TELEDYNE LECROY
Everywhereyoulook™

quantumdata™ 980 HDMI Protocol Analyzer Module

Deep Analysis and Compliance Testing

Key Features

- **Captures and decodes metadata, control data, protocol data, data islands, InfoFrames and auxiliary channel data**
- **Captured data presented graphically in Event Plot and in Data Decode Table; searching and filtering data are supported**
- **Captures video frames and timing data over multiple frames**
- **Provides log of auxiliary channels such as display data channel for monitoring HDCP (including HDCP 2.2) and EDID transactions**
- **Enables capturing of incoming video and replaying it out the HDMI Tx connector**
- **Monitors all protocol, metadata and auxiliary channel data passively between an HDMI source and sink**
- **Provides real time view of incoming video and metadata**
- **Supports various HDMI 2.0 source and sink compliance tests**
- **Supports HDMI, HDCP 1.4 & 2.2 compliance testing**
- **Supports HDMI 1.4 source and sink compliance testing**

The Teledyne LeCroy quantumdata 980 HDMI Protocol Analyzer module is equipped with both an HDMI Rx and HDMI Tx port. The HDMI Rx analyzer port provides full visibility into the HDMI and MHL video, protocol, metadata, timing, control and auxiliary data. The module supports analysis of HDMI and MHL source devices as well as compliance testing for HDMI and MHL source and sink devices. For HDMI, the 980 HDMI Protocol Analyzer module operates at TMDS clock rates up to 300MHz to support analysis and HDMI 2.0 compliance testing of Ultra HD capable source devices.

Deep Analysis

The 980 HDMI 300MHz Protocol Analyzer module provides the deep analysis and compliance test features necessary to enable you to get your product to market more quickly and with reduced expense. Deep analysis enables you to identify and resolve interoperability problems early in the product life cycle. Unlike competing analyzers for HDMI and MHL protocol testing, the 980 captures all protocol data, data islands and control packets with accurate timestamps.

The 980 HDMI Protocol Analyzer module also supports a wide range of HDMI and MHL compliance tests for both sources and sinks including HDMI 1.4b, HDMI 2.0 and HDCP 2.2 (Now Approved by DCP).

Operation

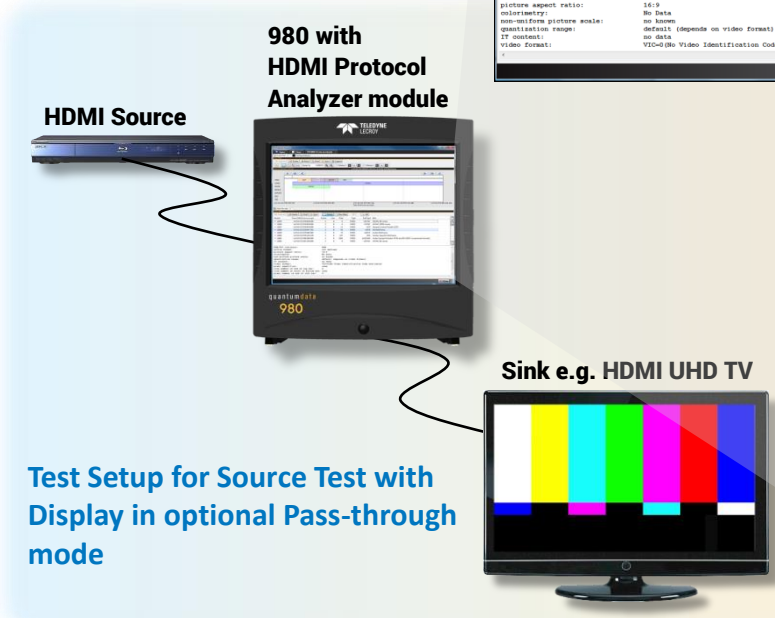
The 980 HDMI Protocol Analyzer module operates in one of two modes: 1) Capture and Store or 2) Real Time Monitoring. In the Capture and Store mode, The 980 HDMI Protocol Analyzer captures and decodes encrypted or unencrypted metadata (protocol data, audio sample, InfoFrames and other data islands) as well as HDMI DDC and MHL C-Bus transactions and HDMI CEC messages. Once the data is captured, the 980 Manager presents the data in an easy to understand way through its GUI graphical user interface.

In the Real Time monitoring mode, you can monitor incoming video and metadata in real time through the front panel display.

CAPTURE/DECODE AND REAL TIME ANALYSIS

Capture and Decode

The 980 HDMI Protocol Analyzer captures and decodes incoming encrypted or unencrypted metadata (protocol data, audio samples, InfoFrames, data islands, DDC channel etc.) from a source up to 300 MHz pixel rate. The captured data enables you to identify and resolve interoperability problems early in the product life cycle. Unlike competing analyzers for HDMI protocol testing, the module captures *all* protocol data, data islands and control packets with accurate timestamps.

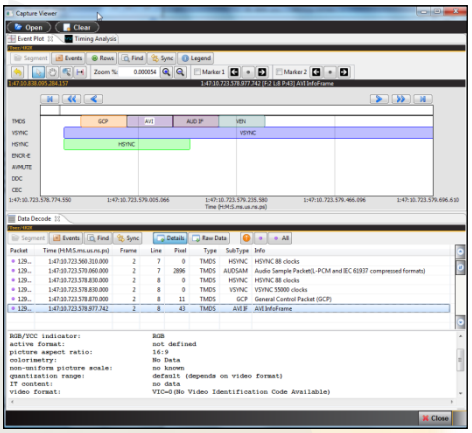


Test Setup for Source Test with Display in optional Pass-through mode

Timing & Video Analysis

The capture and decode feature also captures video frames and timing data. You can apply a filter to capture only timing data in order to catch intermittent timing anomalies.

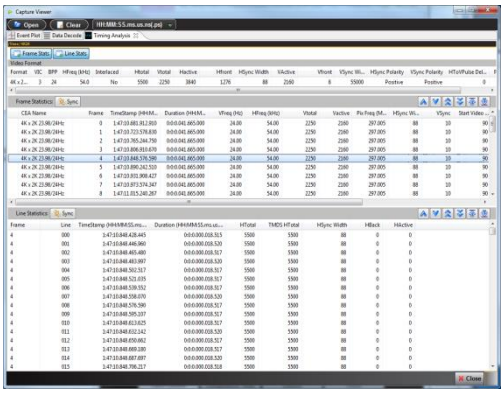
Capture and Decode



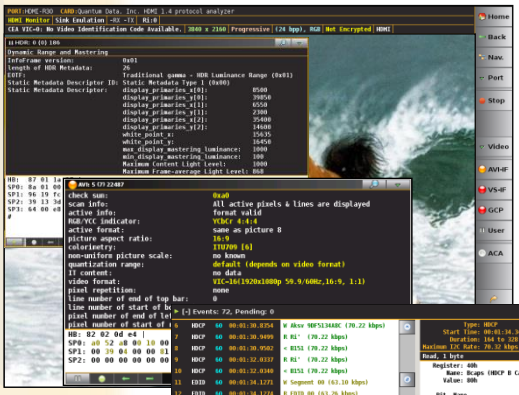
Capture Playback

The 980 Protocol Analyzer can capture incoming HDMI or MHL streams, store them and then replay them out the HDMI Tx port. This enables you to reproduce interoperability or compliance test failures in the lab.

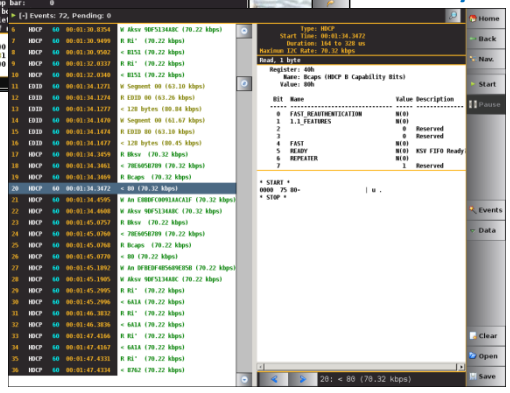
Timing Analysis



Real Time analysis showing video & InfoFrames



Aux Channel Analyzer



Real Time Analysis

The 980 Protocol Analyzer's Real Time analysis feature enables you to monitor the incoming video and metadata, data islands and Info-Frames including High Dynamic Range InfoFrames. A status bar provides an at-a-glance view of the essential incoming video parameters. You can monitor from a source or monitor passively between a source and a sink.

Aux Channel Analyzer

You can use the 980 HDMI Protocol Analyzer to monitor the HDCP (including HDCP 2.2) and EDID transactions occurring over the HDMI DDC channel. You can also monitor CEC messages over the CEC bus. You can view these real time logs when emulating a sink or you can monitor these transactions passively between a source and a sink.

Passive Monitoring

The passive monitoring feature captures and decodes video, meta-data, control data and protocol data passively between a source and a sink device up to 300MHz. This enables you to isolate complex interoperability problems between devices.

COMPLIANCE TEST FEATURES

Compliance Testing

The 980 compliance tests are ideal for pre-testing your 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, the 980 HDMI Protocol Analyzer can be used to 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 enable you to view the captured data (for sources) and detailed test results which help pinpoint the cause of compliance test failures.

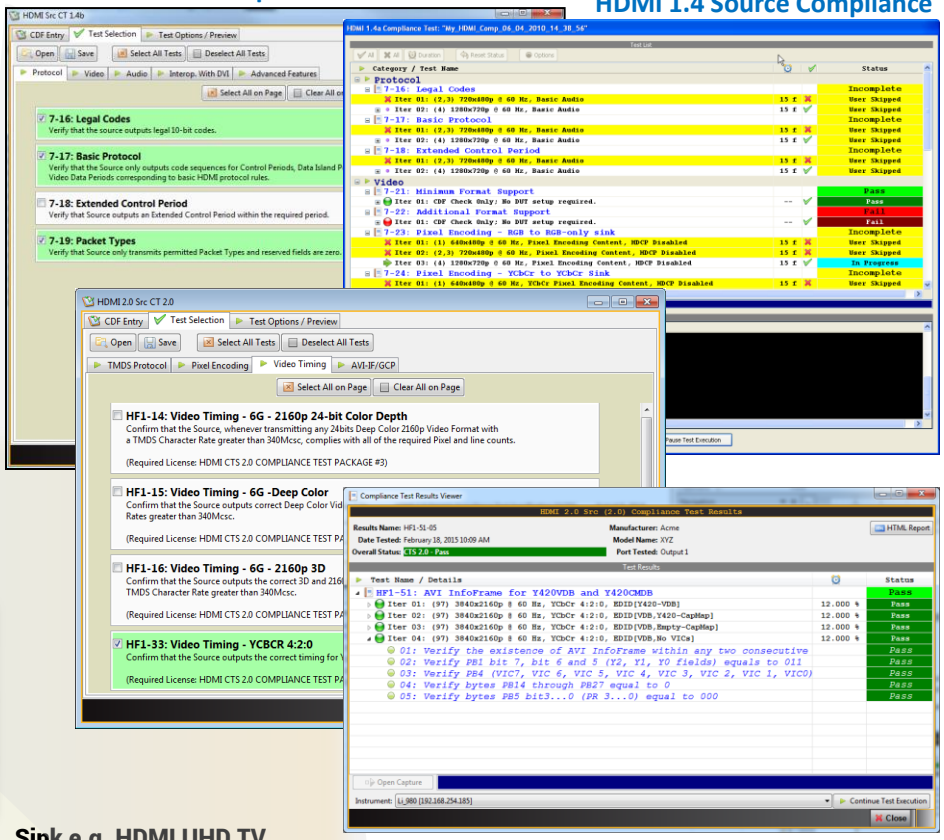
HDMI 1.4 Compliance Tests

The 980 HDMI Protocol Analyzer supports testing of HDMI source devices for compliance to Sections 7.4 through 7.8 of the HDMI CTS 1.4 for sources and Sections 8.2 through 8.8 for sinks.

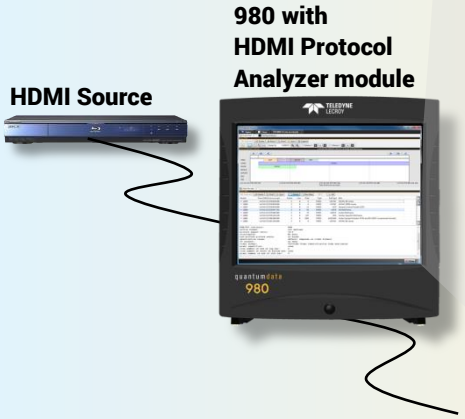
HDMI 2.0 Compliance Tests

The 980 HDMI Protocol Analyzer supports various HDMI 2.0 source and sink compliance tests (MOIs) for Sections 7.2 through 7.7 for sources and Sections 8.3, 8.8 and 8.9 for sinks.

HDMI 1.4 Source Compliance – Test Selection

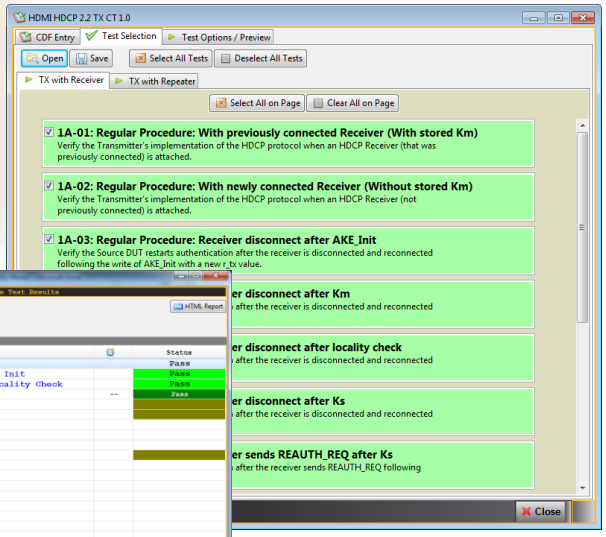


Results Log
HDMI 1.4 Source Compliance



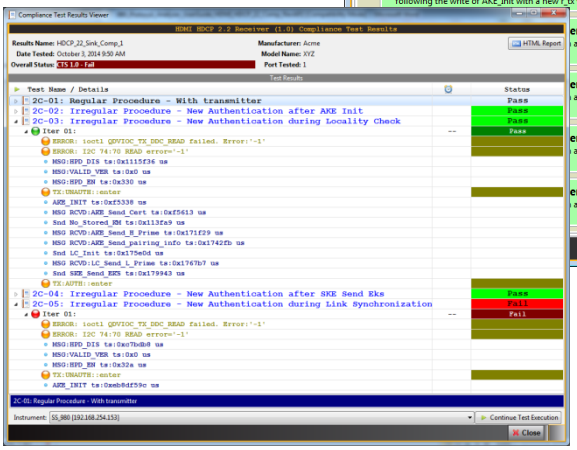
Test Setup for Source and Sink Compliance Tests

HDMI HDCP 2.2 Source Compliance – Test Selection



HDCP Compliance Tests

The 980 HDMI Protocol Analyzer module supports all tests for HDCP 1.4 source devices and supports all tests for HDPC 2.2 source (Now Approved by DCP), sink and repeater devices. Detailed reports pinpoint failures. You can monitor the HDCP authentication transactions during the compliance test with the auxiliary channel analyzer.



Test Results
HDMI HDCP 2.2 Compliance

SPECIFICATIONS

HDMI Rx Port

Version	HDMI 2.0a
Standard Formats	VESA, CEA
Connector	Type A Rx
Protocol	HDMI, DVI
Video Colorimetry	ITU-R BT.601-5, ITU-R BT.709-5
Video Max Pixel Rate	300MHz (3.00 Gbps/channel TMDS rate)
Color Depths	8, 10, 12 bits
Video Encoding/Sampling	RGB, YCbCr; 4:4:4, 4:2:2, 4:2:0
HDCP	Versions 1.4 & 2.2
Capture memory	4 GBytes

HDMI Tx Port

Version	HDMI 2.0a
Standard Formats	VESA, CEA
Connector	Type A Rx
Video Colorimetry	ITU-R BT.601-5, ITU-R BT.709-5
Video Max Pixel Rate	300MHz
Color Depths	8, 10, 12 bits
Video Encoding/Sampling	RGB, YCbCr; 4:4:4, 4:2:2, 4:2:0 per HDMI 2.0
HDCP	Version 1.4 & 2.2

Compliance Test Support

HDMI 1.4b Source	Sections: 7.4 Protocol; 7.5 Video; 7.6 Audio; 7.7 DVI; 7.8 Advanced Features
HDMI 1.4b Sink	Sections: 8.2 EDID; 8.4 Protocol; 8.5 Video; 8.6 Audio; 8.7 DVI; 8.8 Adv. Feat.
MHL 1.2, 1.3, 1.4, 2.0, 2.1 Src	Sections 3 and 6
MHL 1.2, 1.3, 1.4, 2.0, 2.1 Snk	Sections 4 and 6
MHL 1.2, 1.3, 1.4, 2.0, 2.1 Dngl	Sections 5 and 6
HDMI HDCP 1.2 Source	Sections 1A and 1B
HDMI HDCP 2.2 Source	Sections 1A and 1B
HDMI HDCP 2.2 Sink	Section 2C
HDMI HDCP 2.2 Repeater	Sections 3A, 3B, 3C 2C
HDMI 2.0 Source	Various tests in Sections: 7.2 Protocol; 7.3 Pixel Encoding; 7.4 Video Timing; 7.6 HDMI VSIF; 7.7 AVI InfoFrame
HDMI 2.0 Sink	Various tests in Sections: 8.3 Pixel Encoding; 8.8 EDID; 8.9 E-DDC Protocol

Options

Encrypted Link Analyzer	Passively monitor encrypted HDMI stream between source & sink
HDMI Aux Channel Analyzer	Monitor HDMI DDC transactions and CEC message in real time
Compliance Test Packages	See list in table above

Aux Connectors

SPDIF IN	RCA; Audio Return Channel receive for HDMI source
SPDIF OUT	RCA; Audio Return Channel transmit for HDMI sink
Ethernet	(2) RJ-45 HDMI Ethernet Channel

980B Test Platform

Embedded Display	15" diagonal; Resolution: 1024(H); x 768 (V) resolution; 24 bit RGB color.
Power	90-264 VAC, 47-63Hz
Weight	23.76 LBS; 10.78 Kg
Size	Height: 15.25 in. (38.7 cm) Width: 14.57 in. (36.5 cm) Depth: 6.29 in. (15.9 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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