

High-Definition Multimedia Interface

Version 2.0

Quantum Data MOI v1.0

Test ID: HF1-51

April 11, 2014

Preface

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Document Revision History

1.0 April 11, 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 HF1-51: “Source AVI Infoframe - YCBCR 4:2:0 Tests.” 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 HF1-51: Source AVI Infoframe - YCBCR 4:2:0 Tests

Objective

Confirm that a YC_BCr 4:2:0 signaling information in the AVI infoframe is correct.

Table 7-93 Source AVI InfoFrame – YCBCR 4:2:0 Requirements

| Reference | Requirement |
|------------------------|--|
| [HDMI 2.0: 7.1] | “A Source shall not send a Video Format with YCBCR 4:2:0 Pixel Encoded data to a Sink that does not indicate support for such format.” |
| [HDMI 2.0: 7.1.2] | “When a Source sends YCBCR 4:2:0 Pixel encoded data across an HDMI cable, the Y2, Y1, and Y0 fields of the AVI InfoFrame shall be set Y2 = 0, Y1 = 1 and Y0 = 1, as defined in CEA-861-F Section 6.4 and CEA-861-F Table 9.” |
| CEA 861-F, Section 6.2 | <See reference for details on AVI Infoframe> |

Capability(s)

The Source DUT supports at least one Video Format in YC_BCr 4:2:0 color sampling mode.

Test Equipment

| Item | Generic Equipment | Vendor Specific Equipment | Quantity |
|------|---|---|----------|
| 1 | DDC Slave Emulator | 980 Advanced Test Platform series: | 1 |
| 2 | EDID Emulator | 980 HDMI Protocol Analyzer module | 1 |
| 3 | 297MHz Video Protocol Analyzer w/ YC _B Cr 4:2:0 option | HDMI CTS 2.0 Compliance Test Package #1 | 1 |

Generic Procedure

- 1 If the CDF field Source_HDMI_YCBCR_420 is “N”, then SKIP this test.
- 2 Connect the Source DUT to a 297MHz Video Protocol Analyzer with the DDC Slave Emulator and EDID Emulator.
- 3 Program the EDID Emulator to reveal an EDID containing the following:
 - 3.1 YCBCR 4:2:0 Video Data Block with:
 - 3.1.1 YC_BCr 4:2:0-only with SVDs = 96, 97, 101, 102, 106 and 107 (NOTE: If a regular Video Data Block is also present, then it shall not contain SVDs = 96, 97, 101, 102, 106, or 107)
 - 3.1.2 No HF-VSDB shall be included.
- 4 Operate the Source DUT to output a 24-bit/Pixel YC_BCr 4:2:0 Pixel encoded signal at a Video Format for which it supports 4:2:0 transmission (see CDF field

Source_HDMI_YCBCR_420), repeating all of the following tests for at least one of the supported Video Formats.

- 5 Perform the AVI InfoFrame (HB0, HB1 = 0x82, 0x02) test.
 - 5.1 If the AVI InfoFrame does not occur at least once per two Video Fields, then FAIL.
 - 5.2 If PB1 bit 7, bits 6 and 5 (Y2, Y1, Y0 fields) does not equal to 011b, then FAIL.
 - 5.3 If PB4 (VIC7, VIC 6, VIC 5, VIC 4, VIC 3, VIC 2, VIC 1, VIC 0) does not equal to one of 96, 97, 101, 102, 106 or 107, then FAIL.
 - 5.4 If bytes PB14 through PB27 are not equal to 0, then FAIL.
 - 5.5 If PB5 bit3···0 (PR 3···0) does not equal to 0000b, then FAIL.
- 6 Program the EDID Emulator to reveal an EDID containing the following and repeat steps 4 and 5 above:
 - 6.1 Video Data Block with SVDs for 96, 97, 101, 102, 106 and 107 (NOTE: YCBCR 4:2:0 Video Data Block shall be removed).
 - 6.2 YCBCR 4:2:0 Capability Map Data Block with a Capability Bit Map where the bits corresponding to SVDs for 96, 97, 101, 102, 106 and 107 are set (=1).
- 7 Program the EDID Emulator to reveal an EDID containing:
 - All of the VICs 96, 97, 101, 102, 106 and 107 as SVDs in the Video Data Block.
 - A YCBCR 4:2:0 Video Data Block (length-field=1, no SVDs).
 - A YCBCR 4:2:0 Capability Map Data Block (length-field=1, no YCbCr 4:2:0 Capability Bit Map).
- 8 Operate the Source DUT to output a YCBCR 4:2:0 Pixel encoded signal at one of the Video Formats for which it supports 4:2:0 transmission (see CDF field Source_HDMI_YCBCR_420_Video_Formats).
 - 8.2 If Source DUT outputs a YCBCR 4:2:0 Pixel encoded signal, then FAIL. If the leading edges of Hsync and Vsync are not perfectly aligned to the exact Pixel (i.e. + or - 0 Pixels), then FAIL.
- 9 Program the EDID Emulator to reveal an EDID containing:
 - None of the VICs 96, 97, 101, 102, 106 and 107 as SVDs in the Video Data Block.
 - No YCBCR 4:2:0 Video Data Block.

- 10 Operate the Source DUT to output a YCbCr 4:2:0 Pixel encoded signal at one of the Video Formats for which it supports 4:2:0 transmission (see CDF field Source_HDMI_YCbCr_420_Video_Formats).

- 10.1 If Source DUT outputs a YCbCr 4:2:0 Pixel encoded signal, 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 Protocol Analyzer module

The Quantum Data 980 HDMI Protocol Analyzer module can be installed in any of the 980 series Advanced Test Platforms. This 980 HDMI Protocol Analyzer 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 Protocol Analyzer module |
| | | HDMI CTS 2.0 Compliance Test Package #1 |

980 HDMI Protocol Analyzer Module with 980 Series Platform Configurations

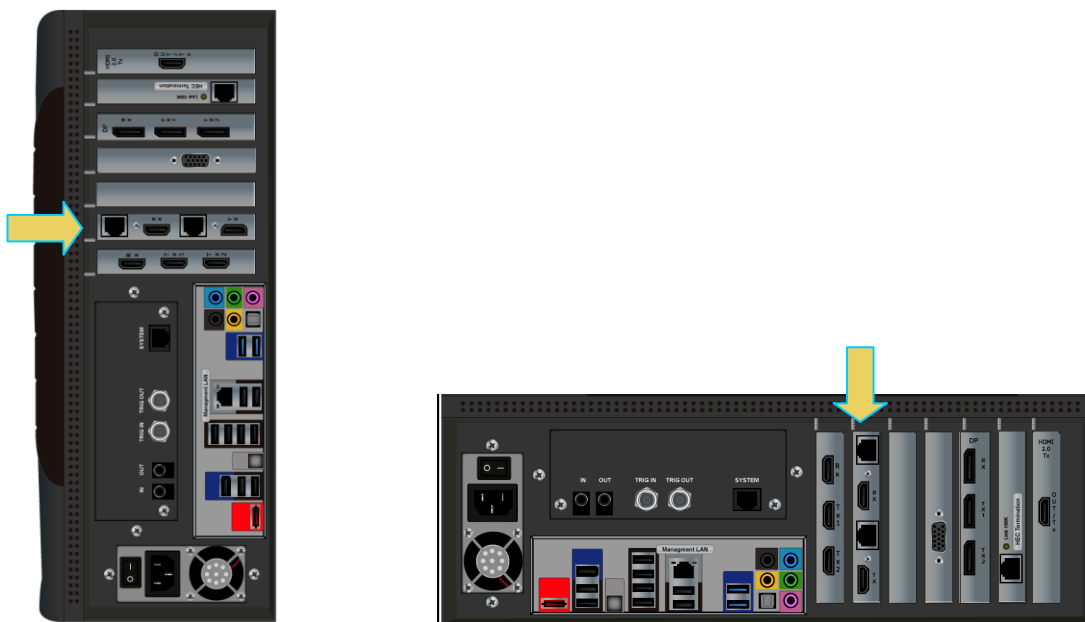
The figures below show depictions of the 980 HDMI Protocol Analyzer module equipped in various 980 series platforms. **Note:** Card positioning may vary depending on configuration.



Current 980 HDMI Protocol Analyzer board rev.



Previous 980 HDMI Protocol Analyzer board rev.



Source AVI Infoframe YCbCr 4:2:0 Tests

Test ID HF1-51 - Source AVI Infoframe YCbCr 4:2:0 Tests

1. Objective

Confirm that a YCbCr 4:2:0 signaling information in the AVI infoframe is correct. The test verifies that when a source sends YCbCr 4:2:0 pixel encoded data it also sends the proper information in the AVI Infoframe. The test also verifies that the source does not send a video format with YCbCr 4:2:0 pixel encoding if the sink does not indicate support for the format.

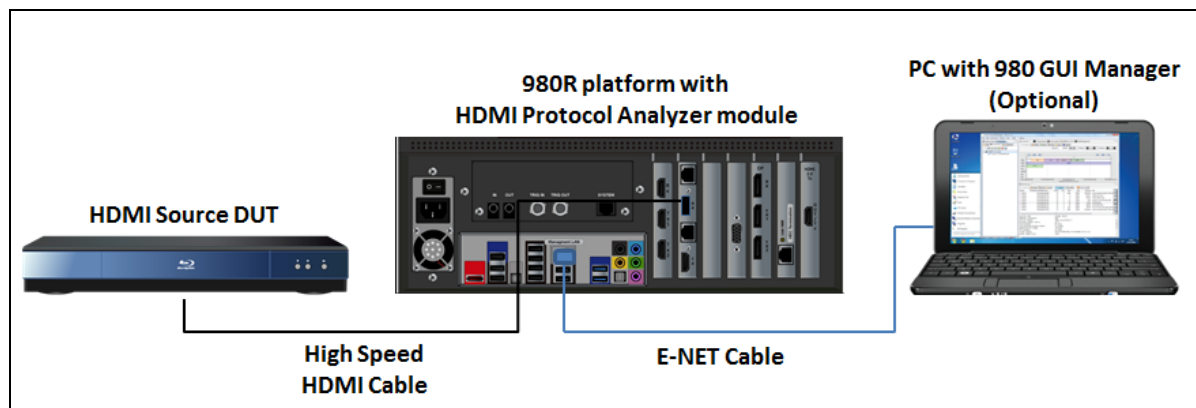
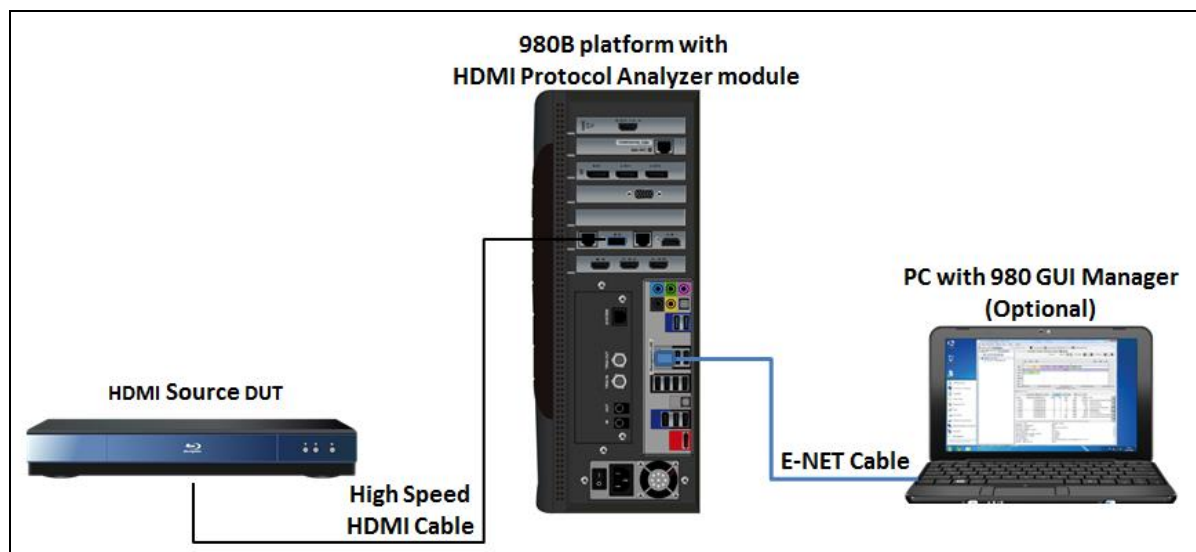
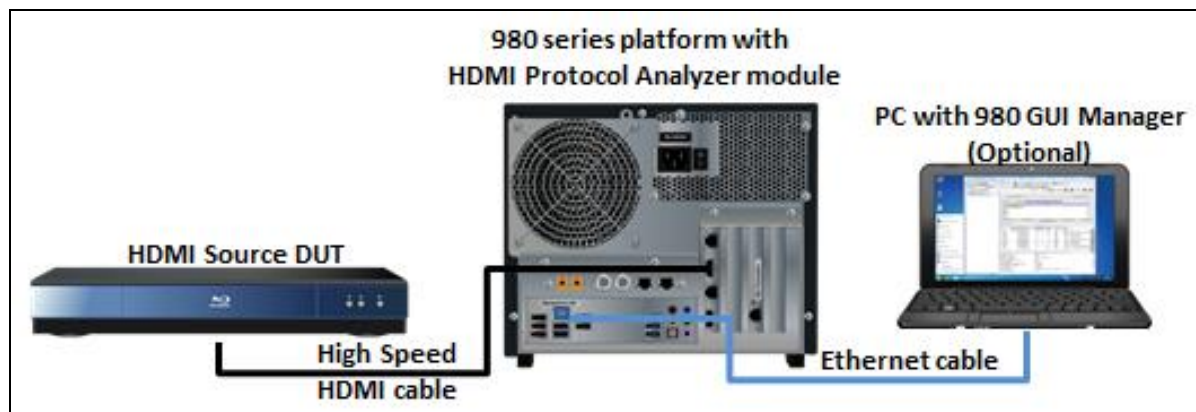
2. Test Overview

This test is run for one YCbCr 4:2:0 compliant format timing with four EDID configurations. The 980 HDMI Protocol Analyzer's Compliance Test application automatically provisions the EDID configurations to facilitate the test. The Pass/Fail criteria is assessed by the application with no human examination required.

3. Procedure

Use the following procedure to conduct this test.

- 1 Connect Source DUT to the Quantum Data 980 HDMI Protocol Analyzer at the module's port labeled Rx. Use a High Speed HDMI cable. Refer to the figures below for reference.

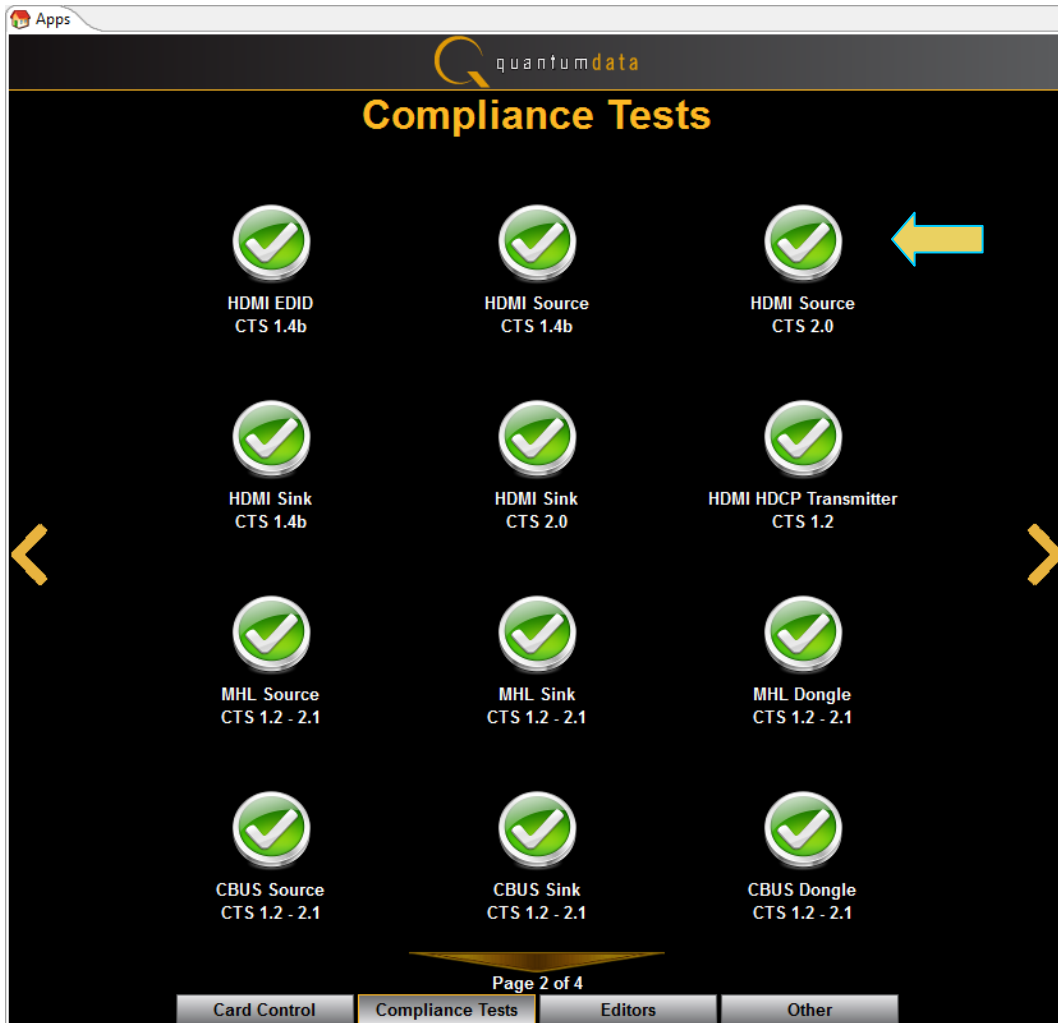


- 2 Operate the Source DUT to output a YCbCr 4:2:0 Pixel encoded signal at a Video Format for which it supports YCbCr 4:2:0 transmission.
- 3 Use Quantum Data 980 Embedded Manager GUI (touchscreen) or invoke Quantum Data 980 External Manager GUI (Windows application).

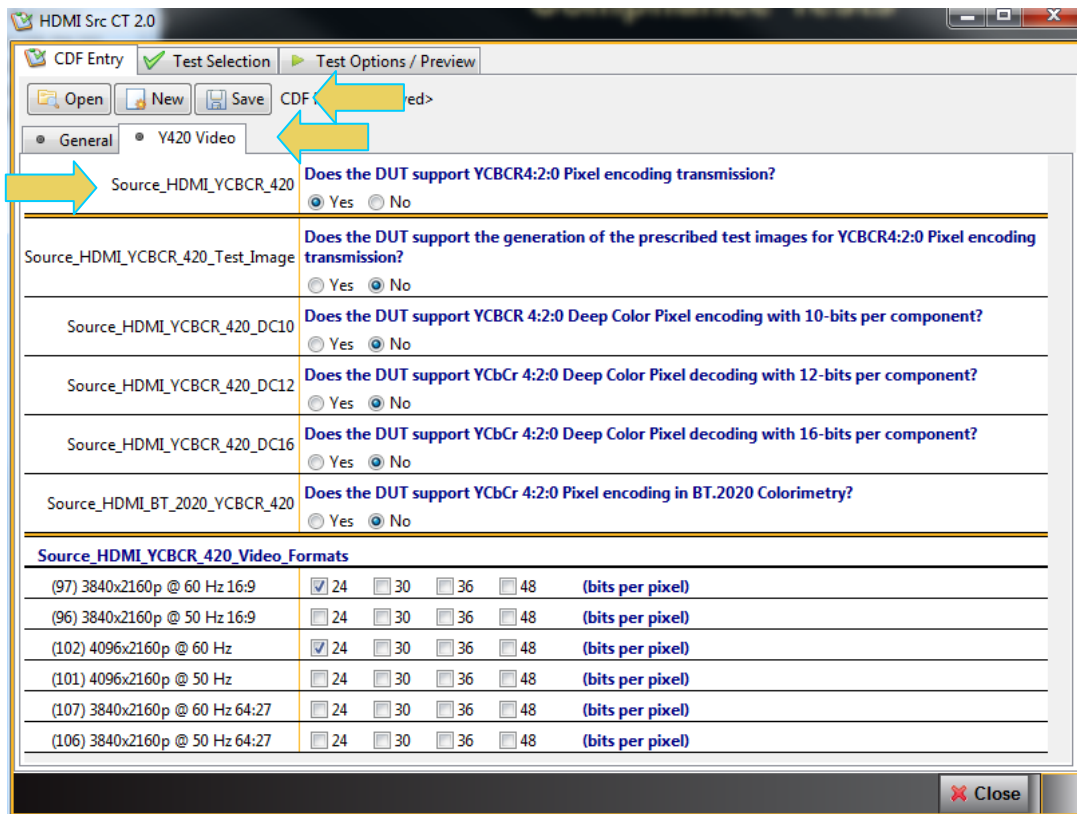
Note: You will not need to connect the PC shown in the figures above if you are running the compliance test through the 980's embedded display. The PC running the 980 HDMI Protocol Analyzer module's compliance test application is connected to the 980 through a standard Ethernet cable.

4 Complete the following steps:

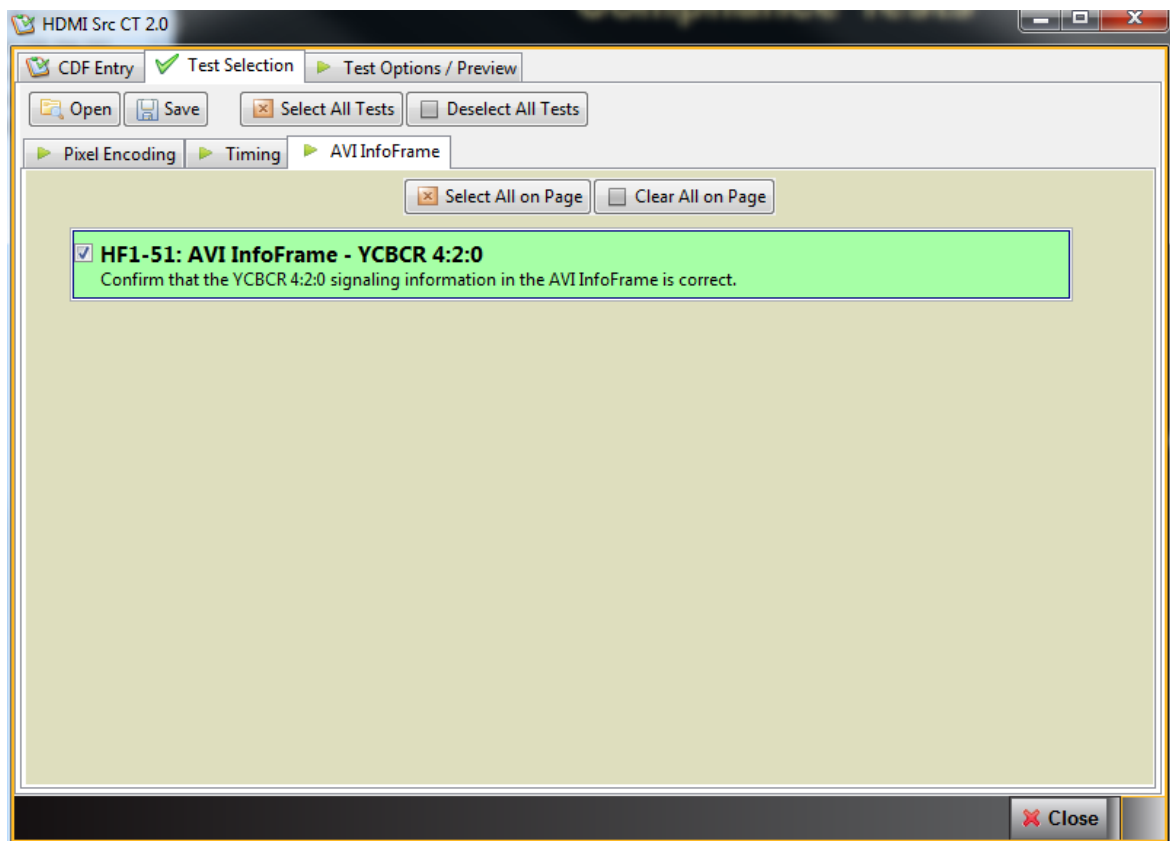
4.1 Click on the HDMI Source CTS 2.0 icon in the Compliance Tests page of the Apps panel.



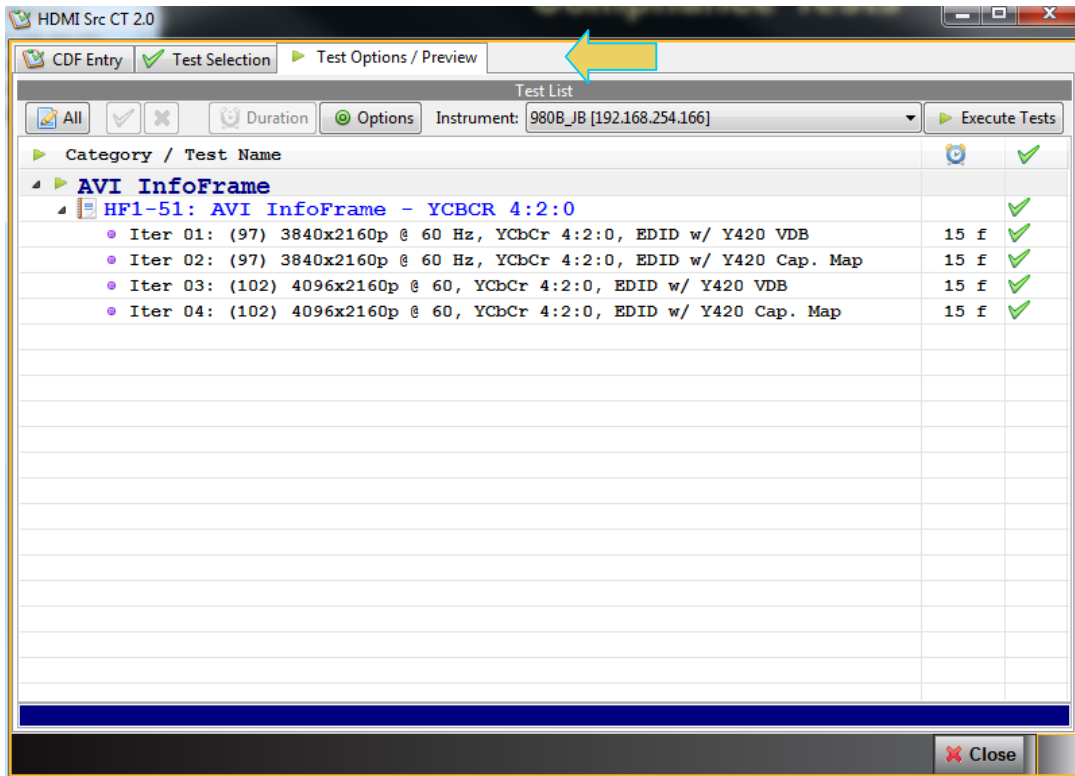
4.2 Navigate to the CDF tab if not already there. If there is a saved CDF file, then click on Open and select it. Otherwise, enter the DUT's CDF information for the General subtab and the Y420 subtab and optionally click on Save to save the CDF.



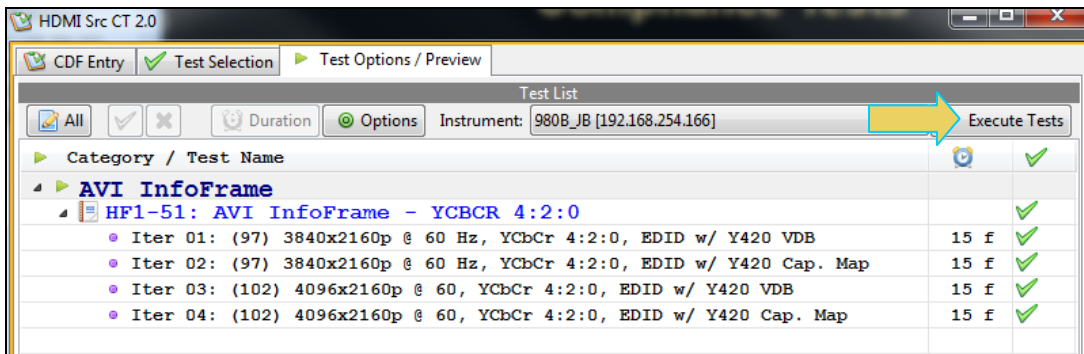
- 4.3 Click on the Test Selection AVI Infoframe tab, and select the HF1-51 Source Video Timing YCbCr 4:2:0 Tests. Refer to the screen example below.



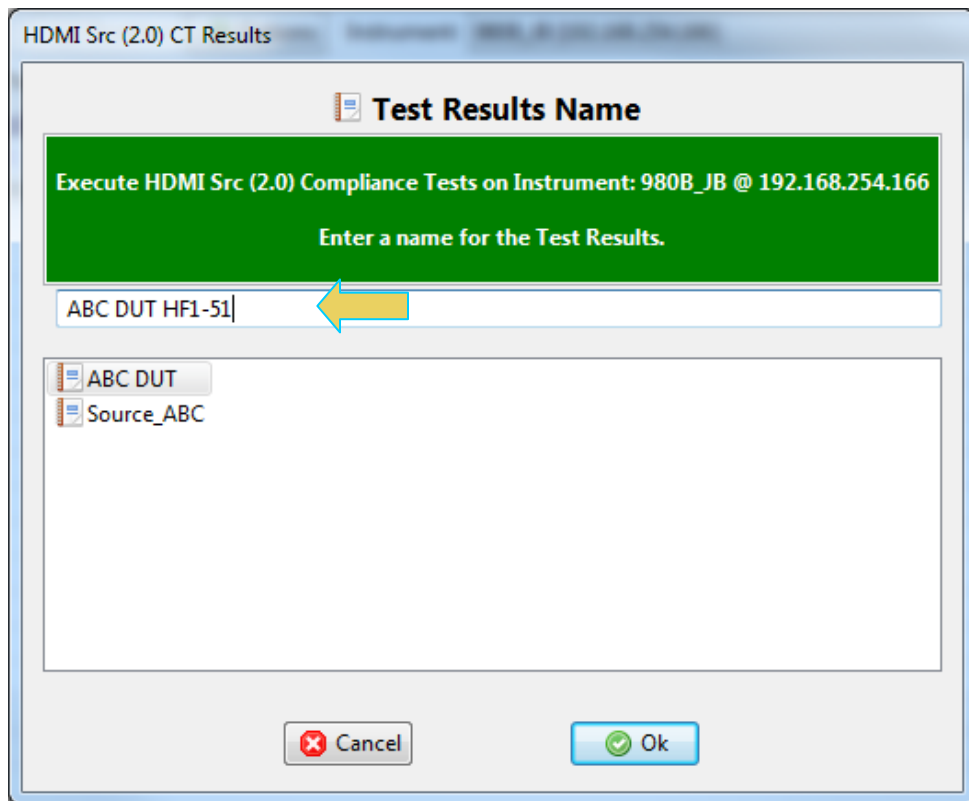
- 4.4 Click on Test Options / Preview tab and review the list of tests. Refer to the screen example below.



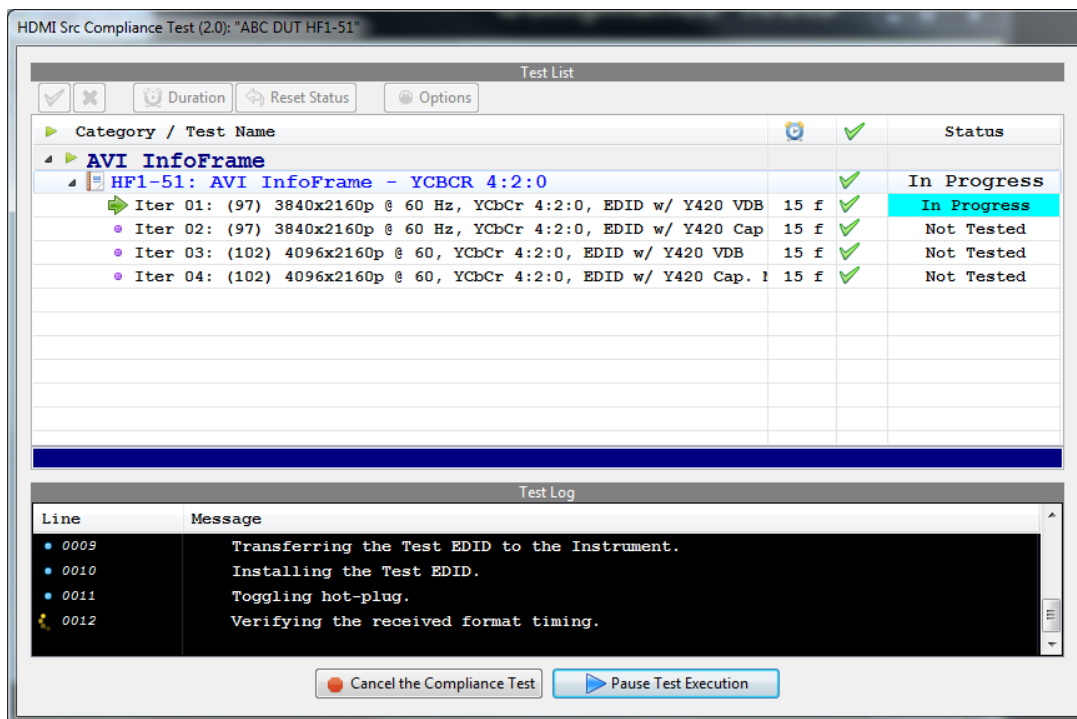
4.5 Click on Execute tests activation button to initiate the test. Refer to the screen example below.



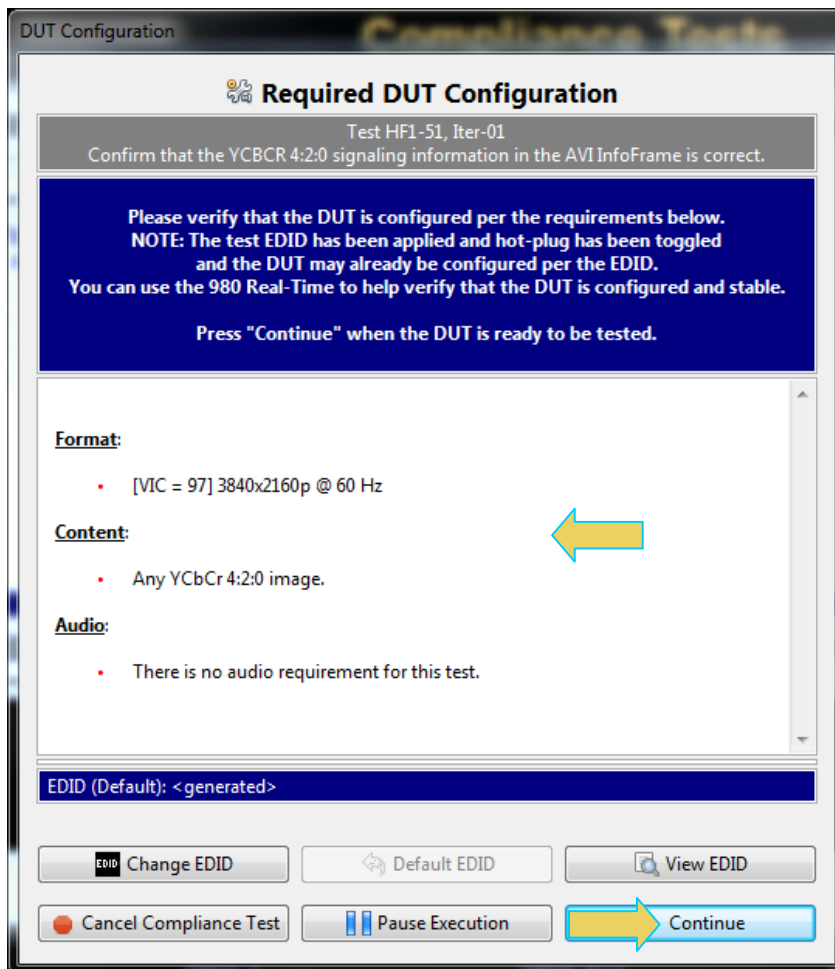
Note: You will be prompted with a dialog box to assign a name to the test results. Refer to the screen example below:



The test will start and a new Test Window will appear as shown below.



You will also be prompted with a dialog box informing you of the requirements of the DUT. Verify that the source is outputting the required HDMI format and pixel encoding and press Continue to run the test.



- 5 If the 980 HDMI Protocol Analyzer's compliance test application reports PASS, then PASS.
If the 980 HDMI Protocol Analyzer's compliance test application reports FAIL, then FAIL.

When the test is complete a Test Results screen appears. Refer to the screen example below.

