

TPA-MHL-8R

Quick Start Guide

Rev: A4



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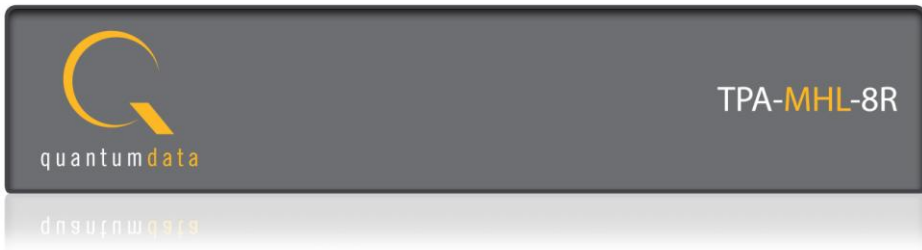
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1 Overview of MHL

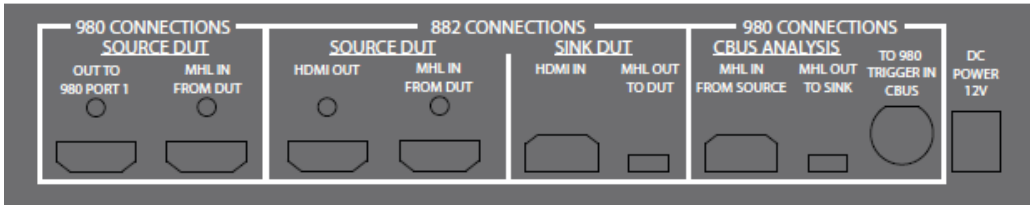
Mobile High-Definition Link (MHL) is a video interface derived from HDMI but targeted to provide an interface from mobile devices like smart phones to TVs or other displays. The MHL standard is designed to connect to smart phones by reusing the existing 5 pin micro-USB connector that many phones have rather than requiring a separate 19 pin HDMI connector. The MHL cable is micro-USB on the source mobile device and HDMI Type A on the other end.

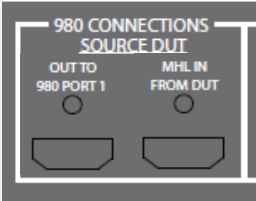
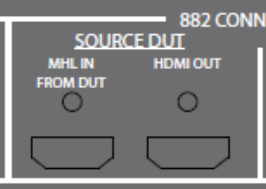
2 Quantum Data MHL Solutions

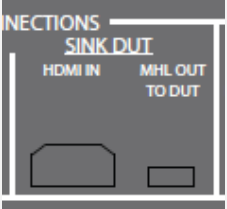
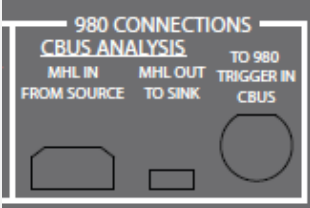
Quantum Data offers a comprehensive suite of test solutions for testing MHL source and sink devices. The centerpiece of these solutions is a test point adapter (TPA-MHL-8R) that converts MHL streams to HDMI and HDMI streams to MHL. The TPA-MHL-8R facilitates basic sink emulation, functional testing, protocol analysis as well as HDMI compliance testing and HDCP compliance testing for MHL source and sink devices. Protocol analysis and HDMI Compliance testing requires the Quantum Data 980 Protocol Analyzer (297MHz module). HDCP compliance testing requires the Quantum Data 882EA.



The rear of the TPA-MHL-8R is shown below. There are three application sections with associated connectors. The connections for each are described in the table below the diagram.



TPA-MHL-8R Section	Connector Label	Connection
980 CONNECTIONS SOURCE DUT 	OUT TO 980 PORT 1	Connect HDMI cable to the Rx port on 980 MHL Protocol Analyzer.
	MHL IN FROM DUT	Connect MHL cable to MHL mobile device (MHL source).
882 CONNECTIONS SOURCE DUT 	HDMI OUT	This is an HDMI output. The device it gets connected to depends on the source test application. <ul style="list-style-type: none"> For basic functional testing of an MHL source - An HDMI cable is connected to the HDMI IN port on an HDTV to monitor the video and audio. For basic protocol testing of an MHL source – An HDMI cable is connected to an HDMI input on the 882EA or 780 to check the timing and protocol data or to check the response to various EDIDs. For HDCP compliance testing of an MHL source – An HDMI cable is connected to a port on the Encryption Status Tester (EST).
	MHL IN FROM DUT	Connect MHL cable from MHL source device under test, e.g. mobile phone.

TPA-MHL-8R Section	Connector Label	Connection
<p>882 CONNECTIONS SINK DUT</p> 	HDMI IN	This is an HDMI input used for HDCP compliance testing of MHL sink devices. An HDMI cable is connected to the Encryption Status Tester (EST) used with the 882EA HDMI output. For basic functional testing of an MHL sink device, an HDMI source devices or 780 Handheld Test Instrument is connected to this port.
	MHL OUT TO DUT	Connect MHL cable to the MHL sink device under test, e.g. HDTV.
<p>980 Connections CBUS ANALYSIS</p> 	MHL IN FROM SOURCE	Connect MHL cable from MHL source device under test, e.g. mobile phone.
	MHL OUT TO SINK	Connect MHL cable to the MHL sink device under test, e.g. HDTV.
	TO 980 TRIGGER IN CBUS	Connect coax cable to TRIG IN port on 980 Protocol Analyzer.

2.1 What is in the TPA-MHL-8R shipping box

The TPA-MHL-8R instrument shipping container includes the items listed in the table below:

Table 1-1: TPA-MHL-8R Shipping Box Contents		
Item		Part No.
TPA-MHL-8R		00-00230
Power Adapter assembly	12V DC power supply	25-00094
	Line cord	30A00400A03
MHL Cable Kit	Contents	78-00061
	RG590A BNC cable	30-00125
	(2) MHL Cables	30-00189
	HDMI Cable	30-00146
Quick Start Guide		68-00224

2.2 Scope of this Quick Start Guide

This Quick Start Guide provides application information for testing your MHL source or MHL sink device. Procedures for connecting up the TPA-MHL-8R are provided in this Guide. Procedures for basic functional testing and protocol testing are available in the 780 User Guide. Procedures for MHL protocol analysis and MHL compliance testing for MHL sources and sinks are provided with the 980 Protocol Analyzer User Guide. Detailed procedures for testing HDCP on MHL sources and sinks are provided in the 882EA User Guide.

2.3 Power Considerations

The TPA-MHL-8R is powered through a 12VDC source jack. The TPA-MHL-8R is supplied with a 12V DC power supply and charger and line cord.

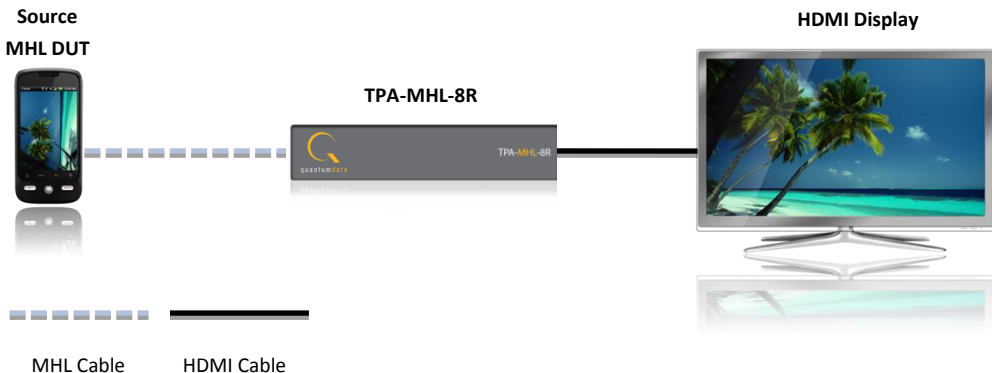


3 MHL Applications for Testing MHL Source Devices

This section describes the MHL test applications supported by Quantum Data test instruments and utilities when testing MHL source devices.

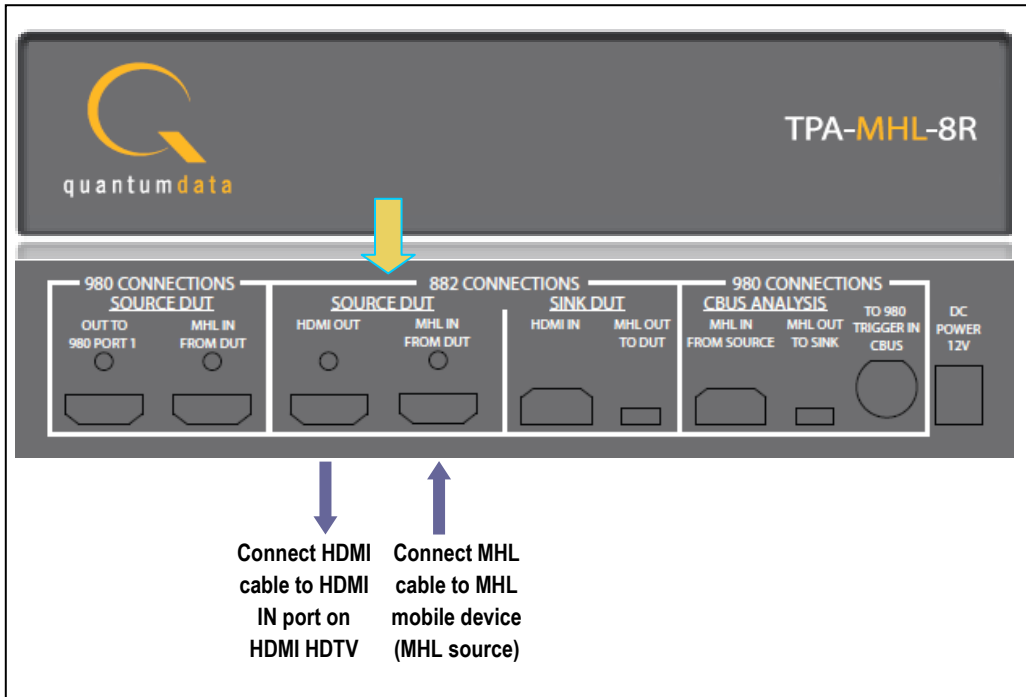
3.1 Functional testing of MHL sources

You can conduct basic functional testing to verify an MHL source device using the TPA-MHL-8R and a standard HDMI HDTV. Basic functional testing involves monitoring the video and audio on an HDMI sink device and verifying it against the expected video resolution and audio format based on the EDID of the HDTV.



Use the procedure below to make the connections to the TPA-MHL-8R for conducting basic functional tests of an MHL source device.

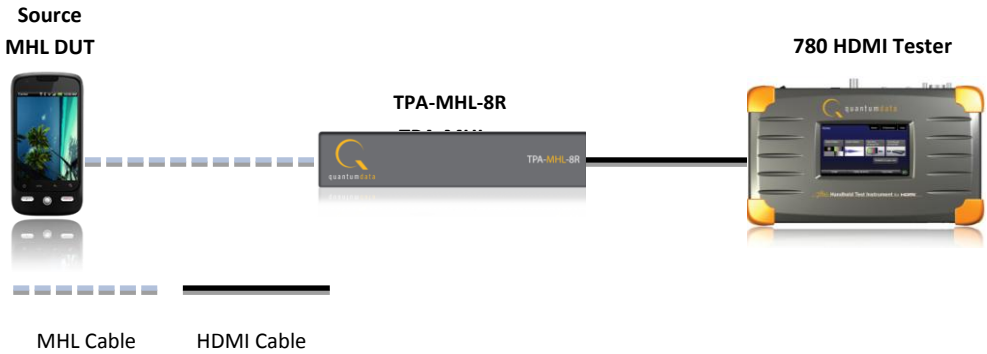
1. Apply power to the TPA-MHL-8R using the power adapter provided.
2. Make the connections as shown in the diagram below. For this application you will be using the section on the TPA-MHL-8R labeled **882 CONNECTIONS – SOURCE DUT**.
 - a. Connect an MHL cable from the MHL source device under test to the MHL IN FROM DUT connector on the TPA-MHL-8R.
 - b. Connect an HDMI cable from the HDMI OUT connector of the TPA-MHL-8R to the HDMI IN connector on the HDMI HDTV.
3. Monitor the HDTV for proper operation.



3.2 Basic Protocol Testing of MHL Sources

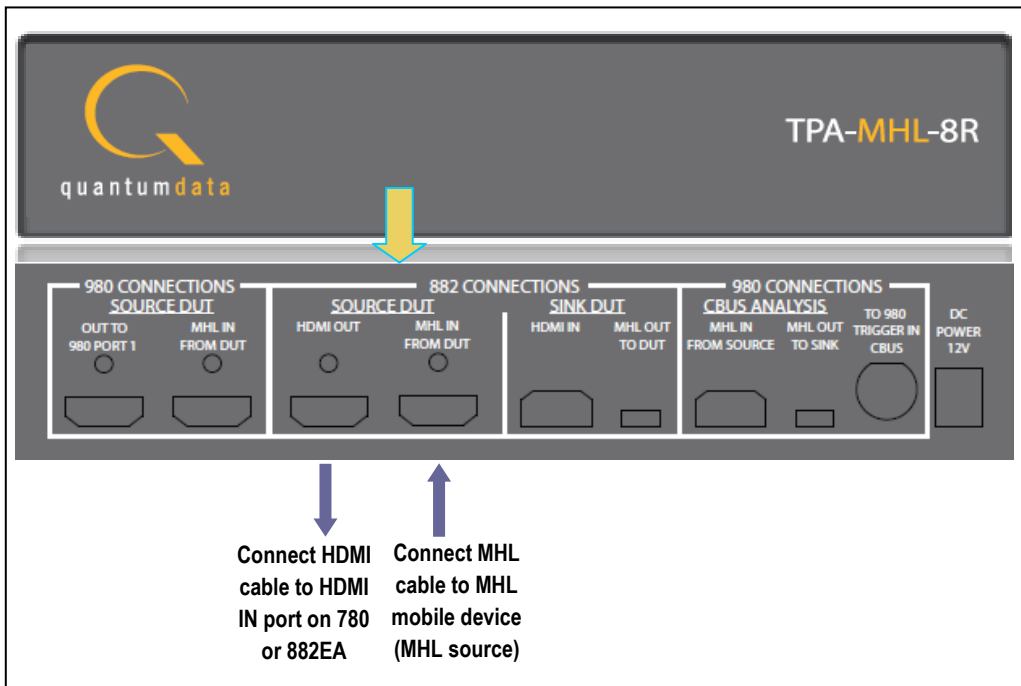
You can conduct basic protocol testing of MHL source devices using the TPA-MHL-8R and an HDMI analyzer such as the Quantum Data 882EA or 780 Handheld Test Instrument. Basic protocol analysis enables you to view snapshots of the MHL timing, video type and metadata (e.g. infoframes and data islands).

For more details on the analysis features and functions of the 882EA or 780, please refer to the Quantum Data products web page at: www.quantumdata.com/products/index.asp. Refer to the diagram below for a depiction of the test setup.



Use the procedure below to make the connections to the TPA-MHL-8R for running basic protocol tests on an MHL source device.

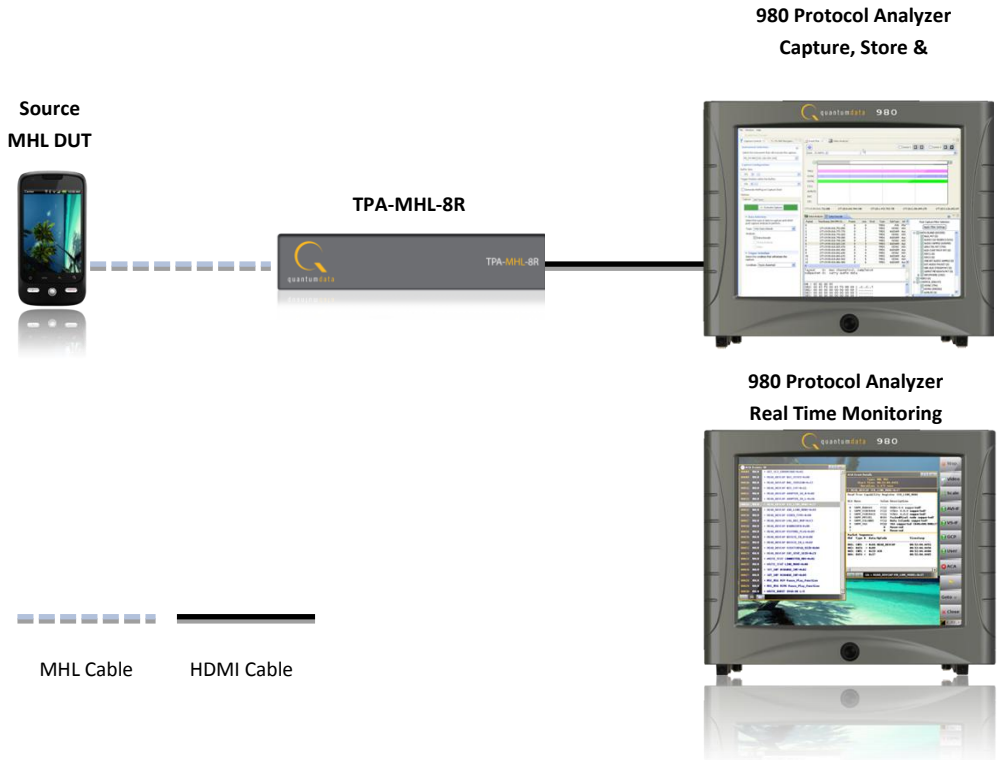
1. Apply power to the TPA-MHL-8R using the power adapter provided.
2. Make the connections as shown in the diagram below. For this application you will be using the section on the TPA-MHL-8R labeled **882 CONNECTIONS – SOURCE DUT**.
 - a. Connect an MHL cable from the MHL source device under test to the MHL IN FROM DUT connector on the TPA-MHL-8R.
 - b. Connect an HDMI cable from the HDMI OUT connector of the TPA-MHL-8R to the HDMI IN port of the 780 or 882EA.
3. Refer to the 780 or 882EA User Guide for details on how to conduct basic protocol and timing tests on an HDMI source device.



3.3 Protocol Analysis of MHL Sources

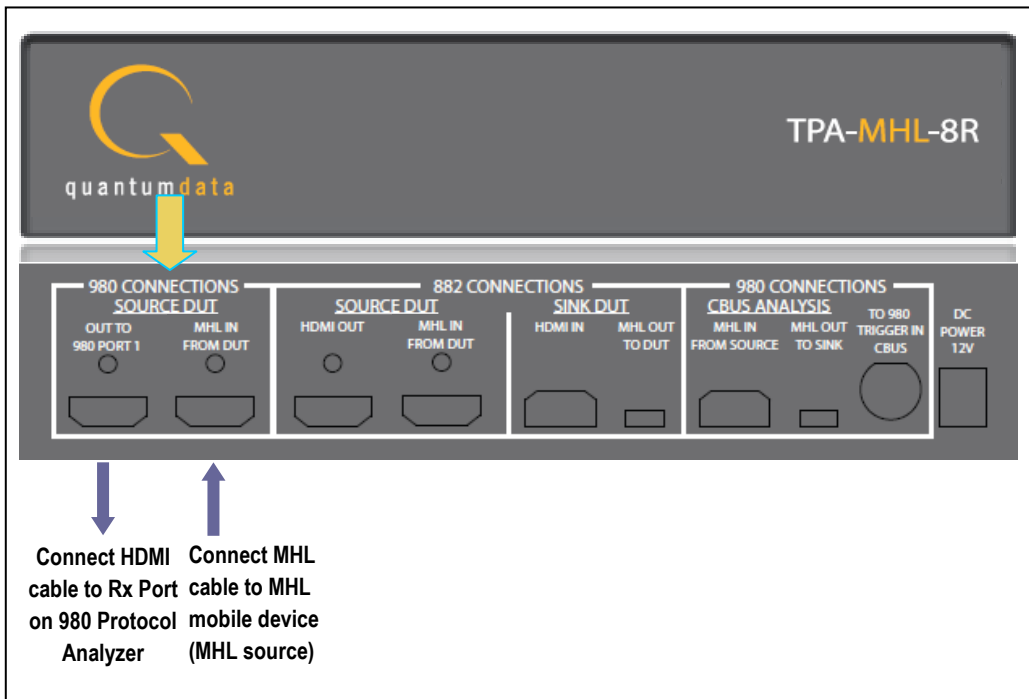
You can conduct protocol analysis of MHL source devices using the TPA-MHL-8R and the Quantum Data 980 Protocol Analyzer. Protocol analysis enables you to view the timing, video type, control data and all metadata (e.g. infoframes and data islands) with precise time stamps in real time or capture and store for analysis. You can also view the MHL C-Bus traffic.

For more details on the MHL protocol analysis functions of the 980, please refer to the 980 User Guides available on the Quantum Data 980 product web page at: www.quantumdata.com/products/980.asp. Refer to the diagram below for a depiction of the test setup.

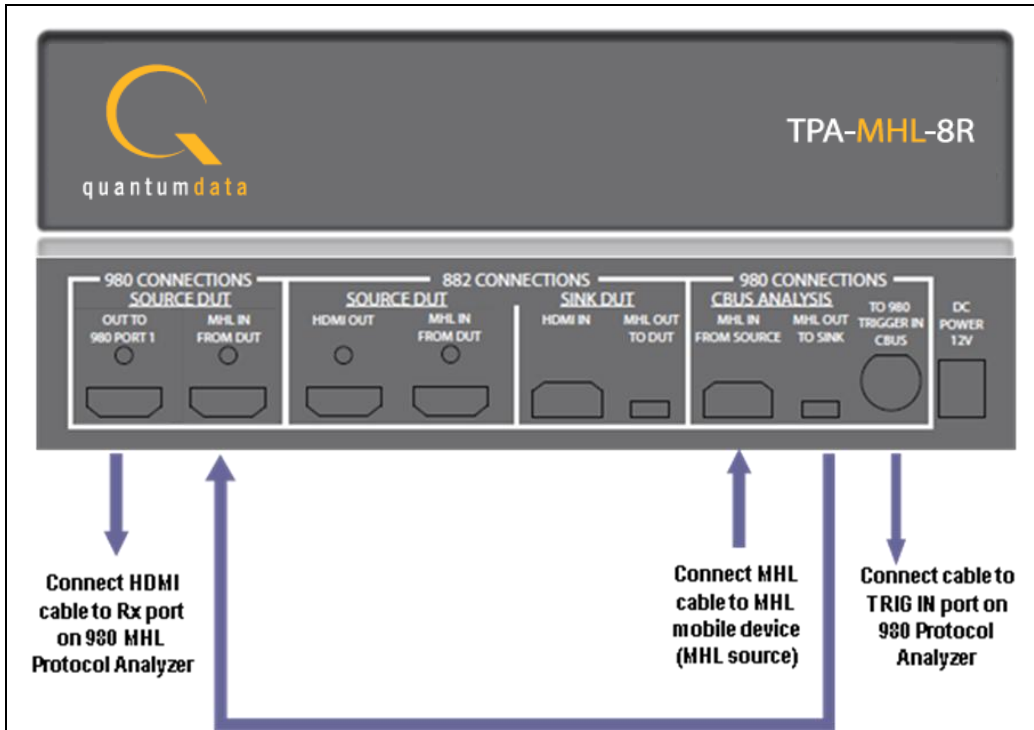


Use the procedures and diagram below to make the connections to the TPA-MHL-8R for running protocol analysis of an MHL source device.

1. Apply power to the TPA-MHL-8R using the power adapter provided.
2. Make the connections as shown in the diagram below. For this application you will be using the section on the TPA-MHL-8R labeled **980 CONNECTIONS – SOURCE DUT**.
 - a. Connect an MHL cable from the MHL source device under test to the MHL IN FROM DUT connector on the TPA-MHL-8R.
 - b. Connect an HDMI cable from the OUT TO 980 PORT 1 connector of the TPA-MHL-8R to the Rx port on the 980 Protocol Analyzer.
3. Refer to the 980 User Guide for details on how to capture, store and analyze data from the MHL source.



4. Optionally, if you wish to monitor the C-Bus transactions while monitoring the MHL stream make the following connections and refer to the diagram that follows as a reference:
 - a. Connect an MHL cable from the MHL source device under test to the MHL IN FROM SOURCE connector on the section of the TPA-MHL-8R labeled **980 CONNECTIONS – CBUS ANALYSIS**.
 - b. Connect a Coax cable from the connector labeled TO 980 TRIGGER IN CBUS on the section of the TPA-MHL-8R labeled to **980 CONNECTIONS – CBUS ANALYSIS** to the BNC connector labeled TRIG IN on the 980 Protocol Analyzer.
 - c. Connect a second MHL cable from the MHL OUT TO SINK connector on the section of the TPA-MHL-8R labeled **980 CONNECTIONS – CBUS ANALYSIS** to the MHL IN FROM DUT connector on the section of the TPA-MHL-8R labeled **980 CONNECTIONS – SOURCE DUT**.
 - d. Connect an HDMI cable from the connector labeled OUT TO 980 PORT 1 on the section of the TPA-MHL-8R labeled **980 CONNECTIONS – SOURCE DUT** to the Rx port on the 980 Protocol Analyzer.

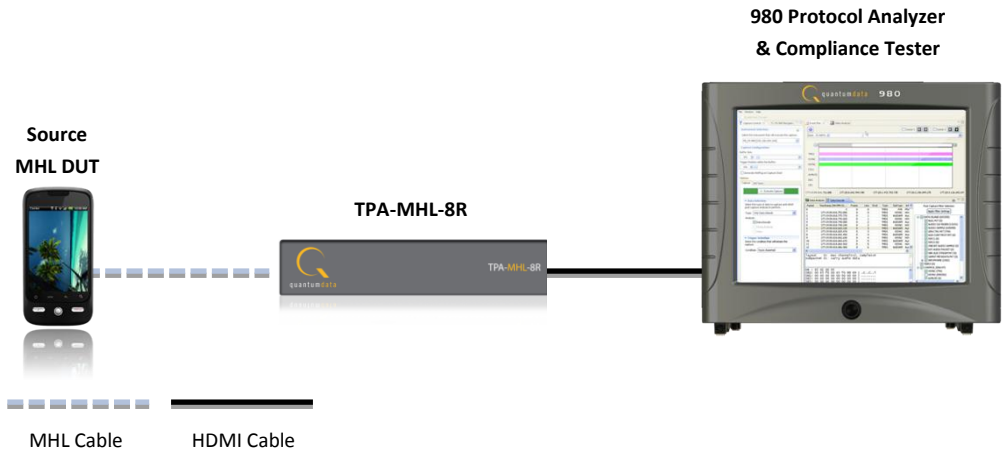


3.4 MHL Source Compliance Testing

You can run MHL compliance testing on source devices in accordance with Section 3 of the MHL Compliance Test Specification using the TPA-MHL-8R and the 980 HDMI Protocol and Compliance Tester.

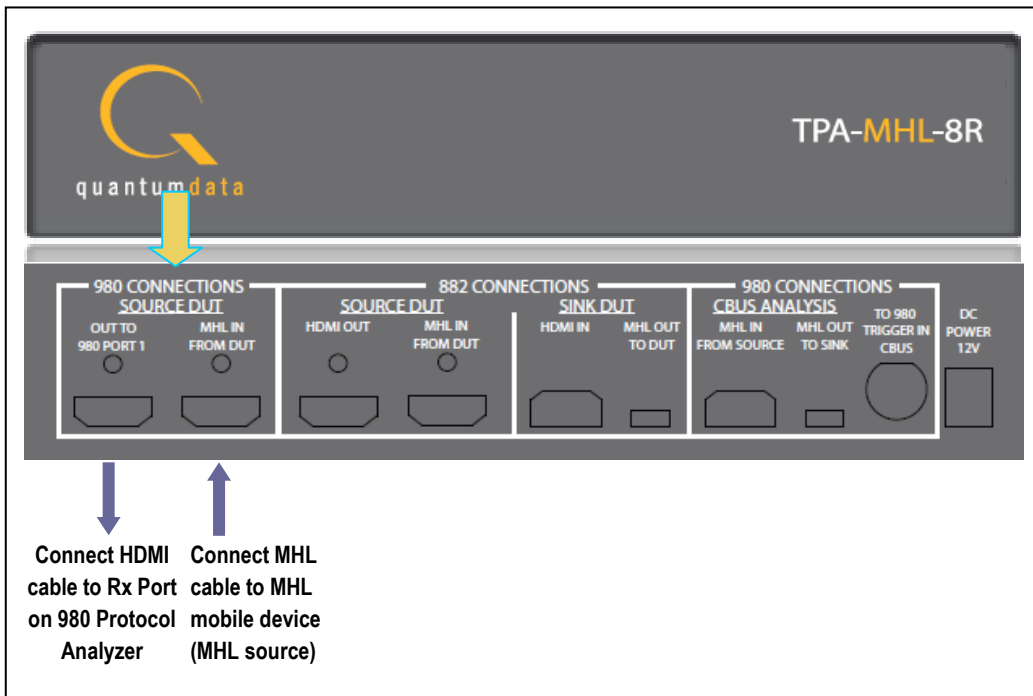
Note: You must purchase the MHL source compliance test option as part of the 980 Protocol Analyzer.

For more details on the MHL Source Compliance Test functions of the 980, please refer to the 980 User Guides available on the Quantum Data 980 product web page at: www.quantumdata.com/products/980.asp. Refer to the diagram below for a depiction of the test setup.



Use the procedure below to make the connections the TPA-MHL-8R for running source compliance tests on an MHL source device.

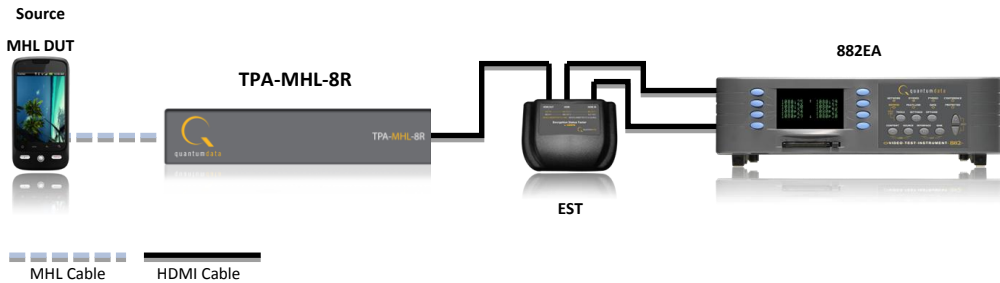
1. Apply power to the TPA-MHL-8R using the power adapter provided.
2. Make the connections as shown in the diagram below. For this application you will be using the section on the TPA-MHL-8R labeled **980 CONNECTIONS – SOURCE DUT**.
 - a. Connect an MHL cable from the MHL source device under test to the MHL IN FROM DUT connector on the TPA-MHL-8R.
 - b. Connect an HDMI cable from the OUT TO 980 PORT 1 connector of the TPA-MHL-8R to the Rx port on the 980 Protocol Analyzer.
3. Refer to the 980 MHL Compliance Test User Guide for details on how to run the MHL compliance test on an MHL source.



3.5 HDCP compliance testing for source devices

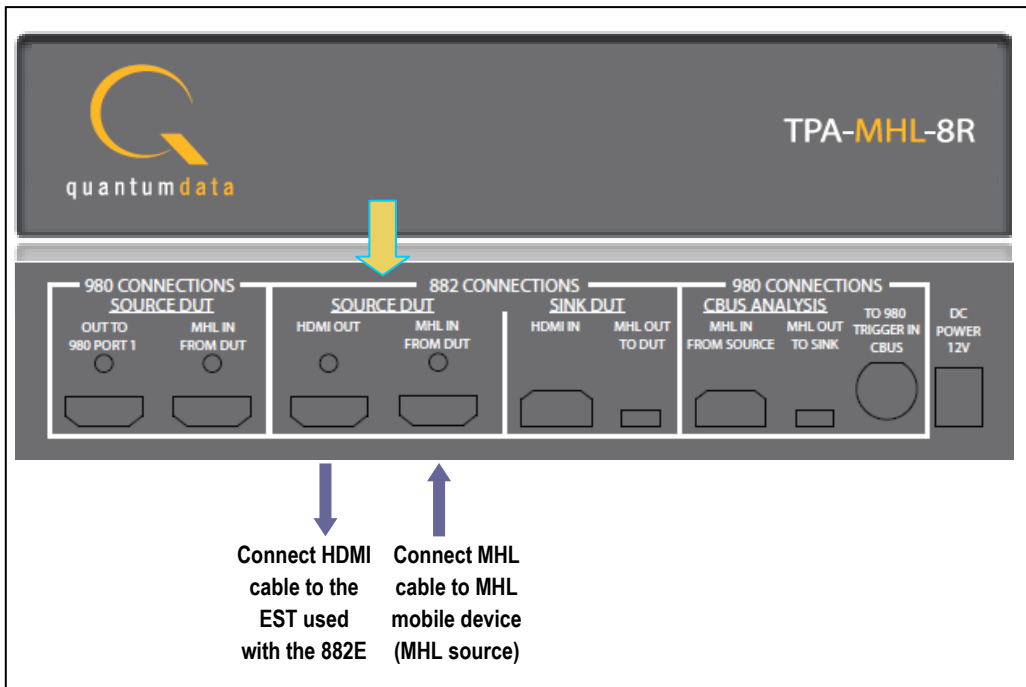
You can run HDCP compliance tests on MHL source devices in accordance with the HDCP 1.2 Compliance Test Specification. This test requires TPA-MHL-8R and 882EA with HDCP compliance test option.

For more details on the HDCP source compliance test feature of the User Guide for the 882EA Video Test Instrument available on the Quantum Data 882E product web page at: www.quantumdata.com/products/882E.asp.



Use the procedure below to make the connections to the TPA-MHL-8R for running the HDCP compliance tests on an MHL source device.

1. Apply power to the TPA-MHL-8R using the power adapter provided.
2. Make the connections as shown in the diagram below. For this application you will be using the section on the TPA-MHL-8R labeled **882 CONNECTIONS – SOURCE DUT**.
 - a. Connect an MHL cable from the MHL source device under test to the MHL IN FROM DUT connector on the TPA-MHL-8R.
 - b. Connect an HDMI cable from the HDMI OUT connector of the TPA-MHL-8R to the appropriate connector on the Encryption Status Tester (EST) and then to the 882EA HDMI IN connector.
3. Refer to the 882EA User Guide for details on how to run HDCP compliance tests on a source device.



3.6 C-BUS Protocol Monitoring of MHL Source and MHL Sinks

You can passively monitor the C-BUS transactions between an MHL source device and an MHL sink device using the TPA-MHL-8R and the Quantum Data 980 Protocol Analyzer. Passively monitoring the C-BUS enables you to view the EDID exchange and HDCP authentication transactions in real time.

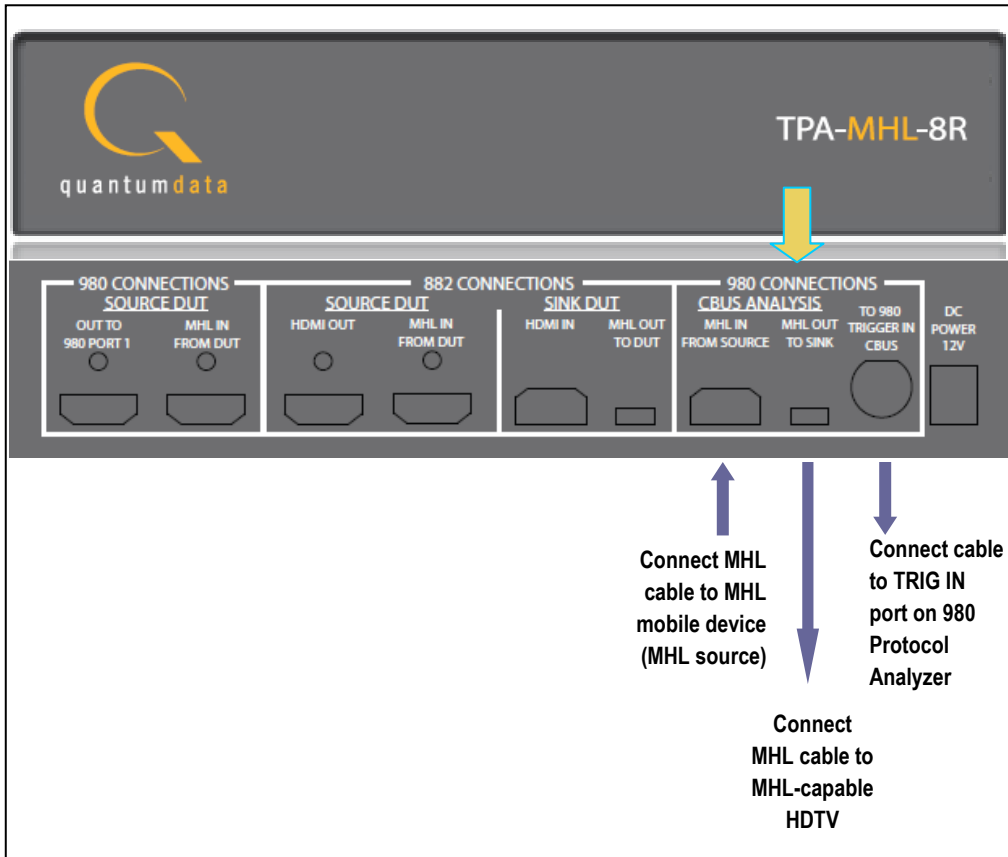
For more details on the analysis features and functions of the 980, please refer to the Quantum Data products web page at: www.quantumdata.com/products/980.asp. Refer to the diagram below for a depiction of the test setup.



Use the procedure below to make the connections to the TPA-MHL-8R for passively monitoring the C-Bus messages between an MHL source device and an MHL sink device.

1. Apply power to the TPA-MHL-8R using the power adapter provided.
2. Make the connections as shown in the diagram below. For this application you will be using the section on the TPA-MHL-8R labeled **980 CONNECTIONS – CBUS ANALYSIS**.

- a. Connect an MHL cable from the MHL source device under test to the MHL IN FROM SOURCE connector on the TPA-MHL-8R.
 - b. Connect a second MHL cable from the MHL OUT TO SINK connector on the TPA-MHL-8R to the MHL sink device.
 - c. Connect a Coax cable from the connector labeled TO 980 TRIGGER IN CBUS on the TPA-MHL-8R to the connector labeled TRIG IN on the 980 Protocol Analyzer.
3. Refer to the Real Time monitoring section of the 980 User Guide for details on how to monitor the MHL C-Bus messages.



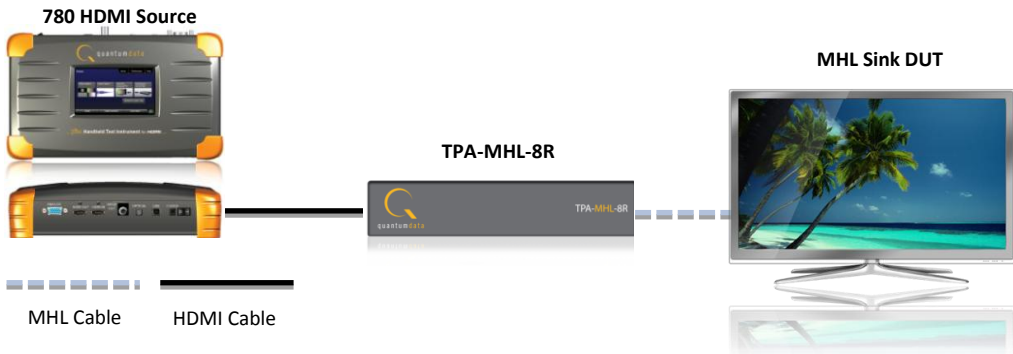
4 MHL Applications for Testing MHL Sink Devices

This section describes the MHL test applications supported by Quantum Data test instruments and utilities for testing MHL sink devices.

4.1 MHL Sink Functional Testing

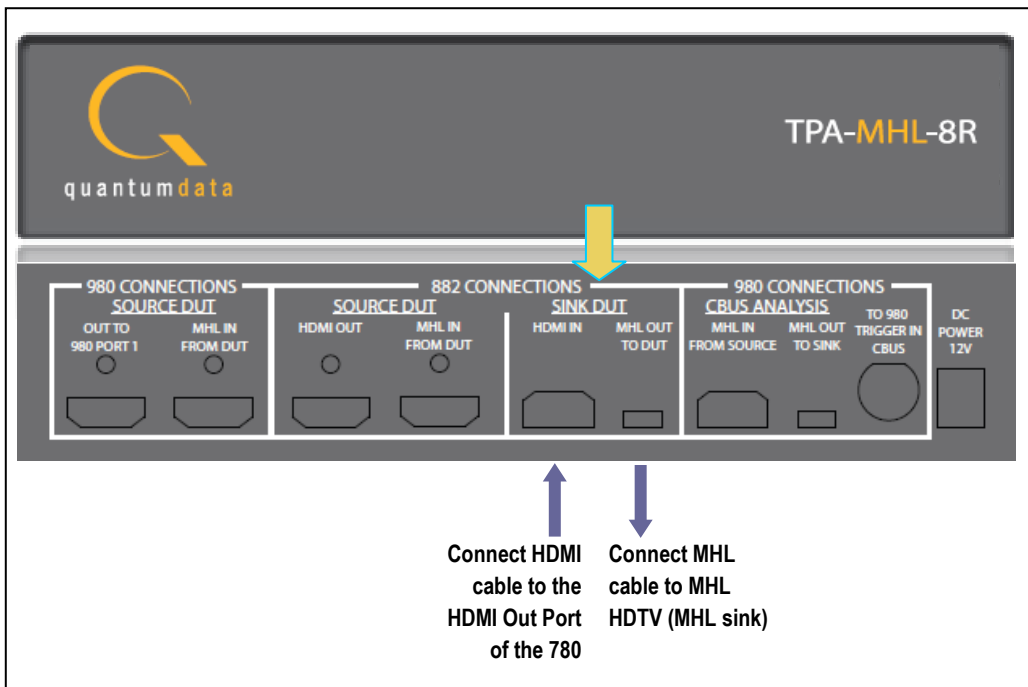
You can run a functional test on an MHL sink using the TPA-MHL-8R and the 780 HDMI Handheld Test Instrument.

For more details on the HDMI test functions of the 780, please refer to the 780 User Guide available on the Quantum Data 780 product web page at: www.quantumdata.com/products/780.asp. Refer to the diagram below for a depiction of the test setup.



Use the procedure below to make the connections for running the compliance tests on an MHL sink device.

1. Apply power to the TPA-MHL-8R using the power adapter provided.
2. Make the connections as shown in the diagram below. For this application you will be using the section on the TPA-MHL-8R labeled **882 CONNECTIONS – SINK DUT**.
 - a. Connect an MHL cable from the MHL sink device under test to the MHL OUT TO DUT connector on the TPA-MHL-8R.
 - b. Connect an HDMI cable from the HDMI IN connector of the TPA-MHL-8R to the HDMI OUT port on the 780 Handheld Test Instrument.
3. Refer to the 780 User Guide for details on how to run functional tests on the MHL/HDMI sink devices.

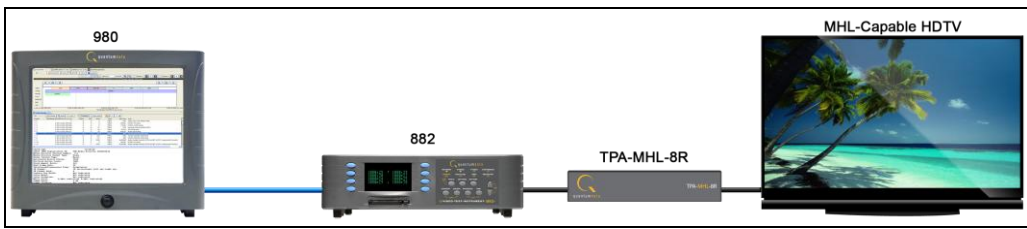


4.2 MHL Sink Compliance Testing

You can run MHL compliance testing on MHL sink devices in accordance with Section 4 of the MHL Compliance Test Specification using the TPA-MHL-8R, 882EA and the 980 HDMI Protocol and Compliance Controller.

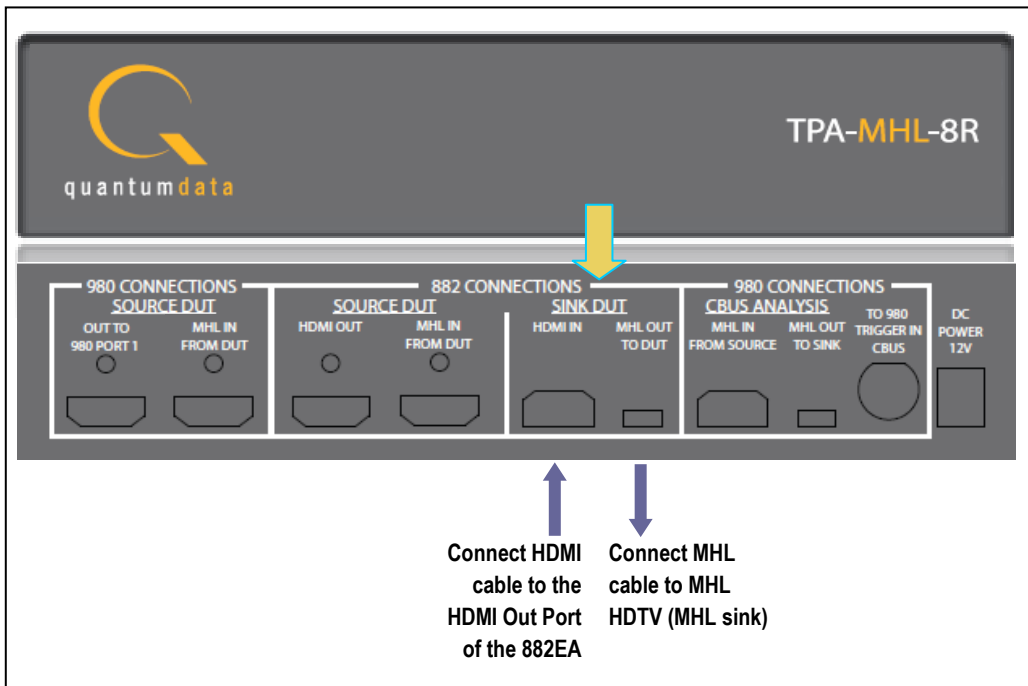
Note: You will have to purchase the MHL Sink Compliance Test option as part of the 980 Protocol Analyzer to run this test series.

For more details on the MHL Sink Compliance Test functions of the 980, please refer to the 980 User Guide for MHL compliance testing available on the Quantum Data 980 product web page at: www.quantumdata.com/products/980.asp. Refer to the diagram below for a depiction of the test setup.



Use the procedure below to make the connections for running the compliance tests on an MHL sink device.

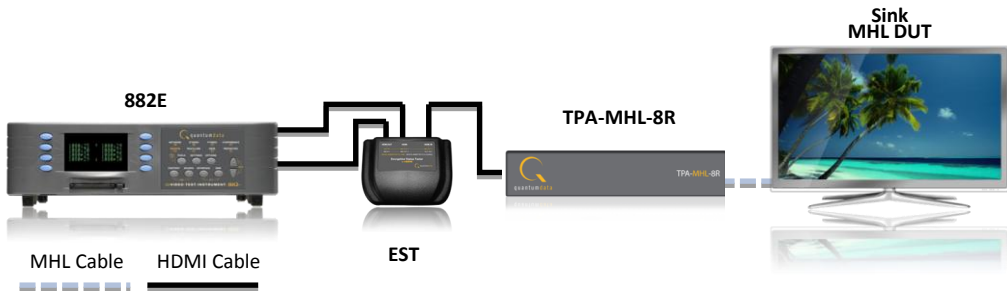
1. Apply power to the TPA-MHL-8R using the power adapter provided.
2. Make the connections as shown in the diagram below. For this application you will be using the section on the TPA-MHL-8R labeled **882 CONNECTIONS – SINK DUT**.
 - a. Connect an MHL cable from the MHL sink device under test to the MHL OUT TO DUT connector on the TPA-MHL-8R.
 - b. Connect an HDMI cable from the HDMI IN connector of the TPA-MHL-8R to the HDMI OUT port on the 882E.
3. Refer to the 980 User Guide for details on how to use the MHL compliance test application to run compliance tests on an MHL sink.



4.3 HDCP compliance testing for sink devices

You can run HDCP compliance tests on MHL sink devices in accordance with the HDCP 1.2 Compliance Test Specification. This test requires TPA-MHL-8R and 882EA with HDCP compliance test option.

For more details on the HDCP source compliance test feature of the User Guide for the 882EA Video Test Instrument available on the Quantum Data 882E product web page at: www.quantumdata.com/products/882E.asp.



1. Apply power to the TPA-MHL-8R using the power adapter provided.
2. Make the connections as shown in the diagram below. For this application you will be using the section on the TPA-MHL-8R labeled **882 CONNECTIONS – SINK DUT**.
 - a. Connect an MHL cable from the MHL sink device under test to the MHL OUT TO DUT connector on the TPA-MHL-8R.
 - b. Connect an HDMI cable from the HDMI IN connector of the TPA-MHL-8R to the appropriate port on the Encryption Status Tester (EST) and then to the 882EA HDMI OUT connector.
3. Refer to the 882EA User Guide for details on how to run HDCP compliance tests on a sink device.

