

High-Definition Multimedia Interface

Version 2.0

Quantum Data MOI v1.0

Test ID: HF2-6

April 24, 2014

Preface

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Document Revision History

1.0 April 24, 2014 - Initial Release.

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Contact Information

The URL for the HDMI Forum web site is: <http://www.hdmiforum.org/>

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Table of Contents

Preface.....	2
<i>Notice.....</i>	<i>2</i>
Document Revision History.....	2
<i>Intellectual Property</i>	<i>2</i>
<i>Contact Information</i>	<i>2</i>
Introduction	4
Scope	4
References Document	4
<i>Normative References</i>	<i>4</i>
<i>Informative Reference</i>	<i>4</i>
Test ID HF2-6: Sink Video Timing – 6G – 24-bit Color Depth	5
<i>Objective</i>	<i>5</i>
<i>Reference</i>	<i>5</i>
<i>Requirement</i>	<i>5</i>
<i>Capability(s)</i>	<i>5</i>
<i>Test Equipment</i>	<i>5</i>
<i>Generic Procedure.....</i>	<i>5</i>
<i>Vendor Specific Test Procedure</i>	<i>7</i>

Introduction

This document provides a set of Method of Implementation for test method described in HDMI Compliance Test Specification Version 2.0 (HDMI CTS 2.0). HDMI Forum created HDMI CTS 2.0 to specify a set of tests that should be performed to verify features described in HDMI Specification Version 2.0.

Scope

This document provides testing procedures for HDMI CTS 2.0 Test ID HF2-6: “Sink Video Timing – 6G – 2160p 24-bit Color Depth.” The procedure below deals with single resolution and only one Test ID is considered at a time.

References Document

Normative References

High-Definition Multimedia Interface Specification Version 1.4b, October 11, 2011.
HDMI Compliance Test Specification Version 1.4b, October 11, 2011.
High-Definition Multimedia Interface Specification Version 2.0, August, 2013.
HDMI Compliance Test Specification Version 2.0,

Informative Reference

No additional informative references.

Test ID HF2-6: Sink Video Timing – 6G – 24-bit Color Depth

Objective

Confirm that the Sink DUT supports 24-bit Color Depth 2160p Video Format for TMDS Character Rate above 340Mcsc up to 600Mcsc indicated in the EDID.

Table 8-31 Sink Video Timing – 6G – 24-bit Color Depth Requirement

Reference	Requirement
[HDMI 2.0: 10.3.2] HDMI Forum Vendor Specific Data Block	<See reference for details>

Capability(s)

The Sink DUT supports any 24-bit Color Depth 2160p Video Format for TMDS Character Rate above 340Mcsc up to 600Mcsc.

Test Equipment

Item	Generic Equipment	Vendor Specific Equipment	Quantity
1	TMDS Signal Generator	980 Advanced Test Platform series:	1
1	I2C Analyzer	980 HDMI 2.0 Video Generator module HDMI CTS 2.0 Compliance Test Package #4	

Generic Procedure

- 1 If the CDF field Sink_Above_340 is “N”, then SKIP this test.
- 2 If none of the Video Formats listed in step 4 below is indicated in the EDID, then SKIP this test.

For each tested format and Pixel clock frequency, configure the TMDS Signal Generator to generate a test pattern in the given format at the tested TMDS clock frequency. The test pattern should permit the operator to determine if the Sink displays the image with no significant distortions (spurious dots, horizontal or vertical jitter, incorrect colors) and in the expected aspect ratio and position. All tested Video Formats shall be tested at two different TMDS clock frequencies. The two different TMDS clock frequencies are the minimum and maximum permitted for a Source.

In the case of 60Hz formats, these values are +0.5%/-0.6% of 148.5MHz.

In the case of 50Hz formats, these values are +0.5%/-0.5% of 148.5MHz.

The tested TMDS clock frequency accuracy shall be $\pm 0.05\%$.

(NOTE: The Scrambling_Enable bit of the Sink DUT is set (=1) by the I2 C Analyzer before the transmission of a scrambled video signal from the TMDS Signal Generator).

Setup:

- 3 Connect the TMDS Signal Generator to the Sink DUT.

Measure:

- 4 Perform the following test for each of the Video Formats listed below and indicated as being supported in the EDID.
 - 3840x2160p 59.94, 60Hz (CEA VIC = 97).
 - 3840x2160p 50Hz (CEA VIC = 96).
 - 4096x2160p 59.94, 60Hz (CEA VIC = 102).
 - 4096x2160p 50Hz (CEA VIC = 101).
- 4.1 Configure the TMDS Signal Generator to transmit the tested Video Format to the Sink DUT at the minimum allowable TMDS clock frequency.
- 4.2 If the Sink DUT does not adequately support this Video Format, then FAIL.
- 4.3 Configure the TMDS Signal Generator to transmit the tested Video Format to the Sink DUT at the maximum allowable TMDS clock frequency.
- 4.4 If the Sink DUT does not adequately support this Video Format, then FAIL.

Vendor Specific Test Procedure

Test Equipment

A variety of equipment is needed for testing HDMI products. Each piece is authorized and included by name in this Compliance Test Specification. This section describes the Quantum Data test equipment.

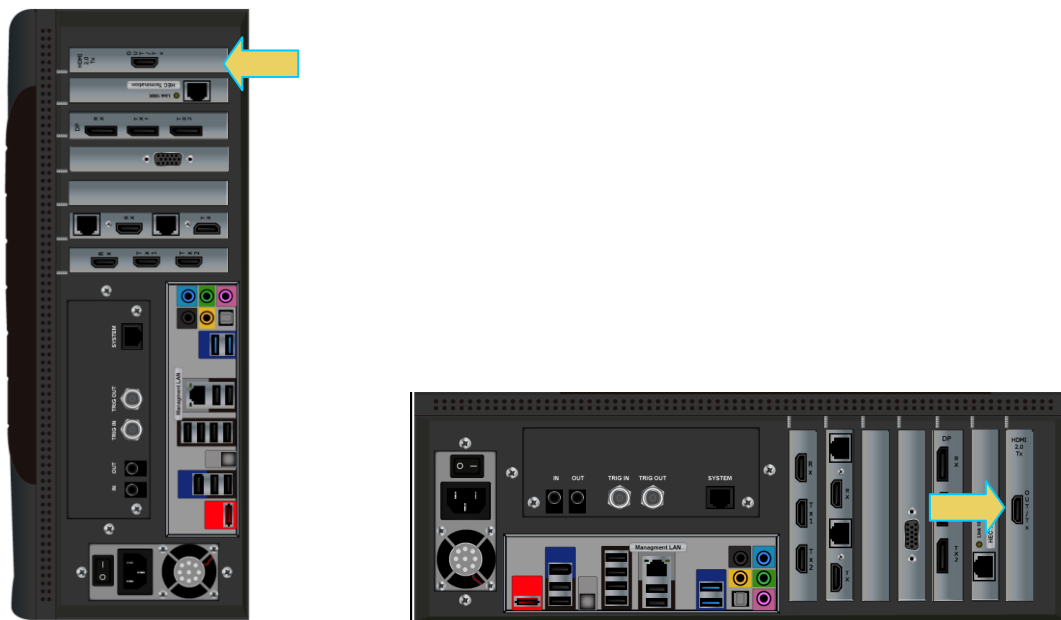
HDMI 2.0 Video Generator module

The Quantum Data 980 HDMI 2.0 Video Generator module can be installed in the 980B or 980R Advanced Test Platforms. This 980 HDMI 2.0 Video Generator module serves the generic test functions called out in the HDMI 2.0 Generic CTS. Refer to the table below:

Item	Quantum Data Equipment	
1	980 Advanced Test Platform series:	
	Equipped with:	980 HDMI 2.0 Video Generator module
		HDMI CTS 2.0 Compliance Test Package #4

980 HDMI 2.0 Video Generator Module with 980 Series Platform Configurations

The figures below show depictions of the 980 HDMI 2.0 Video Generator module equipped in various 980 series platforms. **Note:** Card positioning may vary depending on configuration.



Sink Video Timing – 6G – 2160p 24-bit Color Depth

Test ID HF2-6 - Sink Video Timing – 6G – 2160p 24-bit Color Depth

1. Objective

Confirm that the Sink DUT supports 24-bit Color Depth 2160p Video Format for TMDS Character Rate above 340Mcsc up to 600Mcsc indicated in the EDID.

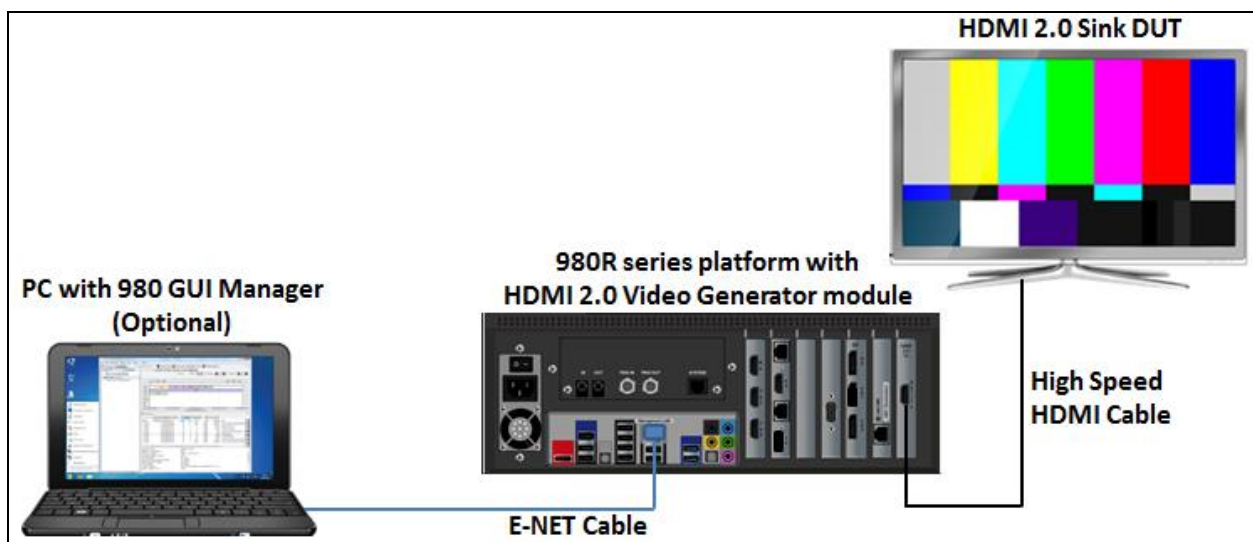
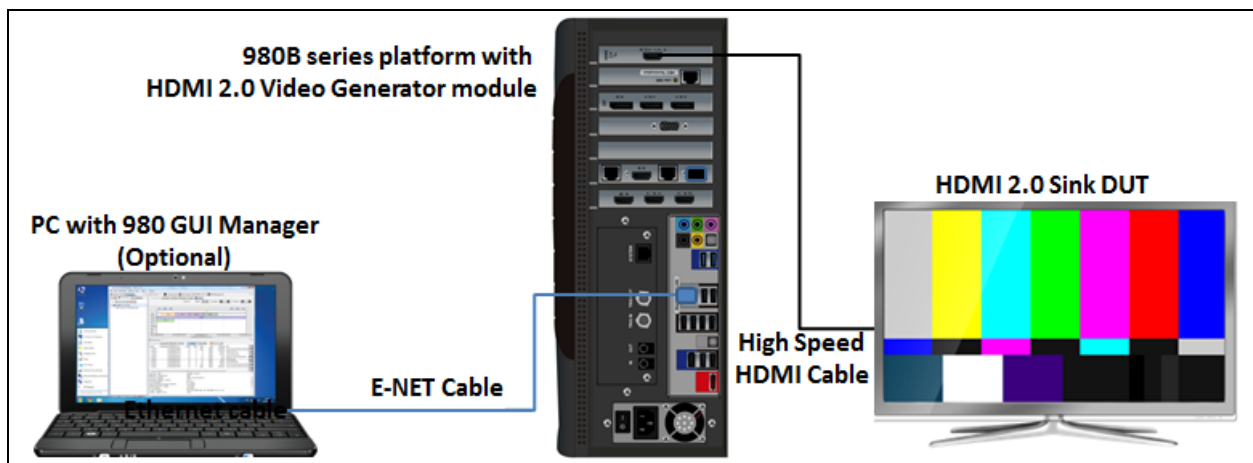
2. Test Overview

The Pass/Fail criteria for this test is assessed by human observation of an test image displayed on the sink DUT.

3. Procedure

Use the following procedure to conduct this test.

1. Connect Sink DUT to the Quantum Data 980 HDMI 2.0 Video Generator module HDMI Tx port. Use a High Speed HDMI cable. Refer to the figures below for reference.

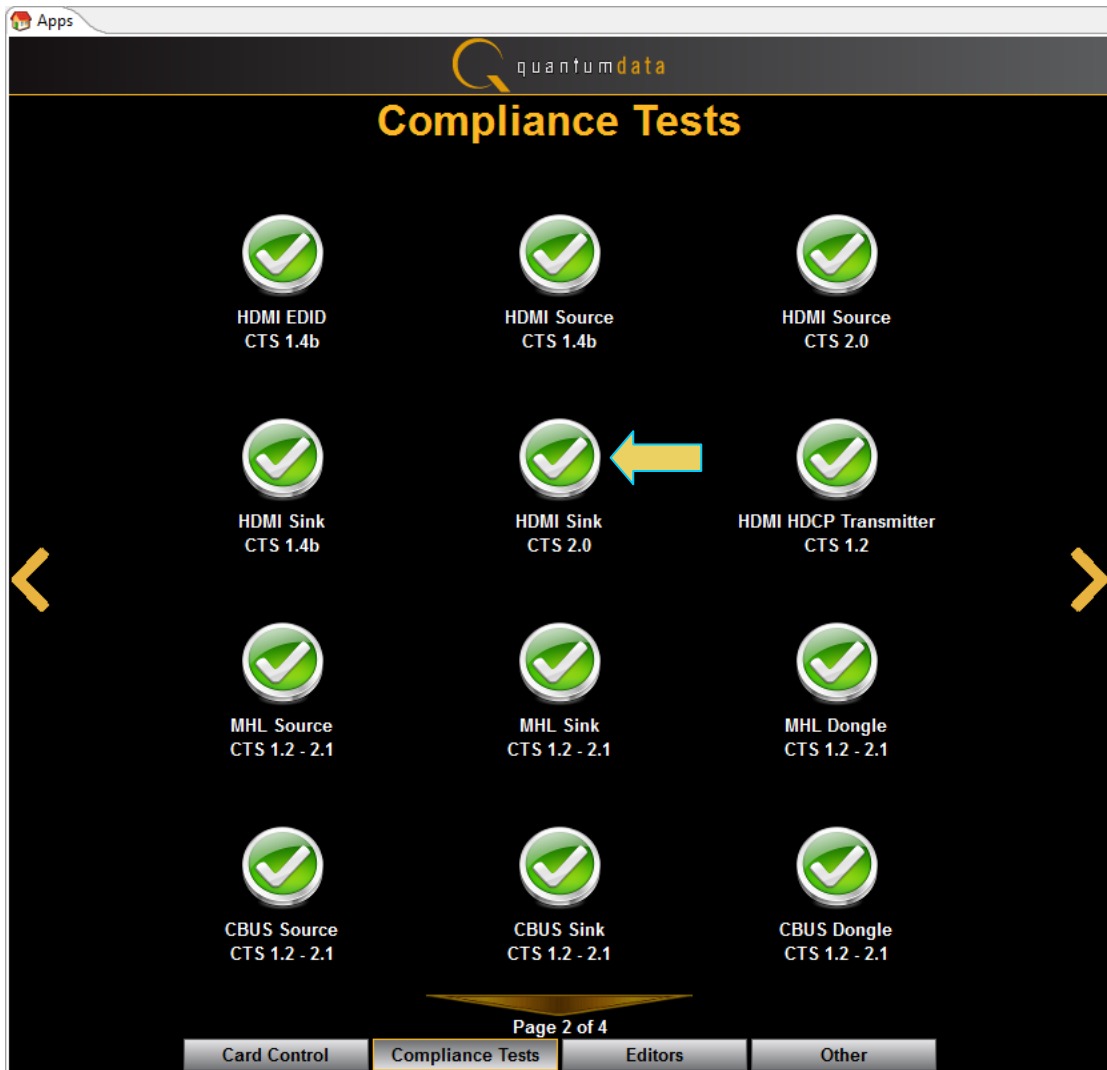


2. Use Quantum Data 980 Embedded Manager GUI (touchscreen) or invoke Quantum Data 980 External Manager GUI (Windows application).

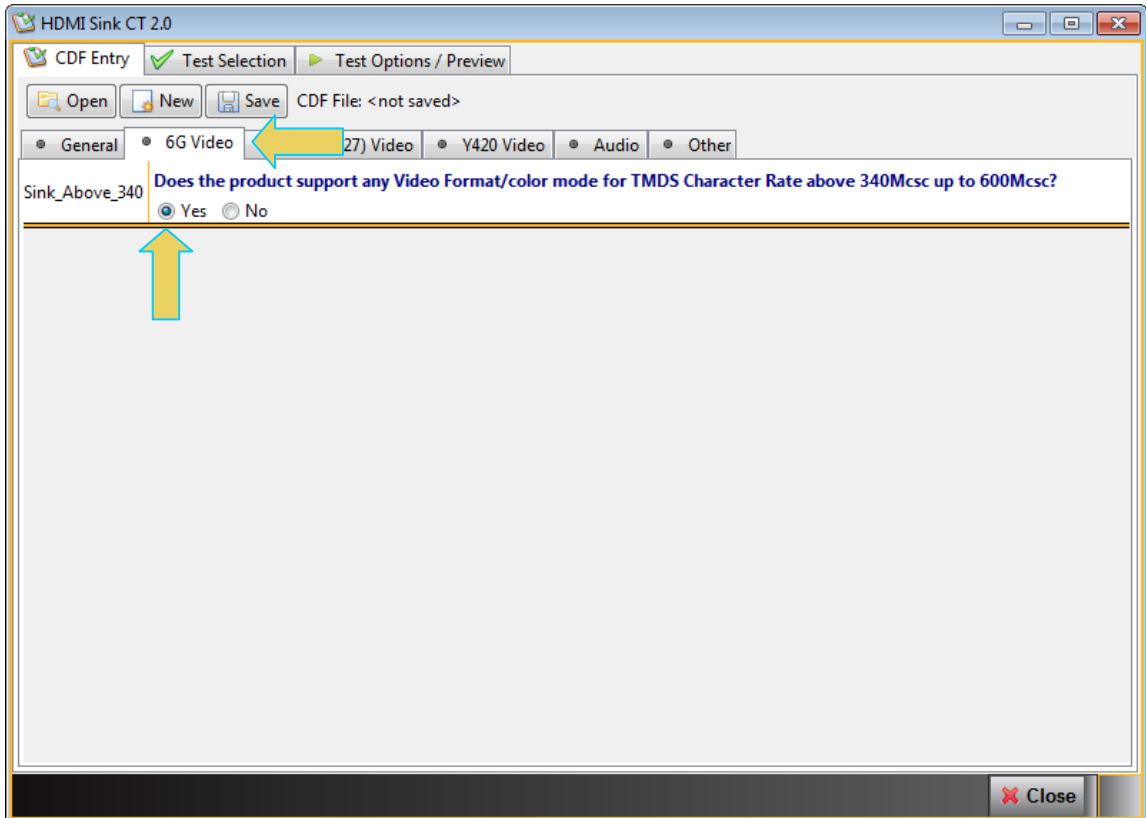
Note: You will not need to connect the PC shown in the figures above if you are running the compliance test through the 980's embedded display. The PC running the 980 HDMI 2.0 Video Generator module's compliance test application is connected to the 980 through a standard Ethernet cable.

3. Complete the following steps:

3.1 Click on the HDMI Sink CTS 2.0 icon in the Compliance Tests page of the Apps panel. Refer to the screen example below.



- 3.2 Navigate to the CDF tab if not already there. Complete the General sub tab and the 6G Video sub tab in the CDF. If there is a saved CDF file, then click on Open and select it. Otherwise, enter the DUT's CDF information and optionally click on Save to save the CDF. Refer to the screen example below.



HDMI Sink CT 2.0

CDF Entry
Test Selection
Test Options / Preview

Open
New
Save
CDF File: <not saved>

General
6G Video
21:9 (64:27) Video
Y420 Video
Audio
Other

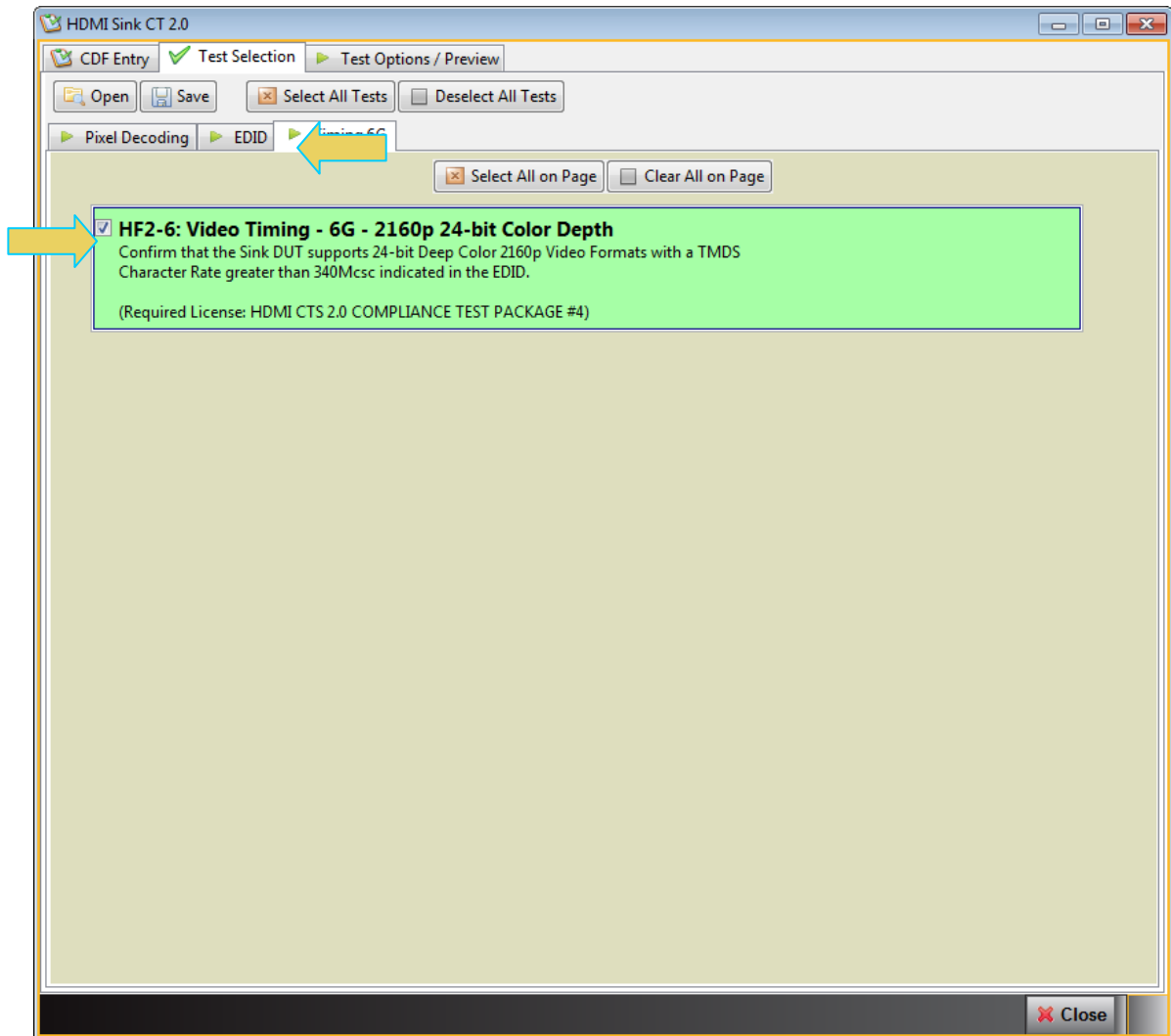
Sink_HDMI_YCBCR_420	Does the DUT support YCbCr 4:2:0 Pixel decoding?	<input checked="" type="radio"/> Yes <input type="radio"/> No
Sink_HDMI_YCBCR_420_DC10	Does the DUT support YCbCr 4:2:0 Deep Color Pixel decoding with 10-bits per component?	<input type="radio"/> Yes <input checked="" type="radio"/> No
Sink_HDMI_YCBCR_420_DC12	Does the DUT support YCbCr 4:2:0 Deep Color Pixel decoding with 12-bits per component?	<input type="radio"/> Yes <input checked="" type="radio"/> No
Sink_HDMI_YCBCR_420_DC16	Does the DUT support YCbCr 4:2:0 Deep Color Pixel decoding with 16-bits per component?	<input type="radio"/> Yes <input checked="" type="radio"/> No
Sink_HDMI_YCBCR_420_BT2020_YCC	Does the DUT support YCC 4:2:0 Pixel encoding in BT.2020 Y'Cb'Cr' Colorimetry?	<input type="radio"/> Yes <input checked="" type="radio"/> No
Sink_HDMI_YCBCR_420_BT2020_cYCC	Does the DUT support YCC 4:2:0 Pixel encoding in BT.2020 Yc'Cb'Cr' Colorimetry?	<input type="radio"/> Yes <input checked="" type="radio"/> No

Sink_HDMI_YCBCR_420_Video_Formats

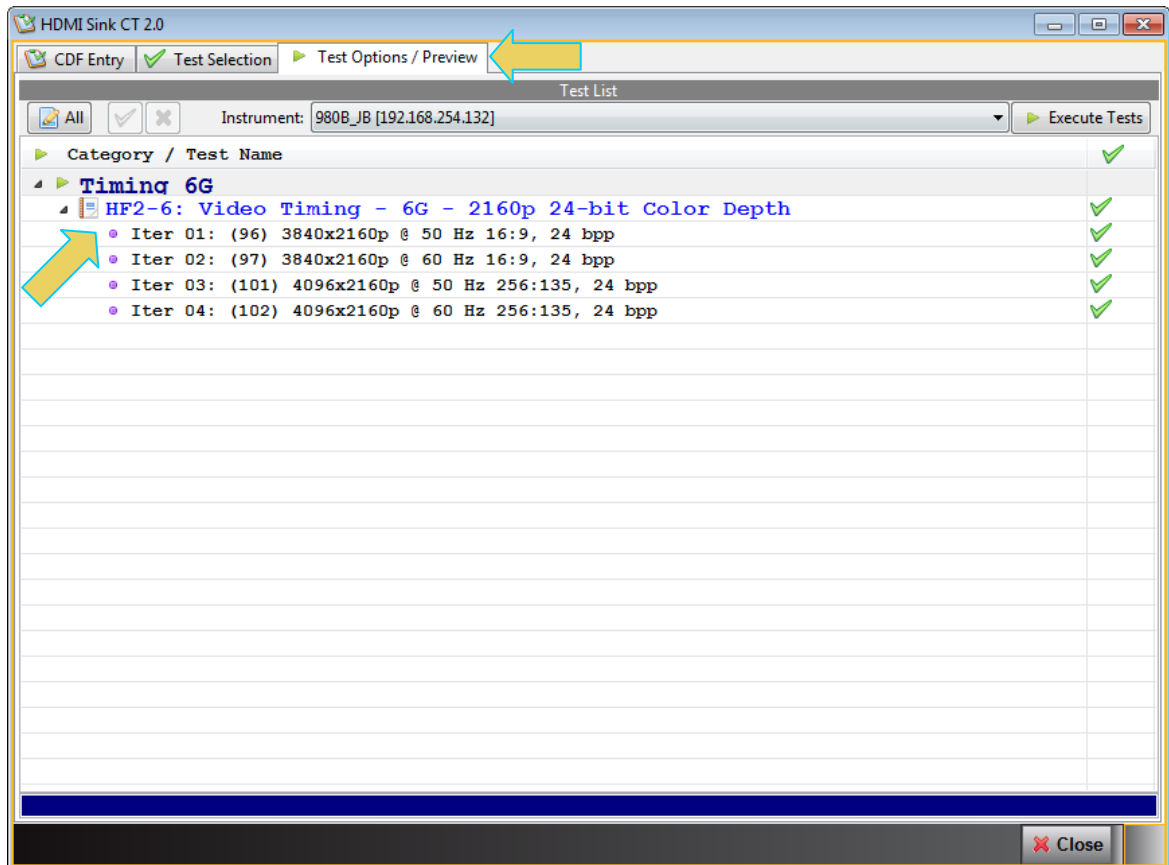
(97) 3840x2160p @ 60 Hz 16:9	<input checked="" type="checkbox"/> 24 <input type="checkbox"/> 30 <input type="checkbox"/> 36 <input type="checkbox"/> 48	(bits per pixel)
(96) 3840x2160p @ 50 Hz 16:9	<input checked="" type="checkbox"/> 24 <input type="checkbox"/> 30 <input type="checkbox"/> 36 <input type="checkbox"/> 48	(bits per pixel)
(102) 4096x2160p @ 60 Hz 256:135	<input checked="" type="checkbox"/> 24 <input type="checkbox"/> 30 <input type="checkbox"/> 36 <input type="checkbox"/> 48	(bits per pixel)
(101) 4096x2160p @ 50 Hz 256:135	<input checked="" type="checkbox"/> 24 <input type="checkbox"/> 30 <input type="checkbox"/> 36 <input type="checkbox"/> 48	(bits per pixel)
(107) 3840x2160p @ 60 Hz 64:27	<input type="checkbox"/> 24 <input type="checkbox"/> 30 <input type="checkbox"/> 36 <input type="checkbox"/> 48	(bits per pixel)
(106) 3840x2160p @ 50 Hz 64:27	<input type="checkbox"/> 24 <input type="checkbox"/> 30 <input type="checkbox"/> 36 <input type="checkbox"/> 48	(bits per pixel)

Close

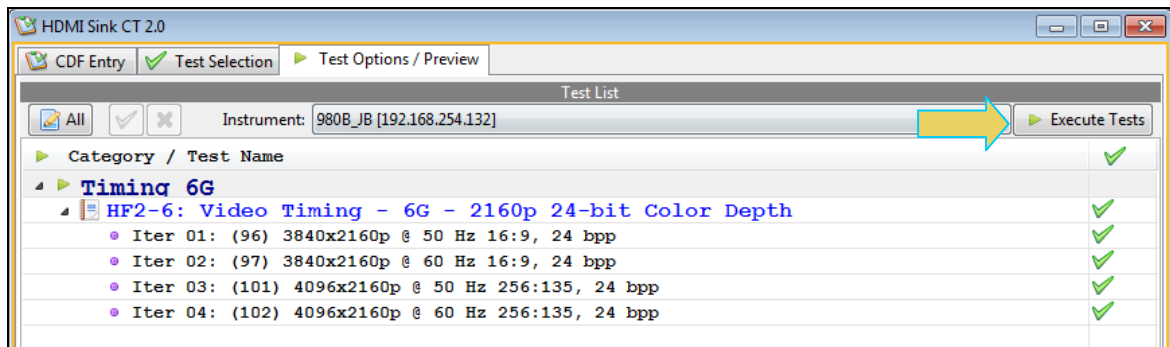
- 3.3 Click on the Test Selection tab, and select the EDID tab and then the HF2-10: Video Timing 6G HF-VSDB Test. Refer to the screen example below.



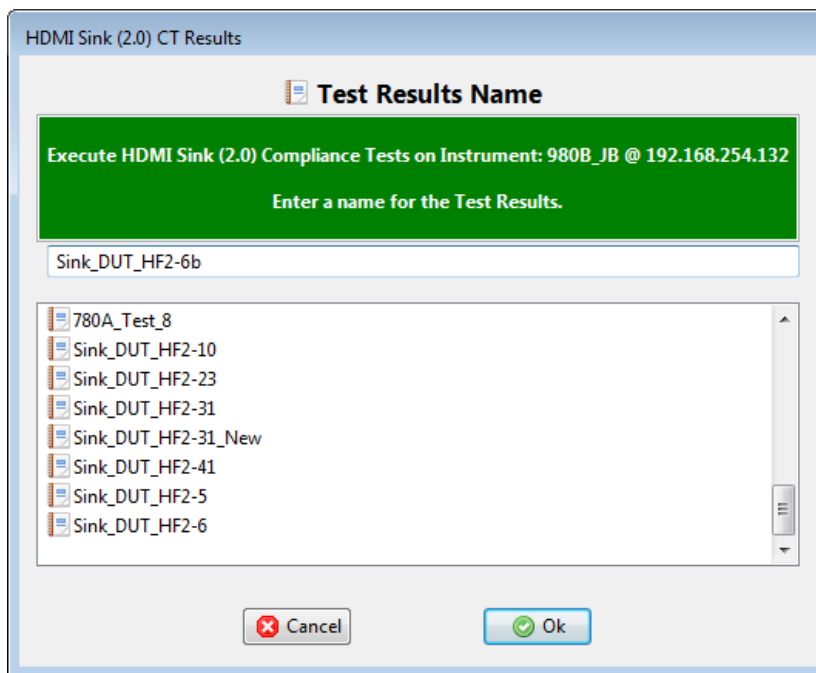
- 3.4 Click on Test Options / Preview tab and review the list of tests. Refer to the screen example below.



- 3.5 Click on the Execute tests activation button to initiate the test. Refer to the screen example below.



Note: You will be prompted with a dialog box to assign a name to the test results. Refer to the screen example below.



A Test Results window and log will appear and you will be prompted with the test setup description. Verify the test setup and click on Continue to run the test.

The screenshot shows the 'HDMI Sink Compliance Test (2.0): "Sink_DUT_HF2-6b"' window. It is divided into two main sections: 'Test List' and 'Test Log'.

Test List: This section contains a table with columns for 'Category / Test Name', a status indicator (checkmark), and 'Status'. The table lists the following tests:

Category / Test Name	Status
Timing 6G	
HF2-6: Video Timing - 6G - 2160p 24-bit Color Depth	In Progress
Iter 01: (96) 3840x2160p @ 50 Hz 16:9, 24 bpp	
Iter 02: (97) 3840x2160p @ 60 Hz 16:9, 24 bpp	In Progress
Iter 03: (101) 4096x2160p @ 50 Hz 256:135, 24 bpp	Not Tested
Iter 04: (102) 4096x2160p @ 60 Hz 256:135, 24 bpp	Not Tested

Test Log: This section displays a log of test execution messages. The messages are as follows:

```
Line    Message
0005    --- Test HF2-6-01
0006    ** EDID Read failed.
0007    ** Execution Error: [99] Internal Error
0008    Test HF2-6 Iter 01 -> Fail
0009    --- Test HF2-6-02
```

At the bottom of the window, there are two buttons: 'Cancel the Compliance Test' and 'Pause Test Execution'.

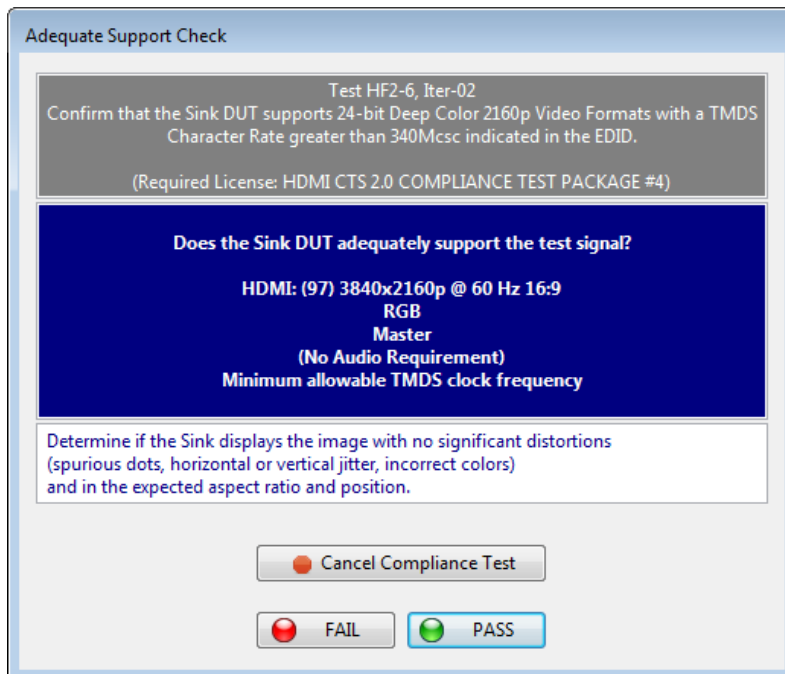
The screenshot shows the 'Test Setup' dialog box. It contains a section titled 'Test Instructions' with the following text:

Connect the DUT input port to be tested to the transmitter port of the test instrument:

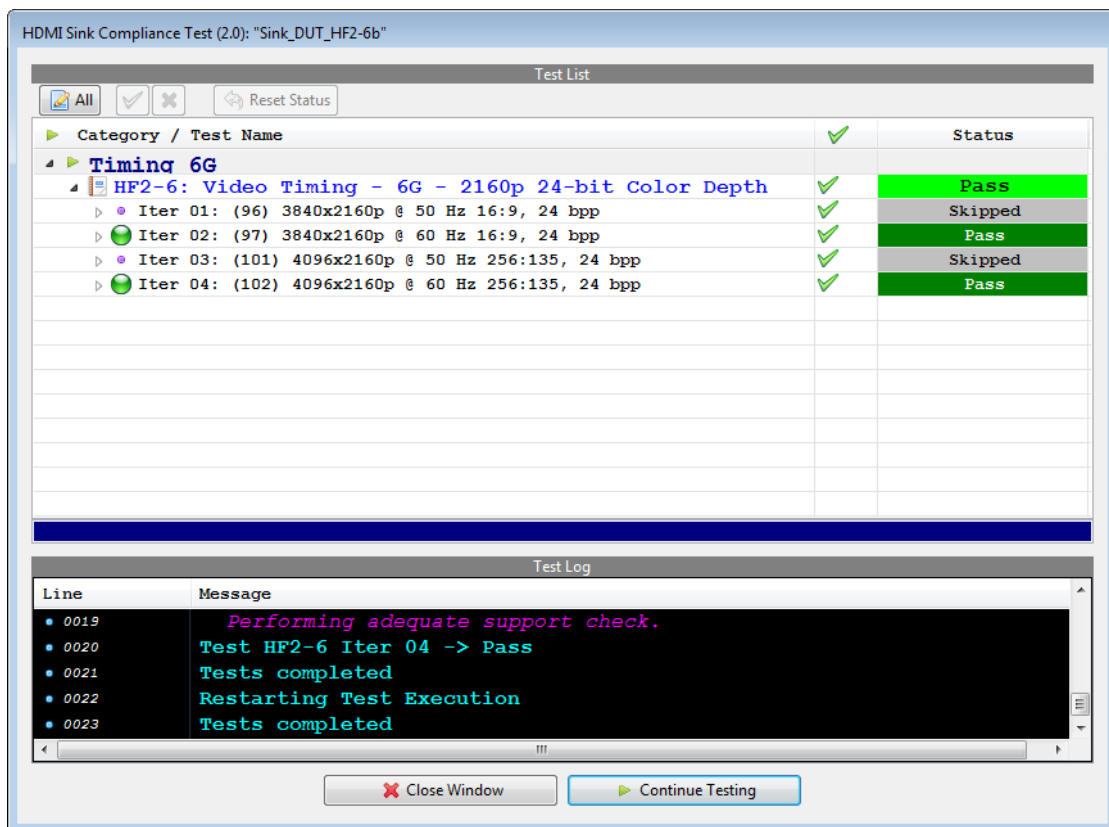
Test Instrument Port
Quantum Data, Inc. 980ATP HDMI2 generator
Card 1, Port 0 (TX)

At the bottom of the dialog box, there are two buttons: 'Cancel Compliance Test' and 'Continue'. A yellow arrow points to the 'Continue' button.

The test results will be assessed user examination as described in the following dialog box. Click on the PASS or FAIL button depending on whether the image looks correct or not.



The results are indicated on the test window as shown below.



4. If the 980 HDMI 2.0 sink compliance test application reports PASS, then PASS. If the 980 HDMI 2.0 sink compliance test application reports FAIL, then FAIL.

When the test is completed a Test Results Viewer screen will appear. Note that tests are skipped if the EDID does not support a particular format.

