

High-Definition Multimedia Interface

Version 2.0

Quantum Data MOI v1.0

Test ID: HF2-24

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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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 HF2-24: Sink Pixel Decoding – YCBCR 4:2:0 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 HF2-24: Sink Pixel Decoding – YCBCR 4:2:0 Deep Color

Objective

Confirm that a YCBCR 4:2:0 Pixel Deep Color encoding-capable Sink DUT supports YCBCR 4:2:0 Pixel Deep Color decoding and signaling.

Table 8-29 Sink Pixel Decoding - YCBCR 4:2:0 Deep Color Requirements

Reference	Requirement
[HDMI 2.0: 7.1.1]	<p>"A Sink capable of supporting Deep Color 4:2:0 Pixel encoding shall set (=1) the appropriate DC_XXbit_420 bits of the HF-VSDB to indicate which color depths are supported"</p> <p>"Sink devices ... shall not utilize Deep Color 4:2:0 Pixel Encoding on a particular Video Format that is not also supported by 4:2:0 Pixel Encoding with 8-bits per component."</p> <p>"A Sink that indicates support for Deep Color 4:2:0 Pixel Encoding, shall support it on all Video Formats indicated in the Y420CMDB (YCBCR 4:2:0 Capability Map Data Block) and Y420VDB (YCBCR 4:2:0 Video Data Block),"</p>

Capability(s)

The Sink DUT supports at least one Video Format in YCBCR 4:2:0 color sampling mode with 10, 12 or 16 bits per color component.

Test Equipment

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

Generic Procedure

Setup:

- 1 If the CDF fields Sink_HDMI_YCBCR_420_DC10 equals "N", Sink_HDMI_YCBCR_420_DC12 equals "N" and Sink_HDMI_YCBCR_420_DC16 equals "N", then SKIP this test.
- 2 If the CDF field Sink_HDMI_YCBCR_420 is "N", then FAIL.
- 3 Connect the Sink DUT to the DDC Master and EDID Analyzer.
- 4 Connect the Sink DUT to the 594MHz Video Generator.

- 5 Turn on the Sink DUT, have the DDC Master output +5V Power and read the Sink DUT's EDID in response to a hot-plug.
 - 5.1 If the Hot Plug Detect signal is not received or the EDID is unreadable, then FAIL.:
- 6 Configure the Video Generator to output a YCBCR 4:2:0 Pixel encoded Deep Color signal at a Video Format for which it supports 4:2:0 Pixel Encoding (see CDF fieldSink_HDMI_YCBCR_420_Video_Formats) with Deep Color (see CDF fields Sink_HDMI_YCBCR_420_DC10, Sink_HDMI_YCBCR_420_DC12, and Sink_HDMI_YCBCR_420_DC16), repeating all of the following tests for all of the Video Formats for which it supports 4:2:0 encoding and at all of the supported color depths.
- 7 Set the TE to output a test image according to Appendix A – then use this procedure to perform a visual check in the steps that follow (NOTE: any equivalent test image/procedure is permitted).
 - 7.1 If the image/video appears to be distorted or disturbed, then FAIL.
 - 7.2 If the color bars in the upper half of the active video are not in the order described in Appendix A, then FAIL.
 - 7.3 If the black and white bars in the lower half of the active video are not evenly spaced, then FAIL.
 - 7.4 If the black and white bars in the lower half of the active video contain a strong blue or red tint when examined at close range, 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.

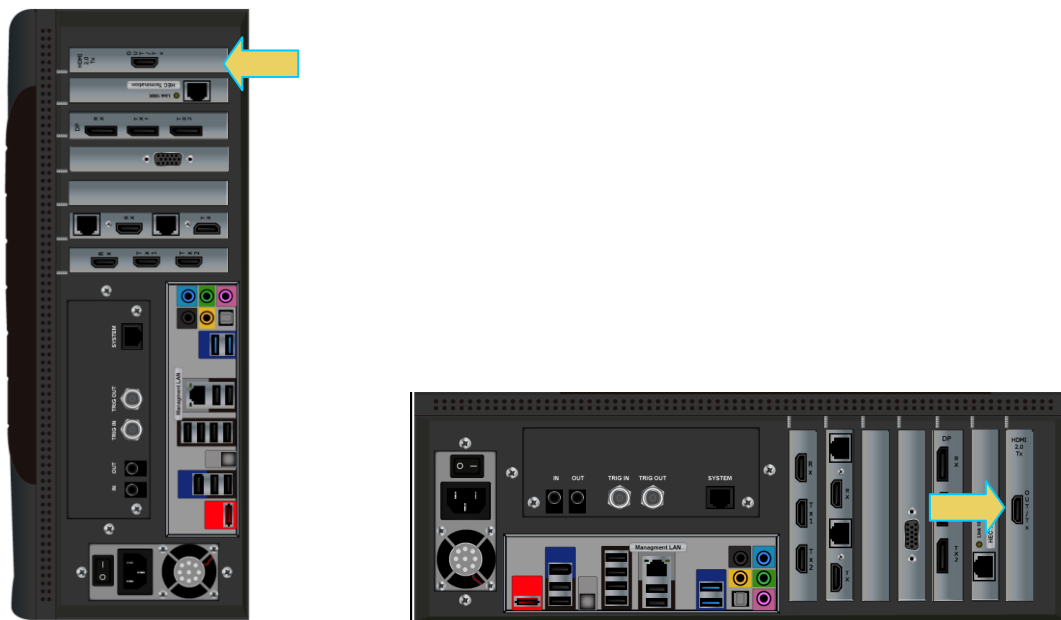
HDMI 2.0 Video Generator module

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.



Pixel Decoding – YCBCR 4:2:0 Deep Color

Test ID HF2-24: Sink Pixel Decoding – YCBCR 4:2:0 Deep Color

1. Objective

Confirm that a YCBCR 4:2:0 Pixel Deep Color encoding-capable Sink DUT supports YCBCR 4:2:0 Pixel Deep Color decoding and signaling.

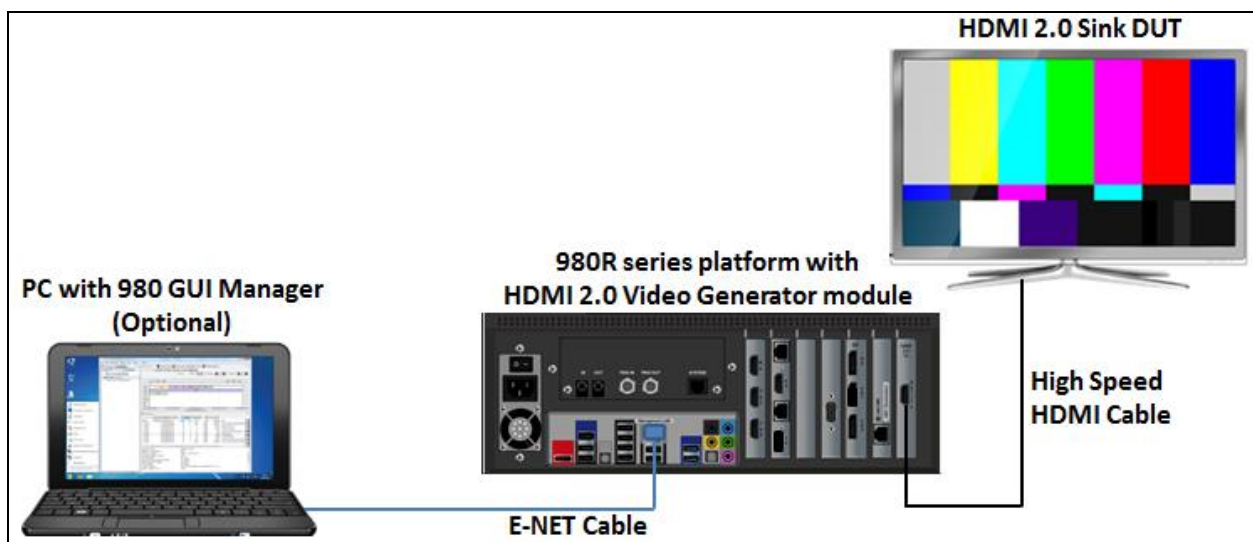
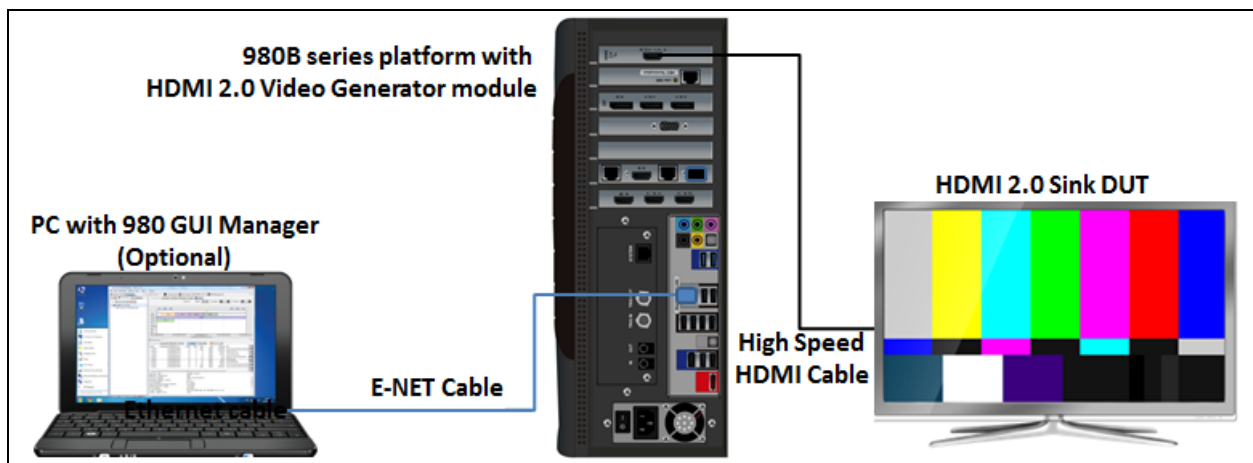
2. Test Overview

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.

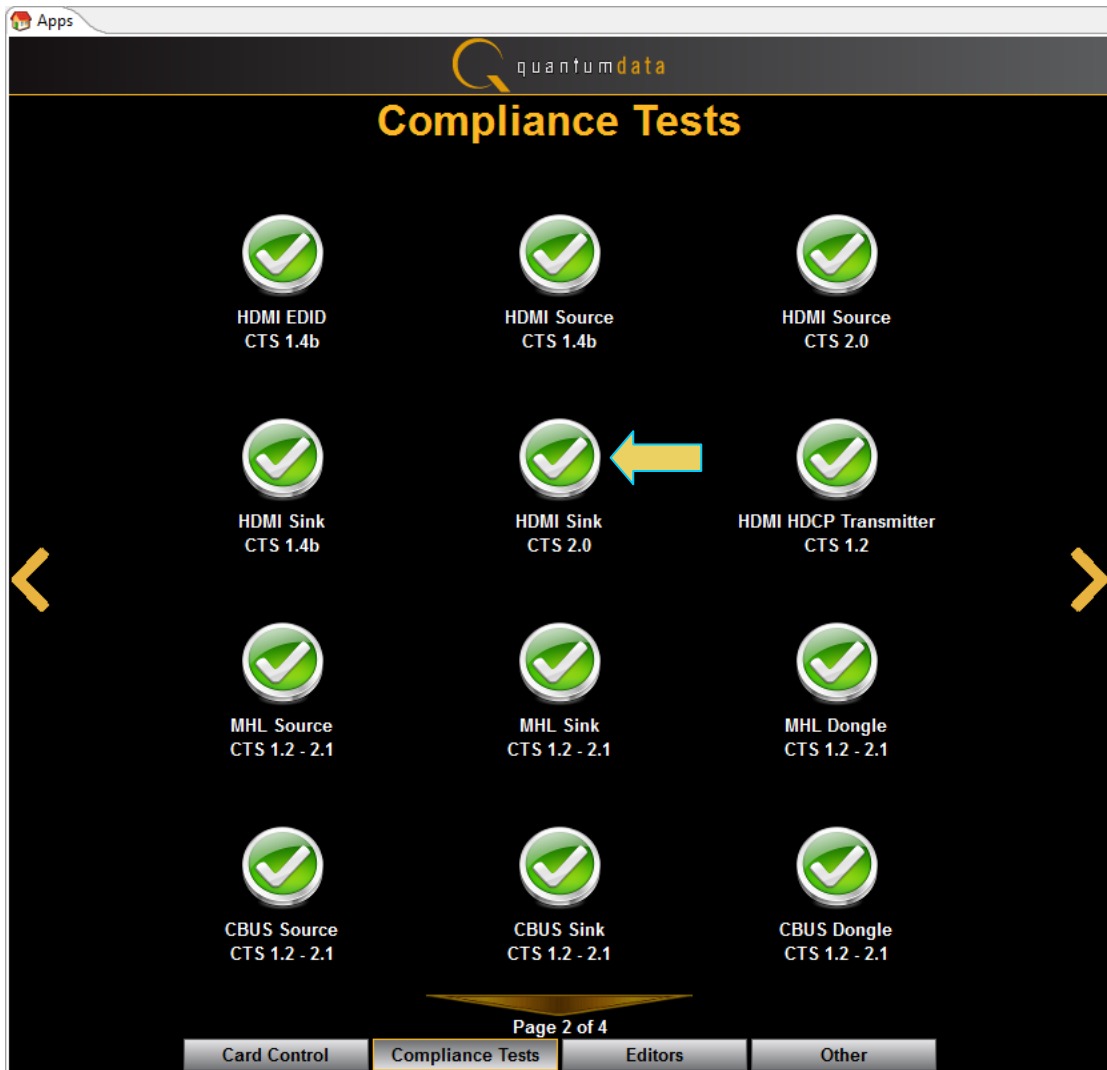


2. Use Quantum Data 980 Embedded Manager GUI (touchscreen) or invoke Quantum Data 980 External Manager GUI (Windows application).

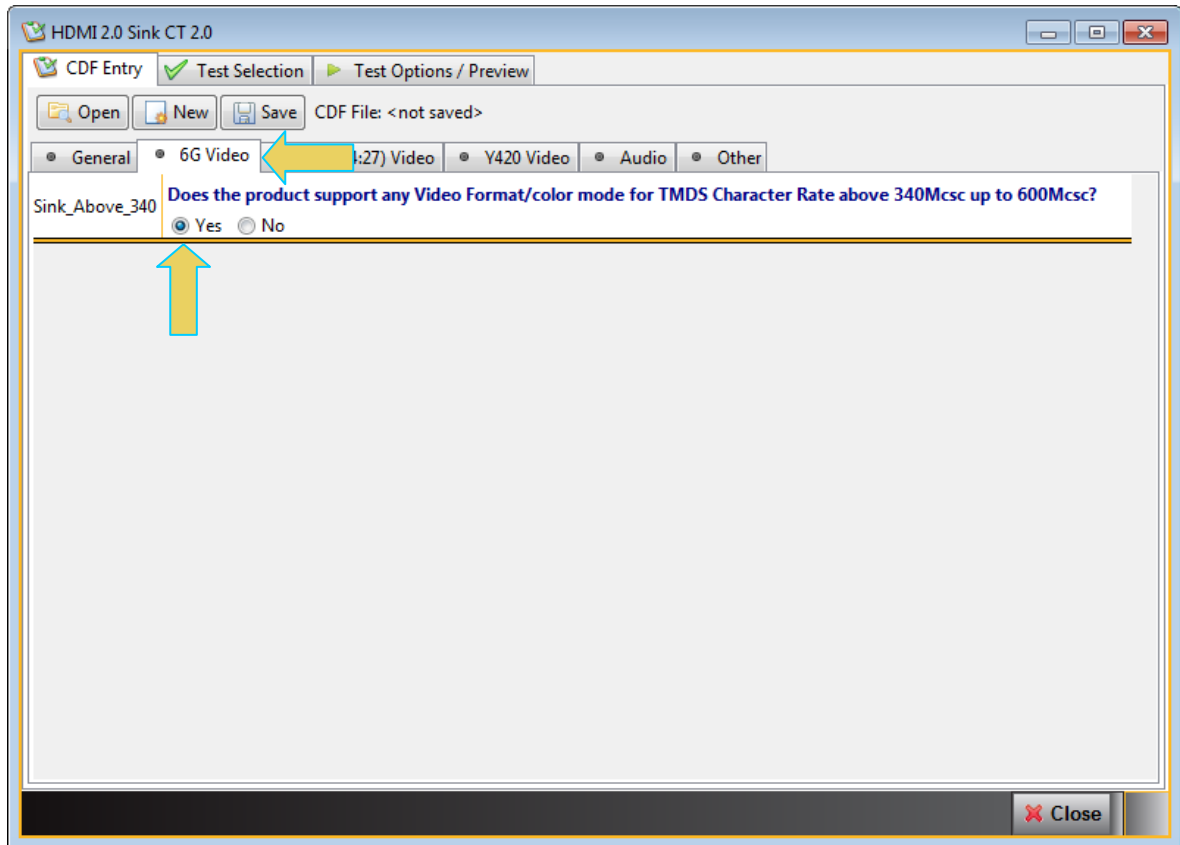
Note: You will not need to connect the PC shown in the figures above if you are running the compliance test through the 980's embedded display. The PC running the 980 HDMI 2.0 Video Generator module's compliance test application is connected to the 980 through a standard Ethernet cable.

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 and Y420 sub tabs 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 2.0 Sink CT 2.0

CDF Entry ☒ Test Selection ☐ Test Options / Preview

Open New Save CDF File: /CDF/XYZ

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

Sink_HDMI_YCBCR_420 Does the DUT support YCbCr 4:2:0 Pixel decoding?
☒ Yes ☐ No

Sink_HDMI_YCBCR_420_DC10 Does the DUT support YCbCr 4:2:0 Deep Color Pixel decoding with 10-bits per component?
☒ Yes ☐ No

Sink_HDMI_YCBCR_420_DC12 Does the DUT support YCbCr 4:2:0 Deep Color Pixel decoding with 12-bits per component?
☒ Yes ☐ No

Sink_HDMI_YCBCR_420_DC16 Does the DUT support YCbCr 4:2:0 Deep Color Pixel decoding with 16-bits per component?
☐ Yes ☒ No

Sink_HDMI_YCBCR_420_BT2020_YCC Does the DUT support YCC 4:2:0 Pixel encoding in BT.2020 Y'Cb'Cr' Colorimetry?
☐ Yes ☒ No

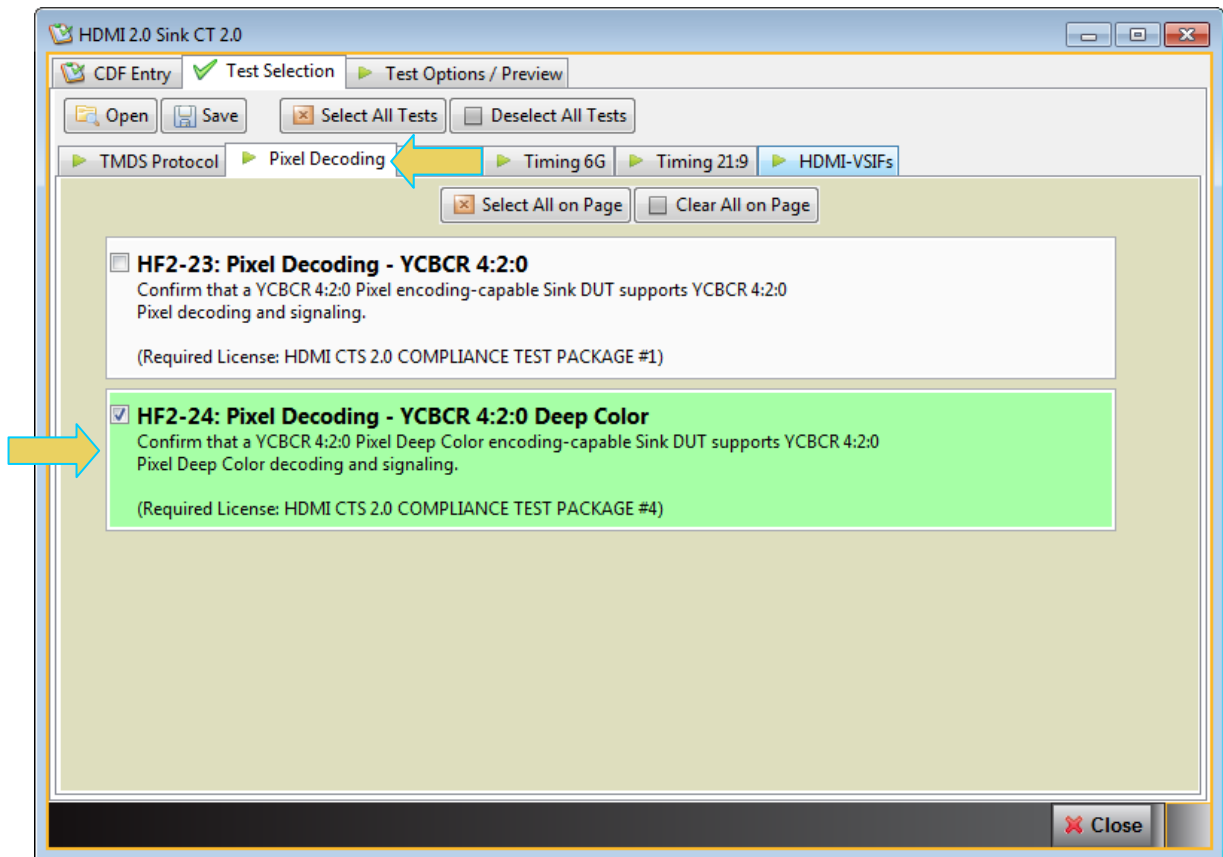
Sink_HDMI_YCBCR_420_BT2020_cYCC Does the DUT support YCC 4:2:0 Pixel encoding in BT.2020 Yc'Cb'Cr' Colorimetry?
☐ Yes ☒ No

Sink_HDMI_YCBCR_420_Video_Formats

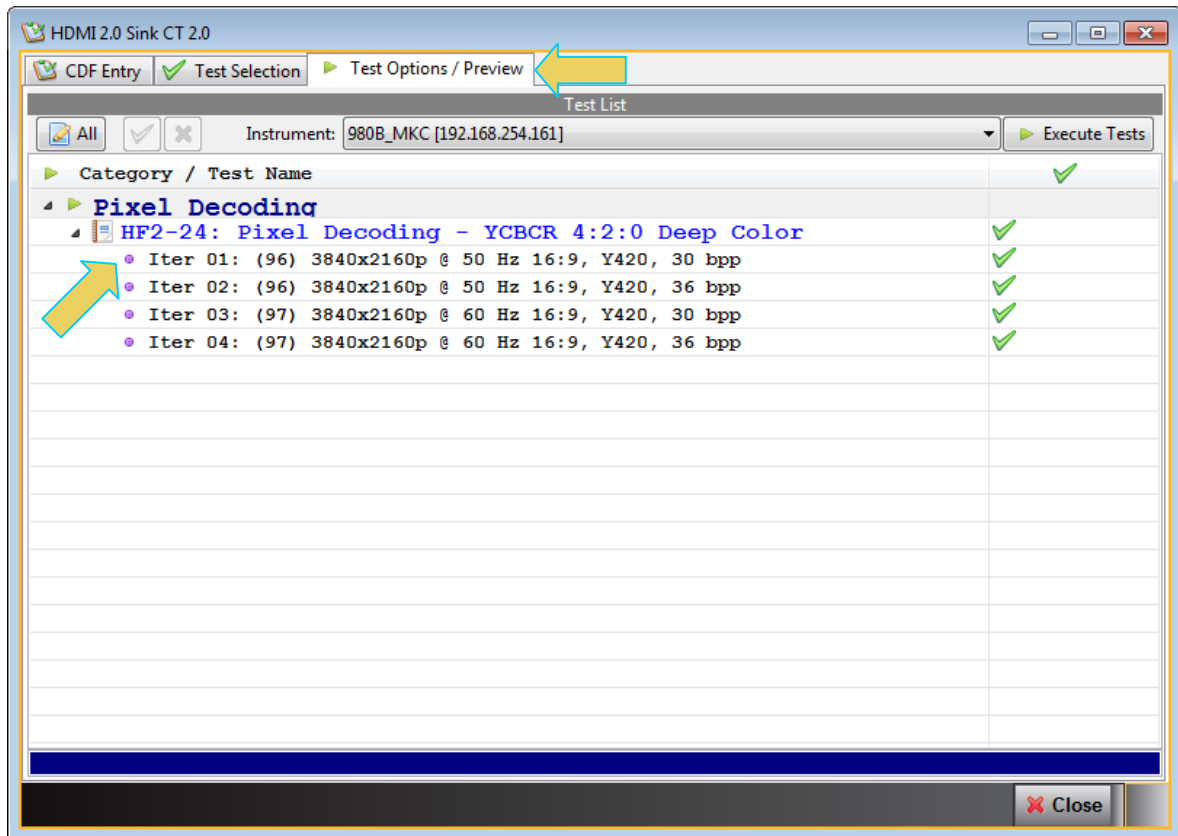
(96) 3840x2160p @ 50 Hz 16:9	<input checked="" type="checkbox"/> 24	<input checked="" type="checkbox"/> 30	<input checked="" type="checkbox"/> 36	<input type="checkbox"/> 48	(bits per pixel)
(97) 3840x2160p @ 60 Hz 16:9	<input checked="" type="checkbox"/> 24	<input checked="" type="checkbox"/> 30	<input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

Close

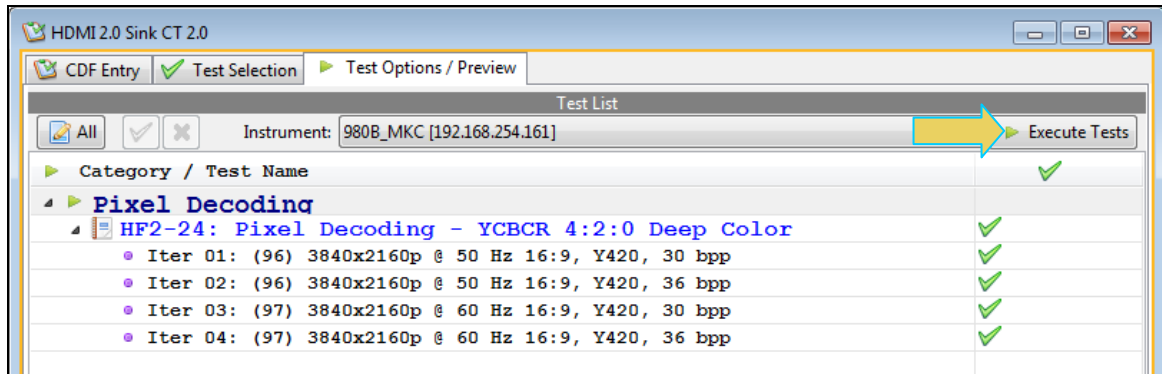
- 3.3 Click on the Test Selection tab, and select the Pixel Decoding tab and then the Test ID HF2-24: Sink Pixel Decoding – YCBCR 4:2:0 Deep Color Test. Refer to the screen example below.



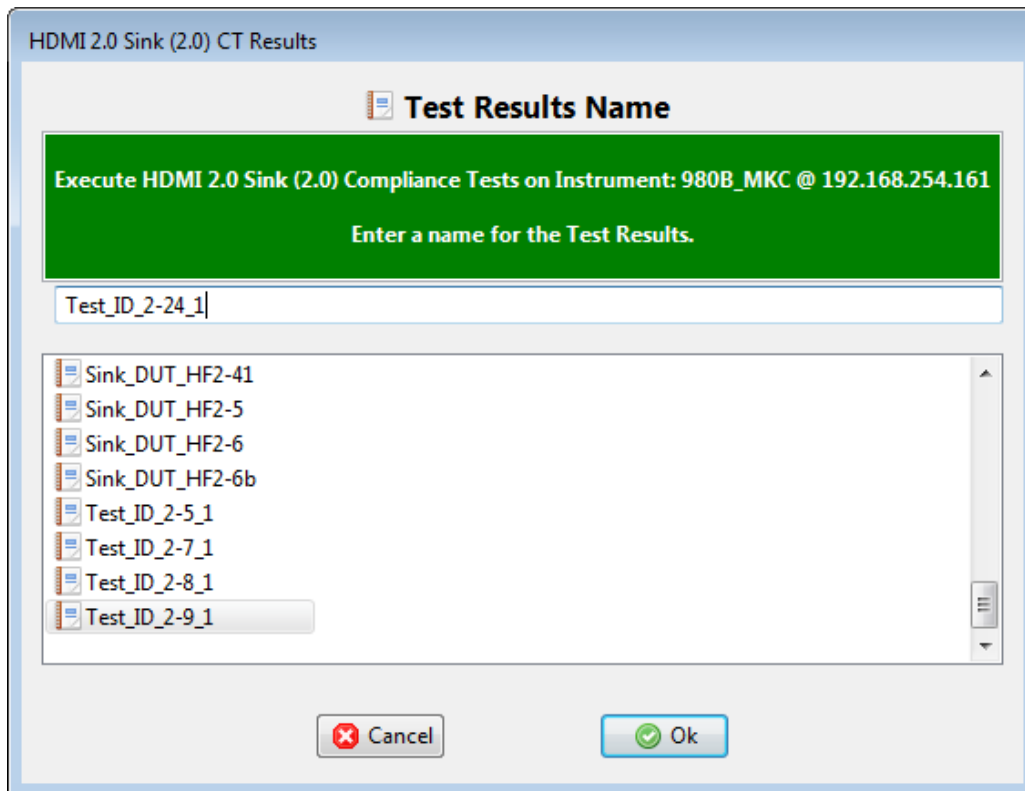
- 3.4 Click on Test Options / Preview tab and review the list of tests. Refer to the screen example below.



- 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_2-24_1"

Test List

Reset Status

Category / Test Name		Status
Pixel Decoding	✓	
HF2-24: Pixel Decoding - YCBCR 4:2:0 Deep Color	✓	In Progress
Iter 01: (96) 3840x2160p @ 50 Hz 16:9, Y420, 30 bpp	✓	In Progress
Iter 02: (96) 3840x2160p @ 50 Hz 16:9, Y420, 36 bpp	✓	Not Tested
Iter 03: (97) 3840x2160p @ 60 Hz 16:9, Y420, 30 bpp	✓	Not Tested
Iter 04: (97) 3840x2160p @ 60 Hz 16:9, Y420, 36 bpp	✓	Not Tested

Test Log

Line	Message
0003	Assembling the test list.
0004	Transferring the CDF to the Test Instrument.
0005	--- Test HF2-24-01
0006	Initializing the TX port
0007	Configuring the Generator.

Cancel the Compliance Test Pause Test Execution

Test Setup

Test Instructions

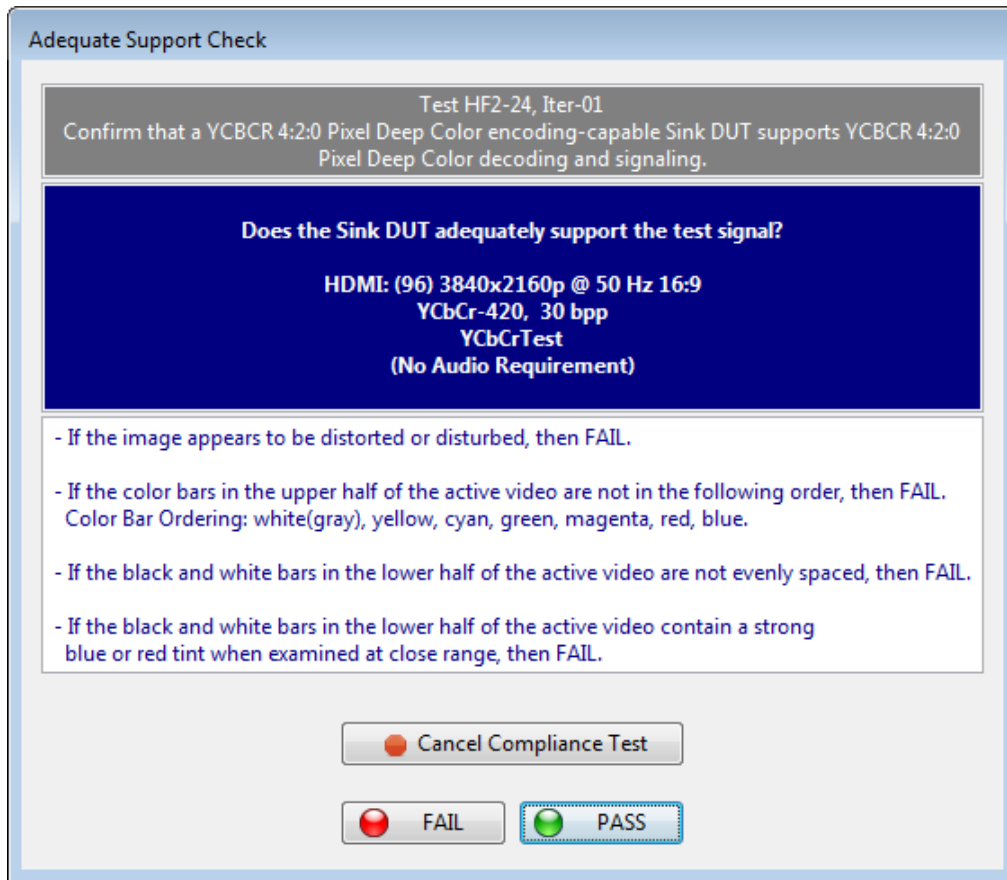
Connect the DUT input port to be tested to the transmitter port of the test instrument:

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

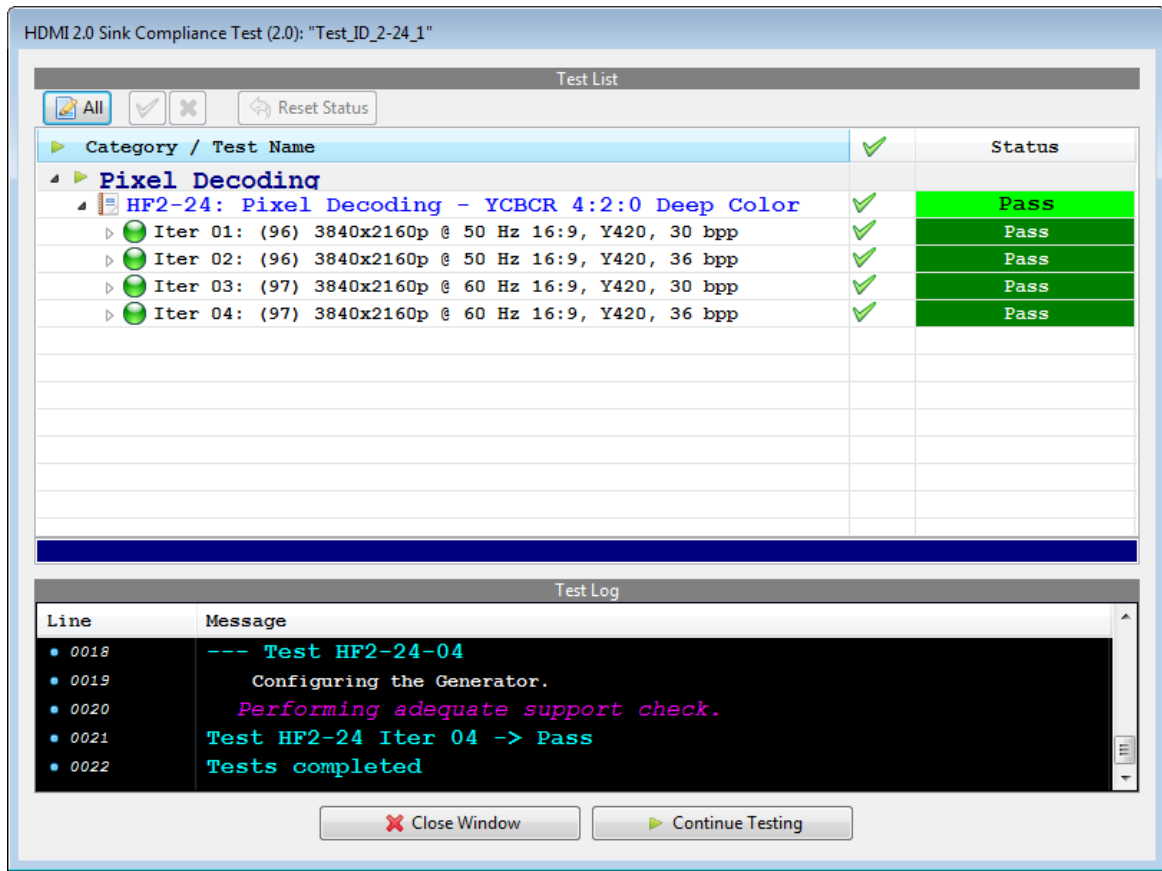
Cancel Compliance Test

Continue

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.

