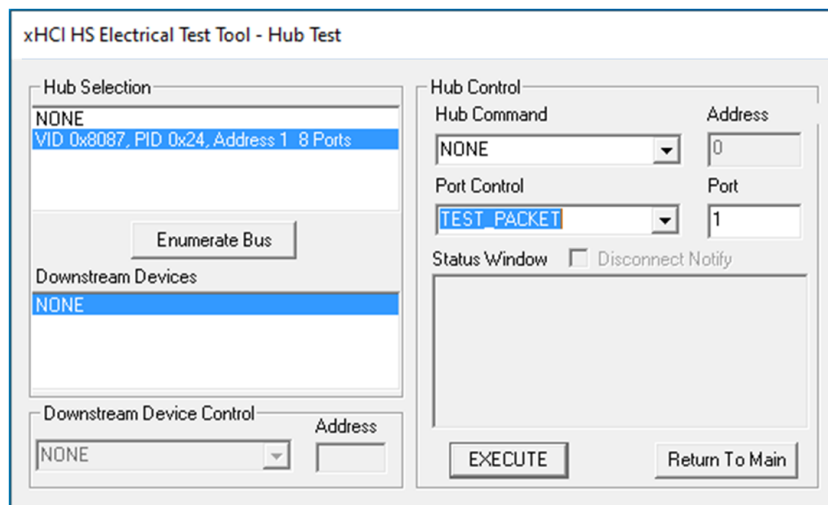
5.4.2 Test Procedures

Before the test, prepare the necessary tools for use.

1. Connect the test devices according to the methods shown in *Test Connection Diagram*.
2. Switch or install the driver according to descriptions in *Driver Installation*.
3. After the driver has been successfully installed, double-click the "XHCI HSETT" software to open it. Then the Stack Switcher interface is displayed, prompting you to select a specified host controller to load Compliance Driver Stack on. Click "Continue" until it is loaded successfully. Then in the xHCI Electrical Test Tool, select "Hub" from "Hi-Speed", then click **TEST** to start testing.





4. Click **Enumerate Bus** to refresh the host port. Select "TEST_PACKET" from "Port Control". Under the "Port", set the port number of the hub that is connected to the fixture. For example, if the currently connected hub port number is 3, you should set the Port to 3. Then click **EXECUTE**. The Status Window shows the execution state. If "Operation Successful" is displayed, it indicates that the selected signal is successfully output. At this time, you can start the compliance analysis test after the oscilloscope has acquired the signal.



NOTE

The hub has multiple ports. If you are not sure which port is connected to the test fixture, you can disconnect other USB devices and only keep the USB connection with the test fixture.

5. Start testing. The test takes DS70000 series oscilloscope as an example.
 - a. Click or tap  >  to enter the "USB2.0 Compliance test" interface.
 - b. Click or tap the **DUT** tab to enter the DUT setting interface. Select "Hub Downstream" under the "DUT" menu item and select "High Speed" under the

"Signal Type" menu item. Select the desired test point according to the actual situation.



NOTE

When the signal type is "High Speed", you can select "Near End" or "Far End" as the test point according to the test scenario. Whether you select "Near End" or "Far End", it determines the test port of the DUT, as shown in the figure below.

- "Near End" should be selected in the following conditions: no USB cable is available before the the DUT and the host; the test point is located in TP3; Template1 is selected for the eye template according to USB2.0 protocol.
- "Far End" should be selected in the following conditions: A USB cable is available before the the DUT and the host; the test point is located in TP2; Template2 is selected for the eye template according to USB2.0 protocol.

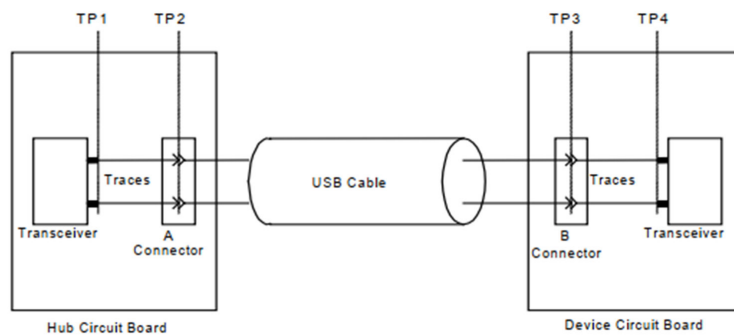
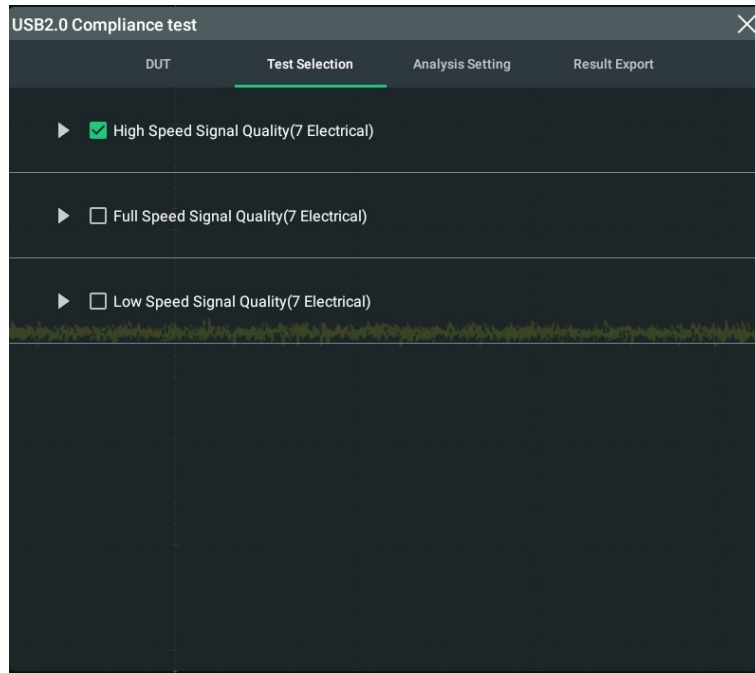
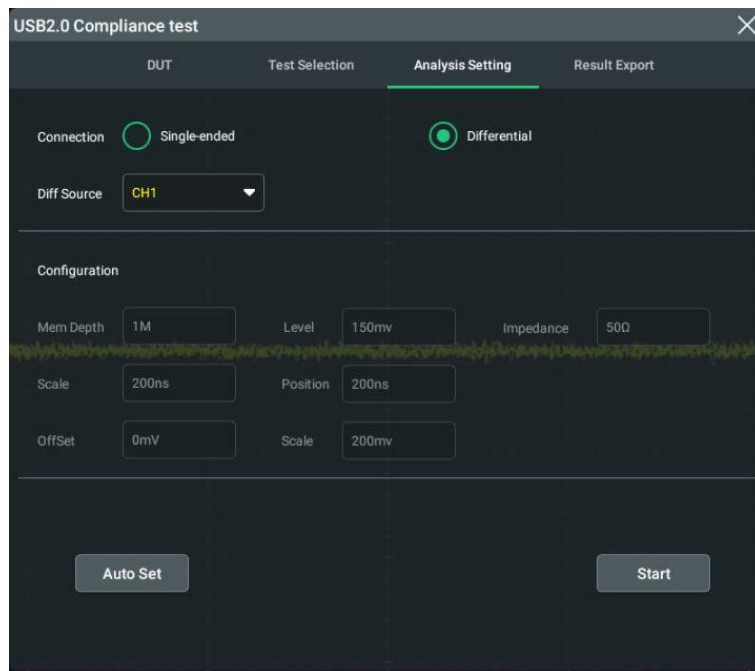


Figure 5.12 USB2.0 Test Model

- c. Click or tap the **Test Selection** tab, as shown in the figure below. Select "High Speed Signal Quality(7 Electrical)".



- d. Click or tap the **Analysis Setting** tab, as shown in the figure below. Select "Single-ended" or "Differential" for the "Connection" menu item. Then select the desired channel source.

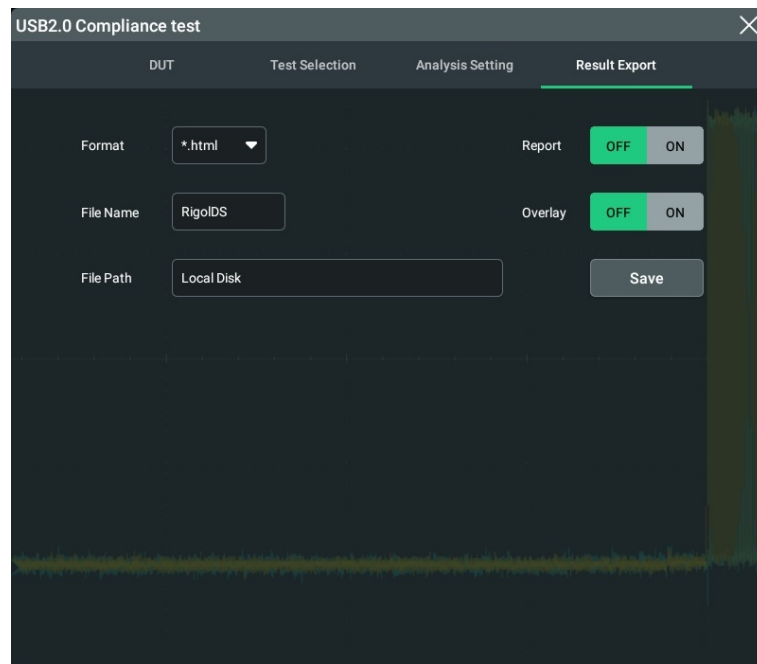


Click or tap **Auto Set**, the oscilloscope starts to set the configuration information automatically. Then click or tap **Start** to start the USB2.0 signal quality compliance analysis test.

NOTE

While testing, ensure that the screen can display the waveforms clearly and only one USB signal waveform can be displayed on the screen.

- e. Click or tap the **Result Export** tab, as shown in the figure below, to set the file storage and save the test report.



6. After the test, to enable the USB interfaces of the host, perform any of the following operations.
- Click **Return to Main** and exit the "Hub Test" menu. Then, click **Exit** to exit the test tool software. After the software is closed, the USB interfaces will be reset automatically, and the USB interface of the host under test will be resumed to be available to use.
 - Through remote desktop connection, open the "Device Manager" of the computer. You will see the "USB Compliance (Host/Device) Controllers" is added under "Device Manager". Right-click "xHCI Compliance Test Host Controller" under "USB Compliance (Host/Device) Controllers" to select "Update driver" to update the driver. Then refer to operation procedures in *Driver Installation* to select "USB xHCI Compliant Host Controller" under the Model for the "Show compatible hardware".

6 Appendix

6.1 Appendix A Fixture Specification and Order Information

The specifications of the four USB2.0 signal quality compliance analysis test fixture should comply with the following values. All the specifications are guaranteed except the parameters marked with "Typical".

Table 6.1 Fixture Specification

Specification	Description
Input Rated Voltage	+5.0 V DC, ± 0.25 V
Fuse Rating	1.5 A 6 V, POLYSWITCH RESETTABLE FUSE
Power Consumption	1W (Typical)
Operating Temperature	+15°C to +35°C

Table 6.2 Order Information

Order Information	Order No.
Fixture Model	
HS Device Electrical Test Fixture	
HS Device SQ Test Fixture	
USB2.0-A to USB2.0-B Cable (1.5 m, 2 cables)	
USB2.0-A to USB2.0-B Cable (135 mm, 1 cable)	TF-USBD-STP (1 set)
USB2.0-A to Micro-B Cable (135 mm, 1 cable)	
SMA Cable (1 m, 2 cables)	
BNC-to-SMA Adaptor (2 adaptors)	
HS Host SQ Test Fixture	
USB-A HS Host SQ Fixture	
USB2.0-A to USB2.0-B Cable (135 mm, 1 cable)	TF-USBD-STP (1 set)
USB2.0-A to Micro-B Cable (135 mm, 1 cable)	

Order Information	Order No.
SMA Cable (1 m, 2 cables)	
BNC-to-SMA Adaptor (2 adaptors)	
Recommended Accessories	
Active Differential Probe (3.5 GHz BW)	PVA8350
Active Differential Probe (7 GHz BW)	PVA8700

For all the fixtures and recommended accessories, please contact the local office of **RIGOL**.

6.2 Appendix B Warranty

RIGOL TECHNOLOGIES CO., LTD. (hereinafter referred to as RIGOL) warrants that the product mainframe and product accessories will be free from defects in materials and workmanship within the warranty period. If a product proves defective within the warranty period, RIGOL guarantees free replacement or repair for the defective product.

To get repair service, please contact your nearest RIGOL sales or service office.

There is no other warranty, expressed or implied, except such as is expressly set forth herein or other applicable warranty card. There is no implied warranty of merchantability or fitness for a particular purpose. Under no circumstances shall RIGOL be liable for any consequential, indirect, ensuing, or special damages for any breach of warranty in any case.

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