

# 980 HDMI 300MHZ PROTOCOL ANALYZER MODULE



The 980 HDMI 300MHz Protocol Analyzer module can be equipped in any of the 980 Advanced Test Platforms: 1) 980, 2) 980B (shown above) or 3) 980R. It is equipped in the 980 platform as a standard feature and can optionally be equipped in the 980B or 980R. The 980 HDMI Protocol Analyzer module is equipped with an HDMI Rx and an HDMI Tx port. The HDMI Rx analyzer port provides full visibility into the HDMI and MHL protocol, metadata, timing, control and auxiliary data at HDMI 1.4b speeds. The module offers 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 4K-capable source devices.

# "DEEP ANALYSIS" DIAGNOSING INTEROPERABILITY PROBLEMS

The 980 HDMI 300MHz Protocol Analyzer 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. 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. Unlike competing analyzers for HDMI and MHL protocol testing, the 980 captures all protocol data, data islands and control packets with accurate timestamps even when they are transmitted in rapid succession.

# COMPLIANCE PRE-TESTING AND SELF-TESTING

The comprehensive suite of HDMI 1.4b, 2.0 and MHL 1.2, 1.3, 2.0 & 2.1 compliance test tools for sources, sinks, dongles (MHL). Compliance tests supported for HDMI 2.0 include 4:2:0 pixel encoding for sources and sinks and EDID and Read Request testing for HDMI 2.0 sinks. Compliance tests are ideal for pre-testing your product prior to submission to an Authorized Test Center (ATC) for approval. Pre-testing provides added assurance that your product will pass on the first submission to the ATC. Where permitted, the 980 HDMI Protocol Analyzer module can be used to self-test your product. Self-testing offers even greater benefits for time to market and cost reduction than pre-testing by avoiding submission to the ATC for approval. The module provides all the necessary raw data test results to demonstrate compliance. HDCP 1.4 source and HDCP 2.2 source, sink and repeater compliance test solutions are also offered as optional packages.

### **OPERATIONAL MODES**

The 980 HDMI Protocol Analyzer module operates in one of two modes: Capture and Store or Real Time Monitoring. In the Capture and Store mode, the module captures and decodes either unencrypted or HDCP encrypted HDMI or MHL metadata. You can trigger a capture on a variety of conditions or events that occur in the various data types and on specific values of a data type. Once the data is captured, the 980 Manager presents the data in an easy to understand way through its GUI graphical user interface.

#### DATA PORTABILITY

Both the captured data as well as compliance test data can be stored permanently and disseminated to subject matter experts at other locations. The 980 test instrument is not required to view the test results. The results and logs can be viewed through the 980 GUI Manager which is free and available from the Quantum Data website.

### REAL TIME MODE

The Real Time mode enables you to view the incoming video and select which type of data to view in real time. Infoframes and other data islands, control, timing data, HDCP and EDID transactions can all be viewed in real time. You can observe changes in these data as changes are made in the source device. Reference frames can be set for any data type to enable easy identification of changes. The 980s' built-in color touch screen provides a graphical user interface (GUI) to control the instrument and to view incoming video and data in the real time mode.

#### **KEY FEATURES + BENEFITS** Data Island Decoding

Captures and decodes all metadata, control data, data islands, infoframes and auxiliary channel data, etc. Decodes audio sample packets—including the decoding of the Channel Status Bits and the control bits from HDMI and MHL streams up to 300MHz.

#### HDMI and MHL Protocol Decoding

Decodes protocol data such as guard bands and preambles. Enables diagnosing protocol compliance test failures. Operates up to 300MHz.

# HDMI DDC Data Decoding

Decodes all DDC transactions including EDID reads and HDCP authentication. You can view HDCP registers in human readable text and pinpoint failures in authentication.

MHL C-Bus Data Monitoring Enables monitoring of MHL C-Bus transactions either passively between an MHL source and an MHL sink or while emulating an MHL sink device.

# Real Time Monitoring Mode

View and monitor the incoming video image and metadata using the new Real Time monitoring mode. You can monitor all the data island data including infoframes and the DDC transactions and MHL C-Bus transactions. Operates up to 300MHz.

#### Capture Playback

The Playback function enables you to make a capture from any HDMI or MHL source device and play it back to an HDMI or MHL sink device under test. Operates up to 300MHz pixel rate.

#### Passive Monitoring

Captures and decodes video, metadata, control data and protocol data passively between a source and a sink device up to 300MHz if the content from the source is not HDCP encrypted. If the source content is encrypted, only the DDC, CEC, MHL C-Bus and timing parameters are captured.

#### Encrypted Link Analyzer (Optional Feature)

Monitor or capture and analyze HDCP encrypted protocol data transmitted between a source device and sink device up to 300MHz. All metadata, audio and timing data can be monitored or captured even when the content from the source is encrypted with HDCP content protection.

#### HDMI Source Compliance Test (Optional Feature)

Supports testing of HDMI source devices for compliance to Sections 7.4 (Protocol), 7.5 (Video), 7.6 (Audio), 7.7 (DVI) and 7.8 (Advanced) of the HDMI CTS 1.4 The 980 source compliance test is an ideal solution for pretesting and/or self testing and enables you to get your source product to market more quickly and to reduce the expense of testing at the ATC.

#### HDMI HDCP Source Compliance Test (Optional Feature)

Supports testing of HDCP compliance testing for source devices in accordance with HDCP CTS 1.2. HDMI Sink Compliance Test (Optional Feature)

# Supports testing of HDMI sinks for compliance to Sections 8.2 (EDID), 8.4 (Protocol), 8.5 (Video), 8.6 (Audio), 8.7 (Interoperability with DVI), 8.8 (Advanced) of the HDMI 1.4 Compliance Test Specification (CTS). The 980 sink compliance test is an ideal solution for pre-testing and/or self testing and enables you to get your sink product to market more quickly and to reduce the expense of testing at the ATC.

HDMI 2.0 Source Compliance Test for 4:2:0 Pixel Encoding (Optional Feature) Supports compliance testing of HDMI 2.0 4K & 4:2:0-capable sources per HDMI 2.0 CTS.

HDMI 2.0 Sink Compliance Test for 4:2:0, EDID, Read Request (Optional Feature) Supports compliance testing of HDMI 2.0 ÉDID, 4:2:0, Read Request tests for sinks per HDMI 2.0 CTS.

NEW! HDMI 2.0 Sink Compliance Test for Read Request (Optional Feature) Supports compliance testing of HDMI 2.0 sinks supporting read request per HDMI 2.0 CTS.

# MHL Source Compliance Test (Optional Feature).

Supports testing of MHL source devices for compliance to Section 3 of the MHL 1.2, 1.3, 1.4, 2.0, 2.1 and 2.2. Compliance Test Specification (approved by MHL consortium). The 980 MHL source compliance test is an ideal solution for pre-testing (and/or self testing where permitted) and enables you to get your MHL source device to market more quickly and to reduce the expense of testing at the ATC.

# MHL Sink Compliance Test (Optional Feature).

Supports testing of MHL sink/dongle devices for compliance to Sections 4 and 5 of the MHL 1.2, 1.3, 1.4, 2.0, 2.1 and 2.2 Compliance Test Specification (approved by MHL consortium). The 980 MHL sink and dongle compliance test solution is ideal solution for pre-testing your MHL sink or dongle device prior to submitting to the MHL ATC for approval. Note: Quantum Data 882 required.

#### HDCP 2.2 Source and Sink Functional Test

Verify an HDMI source and sink's HDCP 2.2 authentication capabilities.

# NEW! HDCP 2.2 Source, Sink Repeater Compliance Test

Test HDMI sources, sinks and repeates for compliance to HDCP 2.2 CTS.

#### Data Portability

Data portability enables you to share capture data and compliance test results with colleagues, subject matter experts at other corporate locations and other experts for analysis and for verifying compliance. The 980 test instrument is not required to view the test results. The data can be viewed through the 980 GUI Manager which is free and available from the Quantum Data website.

#### Triggering and Pre-capture Filtering

Set up triggers on specific data island values and set pre-capture filtering to capture specific data.

# Filtering of Data Transactions

Check box filtering allows you to remove data types you are not interested in. For example you can filter out all data islands except audio sample packets and audio infoframes to compare the respective values for sampling rate

### Searching Through Data

Search through the captured data to locate the specific occurrence of the data you are interested in.

# Special Analysis Tests

Run special analysis tests to verify timing, video, audio sampling and AVmute at the touch of a button.

#### Pixel Error Test

Test HDMI sources and HDMI distribution networks at the sink (downstream) with Pixel Error Test. Verify HDMI networks comprised of cables, audio/video processors, extenders, switches, repeaters, etc. once installed. Test for pixel errors on the TMDS video.

#### Pseudo-Random Noise Test

Test HDMI cables and distribution networks comprised of cables, audio/video processors, extenders, switches, repeaters, etc. using loopback configuration with Pseudo-Random Noise Test pattern.

# HDMI CEC Data Decoding

View CEC messages for addressing, routing, one touch play, etc.

# OPTIONS

PRODUCT OPTIONS	
HDMI Source Compliance	)
Specification	HDMI CTS 1.4b
Test Sections	Section 7.4 (Protocol)
	Section 7.5 (Video)
	Section 7.6 (Audio)
	Section 7.7 (DVI)
	Section 7.8 (Advanced Features)
HDMI Sink Compliance	
Specification	HDMI CTS 1.4b
Test Sections	Section 8.2 (EDID / E-DDC)
	Section 8.4 (Protocol)
	Section 8.5 (Video)
	Section 8.6 (Audio)
	Section 8.7 (Interoperability with DVI)
	Section 8.8 (Advanced Features)
HDMI 2.0 Compliance	
Specification	HDMI CTS 2.0 MOIs
Package #1	4:2:0 Pixel Encoding (source & sink)
Package #2	EDID & Read Request (sink)
HDMI HDCP Source Comp	pliance
Specification	HDCP CTS 1.2 (source) & HDCP 2.2
	(source, sink and repeaters)
Test Sections	Sections 1A & 1B.(Source Testing
MHL Source Compliance	
Specification	MHL CTS 1.2 & (1.3 approved)
	MHL CTS 2.0 & 2.1 approved
Test Sections	Sections 3 & 6
MHL Sink/Dongle Compli	ance
Specification	MHL CTS 1.2 & (1.3, 1.4 approved)
	MHL CTS 2.0, 2.1 & 2.2 approved
Test Sections	Section 4, 5 & 6
Encrypted Link Analyzer	
Monitor or capture and a	analyze HDCP encrypted protocol
data transmitted between a	a source device and sink device.
HDCP 2.x Functional Test	s for sources and sinks
Verify a sources or a sinks H	HDCP 2.2 authentication on HDMI 1.4x
devices.	
HDMI Seture - Source Ar	nalveie & Pace-through

# SPECIFICATION

# 980 HDMI Protocol Analyzer Module

# PROTOCOL ANALYZER MODULE CONNECTORS

HDMI Rx	
Function	HDMI input (analyzer)
Connector	One (1) HDMI Type A
Pixel/TMDS Rate	300 MHz; 3.00 Gb/s (per pair)
Minimum Time Resolution	2.5x10 <sup>-9</sup>
Video	
Encoding	RGB, YCbCr
Sampling modes	4:4:4, 4:2:2, 4:2:0 (per HDMI 2.0)
Bits/component	24/30/36-bit RGB or YCbCr
	16/20/24-bit 4:2:2 YCbCr
Note: 30 and 36 bit Deep Co	olor is supported at TMDS rates up to
3.00Gb/s.	

#### HDMI / MHL Tx

Function	HDMI / MHL output (pass-through)
Connector	One (1) HDMI Type A
TMDS max rate	300MHZ; 3.00 Gb/s
/ideo	
Encoding	RGB, YCbCr
Sampling modes	4:4:4 or 4:2:2
Bits/component	24/30/36-bit RGB or YCbCr
	16/20/24-bit 4:2:2 YCbCr

# Ethernet (2)

Function	HDMI Ethernet Channel
Connector	RJ-45

# 980/980B PLATFORM CONNECTORS/SPECIFICATIONS

SPDIF IN	
Function	Audio Return Channel receive for
	HDMI source
Connector	RCA
SPDIF OUT	
Function	Audio Return Channel transmit
	for HDMI sink
Connector	RCA
TRIG IN	
Function	External Trigger input
	C-Bus pass-through monitoring
Memory	
Size	4 GB

#### Administration

Ethernet (RJ-45) for external GUI Manager 800 pixels by 600 lines color touch screen display for embedded GUI Manager

HDMI Sink

MHL Sink

HDMI Setups - Source Analysis & Pass-throu	g	l
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# MHL Setups - Source Analysis & Pass-through (1.2, 1.3, 2.0, 2.1)



# 980 HDMI Protocol Analyzer Module

# Data Monitoring in Real Time

# Operation is simple:

- 1. Select the Real Time Mode.
- 2. Enable real time monitoring
- 3. Select which metadata to view.
- 4. Configure image viewing parameters

# HDMI & MHL Video

- View incoming video
- View video timing data

# HDMI & MHL Metadata

- AVI Infoframes
- Audio Infoframes
- Vendor Specific Infoframes
- Source Product Descriptor
- General Control Packets

#### HDMI DDC Traffic

- EDID transactions
- HDCP transactions

#### MHL C-Bus

- EDID transactions
- HDCP transaction

PORT:HDMI-ROO CARD:Quantum Data, Inc. HDMI protocol analyzer HDMI Honitor Sink Emulation |+RX -TX | Ri:0 | CEA VIC-2: 720x480p @ 60 Hz 4:3 | 720 x 480 | Progressive | (24 bpp), YCbCr-444, ITU-601 | Encrypted | HDHI | 🖰 Home Back \varTheta AVI: 1 (1) 10493 AVI InfoFrame AVI InfoFrame check sum: scan info: Bar Info: Bar Info: active format: picture aspect ratio: colorimetry icture scale: quantization ranne: extended colorin CVSI: 0 (0) 1843 video format: totac, Super Scale, Super iffor verified some active pixels & lines,at the edges are not displayed no Data format valid YCbCr 4:4:4 same as picture 8 4:3 SMPTE 170M[1] ITU601 [5] not known default (demends on video format) Nav. Port Stop AY deo format: content: con deo format: Vendor-Specific InfoFrame ⇒ Video verified HDMI Licensing LLC [0x000c03] extended resolution format Not indicated 0x01 🔒 AVI-IF NTARIES ( 55) 🖯 VS-IF 4K x 2K 29.97/30Hz ELECTION 72 🖯 GCP HB: 81 01 05 f4 | SP0: 49 03 0c 00 20 01 00 c1 SP1: 00 00 00 00 00 00 00 00 00 SP2: 00 00 00 00 00 00 00 00 00 I... ... 😑 User ..... = SP3: 00 00 00 00 00 00 00 00 |..... ACA  $\triangleright$   $\forall$ 🌍 Video Timing: 46 / 85 I/P=Prog, Vpol=N, Hpol=N, Hfreq=31.4689 kHz, Vfreq=59.9407 Hz, THDS Clock Freq=27.00031 HHz, Type=HDHI Protocol Errors: Invalid Preambles=0 
 H/V
 I Htotal
 I Hblank
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 I blank
 I ffront
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 Fl Hactive | Vactive | Hback | Vfront | Vsync Vback min max avg 720 720 720 720 480 480 480 60 60 60 6| 6| 6| 9| 9| 9| 30| 30| 30| Mode all horizontal measurements in THDS clocks: Note: Tools 



# HDMI and MHL Source Analysis

# Operation is simple:

- 1. Define the trigger and precapture filter criteria or start and stop capture under manual control.
- 2. Initiate the capture. When the trigger criteria is met the data is decoded and presented.
- 3. Navigate to specific data packets of interest in the Event Plot, Data Decode windows (shown below) or the Timing Analyzer or Video Analyzer windows (not shown below). The decoded data is presented in human readable text to facilitate rapid examination of data.

Capture Vie	wer							
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Event Plot	🕱 🔤 Timing Analysis							
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47:11.920.843	.779.552				1:47:10.	.723.578.977.742	[F:2 L:8 P:43] AVI InfoFrame	
TMDS	GCP	ı j	AUD IF	VEN				
/SYNC						VSYNC		
NCR-F	HSYNC		J					
VMUTE								
DDC								
EC								
47:10.723.578	8.762.534 1:47:	10.723.579.0	78.484		1:47:1 Time (	l0.723.579.394. H:M:S.ms.us.ns.	436 1:47:10.723.579.710.386 ps)	1:47:10.723.580.026.336
Data Decod	le 🛛							
er/4K2K								
acket	Time (H:M:S ms us ns ns)	Framo		Divol	Turc	SubTure	Info	
12955	1:47:10.723.578.830.000	riame 2	Line 8	Pixel 0	TMDS	HSYNC	HSYNC 88 clocks	
12956	1:47:10.723.578.830.000	2	8	0	TMDS	VSYNC	VSYNC 55000 clocks	8
12957	1:47:10.723.578.870.000	2	8	11	TMDS	GCP	General Control Packet (GCP)	
12950	1:47:10.723.579.085.485	2	8	75	TMDS	AUD IF	Audio InfoFrame	
12960	1:47:10.723.579.193.226	2	8	107	TMDS	VEN	Vendor-Specific InfoFrame	
12961	1:47:10.723.597.350.000	2	8 9	0	TMDS	HSYNC	HSYNC 88 clocks	nats)
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# HDMI 1.4 Source Compliance Tests

# Operation is simple:

- Define the capabilities of the source device under test 1. using the CDF forms.
- Select the HDMI 1.4 Compliance Tests you wish to run. 2.
- Initiate the test suite. 3.
- View the test results, detail and summary. 4.

# HDMI 1.4 CTS Tests supported:

- Section 7.4: Source Protocol Tests
- Test ID 7-16: Legal Codes
- Test ID 7-17: Basic Protocol
- Test ID 7-18: Extended Control Period •
- Test ID 7-19: Packet Types •

- Section 7.5: Source Video Tests Test ID 7-21: Minimum Format Support
- Test ID 7-22: Additional Format Support .
- .
- Test ID 7-23: Pixel Encoding RGB to RGB-only Sink Test ID 7-24: Pixel Encoding YCbCr to YCbCr Sink •
- Test ID 7-25: Video Format Timing •
- Test ID 7-26: Pixel Repetition .
- Test ID 7-27: AVI InfoFrame

Section 7.6: Source Audio Tests

- Test ID 7-28: IEC 60958/IEC 61937 Test ID 7-29: ACR •
- .
- Test ID 7-30: Audio Sample Packet Jitter •
- . Test ID 7-31: Audio InfoFrame
- Test ID 7-32: Audio Sample Packet Layout

Section 7.7: Source Interoperability with DVI Test ID 7-33: Interoperability with DVI •

Section 7.8: Source Advanced Features

- Test ID 7-34: Deep Color •
- . Test ID 7-35: Gamut Metadata Transmission
- Test ID 7-36: High-Bitrate Audio
- . Test ID 7-37: One Bit Audio
- •
- Test ID 7-38: Video Format Timing Test ID 7-39: 4K x 2K Video Format\* •
- . Test ID 7-40: Extended Colorimetry Transmission (without xvYCC)

\*Approved for use in ATC per CTS version 1.4

Compliance Test Results Viewer			x
HDMI Source Compliance Test Results			
Results Name:     804A_Test     Manufacturer:     Acme       Date Tested:     July 26, 2013 11:25 AM     Model Name: 1		HTML Re	port
Overall Status: CTS 1.4b - Incomplete Port Tested: 1			
Test Results			
Test Name / Details	Q	Status	^
> 😝 Iter 03: (4) 1280x720p 0 60 Hz, Basic Audio, AI=1	2 s	Pass	
Iter 04: (4) 1280x720p @ 60 Hz, Basic Audio, AI=0, PREQ: ACP,	2 s	Skipped	
> 7-21: Minimum Format Support		Pass	
⊿ 📃 7-23: Pixel Encoding - RGB to RGB-only sink		Incomplete	
💢 Iter 01: (1) 640x480p @ 60 Hz, Pixel Encoding Content	15 f	User Skipped	
💢 Iter 02: (2,3) 720x480p @ 60 Hz, Pixel Encoding Content	15 f	User Skipped	
🛛 😝 Iter 03: (4) 1280x720p 0 60 Hz, Pixel Encoding Content	15 f	Fail	Ξ
• Visual verification: The image was transmitted with the cor			
🖌 🥥 01: Test pixel encoding		Fail	
😝 AVI Invalid RGB YCC indicator 1 at frame 1			
		Pass	
>		Fail	
◎ 04: CDF field Source Q FullRange==Y		Pass	
💢 Iter 04: (16) 1920x1080p @ 60 Hz, Pixel Encoding Content	15 f	User Skipped	
🖌 📃 7-25: Video Format Timing		Incomplete	
💥 Iter 01: (1) 640x480p @ 60 Hz	15 f	User Skipped	
💢 Iter 02: (2,3) 720x480p @ 60 Hz	15 f	User Skipped	Ŧ
Open Capture     AVI Invalid RGB YCC indicator 1 at frame 1			
Instrument: 980_MB [192.168.254.229]	•	Continue Test Execut	ion
		💢 Close	



# HDMI Sink Compliance Tests for HDMI 1.4

### Operation is simple:

- 1. Define the capabilities of the source device under test using the CDF forms.
- 2. Select the HDMI 1.4 Compliance Tests you wish to run.
- 3. Initiate the test suite.
- 4. View the test results, detail and summary.

### HDMI 1.4 CTS Tests supported:

- Section 8.2: Sink EDID / E-DDC
- Test ID 8-1: EDID Readable
- Test ID 8-2: EDID VESA Structure
- Test ID 8-3: EDID CEA Timing Extension Structure

Section 8.4: Sink - Protocol

- Test ID 8-15: Character Synchronization
   Test ID 8-16: Acceptance of Valid Packet Tv
- Test ID 8-16: Acceptance of Valid Packet Types

Section 8.5: Sink - Video

- Test ID 8-17: Basic Format Support Requirements
- Test ID 8-18: HDMI Format Support Requirements
- Test ID 8-19: Pixel Encoding Requirements
- Test ID 8-20: Video Format Timing

Section 8.6: Sink - Audio

- Test ID 8-21: Audio Clock Regeneration
- Test ID 8-23: Audio Formats

Section 8.7: Sink - Interoperability with DVI

Test ID 8-24: Interoperability with DVI

Section 8.8: Sink - Advanced Features

- Test ID 8-25: Deep Color
- Test ID 8-27: High Bitrate Audio (requires 882E/EA)
- Test ID 8-29: 3D Video Format Timing
- Test ID 8-30: 4K by 2K Video Format Timing
- Test ID 8-31: AVI Infoframe, YCC Quantization Range



Test List

Cancel the Compliance Test



HDMI Sink Compliance Test (1.4b): "07\_26\_2013\_11\_51\_34\_XYZ\_Test"

# HDMI Compliance MOIs for HDMI 2.0

#### Operation is simple:

- 1. Define the capabilities of the source device under test using the CDF forms.
- 2. Select the HDMI 1.4 Compliance Tests you wish to run.
- 3. Initiate the test suite.
- 4. View the test results, detail and summary.

# HDMI 2.0 CTS Test MOIs supported - Package 1:

Source Tests

- Test ID HF1-31: Source Pixel Encoding YCbCr 4:2:0
- Test ID HF1-33: Source Video Timing YCbCr 4:2:0
- Test ID HF1-51: Source AVI Infoframe YCbCr 4:2:0

Sink Tests:

- Test ID HF2-23: Sink Pixel Decoding YCbCr 4:2:0
- Test ID HF2-31: Sink EDID YCbCr 4:2:0

### HDMI 2.0 CTS Test MOIs supported - Package 2: Sink Tests:

- Test ID HF2-10: Sink Video Timing 6G HF-VSDB
- Test ID HF2-12: E-DDC Read Request Enable Verify
- Test ID HF2-16: E-DDC Read Request Test Config
- Register Reset
   Test ID HF2-26: Sink EDID Video Format Declaration
- Test ID HF2-34: E-DDC Read Request SCDC Update Flag Response
- Test ID HF2-35: Sink EDID YCBCR 4:2:0 Deep Color HF-VSDB
- Test ID HF2-44: E-DDC Read Request SCDC Wait for Bus Free
- Test ID HF2-32: Sink EDID YCBCR 4:2:0 BT.2020 Data Block
- Test ID HF2-39: Sink EDID 3D and Multi-stream Audio Data Blocks
- Test ID HF2-41: Sink HDMI-VSDBs Independent-View
   Test ID HF2-50: E-DDC Read Request
- TestReadRequest and TestReadResponse
- Test ID HF2-53: Sink EDID HF-VSDB

PC

w/ 980 GUI Manager

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Ethernet Cable



# HDMI HDCP 1.2 Source Compliance Tests

### Operation is simple:

- 1. Define the capabilities of the source device under test using the CDF forms.
- Select the HDMI HDCP 1.2 Compliance Tests you wish to run.
- 3. Initiate the test suite.
- 4. View the test results, detail and summary.

## HDMI HDCP 1.2 CTS Tests supported:

Section 1A: Source Transmitter Downstream with HDMI Capable Receiver

- 1A-01: Regular Procedure: w/ HDMI Capable Receiver.
- 1A-02: Regular Procedure: HDCP\_HPD After Writing Aksy.
- 1A-03: Regular Procedure: HDCP\_HPD After StartingThird Part of Authentication.
- 1A-04: Irregular Procedure: (First Part Authentication) HDPC Port Access'.
- 1A-05: Irregular Procedure: (First Part Authentication) Verify Bksv.
- 1A-06: Irregular Procedure: (First Part Authentication) Verify R0'.
- 1A-07: Irregular Procedure: (Third Part Authentication) Verify Ri' (invalid Ri).
- 1A-Ó7a: Irregular Procedure: (Third Part Authentication) Verify Ri' (Ri' not returned).
- 1A-08: Irregular Procedure: SRM. Requires SRM DVD disc.
- 1A-09: Regular Procedure: With DVI Receiver.

Section 1B: Source Transmitter Downstream with HDMI Capable Repeater

- 1B-01: Regular Procedure: w/ HDMI Capable Repeater
- 1B-02: Regular Procedure: HPD After Reading RO'
- 1B-03: Irregular Procedure: (Second Part of
- Authentication) Timeout of KSV List READY
  1B-04: Irregular Procedure: (Second Part of
- Authentication) Verify V'
- 1B-05: Irregular Procedure: (Second Part of Authentication) MAX\_DEVS\_EXCEEDED
- 1B-06: Irregular Procedure: (Second Part of Authentication) MAX\_CASCADE\_EXCEEDED

HDMI HDCP TX Compliance Test (1.2): "07\_26\_2013\_12\_26\_34\_804A" X Duration Reset Status Options Category / Test Name Ø Status V ▲ 🗏 1A-02: Regular procedure: HDCP HPD after writing Aksv Iter 01: HDCP\_HPD maps to physical HPD line 1 IA-03: Regular procedure: HDCP HPD after starting third pa Fail First part of authentication was never attempted. FirstFrame: 1 IA-04: Irregular procedure: (First part of authentication) \varTheta Iter 01: V Pass 🛛 🖪 1A-05: Irregular procedure: (First part of authentication) 에 Iter 01:  $\checkmark$ Pass 1A-06: Irregular procedure: (First part of authentication) ⊿ 📮 \varTheta Iter 01: Pass  $\checkmark$ IA-07: Irregular procedure: (Third part of authentication) 🔒 Iter 01: Fail IA-07a: Irregular procedure: (Third part of authentication) Iter 01: M In Progress IB Tests
 IB-01: Regular procedure: With Repeater Not Tested Line Message 0039 Panei Pancod • 0041 0042 Processing test results. 0043 Test 1A-07 Iter 01 -> Fail 0044 - Test 1A-07a-01 0045 Gancel the Compliance Test Pause Test Execution



# HDMI HDCP 2.2 Source, Sink & Repeater Compliance Tests

# Operation is simple:

- 1. Define the capabilities of the device under test using the CDF forms.
- 2. Select the HDMI HDCP 2.2 Compliance Tests you wish to run.
- 3. Initiate the test suite.
- 4. View the test results, detail and summary.

# HDMI HDCP 2.2 CTS Transmitter (Source) Test Sections supported:

- Section 1A: Transmittler Downstream with Receiver) with HDMI Capable Receiver (all tests supported))
- Section 1B: Transmitter with Downstream Repeater (all tests supported)

# HDMI HDCP 2.2 CTS Receiver (Sink) Test Sections supported:

Section 2C: Receiver Upstream with Transmitter (all tests supported)

# HDMI HDCP 2.2 CTS Repeater Test Sections supported:

- Section 3A: Downstream Procedure with Receiver (all tests supported) Section 3B: Downstream Procedure with Repeater
- (all tests supported)
- Section 3C: Upstream Procedure with Transmitter (all tests supported)

	Test List	
Category	/ Test Name	Status
Upstre	am with Transmitter	
▲ 📑 2C-01	l: Regular Procedure - With transmitter 🛛 🗸	Pass
👂 😑 Itei	r 01: With previously not connected receiver	Pass
🛛 🕞 Iter	r 02: With previously connected receiver	Pass
a 📑 2C-02	2: Irregular Procedure - New Authentication after AKE Init♥	Pass
👂 😑 Iter	r 01:	Pass
a 📑 2C-03	3: Irregular Procedure - New Authentication during Localit	Pass
👂 😖 Iter	r 01:	Pass
a 📑 2C-04	1: Irregular Procedure - New Authentication after SKE Senc 🗸 👘	Pass
👂 😑 Iter	r 01:	Pass
a 📑 2C-05	5: Irregular Procedure - New Authentication during Link Sy 🗸 👘	In Progress
🔶 Iter	r 01:	In Progress
	Test Log	
ine	Message	
0026	Test 2C-04-01	
0027		
0028	Processing test results.	
0029	Test 2C-04 Iter 01 -> Pass	
0030	Test 2C-05-01	
0031		
	Cancel the Compliance Test	



HDMI HDCP 2.2 Receiver Compliance Test (1.0): "HDCP\_22\_Sink\_Comp\_1"

# HDMI 1.4 EDID Compliance Tests for HDMI 1.4

### Operation is simple:

- 1. Define the capabilities of the sink device under test using he CDF forms.
- 2. Initiate the test suite.
- 3. View the test results, detail and summary.

# HDMI CTS 1.4 Tests supported:

- Section 8.2: Sink EDID / E-DDC Test ID 8-1: EDID Readable
- Test ID 8-2: EDID VESA Structure
- Test ID 8-3: EDID CEA Timing Extension Structure •

Section 8.5: Sink - Video

- Test ID 8-17: Basic Format Support Requirements •
- Test ID 8-18: HDMI Format Support Requirements
- Test ID 8-19: Pixel Encoding Requir •

РС w/ 980 GUI Manager

• Test ID 8-20: Video Format Timing\*

\* Tests for Section 8.5 Sink - HDMI Sink Co is required to fully cover 8-19 and 8-20 tests E Compliance Test Results Viewer

	IDMI			
	Results Name: 08_12_2013_11_30_08_Acme_XYZ	Manufacturer: Acme		🔤 HTML Repo
	Date Tested: August 12, 2013 11:44 AM	Model Name: XYZ		
ance Test option	Overall Status: CTS 1.4b - Fail	Port Tested: 1		
		Test Results		
	Test Name / Details		0	Status
	🔺 🗏 8-1: EDID Readable			Pass
	Iter 01:			Pass
	4 🗏 8-2: EDID VESA Structure			Pass
	😝 Iter 01:			Pass
	4 🗏 8-3: CEA Timing Extension Structure	e		Fail
	▶ 😝 Iter 01:			Fail
	🔺 📑 8-17: Basic Format Support Requirem	ments		Pass
	Uter 01:			Pass
	4 🗏 8-18: HDMI Format Support Requireme	ents		Pass
	lter 01:			Pass
	4 🗏 8-19: Pixel Encoding Requirements			Pass
	Uter 01:			Pass
	▷ ➡ 8-20: Video Format Timing			Pass
	8-17: Basic Format Support Requirements			
			]	
	Instrument: [980_MB [192.108.254.229]		•	Continue Test Execution
				X Close
			Sink	
			Sink	
	980		Sink	
	BBB Second Second Seco		Sink	1
nt Cable			Sink	
t Cable	gaa yaa yaa yaa yaa yaa yaa yaa yaa yaa y	IDMI Cable	Sink	
t Cable		IDMI Cable	Sink	
¥t Cable		IDMI Cable	Sink	
et Cable		IDMI Cable	Sink	

# MHL CTS 1.2, 1.3, 2.0, 2.1 Source Compliance Tests Approved by MHL Consortium Operation is simple:

- 1. Define the capabilities of the source device under test using the CDF forms.
- 2. Select the MHL Compliance Tests you wish to run: 1.2, 1.3, 2.0, 2.1.
- 3. Initiate the test suite.
- 4. View the test results, detail and summary.

# MHL CTS 1.2, 1.3, 2.0 & 2.1 Source tests supported (unless otherwise indicated):

- Section 3.2.2: TMDS Coding
- Test 3.2.2.1: Legal Codes Normal mode
- Test 3.2.2.2: Basic Protocol Normal mode
- Test 3.2.2.3: Packet Types Normal mode
- Test 3.2.2.4: Legal Codes PackedPixel mode (1.3, 2.0, 2.1)
- Test 3.2.2.5: Basic Protocol PackedPixel mode (1.3, 2.0, 2.1)
- Test 3.2.2.6: Packet Types PackedPixel mode (1.3, 2.0, 2.1)

Section 3.2.3: Video Modes

- Test 3.2.3.1: Video Formats Normal mode
- Test 3.2.3.2: Required Pixel Encoding Normal mode
- Test 3.2.3.3: AVI InfoFrame Normal mode
- Test 3.2.3.4: Video Quantization Ranges
- Test 3.2.3.5: Video Formats PackedPixel mode (1.3, 2.0, 2.1)
- Test 3.2.3.6: Pixel Encoding PackedPixel mode (1.3, 2.0, 2.1)
- Test 3.2.3.7: AVI InfoFrame PackedPixel mode (1.3, 2.0, 2.1)
- Section 3.2.4: Audio Tests
- Test 3.2.4.1: IEC 60958 / IEC 61937
- Test 3.2.4.2: Audio Clock Regeneration
- Test 3.2.4.4: Audio InfoFrame
- Section 3.2.6: EDID and Device Capability Register Test
- Test 3.2.6.3: Device Status Regs Normal mode (1.3, 2.0, 2.1)
- Test 3.2.6.4: Device Status Regs PackedPixel (1.3, 2.0, 2.1)
- Section 3.2.8: RAP Sub-Command (All Tests) (1.3, 2.0, 2.1)

Section 3.2.9: 3D Tests

- Test 3.2.9.2: 3D Video Format Timings (2.0, 2.1) - Test 3.2.9.3: 3D Video Mode Indicator (2.0, 2.1)

Section 3.2.10: UCP Sub-Command Tests (All Tests)

### MHL Source CTS CTS 1.2, 1.3, 2.0, 2.1 tests supported by 980 MHL CBUS Module (excepted where noted):

Section 3.1.1: Electrical Tests - Test 3.1.1.13: Rx Sense Impedance

- Section 3.2.6: EDID and Device Capability Register Test
- Test 3.2.6.1: EDID Reading Test
- Test 3.2.6.2: Device Capability Registers Test

Section 3.2.7: RCP Sub-command Test

Section 3.3: CBUS Tests (All tests in Sections 3.3.2 thru 3.3.23)

Section 3.2.9: 3D Tests - Test 3.2.9.1: 3D Video Mode Support (3D Req) (2.0, 2.1) Section 3.2.10: UCP Sub-Command Tests (2.0, 2.1)

Section 6: Common Tests (All tests in section 6.3.1 - 6.3.22)

MHL Cable

# MHL Source tests supported by 882EA:



Source MHL DUT

tesuits Name: Acme_MitL_Tests Manufacturer: Acme Date Tested: Juna 10, 2011 2:46 FM Model Name: verall Status: CTS 1.0 - Incomplete Port Tested: 1		I HTML R
Test Results		
Fest Hame / Details	0	Status
3.2.2.1: Legal Codes		Pass
3.2.2.2: Basic Protocol		Incomplete
∃ 😸 Iter 01: (2,3) 720x480p 0 60 Hz	15 f	Pass
The CDF does not indicate support for the mandatory formats: 576E		
01: Control Period Encoding:Expected Values 0x354, (		Pass
Q 02: Date Island(DI) Guard Band:Exp Vals Ch0 0x28e, C		Pass
		Pass
● 04: Video Guard Band:Exp Vals 0x2cc, 0x133, 0x2cc		Pass
05: Legal Video Data codes		Pass
06: Control period 12 pix before transition to next		Pass
		Pass
08: Control period prior to the preamble should not		Pass
09: Illegal preamble		Pass
10: Leading and Trailing guard Band(GB)		Pass
II: First Chr following the Leading GB should not he		Pass
12: Any other Chr prior to trailing GB should have 1		Pass
		Pass
		Pass
⊜ 15: ENC EN code is detected		Pass
₩ Iter U2: (4) 1280x720p @ 60 Hz	15 £	User Skipped
3.2.2.3: Packet Types		Incomplete
3.2.3.1: Video Formats		Pass
3.2.3.2: Required Pixel Encoding	45.6	Fall
∃ ₩ Iter 01: (2,3) 720x480p @ 60 Hz, R6B	15 E	Fail
□	15 T	Fail
■ ♥ 01: Test YCC 4:2:2 pixel encoding		Pall
The open indicated yec_422 does not match with AVI YI and YU [F:	15.6	77 - 4 3
□	15 T	rail
B W U1: Test YCC 4:4:4 pixel encoding	_	Pa11
ber indicated you and not match with AVI II and IO [F		De 41
The Discover and the second se	_	Fall
H TIGE DI: CPT AVI SUPPORT NOT SELECTED DUT reguired: Automatic FAIL		Incomplete
2 3.2.4.1: IDU 00930 / IBU01937		Incomplete
5.2.4.2. Audio Clock Regeneration		Incomprete



# 980 HDMI Protocol Analyzer Module

# MHL CTS 1.2, 1.3, 2.0, 2.1 Sink **Compliance Tests**

### Operation is simple:

- Define the capabilities of the sink device under test 1. using the CDF forms.
- 2. Select the MHL Compliance Tests you wish to run.
- 3. Initiate the test suite.
- View the test results, detail and summary. 4.

### MHL CTS 1.2, 1.3, 2.0, 2.1 Sink tests supported (except where noted) (882EA required):

- Section 4.2.1: System
- Test 4.2.1.1: Character Sync Normal mode
- Test 4.2.1.2: Packet Types Normal mode
- Test 4.2.1.3: Character Sync PackedPixel (1.3, 2.0, 2.1)
- Test 4.2.1.4: Packet Types PackedPixel mode (1.3, 2.0, 2.1)
- Section 4.2.2: Video
- Test 4.2.2.1: Video Formats Normal mode Test 4.2.2.2: Pixel Encoding Normal mode
- Test 4.2.2.3: Video Quantization Ranges
- Test 4.2.2.4: Video Formats PackedPixel (1.3, 2.0, 2.1)
- Test 4.2.2.5: Pixel Encoding PackedPixel (1.3, 2.0, 2.1)
- Section 4.2.3: Audio
- Test 4.2.3.1: IEC 60958 / IEC 61937
- Test 4.2.3.2: Audio Clock Regeneration
- Section 4.2.7: RAP Sub-command tests (1.3, 2.0, 2.1)
- Section 4.2.8: 3D Video Formats
- Test 4.2.8.2: 3D Video Formats Normal mode (2.0, 2.1)
- Test 4.2.8.3: 3D Video Formats PackedPixel (2.0. 2.1)

# MHL CTS 1.2, 1.3, 2.0, 2.1 Sink tests supported by 980 MHL CBUS Module (except where noted):

- Section 4.1.1: Electrical Tests
- Test 4.1.1.7: Rx Sense Impedance
- Section 4.2.5: EDID and Device Capability Register Test
- Test 4.2.5.1: EDID Reading Test
- Test 4.2.5.2: Device Capability Registers Test
- Test 4.2.5.3: Device Status Registers Test (1.3, 2.0, 2.1)
- Section 4.2.6: RCP Sub-command Tests

#### Section 4.2.8: 3D Video

- Test 4.2.8.1: 3D Mode Support (2.0, 2.1)

Section 4.2.9: UCP Sub-command Tests (2.0, 2.1)

Section 4.3: CBUS Tests

(All tests in Sections 4.3.2 through 4.3.25)

Section 6: Common Tests (All tests in section 6.3.1 - 6.3.22)

MHL Sink tests supported by 882EA: Section 4.2.4: HDCP Test



 Options 🖌 AI 🗶 AI Category / Test Name Status ➡ Iter 02: (4)
➡ Iter 03: (5) 1280×720p 59.94/60Hz 1920×1080i 59.94/60Hz Fail Pass E 4.2.2.2: Pixel Encoding ↓ Iter D1: CDF Checks
 ↓ Iter D2: 480p60, RGB Encoding
 ↓ Iter D3: 480p60, YCbCr-444 Encoding
 ↓ Iter D4: 480p60, YCbCr-422 Encoding \*\*\*\* Pass Pass Fail Fail ž ~~~ Pass Pass Pass Ter G: Soupho, PC 20: Solve Audio 1.4. 2.3.2: Audio Clock Regeneration Tier 01: 400p60, PCM 20: Solve Audio, Minimum N Tier 01: 400p60, PCM 20: Solve Audio, Minimum N Tier 03: 480p60, PCM 20: Addis, Minimum N Tier 05: 400p60, PCM 20: 400h6, Minimum N E 
 11er 05: 400p60, PCM 20: 400h6, Minimum N
 E mplete User Skipped User Skipped User Skipped Skipped User Pass 🗄 😝 Iter 06: 480p60, PCM 2Ch 48kHz, Maximum N Line Ressage • 0082 • 0083 onfiguring the Test Source HDMI, 480p50, /cache0/images/SmpteBar, RGB, 24 hpp, PCM\_2CH, 48 KHz 0086 • 0085 • 0086 t 4.2.3.2 Iter 05 -> Pass 0081 0089 0089 0085 HDMI, 480960, /cache0/images/SmpteBar, RGB, 24 bpp, PCM\_2CH, 48 KHz Performing adequate suppor Test 4.2.3.2 Iter 06 -> Pass Tests completed Continue Testing 💢 Close Window

# 980 HDMI Protocol Analyzer Module

MHL CTS 1.2, 1.3, 2.0, 2.1 Dongle Compliance Tests

### Operation is simple:

- 1. Define the capabilities of the sink device under test using the CDF forms.
- 2. Select the MHL Compliance Tests you wish to run.
- 3. Initiate the test suite.
- 4. View the test results, detail and summary.

# MHL CTS 1.2, 1.3, 2.0, 2.1 Dongle tests supported (except where noted) (882EA required):

- Section 5.2.1: System
- Test 5.2.1.1: Character Sync Normal mode
- Test 5.2.1.2: Packet Types Normal mode
- Test 5.2.1.3: Character Sync PackedPixel mode (1.3, 2.0, 2.1)
- Test 5.2.1.4: Packet Types PackedPixel mode (1.3, 2.0, 2.1)
- Section 5.2.2: Video
- Test 5.2.2.1: Video Formats Normal mode - Test 5.2.2.2: Pixel Encoding Normal mode
- Test 5.2.2.2. Fixer Lincounity Normal mou
- Test 5.2.2.3: Video Quantization Ranges
- Test 5.2.2.4: Video Formats PackedPixel mode (1.3, 2.0, 2.1) - Test 5.2.2.5: Pixel Encoding PackedPixel mode (1.3, 2.0, 2.1)
- Section 5.2.3: Audio
- Test 5.2.3.1: IEC 60958 / IEC 61937
- Test 5.2.3.2: Audio Clock Regeneration

Section 5.2.7: RAP Sub-command tests (1.3, 2.0, 2.1)

- Section 5.2.8: 3D Video
- Test 5.2.8.2: 3D Video Formats (2.0, 2.1)
- Test 5.2.8.3: 3D Video Formats PackedPixel (2.0, 2.1)

### MHL CTS 1.2, 1.3, 2.0, 2.1 Dongle tests supported by 980 MHL CBUS Compliance Test Module (except where noted):

- Section 5.1.1: Electrical Tests
- Test 5.1.1.7: Rx Sense Impedance (Powered)
- Test 5.1.1.8: Rx Sense Impedance (Unpowered)
- Section 5.2.5: EDID and Device Capability Register Test
- Test 5.2.5.1: EDID Reading Test
- Test 5.2.5.2: Device Capability Registers Test
- Test 5.2.5.3: Device Status Registers Test (1.3, 2.0, 2.1)
- Section 5.2.6: RCP Sub-command Tests

### Section 5.2.8: 3D Video

- Test 5.2.8.1: 3D Video Mode Support Data (2.0, 2.1)
- Section 5.2.9: UCP Sub-command Test (2.0, 2.1)

Section 5.3: CBUS Tests (All tests in Sections 4.3.2 through 4.3.25)

Section 6: Common Tests (All tests in section 6.3.1 - 6.3.22)

# MHL Dongle tests supported by Quantum Data 882EA:

Section 5.2.4: HDCP Test



Revised 4/1/15 - Rev A22

V Al 🗶 Al Options Category / Test Name Status Guegory / 1000 Kane ⊕ Tter 02: (4) 1280x720p 59.94/60Hz ⊕ Tter 03: (5) 1920x1080i 59.94/60Hz ↓ 2.2.2.2: Pixel Encoding Fail Pass Pass Pass ☐ 1.2.2.3: Video Quantization Range ⊕ Iter 01: 480p60, YChCr-444 / YChCr-422 ⊕ Iter 02: 480p60, RGB Fail Fail Audio
 Clock Regeneration Pass Pass Pass Pass ■ 4.3.3.2: Audio Clock Regeneration
 ■ 1.4.3.2: Audio Clock Regeneration
 ■ Ther 01: 400p60, FCM 2Ch 32Mic Audio, Minimum N
 ■ Ther 03: 480p60, FCM 2Ch 44.1Mic, Minimum N
 ■ Ther 03: 480p60, FCM 2Ch 44.1Mic, Minimum N
 ■ Ther 05: 400p60, FCM 2Ch 44.1Mic, Minimum N
 ■ Ther 05: 400p60, FCM 2Ch 44.1Mic, Minimum N
 ■ Ther 05: 400p60, FCM 2Ch 44.1Mic, Minimum N
 ■ Ther 05: 400p60, FCM 2Ch 44.1Mic, Minimum N User Skipped User Skipped User Skipped Skippe Pass Line Hessage Configuring the Test Source HDMI, 480p60, /cache0/images/SmpteBar, RGB, 24 hpp, PCM\_2CH, 48 KHz 0083 0084 0085 Test 4.2.3.2 Iter 05 -> Pass --- Test 4.2.3.2-06 HDMI, 480960, /cache0/images/SmpteBar, RGB, 24 bpp, PCM\_2CH, 48 KHz Performing adequate suppor Test 4.2.3.2 Iter 06 -> Pass Tests completed 💢 Close Window Continue Testing PC w/ 980 GUI Manager