



quantumdata

# 980 HDMI Protocol Analyzer Module HDMI HDCP Source Compliance Testing

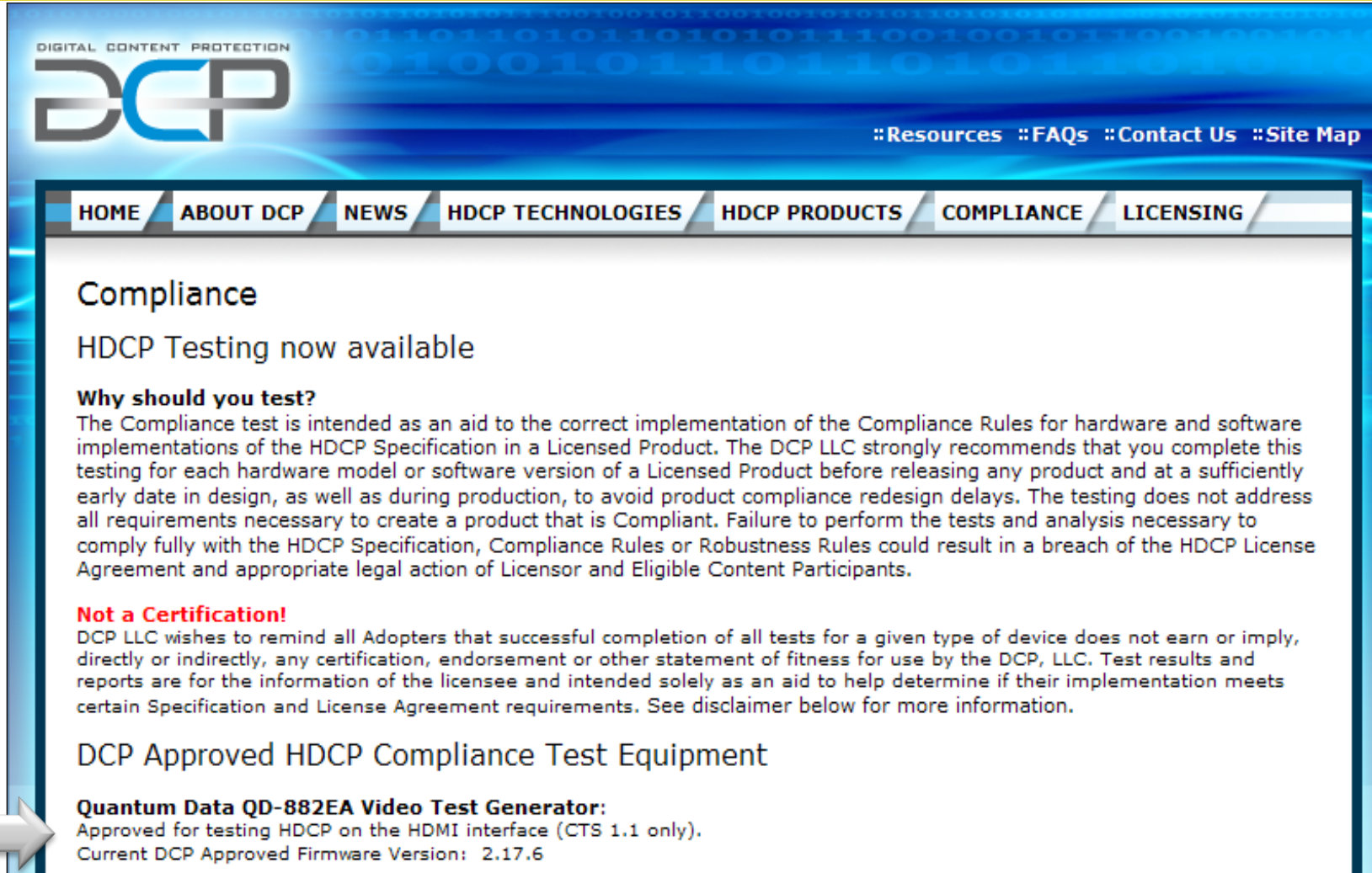
# 980 HDMI Protocol Analyzer – For HDMI & MHL Sources



# 980 Protocol Analyzer Module Source Compliance Tests

- Benefits
  - Ideal solution for compliance pre-testing or self-testing where permitted.
  - Enables you to get your product to market quicker by avoiding submission or resubmission delays at the ATC. And reduces expenses of resubmission to ATC.
- HDMI source compliance tests.
  - Supports HDMI source compliance tests in Sections 7.4 through 7.8.
  - Includes Test ID 7-39 4Kx2K test with 980 HDMI Protocol Analyzer module (297MHz).
- HDMI HDCP source compliance tests.
  - Supports HDMI HDCP source compliance tests in Sections 1A and 1B.
- MHL source compliance tests
  - Requires Test Point Adapter (TPA-MHL-8R [CTS 1.2] TPA-MHL2-8R [CTS 2.0]).
  - Only supported on 980 HDMI Protocol Analyzer module (297MHz).
  - MHL source compliance tests in Section 3 of MHL Compliance Test Specification (MHL CTS 1.2 and 2.0).

# Quantum Data's HDMI-HDCP Compliance Test



DIGITAL CONTENT PROTECTION  
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## Compliance

### HDCP Testing now available

**Why should you test?**  
The Compliance test is intended as an aid to the correct implementation of the Compliance Rules for hardware and software implementations of the HDCP Specification in a Licensed Product. The DCP LLC strongly recommends that you complete this testing for each hardware model or software version of a Licensed Product before releasing any product and at a sufficiently early date in design, as well as during production, to avoid product compliance redesign delays. The testing does not address all requirements necessary to create a product that is Compliant. Failure to perform the tests and analysis necessary to comply fully with the HDCP Specification, Compliance Rules or Robustness Rules could result in a breach of the HDCP License Agreement and appropriate legal action of Licensor and Eligible Content Participants.

**Not a Certification!**  
DCP LLC wishes to remind all Adopters that successful completion of all tests for a given type of device does not earn or imply, directly or indirectly, any certification, endorsement or other statement of fitness for use by the DCP, LLC. Test results and reports are for the information of the licensee and intended solely as an aid to help determine if their implementation meets certain Specification and License Agreement requirements. See disclaimer below for more information.

### DCP Approved HDCP Compliance Test Equipment

**Quantum Data QD-882EA Video Test Generator:**  
Approved for testing HDCP on the HDMI interface (CTS 1.1 only).  
Current DCP Approved Firmware Version: 2.17.6

## HDCP Compliance:

- Quantum Data has expertise in delivering HDCP compliance solution.
- 882EA HDCP tool approved by DCP.
- 980 Protocol Analyzer solution uses same technology.

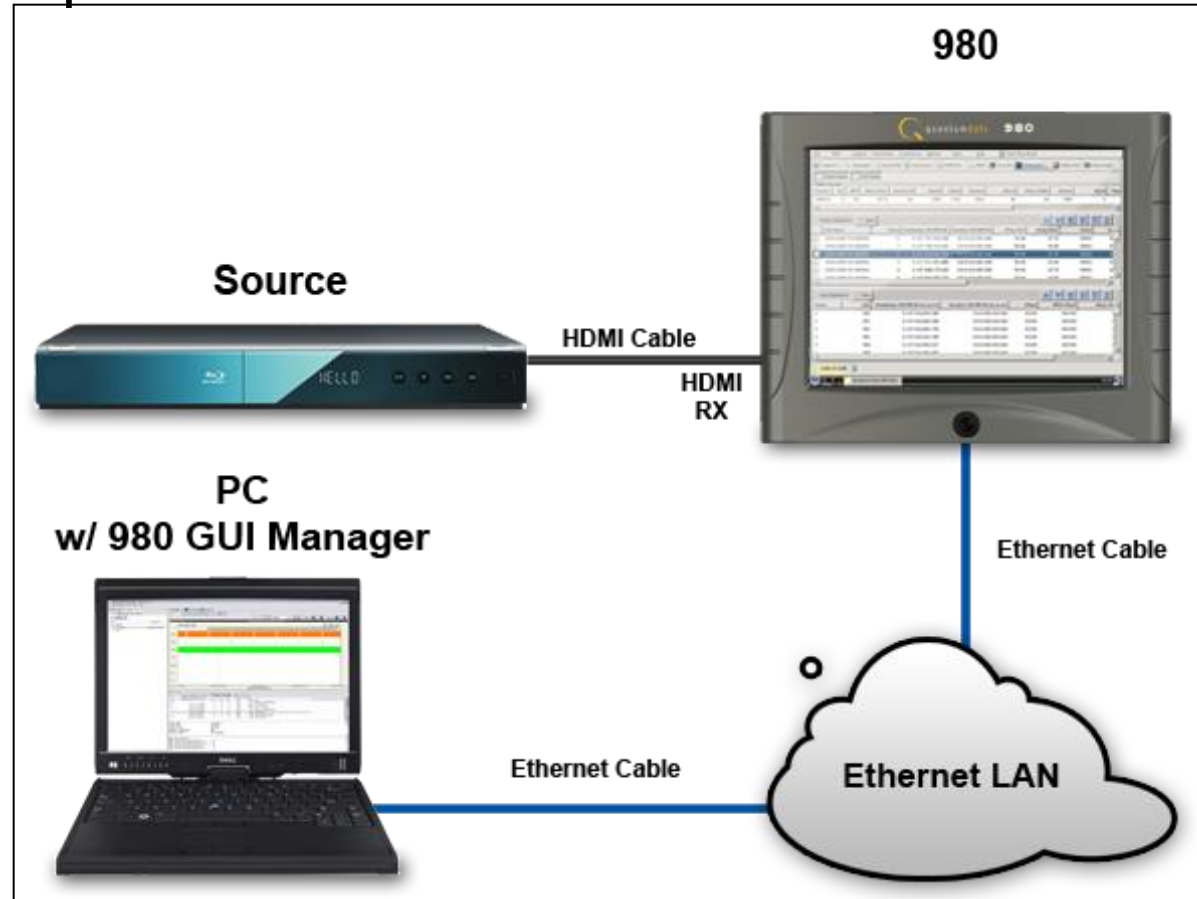
# HDMI HDCP Source Compliance Testing

# 980 HDMI 1.2 HDMI HDCP Source Compliance Test

- Solution provides complete test coverage for source testing in accordance with test sections 1A and 1B of HDCP CTS version 1.2.
- Ideal solution for pre-testing and enables you to get your product to market more quickly and reduce expenses of resubmission at an Authorized Test Center.
- Solution provides easy access to the raw HDMI and DDC protocol data to view the details about the failure.
- Optimized for debugging compliance test failures; invaluable tool for ensuring that your HDMI HDCP source device is compliant.
- Enables you to share the detailed test results and captures with colleagues and subject matter experts. The 980 HDMI Protocol Analyzer module is not required to view these results and captures. You can view these files with the 980 GUI Manager which is available free from the Quantum Data website.

# HDMI HDCP Source Compliance Test – Setup

- Run tests using external 980 GUI Manager (shown) or through embedded 980 GUI Manager.
- Test setup shown below.



# Capabilities Declaration Form



# HDMI HDCP Source Compliance – CDF

The screenshot shows the Edid Editor software interface. The main window is titled 'Edid Editor' and contains several tabs: 'Event Plot', 'HDMI HDCP TX CT 1.2', 'HDMI Src CT 1.4b', and 'HDMI Sink CT 1.4b'. Below the tabs is a menu bar with 'CDF Entry', 'Test Selection', and 'Test Options / Preview'. A toolbar contains 'Open', 'New', and 'Save' buttons, followed by 'CDF File: <not saved>'. Below the toolbar are two tabs: 'Product' and 'Source'. The 'Product' tab is selected, showing a form with the following fields:

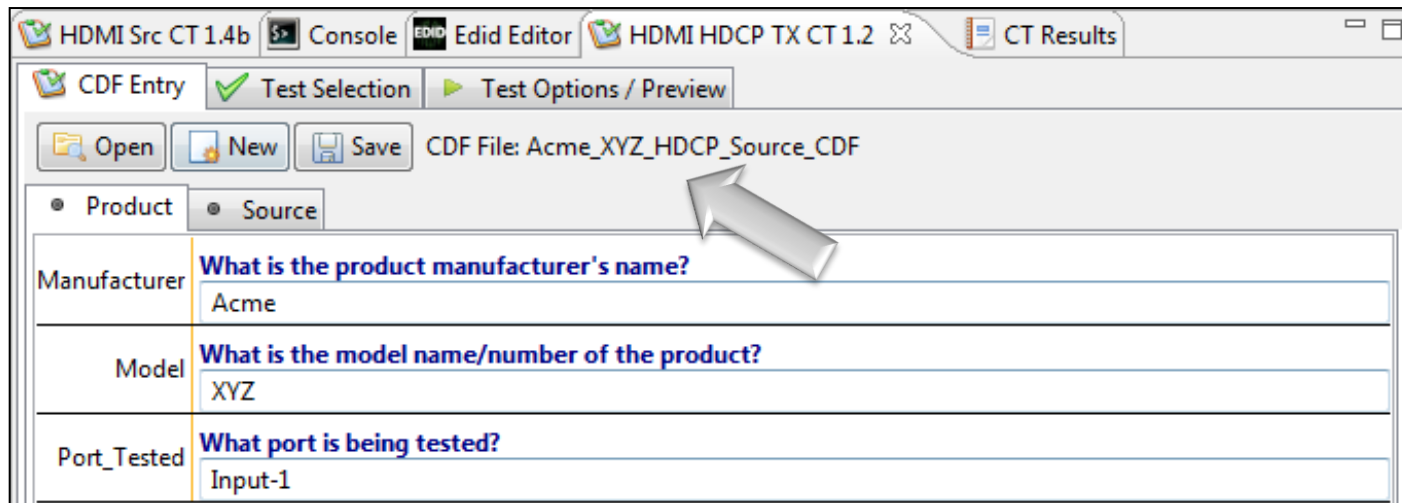
Manufacturer	What is the product manufacturer's name? Acme
Model	What is the model name/number of the product? XYZ
Port_Tested	What port is being tested? Input-1

Two arrows are present: one pointing to the 'Product' tab and another pointing to the 'Manufacturer' field.

## Capabilities Declaration Form (CDF):

- Defines the capabilities of the device under test.
- Provides tabs for each type of feature.
- Determines which tests run.
- Save CDF definitions for later reuse.
- Shows error if mandatory fields are not shown.
- Product tab shown (left).

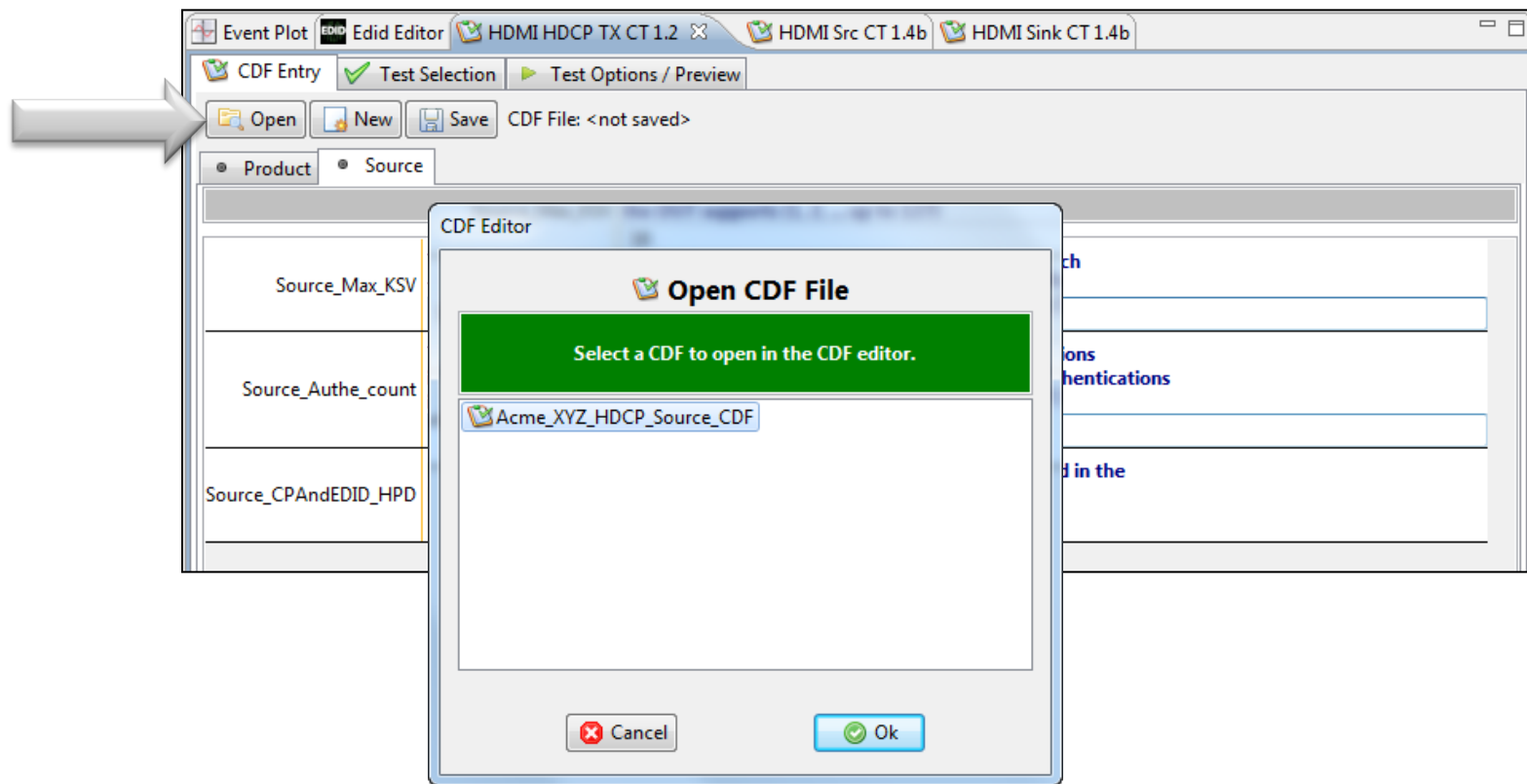
# HDMI HDCP Source Compliance – CDF



CDF:

- Source tab shown (left).
- Name of CDF in use shown on panel

# HDMI HDCP Source Compliance - Load Existing CDF

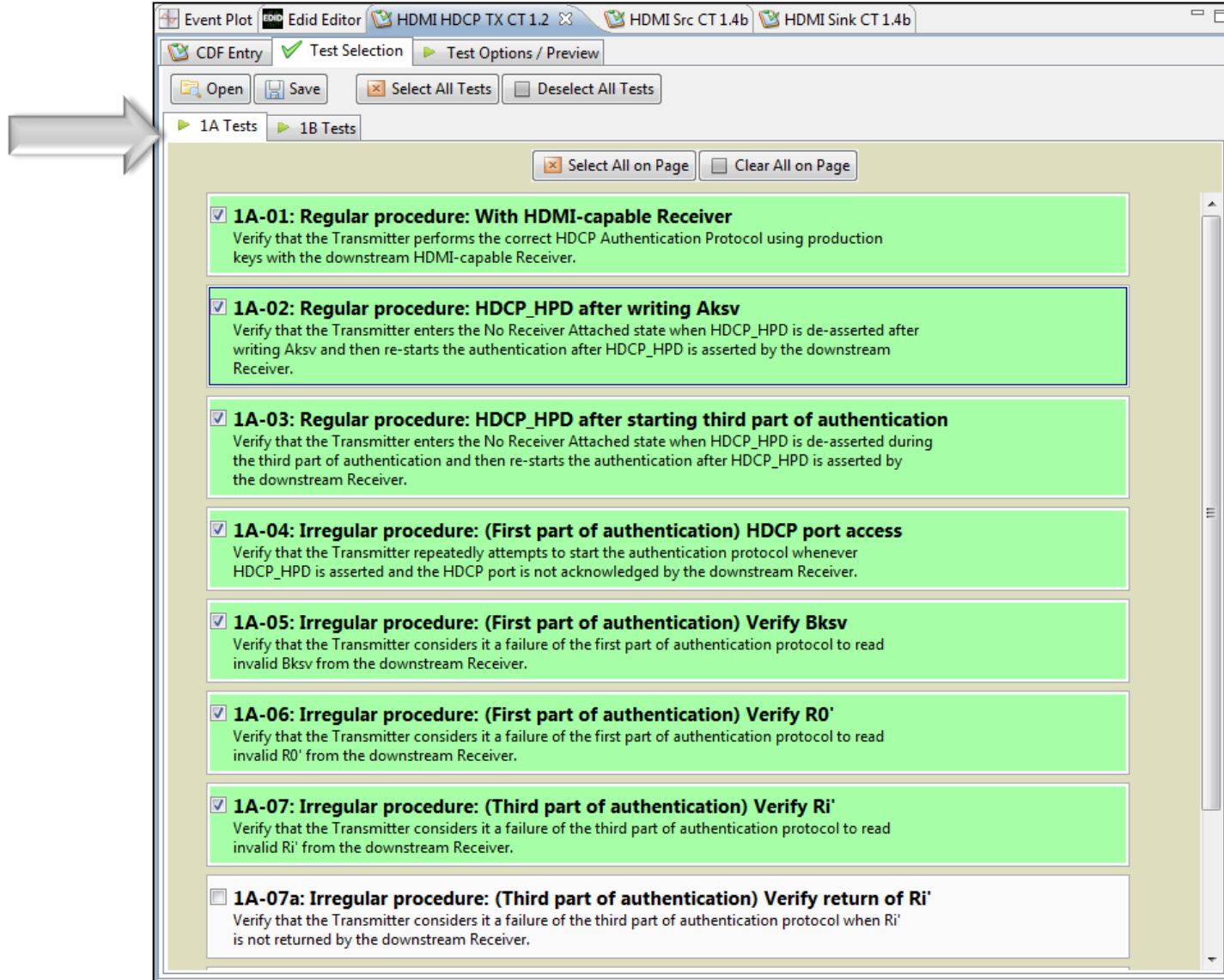


CDF:

- Load a previously saved CDF for reuse.

# Test Selection

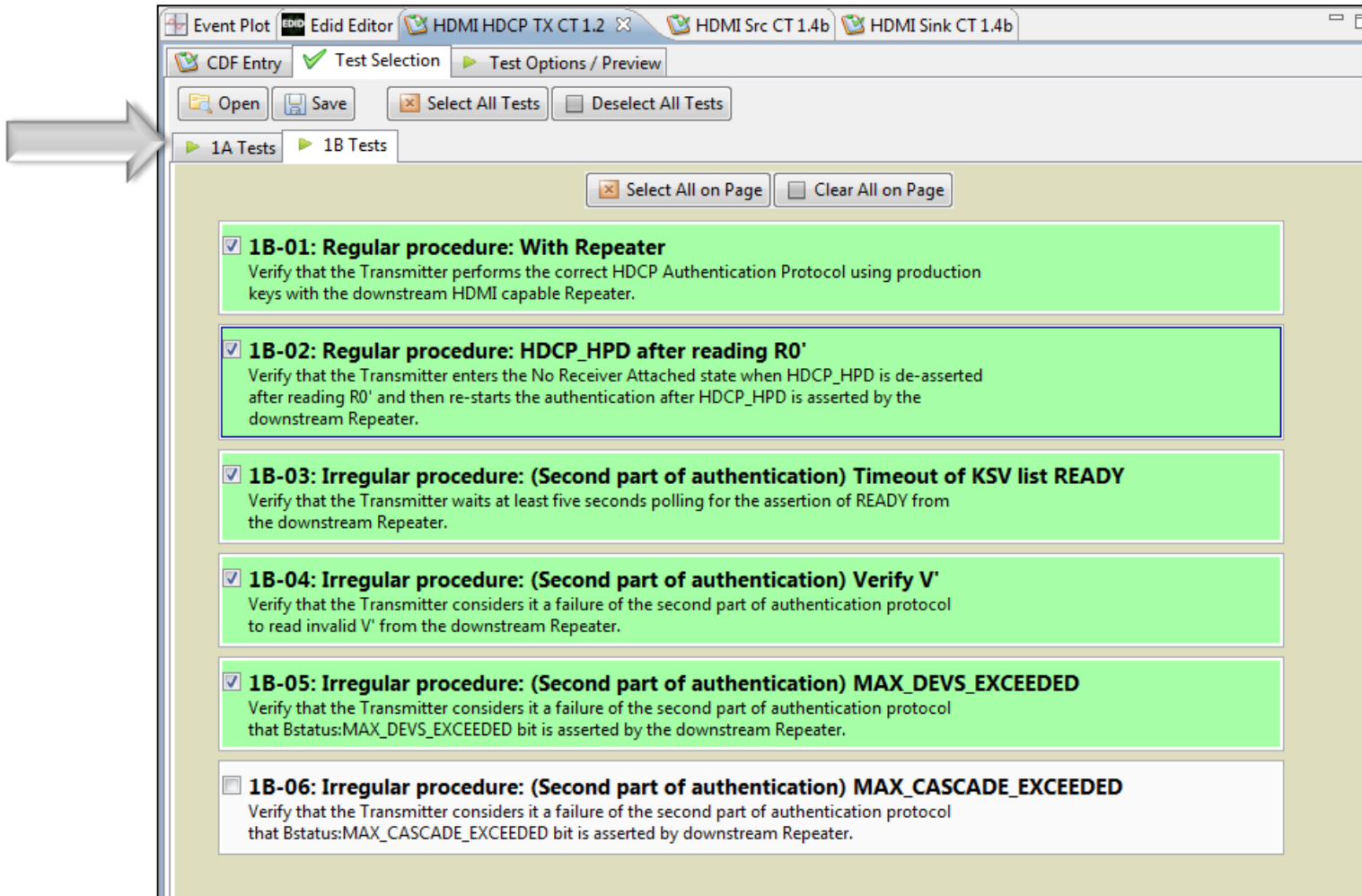
# HDMI HDCP Source Compliance - Select 1A Tests



## Test Selection:

- Determine which specific tests to run in a test suite.
- Tabs correspond to each Section in the HDMI HDCP CTS.
- 1A Tests shown

# HDMI HDCP Source Compliance - Select 1B Tests

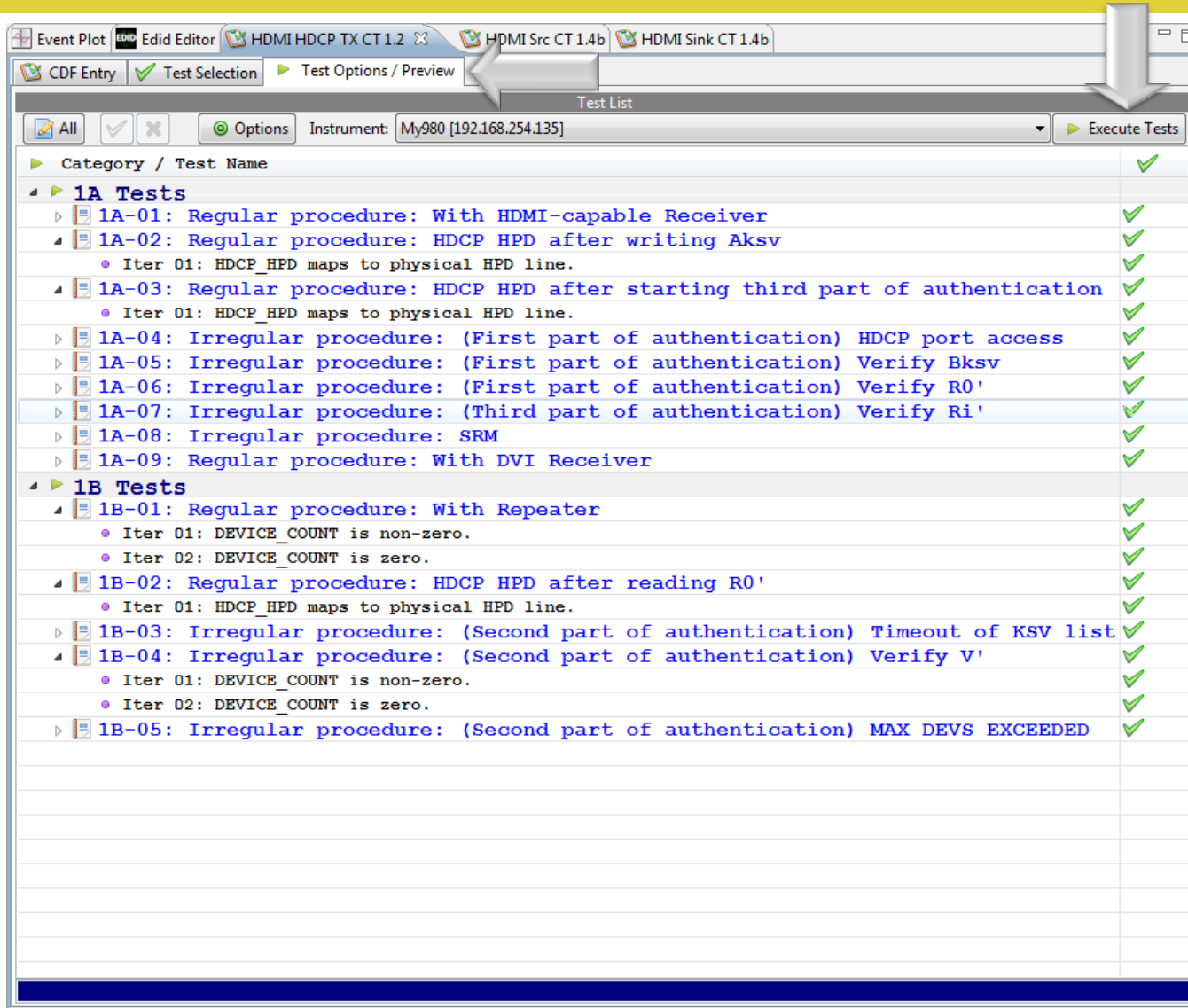


## Test Selection:

- Determine which specific tests to run in a test suite.
- Tabs correspond to each Section in the HDMI HDCP CTS.
- 1B Tests shown

# Running the Tests

# HDMI HDCP Source Compliance - Execute Test Series



## Test Options / Preview:

- Review list of tests by Section.
- Execute Tests



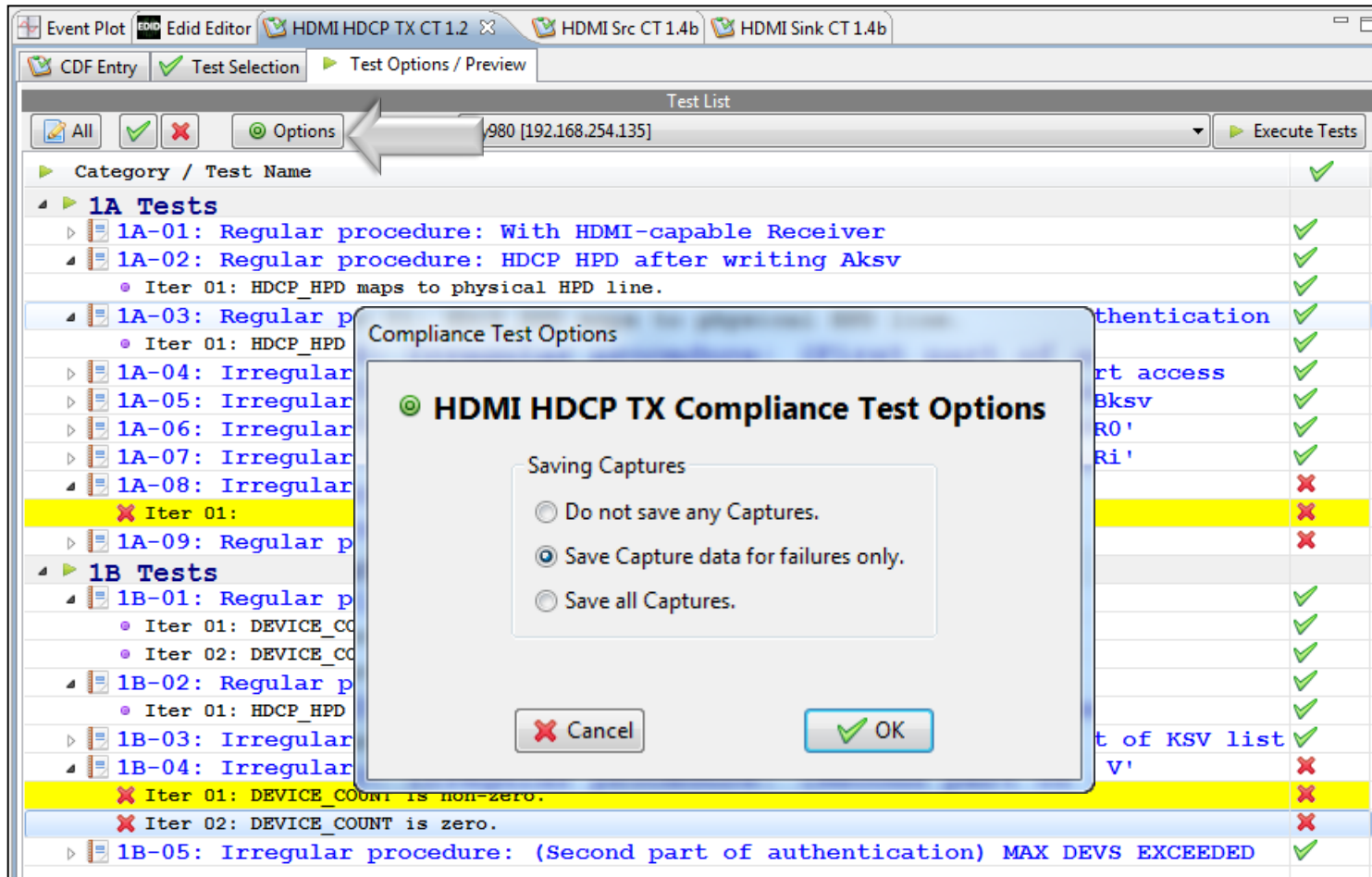
# HDMI HDCP Source Compliance - Optionally Skip Tests

Category / Test Name	Status
<b>1A Tests</b>	✓
1A-01: Regular procedure: With HDMI-capable Receiver	✓
1A-02: Regular procedure: HDCP HPD after writing Aksv	✓
• Iter 01: HDCP_HPDP maps to physical HPD line.	✓
1A-03: Regular procedure: HDCP HPD after starting third part of authentication	✓
• Iter 01: HDCP_HPDP maps to physical HPD line.	✓
1A-04: Irregular procedure: (First part of authentication) HDCP port access	✓
1A-05: Irregular procedure: (First part of authentication) Verify Bksv	✓
1A-06: Irregular procedure: (First part of authentication) Verify R0'	✓
1A-07: Irregular procedure: (Third part of authentication) Verify Ri'	✓
1A-08: Irregular procedure: SRM	✗
✗ Iter 01:	✗
1A-09: Regular procedure: With DVI Receiver	✗
<b>1B Tests</b>	✓
1B-01: Regular procedure: With Repeater	✓
• Iter 01: DEVICE_COUNT is non-zero.	✓
• Iter 02: DEVICE_COUNT is zero.	✓
1B-02: Regular procedure: HDCP HPD after reading R0'	✓
• Iter 01: HDCP_HPDP maps to physical HPD line.	✓
1B-03: Irregular procedure: (Second part of authentication) Timeout of KSV list	✓
1B-04: Irregular procedure: (Second part of authentication) Verify V'	✗
✗ Iter 01: DEVICE_COUNT is non-zero.	✗
✗ Iter 02: DEVICE_COUNT is zero.	✗
1B-05: Irregular procedure: (Second part of authentication) MAX DEVS EXCEEDED	✓

Test Options / Preview:

- Optionally, skip certain tests (red X).

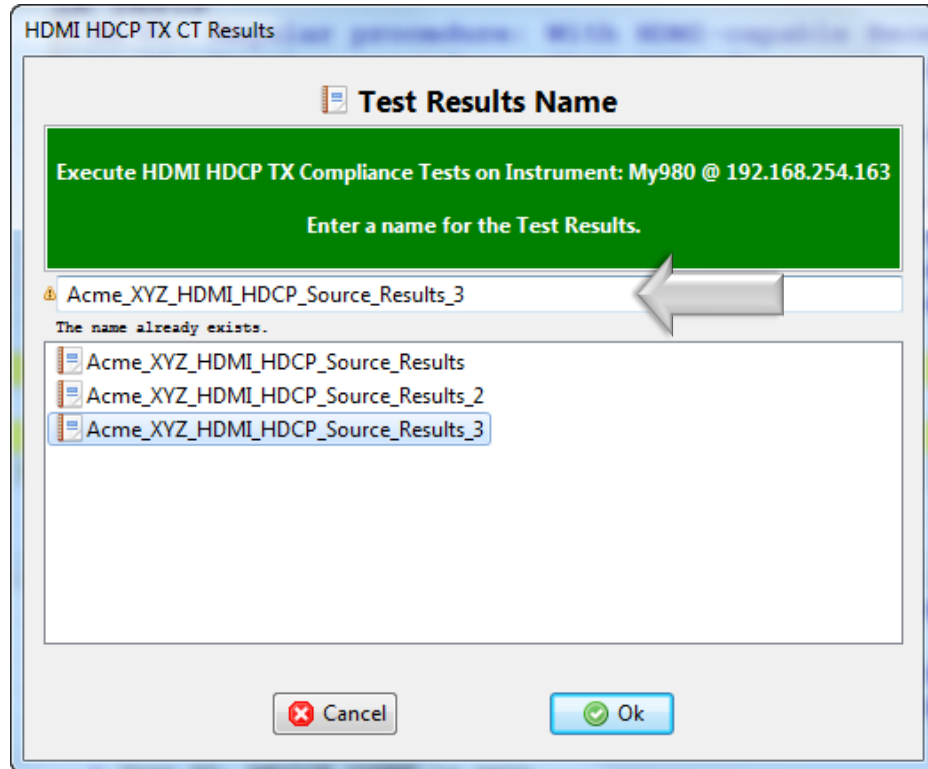
# HDMI HDCP Compliance – Determine captures to save



## Test Options / Preview:

- Select when you want to save captures.
- Saving captured data is helpful when you want to determine the root cause of compliance failures.

# HDMI HDCP Compliance – Select Name for Test Results



Test Results:

- Select a name for your test results.

# HDMI HDCP Source Compliance - Test Execution

The screenshot displays the 'HDMI HDCP TX Compliance Test (1.2): "Acme\_XYZ\_HDMI\_HDCP\_Source\_Results\_3"' application. The main window is titled 'Test List' and contains a table of test results. A 'Source Test Setup' dialog box is overlaid on the test list, providing instructions for Test 1A-01, Iter-01. The dialog includes a diagram showing the connection between the DUT (Source) and Test Equipment (Pseudo-Sink) via HDMI. The log window at the bottom shows the test execution progress, including messages like 'Compliance Test Setup Initialization' and 'Set Configuration to: SOURCE'.

Category / Test Name	Status
1A Tests	
1A-01: Regular procedure: With HDMI-capable Receiver	In Progress
Iter 01:	In Progress
1A-02: Regular procedure: HDCP H	Not Tested
Iter 01: HDCP_HPD maps to physical HPD	Not Tested
1A-03: Regular procedure: HDCP H	Not Tested
Iter 01: HDCP_HPD maps to physical HPD	Not Tested
1A-04: Irregular procedure: (Fir	Not Tested
1A-05: Irregular procedure: (Fir	Not Tested
1A-06: Irregular procedure: (Fir	Not Tested
1A-07: Irregular procedure: (Thi	Not Tested
1A-08: Irregular procedure: SRM	Not Tested
Iter 01:	Incomplete
1A-09: Regular procedure: With D	User Skipped
Iter 01:	Incomplete
Iter 01:	User Skipped
1B Tests	
1B-01: Regular procedure: With R	Not Tested
Iter 01: DEVICE_COUNT is non-zero.	Not Tested
Iter 02: DEVICE_COUNT is zero.	Not Tested
1B-02: Regular procedure: HDCP H	Not Tested
Iter 01: HDCP_HPD	Not Tested
1B-03: Irregular	Not Tested

Test execution:

- Tests run uninterrupted until user input is required.
- Test setup diagrams provided.

# HDMI HDCP Source Compliance - Test Execution Status

The screenshot displays the 'HDMI HDCP TX Compliance Test (1.2): "Acme\_XYZ\_HDMI\_HDCP\_Results1"' window. It features a 'Test List' table with columns for 'Category / Test Name', 'Status', and 'Test Name'. The tests are categorized into 1A and 1B. The status of each test is indicated by a colored background: green for 'Pass', red for 'Fail', yellow for 'Incomplete', and cyan for 'In Progress'. A green arrow points to the '1B-02' test, which is currently 'In Progress'. Below the test list is a 'Test Log' panel showing the execution details for the selected test, including messages like 'Generating a verification image', 'Displaying the verification image', and 'Test 1B-01 Iter 01 -> Pass'. At the bottom of the window, there are buttons for 'Cancel the Compliance Test' and 'Pause Test Execution'.

Category / Test Name	Status	Test Name
1A Tests		
1A-01: Regular procedure: With HDMI-capable Receiver	Pass	1A-01: Regular procedure: With HDMI-capable Receiver
Iter 01:	Pass	Iter 01:
1A-02: Regular procedure: HDCP HPD after writing Aksv	Fail	1A-02: Regular procedure: HDCP HPD after writing Aksv
Iter 01: HDCP_HPDP maps to physical HPD line.	Fail	Iter 01: HDCP_HPDP maps to physical HPD line.
1A-03: Regular procedure: HDCP HPD after starting third part of authenticatio	Fail	1A-03: Regular procedure: HDCP HPD after starting third part of authenticatio
Iter 01: HDCP_HPDP maps to physical HPD line.	Fail	Iter 01: HDCP_HPDP maps to physical HPD line.
1A-04: Irregular procedure: (First part of authentication) HDCP port access	Pass	1A-04: Irregular procedure: (First part of authentication) HDCP port access
Iter 01:	Pass	Iter 01:
1A-05: Irregular procedure: (First part of authentication) Verify Bksv	Fail	1A-05: Irregular procedure: (First part of authentication) Verify Bksv
Iter 01:	Fail	Iter 01:
1A-06: Irregular procedure: (First part of authentication) Verify R0'	Pass	1A-06: Irregular procedure: (First part of authentication) Verify R0'
Iter 01:	Pass	Iter 01:
1A-07: Irregular procedure: (Third part of authentication) Verify Ri'	Incomplete	1A-07: Irregular procedure: (Third part of authentication) Verify Ri'
Iter 01:	User Skipped	Iter 01:
1A-07a: Irregular procedure: (Third part of authentication) Verify return of	Incomplete	1A-07a: Irregular procedure: (Third part of authentication) Verify return of
Iter 01:	User Skipped	Iter 01:
1B Tests		
1B-01: Regular procedure: With Repeater	Pass	1B-01: Regular procedure: With Repeater
Iter 01: DEVICE_COUNT is non-zero.	Pass	Iter 01: DEVICE_COUNT is non-zero.
Iter 02: DEVICE_COUNT is zero.	Pass	Iter 02: DEVICE_COUNT is zero.
1B-02: Regular procedure: HDCP HPD after reading R0'	In Progress	1B-02: Regular procedure: HDCP HPD after reading R0'
Iter 01: HDCP_HPDP maps to physical HPD line.	In Progress	Iter 01: HDCP_HPDP maps to physical HPD line.
1B-03: Irregular procedure: (Second part of authentication) Timeout of KSV li	Not Tested	1B-03: Irregular procedure: (Second part of authentication) Timeout of KSV li
1B-04: Irregular procedure: (Second part of authentication) Verify V'	Not Tested	1B-04: Irregular procedure: (Second part of authentication) Verify V'

```
Line      Message
0037      Generating a verification image.
0038      Displaying the verification image.
0039      Test 1B-01 Iter 01 -> Pass
0040      --- Test 1B-01-02
0041      Executing the test.
0042      Processing test results.
0043      Generating a verification image.
0044      Displaying the verification image.
0045      Test 1B-01 Iter 02 -> Pass
0046      --- Test 1B-02-01
0047      Executing the test.
```

Test execution:

- Status provided for each test. Results can be: Passed, Failed, Skipped, Canceled or Not Tested.
- Current test is indicated by green arrow.
- Detailed Test Log is shown in lower panel.
- You can Pause or Cancel the test at any time.

# HDMI HDCP Source Compliance - Test Execution Status

Category / Test Name	Status
1A Tests	
1A-01: Regular procedure: With HDMI-capable Receiver	In Progress
Iter 01:	In Progress
1A-02: Regular procedure: HDCP HPD after writing Aksv	Not Tested
Iter 01: HDCP_HPDP maps to physical HPD line.	Not Tested
1A-03: Regular procedure: HDCP HPD after starting third part of authentication	Not Tested
Iter 01: HDCP_HPDP maps to physical HPD line.	Not Tested
1A-04: Irregular procedure:	Not Tested
1A-05: Irregular procedure:	Not Tested
1A-06: Irregular procedure:	Not Tested
1A-07: Irregular procedure:	Not Tested
1A-08: Irregular procedure:	Not Tested
Iter 01:	Incomplete
1A-09: Regular procedure:	User Skipped
Iter 01:	Incomplete
1A-09: Regular procedure:	User Skipped
1B Tests	
1B-01: Regular procedure: With HDMI-capable Receiver	
Iter 01: DEVICE_COUNT is non-zero.	
Iter 02: DEVICE_COUNT is zero.	
1B-02: Regular procedure: HDCP HPD after writing Aksv	
Iter 01: HDCP_HPDP maps to physical HPD line.	
1B-03: Irregular procedure:	
1B-04: Irregular procedure: (Second part of authentication) Verify V'	

Test Log

```
Line Message
0005 Transferring the CDF to the Test Instrument.
0006 --- Test 1A-01-01
0007 Set Configuration to: SOURCE
0008 Executing the test.
0009 Processing test results.
0010 Connecting to the CMD interface.
0011 Generating a verification image.
0012 Displaying the verification image.
```

Test execution:

- You will be asked to view the video on a 980 screen to assess pass/fail.

Test 1A-01, Iter-01: Verify that the Transmitter performs the correct HDCP Authentication Protocol using production keys with the downstream HDMI-capable Receiver.

If the decrypted images are not considered right visually then FAIL, otherwise PASS.

001 of 102

# Viewing the Test Results

# HDMI Source Compliance - Test Results

Results Name: Acme\_XYZ\_HDMI\_HDCP\_Results1  
Date Tested: November 5, 2012 3:23 PM  
Overall Status: **CTS 1.2 - Incomplete**

Manufacturer: Acme  
Model Name: XYZ  
Port Tested: Input-1

Test Name / Details	Status
1A-01: Regular procedure: With HDMI-capable Receiver	Pass
Iter 01:	Pass
Visual verification: The image was transmitted correctly.	
1A-02: Regular procedure: HDCP HPD after writing Aksv	Fail
1A-03: Regular procedure: HDCP HPD after starting third part of authentication	Fail
Iter 01: HDCP_HPDP maps to physical HPD line.	Fail
1A-04: Irregular procedure: (First part of authentication) HDCP port access	Pass
1A-05: Irregular procedure: (First part of authentication) Verify Bksv	Fail
1A-06: Irregular procedure: (First part of authentication) Verify R0'	Pass
1A-07: Irregular procedure: (Third part of authentication) Verify Ri'	Incomplete
1A-07a: Irregular procedure: (Third part of authentication) Verify return of Ri'	Incomplete
1B-01: Regular procedure: With Repeater	Pass
Iter 01: DEVICE_COUNT is non-zero.	Pass
Iter 02: DEVICE_COUNT is zero.	Pass
Visual verification: The image was transmitted correctly.	
1B-02: Regular procedure: HDCP HPD after reading R0'	Fail
1B-03: Irregular procedure: (Second part of authentication) Timeout of KSV list	Pass
Iter 01:	Pass
1B-04: Irregular procedure: (Second part of authentication) Verify V'	Fail
Iter 01: DEVICE_COUNT is non-zero.	Pass
Iter 02: DEVICE_COUNT is zero.	Fail
First part of authentication was never attempted.	
1B-05: Irregular procedure: (Second part of authentication) MAX DEVS EXCEEDED	Pass
1B-06: Irregular procedure: (Second part of authentication) MAX CASCADE EXCEEDED	Fail
Iter 01:	Fail
First part of authentication was never attempted.	

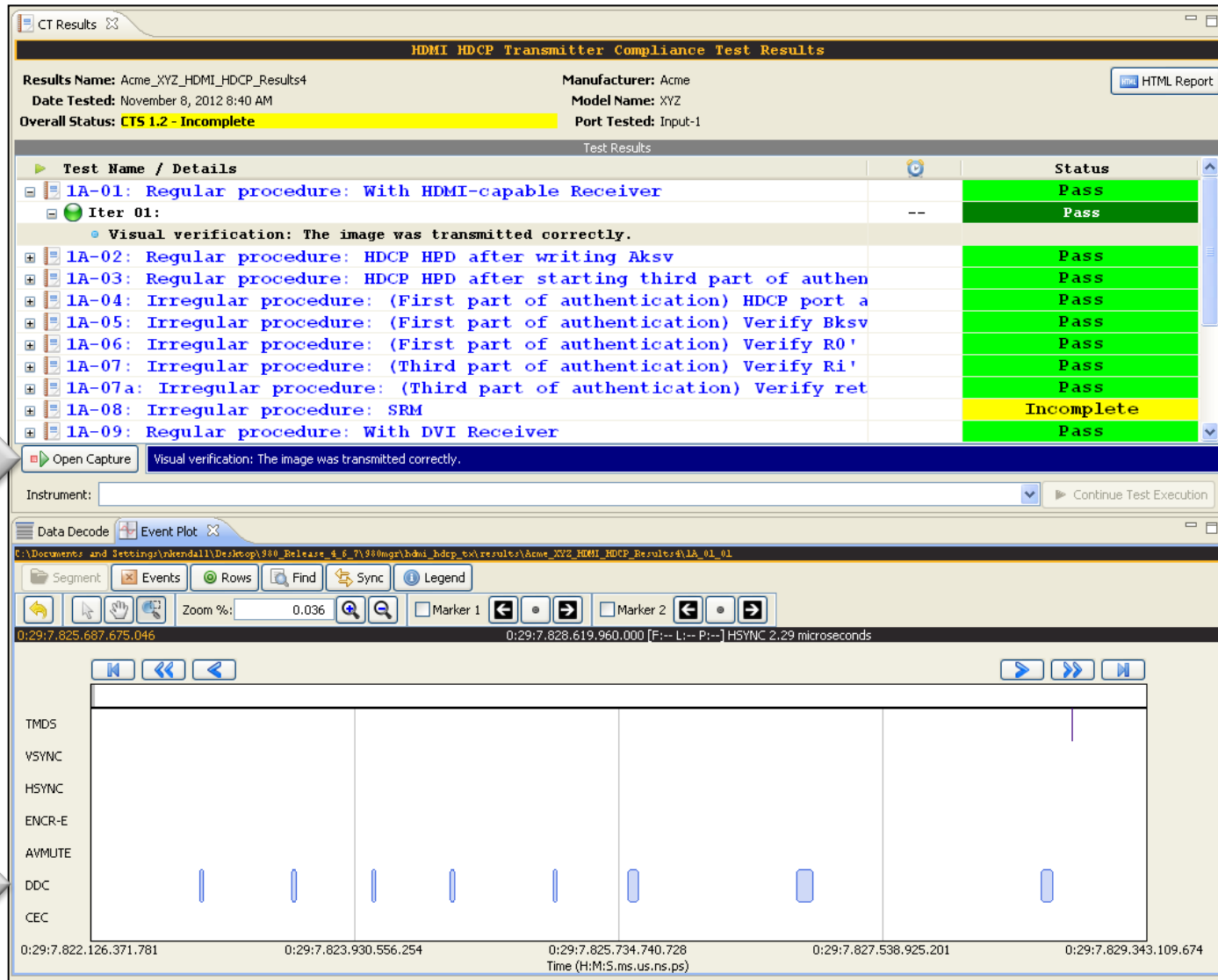
Instrument: My980 [192.168.254.163]

Test results:

- Compliance Test Results Tab appears when the tests are completed.
- Results are also accessible from the Navigator/Compliance panel.
- You can also access a summary of the test results and the CDF.
- There is a separate capture for each test.



# HDMI HDCP Source Compliance - Captured Data



## Test results:

- Test results provide access to raw data where failure occurred.
- View captured data either through Event Plot (shown) and/or Data Decode panel.
- Capture data is crucial for debugging.
- Share data with colleagues. 980 Test Instrument not required to view results.

# HDMI HDCP Source Compliance - HTML Report

HTML Viewer  
C:\Documents and Settings\inkendall\Desktop\980\_Release\_4\_6\_7\980mgr\hdmr\_hdcp\_tx\results\Acme\_XYZ\_HDMI\_HDCP\_Results1\Report\_Cdf.htm

Report generated on: November 5, 2012 3:50 PM [www.quantumdata.com](http://www.quantumdata.com)

**Quantum Data**  
**HDMI HDCP TX Compliance Test Report**  
**CTS 1.2**

Results Name:	Acme_XYZ_HDMI_HDCP_Results1	Manufacturer:	Acme
Date Tested:	November 5, 2012 3:23 PM	Model Name:	XYZ
Overall Status:	Incomplete	Port Tested:	Input-1

Report Index / Summary					
<a href="#">Test 1A-01</a>	Pass	<a href="#">Test 1A-02</a>	Fail	<a href="#">Test 1A-03</a>	Fail
<a href="#">Test 1A-04</a>	Pass	<a href="#">Test 1A-05</a>	Fail	<a href="#">Test 1A-06</a>	Pass
<a href="#">Test 1A-07</a>	Incomplete	<a href="#">Test 1A-07a</a>	Incomplete	<a href="#">Test 1B-01</a>	Pass
<a href="#">Test 1B-02</a>	Fail	<a href="#">Test 1B-03</a>	Pass	<a href="#">Test 1B-04</a>	Fail
<a href="#">Test 1B-05</a>	Pass	<a href="#">Test 1B-06</a>	Fail	<a href="#">_CDF_</a>	
<a href="#">_Equipment Info_</a>					

Capabilities Declaration Form (CDF)	
General	
Manufacturer	Acme
Model	XYZ
Port Tested	Input-1
Source_Authe_count	1
Source_CPAndEDID_HPD	NO
Source_Max_KSV	1

Back Forward Save As Close

## HTML Report:

- Summary report.
- Share with other engineers.

# HDMI HDCP Source Compliance - HTML Report

The screenshot shows an HTML report viewer with the following content:

- Test 1A-01**  
Regular procedure: With HDMI-capable Receiver  
Result: Pass  
• Iter 01:
  - Visual verification: The image was transmitted correctly.
- Test 1A-02**  
Regular procedure: HDCP\_HPD after writing Aksv  
Result: Fail  
• Iter 01: HDCP\_HPD maps to physical HPD line.
  - Unable to capture logs properly
- Test 1A-03**  
Regular procedure: HDCP\_HPD after starting third part of authentication  
Result: Fail  
• Iter 01: HDCP\_HPD maps to physical HPD line.
  - Captured Data -- 1A\_03\_01
  - DUT kept encryption enabled without reauthentication after HPD went high.
- Test 1A-04**  
Irregular procedure: (First part of authentication) HDCP port access  
Result: Pass  
• Iter 01:
  - Time between HDCP accesses was 2.03079602000046 seconds. | 204847 01 268 23686611593.46 20.44 DDC MASTER -> SLAVE I2C
  - Time between HDCP accesses was 2.02613461999893 seconds. | 403244 01 270 23688638566.32 20.44 DDC MASTER -> SLAVE I2C
  - Time between HDCP accesses was 2.02685020000076 seconds. | 601684 01 272 23690666581.86 20.44 DDC MASTER -> SLAVE I2C
  - Time between HDCP accesses was 2.02662527999878 seconds. | 800120 01 274 23692693994.26 20.44 DDC MASTER -> SLAVE I2C
  - Time between HDCP accesses was 2.02702397999854 seconds. | 998598 01 276 23694721825.80 20.44 DDC MASTER -> SLAVE I2C
  - Time between HDCP accesses was 2.02604261999893 seconds. | 1196927 01 278 23696748675.98 20.44 DDC MASTER -> SLAVE I2C
  - Time between HDCP accesses was 2.02641062000275 seconds. | 1395345 01 280 23698775873.72 20.44 DDC MASTER -> SLAVE I2C
  - Time between HDCP accesses was 2.02587907999802 seconds. | 1593662 01 282 23700802611.48 20.44 DDC MASTER -> SLAVE I2C
  - Time between HDCP accesses was 2.02673774000168 seconds. | 1792143 01 284 23702830483.90 20.44 DDC MASTER -> SLAVE I2C

## HTML Report:

- Summary report.
- Share with other engineers.

# The Quantum Data 980 HDMI Protocol Analyzer...



... your solution for testing HDMI & MHL source devices for HDCP compliance.