**Basic DisplayPort Rx port, two options:**

- **DP Tx for display testing**
- **Tx (2) DP Standard; Tx / Rx versions 1.3 & 2.2**
- **Lane Count:**
  - 1, 2, 4 Lanes
- **Color Depths:**
  - 8, 10, 12, 16 bits
- **Video Encoding:**
  - RGB, YCbCr
- **Video Sampling Modes:**
  - 4:4:4, 4:2:2
- **HDCP:**
  - Versions 1.3 & 2.2
- **Audio:**
  - 8 Channel LPCM programmable sine wave
- **Capture memory:**
  - 4 GBBytes

---

**Options**

- **DisplayPort Tx / Rx:**
  - Either or both:
    - - DP Tx for display testing
    - - DP Rx port, two options:
    - - Basic Analyzer
    - - Protocol Analyzer (requires Basic analyzer option)

- **DP Aux Channel Analyzer**: Monitor DisplayPort Aux Channel transactions in real time either while emulating a source or sink
- **DP HDCP 2.2 Compliance**: Run HDCP 2.2 compliance test on DisplayPort sources, sinks and repeaters
- **DP 1.2 Link Layer Compliance**: Run DisplayPort 1.2 Core Link Layer compliance test on sinks (displays)
- **Compliance Reduced Lane Count**: Compliance test for reduced lane count

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**980 Test Platforms**

- **Embedded Display**: 980B: 15” diagonal; Resolution: 1024(H)x768(V) resolution; 24 bit RGB color.
  - 980R: 7” diagonal; Resolution: 800(H)x480(V); 24 bit RGB color.
- **Power**: 90-264 VAC; 47-63Hz
- **Weight**: 23.76 LBS; 10.78 Kg
- **Size**: 980B: Height: 15.25 in (38.7 cm); Width: 14.57 in (36.5 cm); Depth: 6.29 in (15.9 cm)
  - 980R: Height: 6.29 in (15.9 cm); Width: 15.25 in (38.7 cm); Depth: 14.57 in (36.5 cm)
- **Command Line Control**: Ethernet (RJ-45) for external GUI and telnet
- **Environmental**: Operating Temp: 32 to 104 °F; 0 to 40 °C

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**SPECIFICATIONS**

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**Key Features**

- Run functional tests on DisplayPort displays and monitors up to 5.4 Gb/s link rates with standard format library consisting of 600 standard timings and over 300 test patterns.
- Run VESA Reduced Lane Count compliance tests on DisplayPort sources and displays.
- NEW! Run DCP-approved HDCP 2.2 compliance tests on DisplayPort sources, sinks and repeaters.
- Run DP 1.2 Core Link Layer compliance tests on DisplayPort sinks.
- View EDID and DPCD registers of connected display to verify contents.
- Configure link training parameters to test display’s handling of various link training configurations.
- Run audio tests using programmable LPCM sine wave audio tones.
- Monitor Link training, HDCP and EDID over the Aux Channel with the Auxiliary Channel Analyzer feature.
- Capture and decode main link metadata including main stream attributes and secondary data.
- View incoming video and metadata in real time.

---

**Source Testing**

The DP 1.2 module’s optional Rx analyzer port emulates a DisplayPort 1.2 display device including EDID and DPCD emulation, Rx Link Training function and MST Rx function. The analyzer supports HDCP 2.2 compliance testing for DisplayPort 1.2 source devices. There are two options for the analysis function for testing DisplayPort 1.2 source devices:

- Basic Analyzer – Provides real time viewing of video and metadata for functional testing.
- Protocol Analyzer – Provides capture and store of the main link including main stream attributes and secondary data.

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**Display Testing**

The 980 DP1.2 Video Generator module supports video, audio and protocol functional testing of high-end DP displays and sources. The module supports HBR2 data rates including 1.63, 2.70 & 5.40 Gb/s on 1, 2 & 4 lanes on both its Tx ports and its Rx port. The module features two DisplayPort 1.2 outputs—both active simultaneously—for testing displays with multiple DisplayPort inputs. The DP1.2 module is equipped with all the standard video timings and test patterns necessary for testing modern displays.

The 980 DP Video Generator / Protocol Analyzer module can be equipped in either the 980B or 980R Advanced Test Platform. The module can be controlled either through the PC-based 980 GUI Manager or through the embedded 980 GUI Manager running on the 980 platform itself. The 980’s built-in color touch screen provides a graphical user interface (GUI) to control the module.

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**The Teledyne LeCroy quantumdata 980 DP1.2 Video Generator / Analyzer module supports video, audio and protocol functional testing of high-end DP displays and sources. The module supports HBR2 data rates including 1.63, 2.70 & 5.40 Gb/s on 1, 2 & 4 lanes on both its Tx ports and its Rx port. The module features two DisplayPort 1.2 outputs—both active simultaneously—for testing displays with multiple DisplayPort inputs. The DP1.2 module is equipped with all the standard video timings and test patterns necessary for testing modern displays. The DP video generator also supports DCP-approved HDCP 2.2 compliance tests for DP source, sink and repeater devices and link layer compliance tests for sink 1.2 devices.**
DISPLAY TESTS - VIDEO PATTERN TESTING FOR UHD TVs

Video Testing
The 980 DP Video Generator / Analyzer module supports video and audio functional testing at link rates up to 5.4 Gb/s on 1, 2 and 4 lanes to support high resolution formats. The 980 DP Video Generator / Analyzer module has an extensive set of video formats and library of test patterns. You can set any pattern in motion to test motion artifacts with the Image Shift feature.

Audio Testing
The module offers a programmable LPCM audio sine wave generator enabling you to set the number of channels (up to 8), the amplitude, frequency, sampling rate and bit depth for uncompressed formats.

980 with DP Video Generator / Analyzer module

Test Setup for Sink Test

Link Training Control and Configuration
The module’s link training control feature enables you to configure the link training parameters during testing. You can set limits on the lane count and link rate and allow the link training engine to establish link training based on those limitations or you can force link training parameters—lane count, link rate, voltage swing, pre-emphasis.

Format Selection

Test Pattern Selection

Link Training Control and Configuration

Protocol Testing
The 980 DP Video Generator module offers a variety of features for testing DisplayPort protocols. You can verify HDCP 1.3 and optionally HDCP 2.2 authentication transactions between the module’s Tx port and a DP 1.2 display. The module’s EDID Decode feature enables you to examine the EDID of the connected display in text. The DPCD Decode feature enables you to examine the DPCD registers of the connected display. You can read the EDID and/or the DPCD of downstream MST nodes.

EDID Decode View

SCDC Register View

HDCP 2.2 Test

Multi-Stream Transport
The DP1.2 Video Generator module emulates an MST source for testing an MST branch device or MST-capable monitor. Up to four (4) streams are supported with a depth of one. The Auxiliary Channel Analyzer (ACA) utility depicts the MST negotiations with the connected MST Rx device.

Auxiliary Channel Analyzer
The 980 DP Video Generator / Analyzer module’s Auxiliary Channel Analyzer (ACA) feature enables you to monitor the DP Aux Channel for link training and MST negotiations, HDCP transactions and EDID exchanges between the module and a connected display. The ACA logs these events and assigns precise timestamps to them. You can view the details of each transaction. These ACA logs can be saved and disseminated for further analysis by colleagues and other subject matter experts.

Aux Channel Analyzer
**Video Testing**

The 980 DP Video Generator / Analyzer module supports video and audio functional testing at link rates up to 5.4 Gb/s on 1, 2 and 4 lanes to support high resolution formats. The 980 DP Video Generator / Analyzer module has an extensive set of video formats and library of test patterns. You can set any pattern in motion to test motion artifacts with the Image Shift feature.

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**Protocol Testing**

The 980 DP Video Generator / Analyzer module’s Auxiliary Channel Analyzer (ACA) feature enables you to monitor the DP Aux Channel for link training and MST negotiations, HDCP transactions and EDID exchanges between the module and a connected display. The ACA logs these events and assigns precise timestamps to them. You can view the details of each transaction. These ACA logs can be saved and disseminated for further analysis by colleagues and other subject matter experts.

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Capture and Decode

The 980 DP Video Generator / Analyzer module captures and decodes the main link attributes in order to diagnose interoperability issues related to them. The Protocol Analyzer captures and stores main link data and provides visibility into main stream attributes, secondary data elements, K-Characters and protocol errors. The Protocol Analyzer presents these elements on a graphical timeline and in a table. You can search for data and select any transaction in the table to view its details. The capture utility also enables you to capture specific MST streams from the source.

Capture and Decode (Filter View)

Capture and Decode (Search)

Real Time Analysis (Basic Analyzer)

The 980 DP Video Generator / Analyzer module’s Real Time analysis feature enables you to view the incoming video, lanes and link rate, timing, colorimetry and various other metadata in real time at a glance. The Real Time mode provides a basic confidence test to verify that the incoming video is essentially correct. The Rx port emulates any EDID on the DP-Rx port using the DPCD Editor (below).

Aux Channel Analyzer

The 980 DP Video Generator / Analyzer module’s Auxiliary Channel Analyzer (ACA) feature enables you to monitor the DP Aux Channel for link training and MST negotiations, HDCP transactions and EDID exchanges between the module and a connected display. The ACA logs these events and assigns precise timestamps to them. You can view the details of each transaction. These ACA logs can be saved and disseminated for further analysis by colleagues and other subject matter experts.

Auxiliary Channel Analyzer

DPCD Editor

Link Training Status

Test Setup for Source Analysis (Capture/Decode)
Capture and Decode
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Real Time Analysis
Real Time Analysis (Basic Analyzer)
Real Time Analysis (Search)

Aux Channel Analyzer
The 980 DP Video Generator / Analyzer module’s Auxiliary Channel Analyzer (ACA) feature enables you to monitor the DP Aux Channel for link training and MST negotiations, HDCP transactions and EDID exchanges between the module and a connected display. The ACA logs these events and assigns precise timestamps to them. You can view the details of each transaction. These ACA logs can be saved and disseminated for further analysis by colleagues and other subject matter experts.

Auxiliary Channel Analyzer
Auxiliary Channel Analyzer

Link Training Status
DPCD Editor
DPCD Editor
**HDCP 2.2 SOURCE, SINK & REPEATER COMPLIANCE**

**HDCP 2.2 Compliance (DCP Approved)**

The 980 HDCP 2.2 compliance tests are ideal for pre-testing your DisplayPort 1.2 source, sink or repeater product prior to submission to an Authorized Test Center for approval. Pre-testing provides assurance that your product will pass at the ATC when submitted. The compliance tests enable you to view the auxiliary channel analyzer traces logged during the test to help diagnose the cause of compliance test failures.

**HDCP 2.2 Source Tests - Test Selection**

**DP Source**

980 DP Video Generator / Analyzer module

Test Setup for Source Analysis (Capture/Decode)

980 with DP Video Generator / Analyzer module

DisplayPort Monitor

**DisplayPort Link Layer Compliance**

The 980 DP sink (display) link layer compliance tests are ideal for pre-testing your DisplayPort 1.2 display product prior to submission to an Authorized Test Center for approval. Pre-testing provides added assurance that your product will pass at the ATC when submitted. Where permitted, you can self-test your product. Self-testing offers greater benefits for time to market and cost reduction than pre-testing by avoiding submission to the ATC for approval. The compliance tests (below right) enable you to view the captured data and detailed test results which help pinpoint the cause of compliance test failures. You can link to the aux channel traces in the Aux Channel Analyzer (ACA) to view the root cause of failures (below).

**HDCP 2.2 Sink Tests - Test Selection**

**DP 1.2 Core Link Layer Compliance - Test Selection**

**DP 1.2 Core Link Layer Compliance - Test Results**

**DP 1.2 Aux Channel Traces – From LLC Test**
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The 980 HDCP 2.2 compliance tests are ideal for pre-testing your DisplayPort 1.2 source, sink or repeater product prior to submission to an Authorized Test Center for approval. Pre-testing provides assurance that your product will pass at the ATC when submitted. The compliance tests enable you to view the auxiliary channel analyzer traces logged during the test to help diagnose the cause of compliance test failures.

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HDCP 2.2 Source Tests - Test Selection

HDCP 2.2 Source Tests - Test Results

HDCP 2.2 Sink Tests - Test Selection

HDCP 2.2 Sink Tests - Test Results

DP 1.2 Core Link Layer Compliance - Test Selection

DP 1.2 Core Link Layer Compliance - Test Results

DP 1.2 Aux Channel Traces – From LLC Test

DP Source
980 DP Video Generator / Analyzer module

Test Setup for Source Analysis (Capture/Decode)

980 with DP Video Generator / Analyzer module
DisplayPort Monitor

Test Setup for Sink Test

HDCP 2.2 Source Tests - Test Selection

HDCP 2.2 Source Tests - Test Results

HDCP 2.2 Sink Tests - Test Selection

HDCP 2.2 Sink Tests - Test Results

DP 1.2 Core Link Layer Compliance - Test Selection

DP 1.2 Core Link Layer Compliance - Test Results

DP 1.2 Aux Channel Traces – From LLC Test
**SPECIFICATIONS**

**DisplayPort Tx and Rx Ports**

- **Version**: DisplayPort 1.2
- **Standard Formats**: VESA
- **Connectors**: Tx (2) DP Standard; Rx (1) DP Standard
- **Protocol**: DisplayPort
- **Video Data Rates**: 1.62, 2.70, 5.40 Gb/s Link rates
  - 1, 2, 4 Lanes
- **Color Depths**: 8, 10, 12, 16 bits
- **Video Encoding**: RGB, YCbCr
- **Video Sampling Modes**: 4:4:4, 4:2:2
- **HDCP**: Versions 1.3 & 2.2
- **Audio**: 8 Channel LPCM programmable sine wave
- **Capture memory**: 4 GBBytes

**Options**

- **DisplayPort Tx / Rx**: Either or both:
  - DP Tx for display testing
  - DP Rx port, two options:
    - Basic Analyzer
    - Protocol Analyzer (requires Basic analyzer option)

- **DP Aux Channel Analyzer**: Monitor DisplayPort Aux Channel transactions in real time either while emulating a source or sink

- **DP & HDCP 2.2 Compliance**: Run DCP-Approved HDCP 2.2 compliance test on DisplayPort sources, sinks & repeaters

- **DP 1.2 Link Layer Compliance**: Run DisplayPort 1.2 Core Link Layer compliance test on sinks (displays)

- **Compliance Reduced Lane Count**: Compliance test for reduced lane count

**980 Test Platforms**

- **Embedded Display**: 980B: 15” diagonal; Resolution: 1024(H) x 768 (V) resolution; 24 bit RGB color.
  980R: 7” diagonal; Resolution: 800 (H) x 480 (V); 24 bit RGB color.
- **Power**: 90–264 VAC; 47–63Hz
- **Weight**: 23.76 LBS; 10.78 Kg
- **Size**: 980B: Height: 15.25 in. (38.7 cm); Width: 14.57 in. (36.5 cm); Depth: 6.29 in. (15.9 cm)
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- **Command Line Control**: Ethernet (RJ-45) for external GUI and telnet
- **Environmental**: Operating Temp: 32 to 104 (F); 0 to 40 (C)

Key Features

- **Run functional tests on DisplayPort displays and monitors up to 5.4 Gb/s link rates with standard format library consisting of 600 standard timings and over 300 test patterns**

- **Run VESA Reduced Lane Count compliance tests on DisplayPort sources, sinks & repeaters**

- **Run HDCP 2.2 compliance tests on DisplayPort sinks and repeaters**

- **NEW! Run DP 1.2 Core Link Layer compliance tests on DisplayPort sinks**

- **View EDID and DPCD registers of connected display to verify contents**

- **Configure link training parameters to test display’s handling of various link training configurations**

- **Run audio tests using programmable LPCM sine wave audio tones**

- **Monitor Link training, HDCP and EDID over the Aux Channel with the Auxiliary Channel Analyzer feature**

- **Capture and decode main link metadata including main stream attributes and secondary data.**

- **View incoming video and metadata in real time**

The Teledyne LeCroy quantumdata 980 DP1.2 Video Generator / Analyzer module supports video, audio and protocol functional testing of high-end DP displays and sources. The module supports HBR2 data rates including 1.63, 2.70 & 5.40 Gb/s on 1, 2 & 4 lanes on both its Tx ports and its Rx port. The module features two DisplayPort 1.2 outputs—both active simultaneously—for testing displays with multiple DisplayPort inputs. The DP1.2 module is equipped with all the standard video timings and test patterns necessary for testing modern displays.

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**Source Testing**

The DP 1.2 module's optional Rx analyzer port emulates a DisplayPort 1.2 display device including EDID and DPCD emulation, Rx Link Training function and MST Rx function. The analyzer supports HDCP 2.2 compliance testing for DisplayPort 1.2 source devices. There are two options for the analysis function for testing DP 1.2 source devices:

- **Basic Analyzer** – Provides real time viewing of video and metadata for functional testing.
- **Protocol Analyzer** – Provides capture and store of the main link including main stream attributes and secondary data.

**Display Testing**

The 980 DP1.2 Video Generator module supports video, audio and protocol functional testing high-end DP 1.2 displays. The module supports HBR2 data rates including 1.63, 2.70 & 5.40 Gb/s on 1, 2 & 4 lanes on both its Tx ports and its Rx port. The module features two DisplayPort 1.2 outputs—both active simultaneously—for testing displays with multiple DisplayPort inputs. The DP module is equipped with all the standard video timings and test patterns necessary for testing modern displays.

The DP video generator also supports HDCP 2.2 compliance testing for DisplayPort sink devices and link layer compliance testing for sink 1.2 devices.