

High-Definition Multimedia Interface

Version 2.0

Quantum Data MOI v1.0

Test ID: HF2-7

July 15, 2014

Preface

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Document Revision History

1.0 July 15, 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 HF2-7: Sink Video Timing – 6G – 2160p Deep Color	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>9</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 HF2-7: Sink Video Timing – 6G – 2160p Deep Color.” 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 HF2-7: Sink Video Timing – 6G – 2160p Deep Color

Objective

Confirm that the Sink DUT supports Deep Color 2160p Video Formats for TMDS Character Rate 340Mcsc up to 600Mcsc indicated in the EDID.

Table 8-33 Sink Video Timing – 6G – 2160p Deep Color Requirements

Reference	Requirement
[HDMI 2.0: 10.4.1.4] TMDS Configuration	<See reference for details>

Capability(s)

The Sink DUT supports any Deep Color Video 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 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 24/30Hz formats, these values are +0.5%/-0.6% of 92.8125MHz, 111.375MHz or 148.5MHz.

In the case of 25Hz formats, these values are +0.5%/-0.5% of 92.8125MHz, 111.375MHz or 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 I2C 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:

- 1920x1080p 119.88, 120Hz (CEA VIC=63).
- 1920x1080p 100Hz (CEA VIC=64).
- 3840x2160p 29.97, 30Hz (HDMI_VIC =1 and CEA VIC = 95).
- 3840x2160p 25Hz (HDMI_VIC =2 and CEA VIC = 94).
- 3840x2160p 23.98, 24Hz (HDMI_VIC =3 and CEA VIC = 93).
- 4096x2160p 23.98, 24Hz (HDMI_VIC =4 and CEA VIC = 98).
- 4096x2160p 29.97, 30Hz (CEA VIC = 100).
- 4096x2160p 25Hz (CEA VIC = 99).

4.1 If DC_36bit of H14b-VSDB is equal to 1 in the EDID:

4.1.1 If the value of Max_TMDS_Character_Rate of HF-VSDB in the EDID x 5 is greater than 445.5 then:

4.1.1.1 Configure the TMDS Signal Generator to transmit that Video Format to the Sink DUT using 36-bit Pixel depth and RGB Pixel encoding at the minimum allowable TMDS clock frequency.

4.1.1.2 If the Sink DUT does not adequately support this Video Format, then FAIL.

4.1.1.3 Configure the TMDS Signal Generator to transmit the tested Video Format to the Sink DUT at the maximum allowable TMDS clock frequency.

4.1.1.4 If the Sink DUT does not adequately support this Video Format, then FAIL.

4.1.1.5 If DC_Y444 of H14b-VSDB is equal to 1 in the EDID then configure the TMDS Signal Generator to transmit that Video Format to the Sink DUT using 36-bit Pixel depth and YCBCR 4:4:4 Pixel encoding at the minimum allowable TMDS clock frequency.

4.1.1.6 If the Sink DUT does not adequately support this Video Format, then FAIL.

- 4.1.1.7 Configure the TMDS Signal Generator to transmit the tested Video Format to the Sink DUT at the maximum allowable TMDS clock frequency.
 - 4.1.1.8 If the Sink DUT does not adequately support this Video Format, then FAIL.
- 4.2 If DC_30bit of H14b-VSDB is equal to 1 in the EDID:
 - 4.2.1 If the value of Max_TMDS_Character_Rate of HF-VSDB in the EDID x 5 is greater than 371.25 then:
 - 4.2.1.1 Configure the TMDS Signal Generator to transmit that Video Format to the Sink DUT using 30-bit Pixel depth and RGB Pixel encoding at the minimum allowable TMDS clock frequency.
 - 4.2.1.2 If the Sink DUT does not adequately support this Video Format, then FAIL.
 - 4.2.1.3 Configure the TMDS Signal Generator to transmit the tested Video Format to the Sink DUT at the maximum allowable TMDS clock frequency.
 - 4.2.1.4 If the Sink DUT does not adequately support this Video Format, then FAIL.
 - 4.2.1.5 If DC_Y444 of H14b-VSDB is equal to 1 in the EDID then configure the TMDS Signal Generator to transmit that Video Format to the Sink DUT using 30-bit Pixel depth and YCBCR 4:4:4 Pixel encoding at the minimum allowable TMDS clock frequency.
 - 4.2.1.6 If the Sink DUT does not adequately support this Video Format, then FAIL.
 - 4.2.1.7 Configure the TMDS Signal Generator to transmit the tested Video Format to the Sink DUT at the maximum allowable TMDS clock frequency.
 - 4.2.1.8 If the Sink DUT does not adequately support this Video Format, then FAIL.
- 4.3 If DC_48bit of H14b-VSDB is equal to 1 in the EDID:
 - 4.3.1 If the value of Max_TMDS_Character_Rate of HF-VSDB in the EDID x 5 is greater than 594 then:
 - 4.3.1.1 Configure the TMDS Signal Generator to transmit that Video Format to the Sink DUT using 48-bit Pixel depth and RGB Pixel encoding at the minimum allowable TMDS clock frequency.
 - 4.3.1.2 If the Sink DUT does not adequately support this Video Format, then FAIL.
 - 4.3.1.3 Configure the TMDS Signal Generator to transmit the tested Video Format to the Sink DUT at the maximum allowable TMDS clock frequency.

4.3.1.4 If the Sink DUT does not adequately support this Video Format, then FAIL.

4.3.1.5 If DC_Y444 of H14b-VSDB is equal to 1 in the EDID then configure the TMDS Signal Generator to transmit that Video Format to the Sink DUT using 48-bit Pixel depth and YCBCR 4:4:4 Pixel encoding at the minimum allowable TMDS clock frequency.

4.3.1.6 If the Sink DUT does not adequately support this Video Format, then FAIL.

4.3.1.7 Configure the TMDS Signal Generator to transmit the tested Video Format to the Sink DUT at the maximum allowable TMDS clock frequency.

4.3.1.8 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.

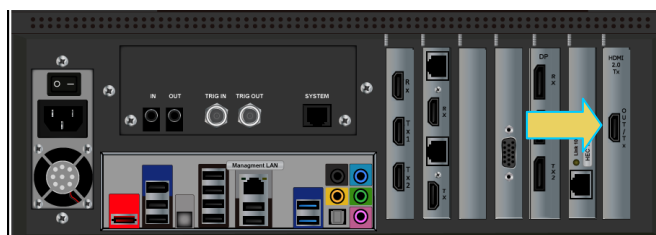
HDMI 2.0 Video Generator module

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 Deep Color

Test ID HF2-7 - Sink Video Timing – 6G – 2160p Deep Color

1. Objective

Confirm that the Sink DUT supports Deep Color 2160p Video Formats for TMDS Character Rate 340Mcsc up to 600Mcsc indicated in the EDID.

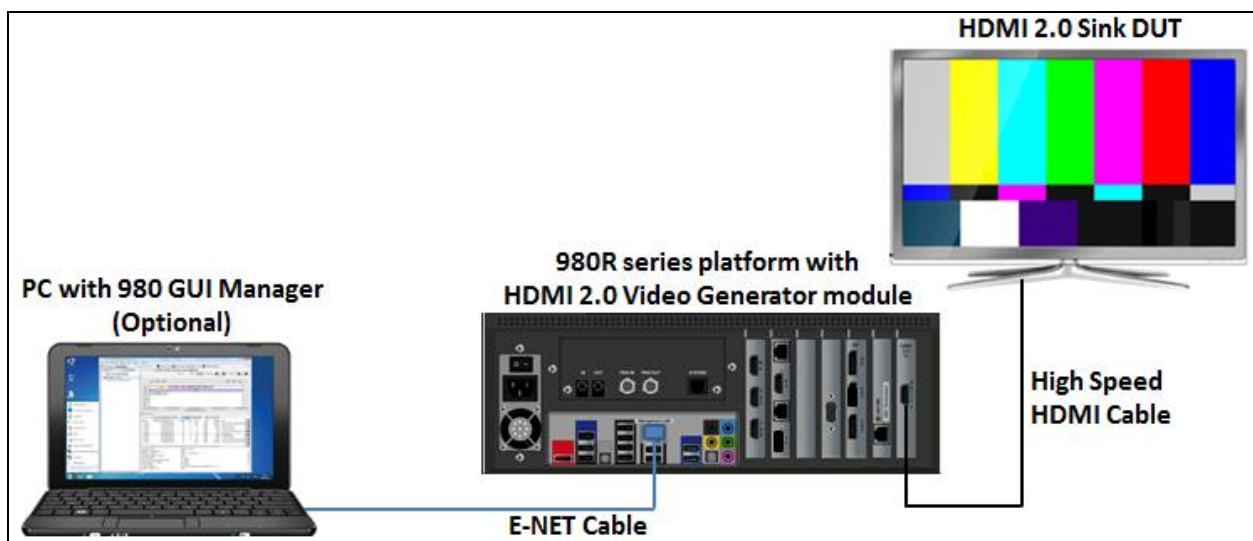
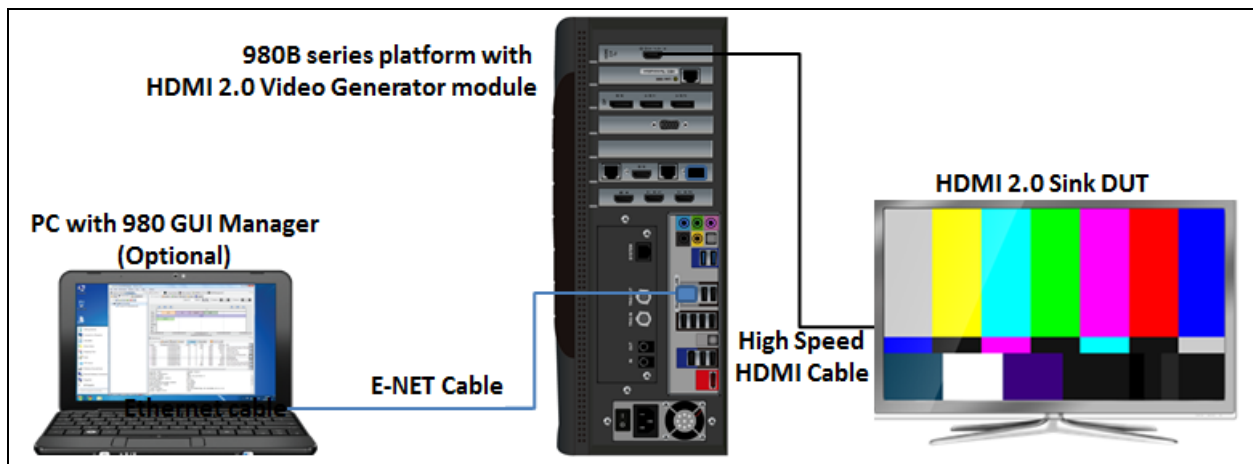
2. Test Overview

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.

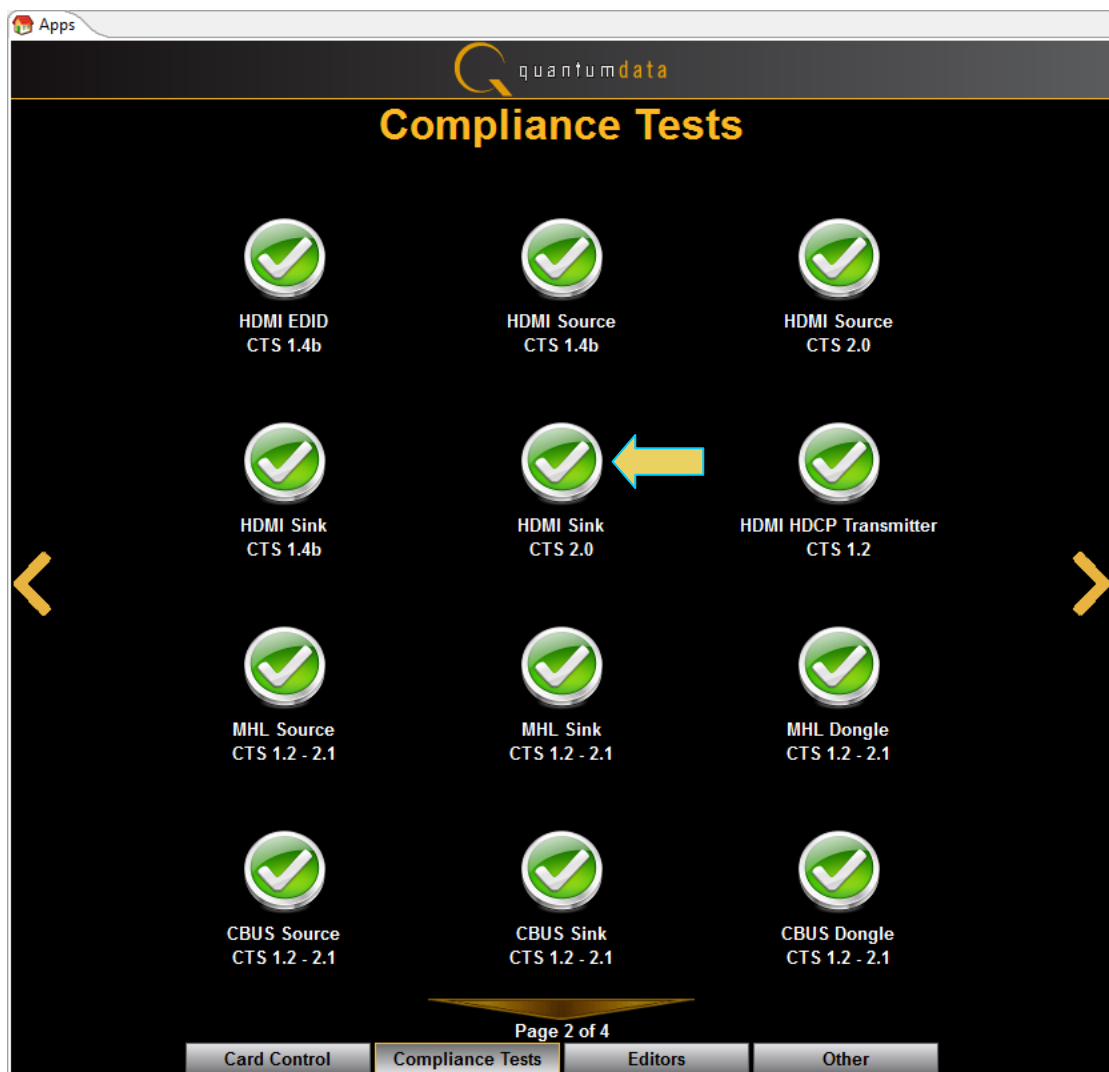


2. Use Quantum Data 980 Embedded Manager GUI (touchscreen) or invoke Quantum Data 980 External Manager GUI (Windows application).

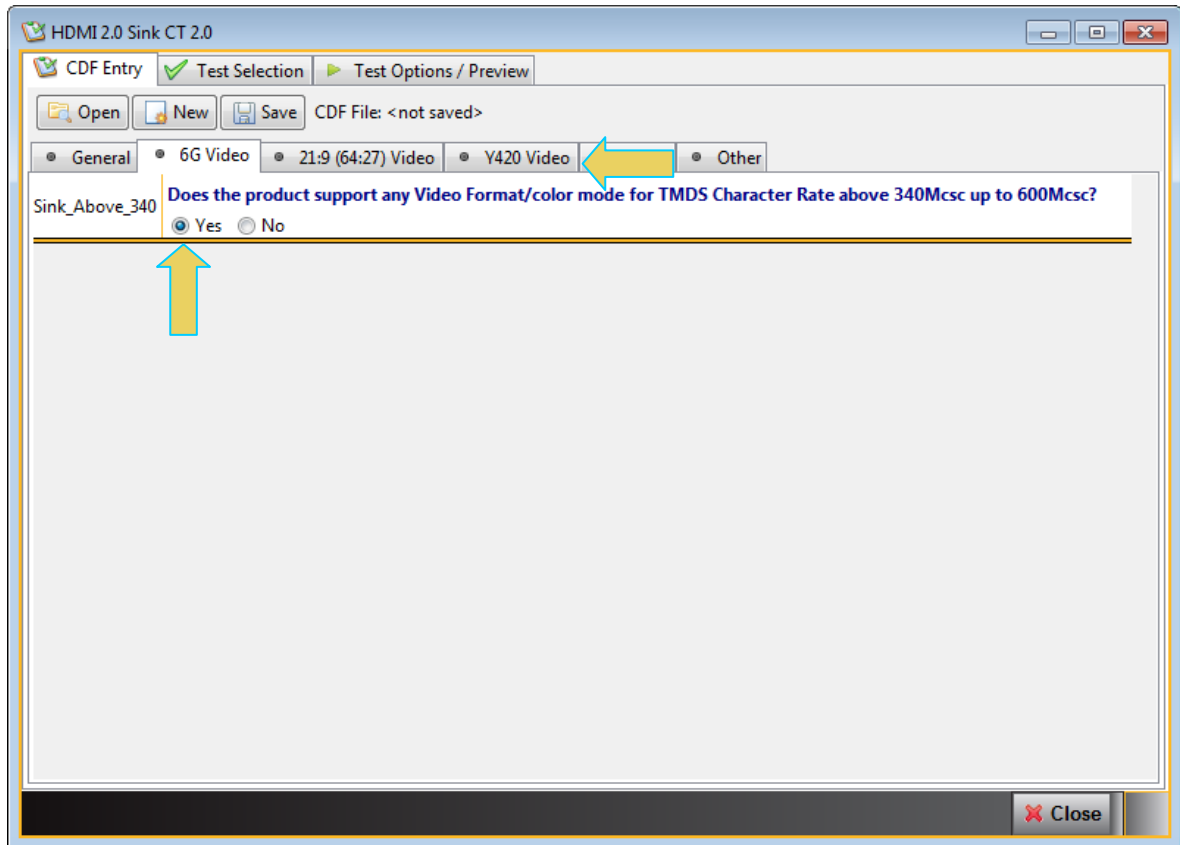
Note: You will not need to connect the PC shown in the figures above if you are running the compliance test through the 980's embedded display. The PC running the 980 HDMI 2.0 Video Generator module's compliance test application is connected to the 980 through a standard Ethernet cable.

3. Complete the following steps:

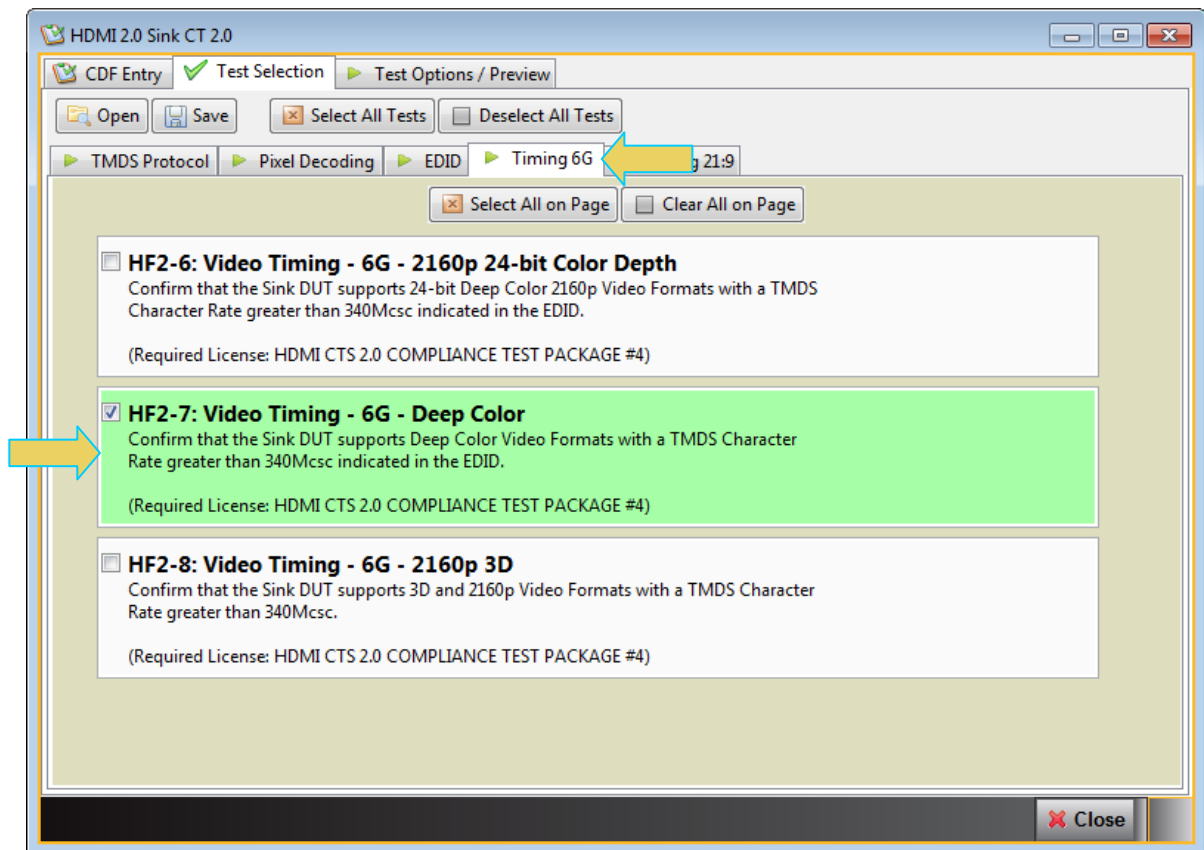
- 3.1 Click on the HDMI Sink CTS 2.0 icon in the Compliance Tests page of the Apps panel. Refer to the screen example below.



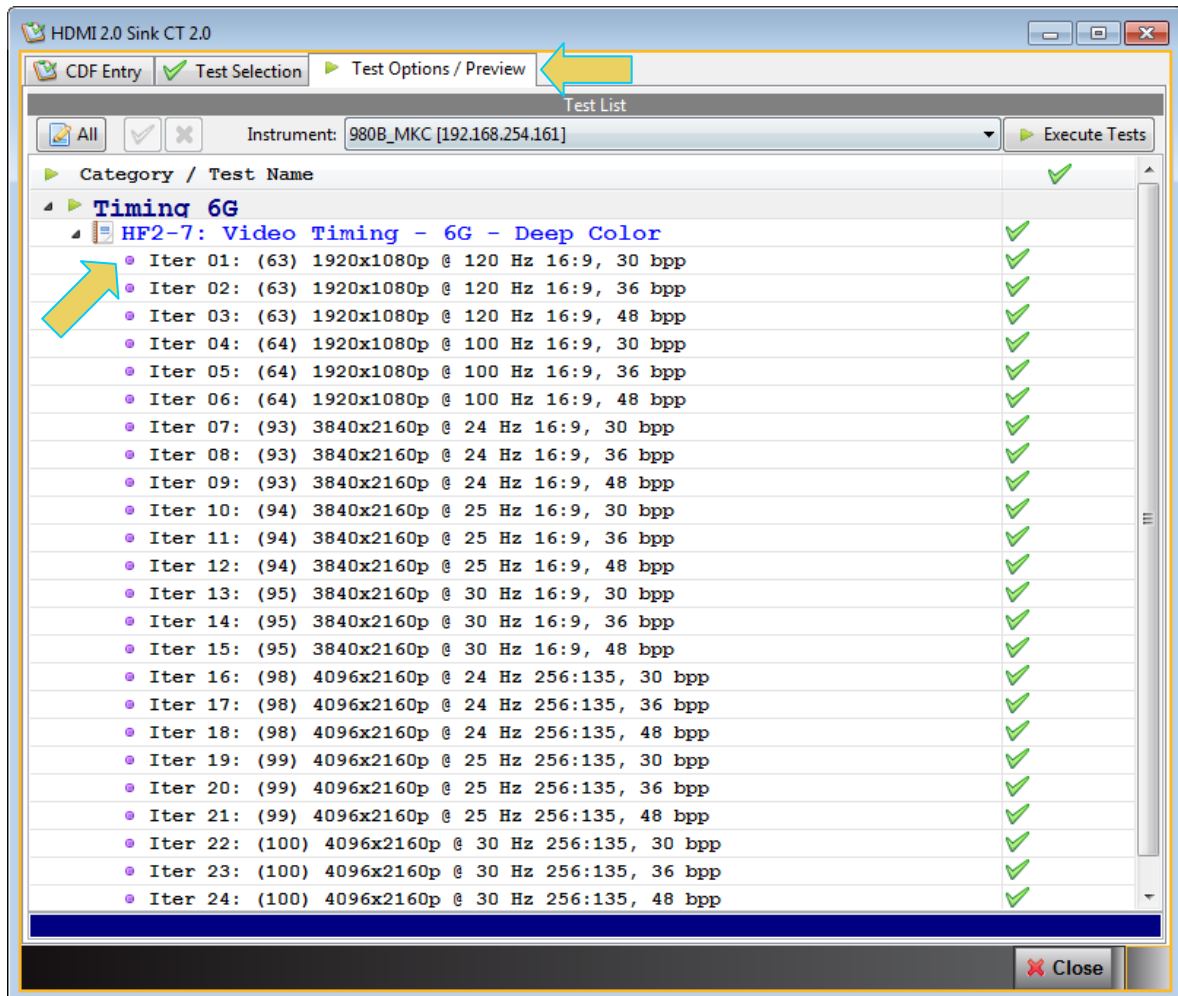
- 3.2 Navigate to the CDF tab if not already there. Complete the General sub tab and the 6G Video sub tab in the CDF. If there is a saved CDF file, then click on Open and select it. Otherwise, enter the DUT's CDF information and optionally click on Save to save the CDF. Refer to the screen example below.



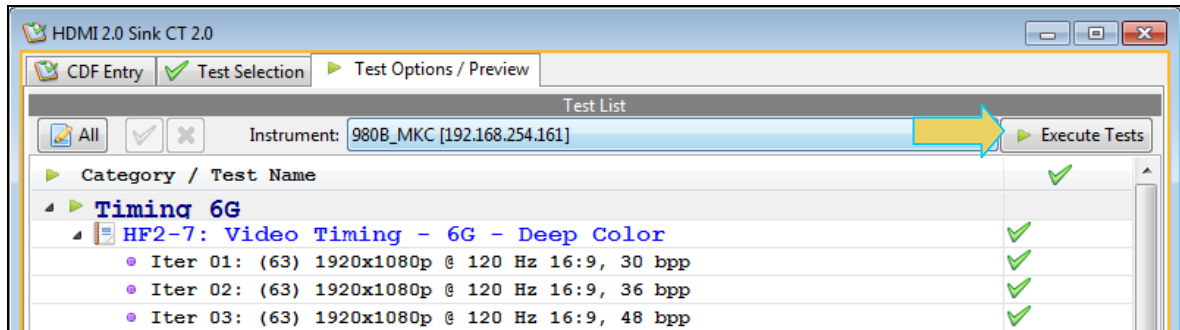
- 3.3 Click on the Test Selection tab, and select the Timing 6G tab and then the Test ID HF2-7 - Sink Video Timing – 6G – 2160p Deep Color Test. Refer to the screen example below.



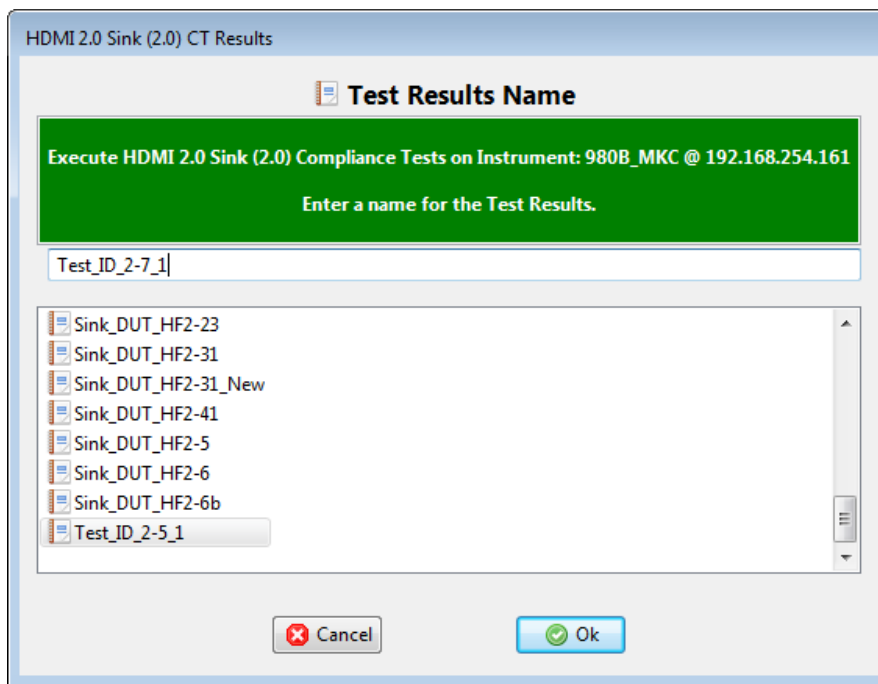
- 3.4 Click on Test Options / Preview tab and review the list of tests. Refer to the screen example below.



- 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.

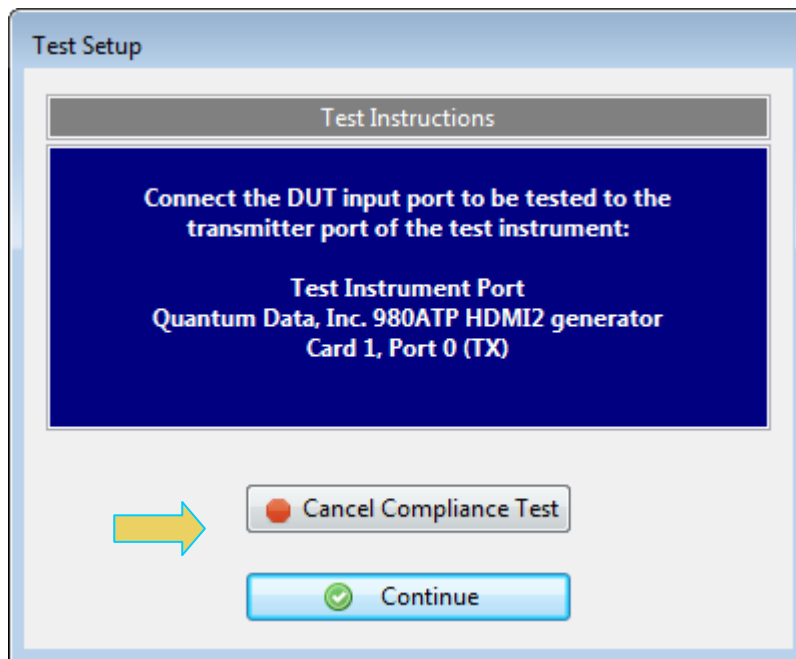
HDMI 2.0 Sink Compliance Test (2.0): "Test_ID_2-7_1"

Test List

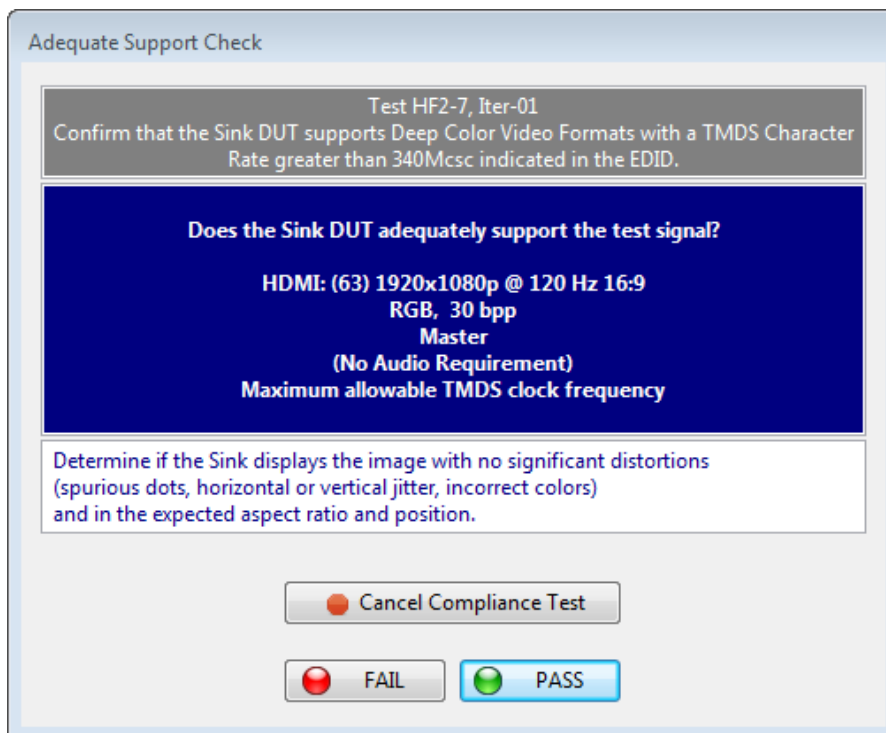
Category / Test Name	✓	Status
▶ Timing 6G	✓	
▶ HF2-7: Video Timing - 6G - Deep Color	✓	In Progress
▶ Iter 01: (63) 1920x1080p @ 120 Hz 16:9, 30 bpp	✓	In Progress
▶ Iter 02: (63) 1920x1080p @ 120 Hz 16:9, 36 bpp	✓	Not Tested
▶ Iter 03: (63) 1920x1080p @ 120 Hz 16:9, 48 bpp	✓	Not Tested
▶ Iter 04: (64) 1920x1080p @ 100 Hz 16:9, 30 bpp	✓	Not Tested
▶ Iter 05: (64) 1920x1080p @ 100 Hz 16:9, 36 bpp	✓	Not Tested
▶ Iter 06: (64) 1920x1080p @ 100 Hz 16:9, 48 bpp	✓	Not Tested
▶ Iter 07: (93) 3840x2160p @ 24 Hz 16:9, 30 bpp	✓	Not Tested
▶ Iter 08: (93) 3840x2160p @ 24 Hz 16:9, 36 bpp	✓	Not Tested
▶ Iter 09: (93) 3840x2160p @ 24 Hz 16:9, 48 bpp	✓	Not Tested
▶ Iter 10: (94) 3840x2160p @ 25 Hz 16:9, 30 bpp	✓	Not Tested
▶ Iter 11: (94) 3840x2160p @ 25 Hz 16:9, 36 bpp	✓	Not Tested
▶ Iter 12: (94) 3840x2160p @ 25 Hz 16:9, 48 bpp	✓	Not Tested
▶ Iter 13: (95) 3840x2160p @ 30 Hz 16:9, 30 bpp	✓	Not Tested
▶ Iter 14: (95) 3840x2160p @ 30 Hz 16:9, 36 bpp	✓	Not Tested

Test Log

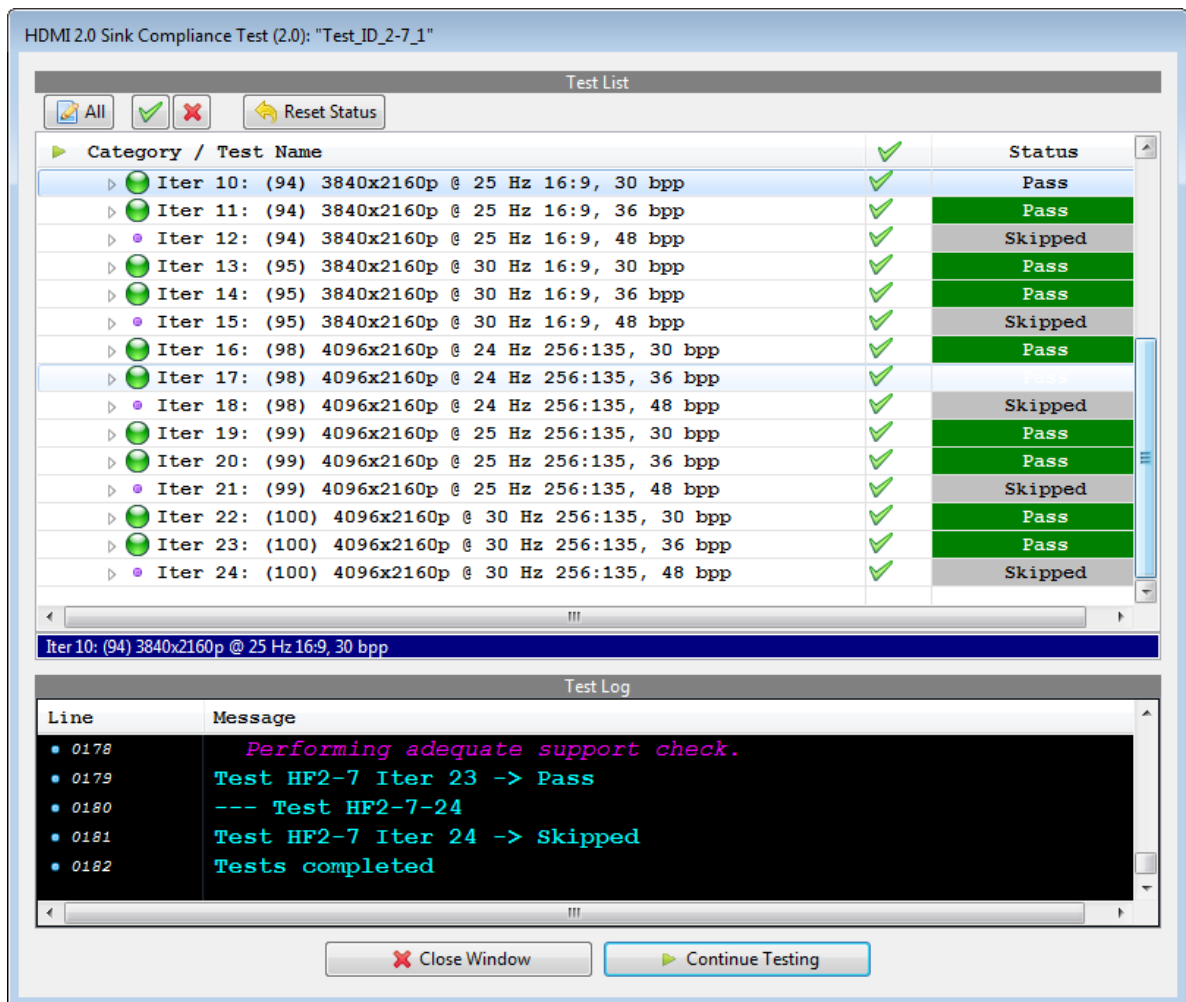
Line	Message
0003	Assembling the test list.
0004	Transferring the CDF to the Test Instrument.
0005	--- Test HF2-7-01
0006	Initializing the TX port
0007	Configuring the Generator.



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.

Compliance Test Results Viewer

HDMI 2.0 Sink (2.0) Compliance Test Results

Results Name: Test_ID_2-7_1
Date Tested: May 22, 2014 10:56 AM
Overall Status: CTS 2.0 - Pass

Manufacturer: ACME
Model Name: XYZ
Port Tested: 1

HTML Report

Test Results

Test Name / Details	Status
HF2-7: Video Timing - 6G - Deep Color	Pass
Iter 01: (63) 1920x1080p @ 120 Hz 16:9, 30 bpp	Pass
Iter 02: (63) 1920x1080p @ 120 Hz 16:9, 36 bpp	Pass
Iter 03: (63) 1920x1080p @ 120 Hz 16:9, 48 bpp	Skipped
Iter 04: (64) 1920x1080p @ 100 Hz 16:9, 30 bpp	Pass
Iter 05: (64) 1920x1080p @ 100 Hz 16:9, 36 bpp	Pass
Iter 06: (64) 1920x1080p @ 100 Hz 16:9, 48 bpp	Skipped
Iter 07: (93) 3840x2160p @ 24 Hz 16:9, 30 bpp	Pass
Iter 08: (93) 3840x2160p @ 24 Hz 16:9, 36 bpp	Pass
Iter 09: (93) 3840x2160p @ 24 Hz 16:9, 48 bpp	Skipped
Iter 10: (94) 3840x2160p @ 25 Hz 16:9, 30 bpp	Pass
Iter 11: (94) 3840x2160p @ 25 Hz 16:9, 36 bpp	Pass
Iter 12: (94) 3840x2160p @ 25 Hz 16:9, 48 bpp	Skipped
Iter 13: (95) 3840x2160p @ 30 Hz 16:9, 30 bpp	Pass
Iter 14: (95) 3840x2160p @ 30 Hz 16:9, 36 bpp	Pass
Iter 15: (95) 3840x2160p @ 30 Hz 16:9, 48 bpp	Skipped

Instrument: 980B_MKC [192.168.254.161]
Continue Test Execution
Close