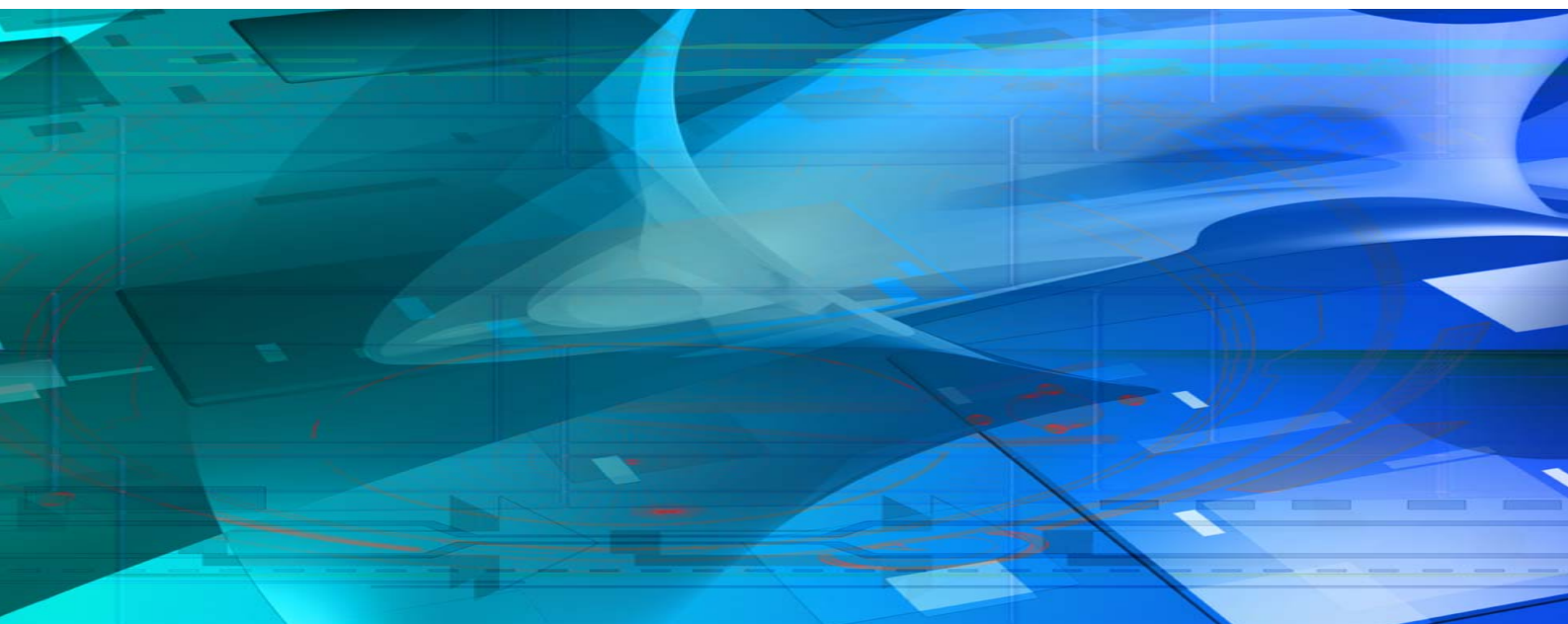




DisplayPort™ Reference Source CTS Tool



User Manual



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Edition

DP Reference Source CTS Tool User Manual

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Quick Start Guide

This is a reduced version of the CTS tool configuration. If you feel quite confident with installing new hardware and software in your PC you can attempt this procedure.

Serial Communication Setup

- ▶ Copy the **dpctsgui.exe** tool into your PC
- ▶ Connect a COM output or a USB to COM converter cable to the SubD9 connector of the DPT-200 or the SubD9 connector on the DP adapter of the VTG-5225.
- ▶ Note the COM port that your PC is using for the communication with the Test Equipment for instance by using Windows Device Manager).
- ▶ Power up the Test Equipment.
- ▶ Launch the tool
- ▶ Use **Tools > Options** and in the dialog select the COM port that your PC is using.

Verifying the Firmware Version

- ▶ From the pull down menu select **Tools > Firmware Update ...**
- ▶ Click the **Check Running Version** to verify the version number of the firmware loaded in your Test Equipment.
- ▶ If you need to upgrade the firmware select the new *.hex file and click **Upgrade**.
- ▶ After the upgrade is complete reset the Test Equipment.

Adding a License Key

- ▶ Select **Tools > Add License(s)**.
- ▶ Insert each of the 32 character long *License Keys* in the field provided and click **Add License** button.

1. GENERAL

About This Manual

This guide introduces you the installation and use of Unigraf CTS Test Tool for DisplayPort™ Reference Source. Please refer to the relevant VESA Compliance Test Standard for the description of the requirements and pass criteria for each test.

The purpose of this guide is to

- Give an overview of this DisplayPort™ CTS Test Tool and its features.
- Provide instructions for the user on how to install the tool and upgrade the Test Equipment firmware.
- Guide to the tool practical usage.

Product Versions

This manual introduces functions in the following software versions. Please contact Unigraf for details.

	Version	Issued
UGDP RefSource		
UGDP RefSource release	2.1.0	07 Oct 2008
Firmware (FW) GDPSource_x.x.x.hex	v.2.1.0	
User Interface (GUI) dpctsgui.exe	v.1.1.24	

Notes

On certain sections of the manual, when important information or notification is given, text is formatted as follows. Please read these notes carefully.

Note	This text is an important note
------	--------------------------------

2. INTRODUCTION

Unigraf VTG-5225 DP

VTG is a family of video pattern generators available with RGB, DVI, LVDS, Composite, Component and DisplayPort™ outputs. The VTG-5000 series pattern generators provide deep color and high pixel rate signals at various output formats. VTG-5225 DP is a DisplayPort™ Reference Source compatible with Unigraf DP CTS tools.

Unigraf DPT-200

DPT-200 is a compact sized yet full featured DisplayPort™ Reference Source. It is controlled and powered by a PC through a USB connection. DPT-200 is compatible with Unigraf DP CTS tools.

Unigraf DisplayPort™ Reference Sink and Reference Source CTS Tools

The CTS tools consist of two components: the Windows graphical user interface (GUI) application, and the target firmware (FW) for the DisplayPort™ controller located on the Test Equipment (TE). The actual tests are implemented by the FW, while system control and status reporting are done by the GUI. The GUI and the FW are communicating using a serial interface. The FW implements both the functions needed in the CTS tests and the normal functionality as DP video generator or frame grabber.

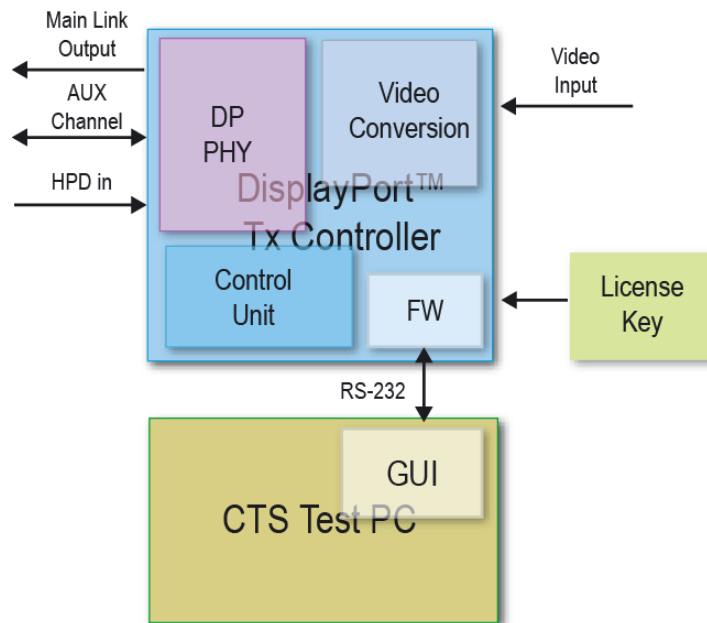
Unigraf's DisplayPort™ Reference Source CTS can be used with the DP Video Test Generator VTG-5225-DP and with the DPT-200, while the Reference Sink CTS can be operated on either the DPR-100 DP sink or the UFG04-DP DP Frame Grabber.

Both CTS tools feature a graphical user interface that provides the user diagnostic functionalities and controls for performing the actual tests. The tools can generate detailed HTML test reports and may include both Link Layer and HDCP compliance tests.

Unigraf Reference Source CTS Tool

Unigraf's Reference Source CTS Tool can be used either with VTG-5225 DP or DPT-200 units (commonly called Test Equipment, TE). The functionality is identical between the two devices. The CTS software is connected to both devices by using a RS-232 connection. A separate USB to serial conversion cable can be used if a RS232 port is not available.

Reference Source Block Diagram



3. SETUP INSTRUCTIONS

Contents of the Delivery

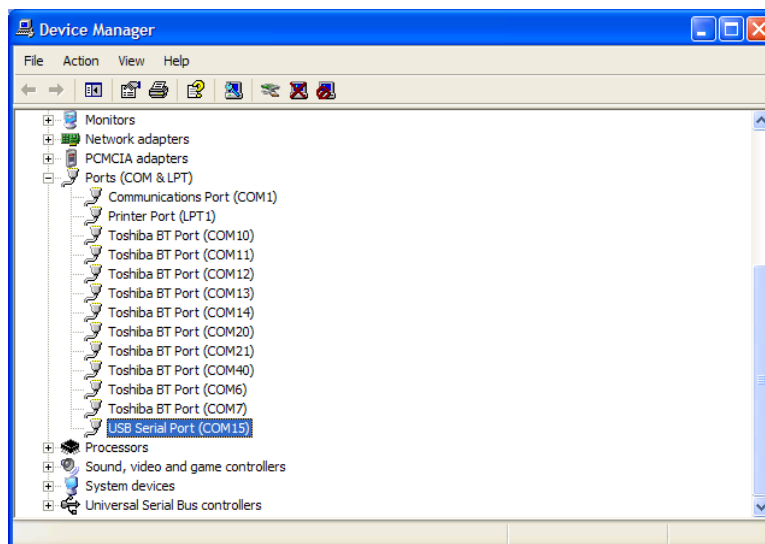
Unigraf's CTS Tool for DisplayPort™ Reference Source delivery includes the following items:

- The Graphical User Interface (GUI) **dpctsgui.exe**
- The DPTX Firmware (FW) **UGDPSource_x.x.x.hex**
- Release notes UGDPreSource_release_notes.txt
- This manual

Communications Setup

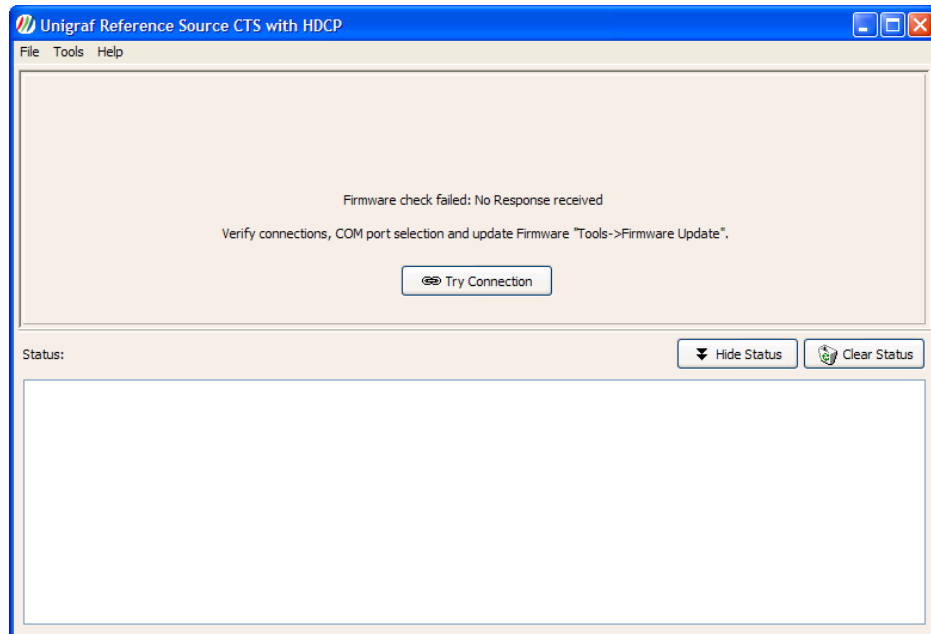
The communication between the CTS Tool GUI and the firmware located in the DP output card of the test equipment (TE) is done by using a RS-232 serial communication channel. The CTS tool will assign the right communication parameters but you have to specify the COM port your PC is using for the connection.

- ▶ Connect a COM port or a USB to COM converter cable to the SubD9 connector of the DPT-200 or the SubD9 connector in the DP adapter of the VTG-5225.
- ▶ From *Windows Device Manager* find out the COM port that Windows has assigned to the connection. When using a *USB to Serial Converter* it will be the one marked as **USB Serial Port**.



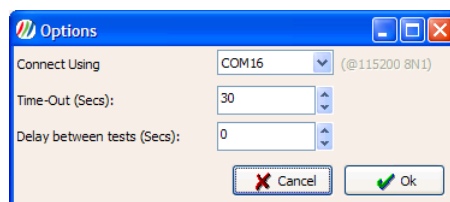
GUI Setup

The CTS Tool graphical user interface (GUI) executable is named **dpctsgui.exe**. It can be copied to any location in your PC and does not require any special installation. You can run it directly from its folder by double clicking the icon.



Setting up the Communication

- From the pull down menu select **Tools > Options ...** and select the serial port for communicating with the TE. In the **Time-Out** field you can define the maximum time a test can take for executing before it is aborted. In the **Delay between tests** field you can specify the time the tool will wait after a test has completed and before starting the following one.

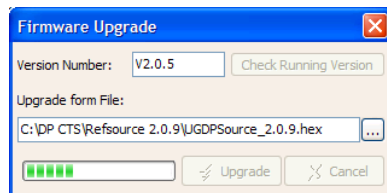


Updating the DPTx Firmware

The firmware (FW) for the DisplayPort™ source controller (DPTX) resides in the Test Equipment, i.e. the VTG-5225 DP or the DPT-200. The actual tests are implemented in the FW, while the system control and the status reporting are done by the GUI. The FW implements both the DPTX functions needed in the CTS tests and the normal functionality as DP video generator.

The DPTX current firmware version can be verified and firmware can be updated by using the *Firmware Upgrade* dialog.

- ▶ From the pull down menu select **Tools > Firmware Update ...**
- ▶ Click the **Check Running Version** to check the current version number of the firmware (if needed).
- ▶ Click the ellipsis button (...) to browse for a firmware update file and click **Upgrade** to start loading the code. You can monitor the status of the upgrade process from the *Status* panel in the lower part of the dialog.

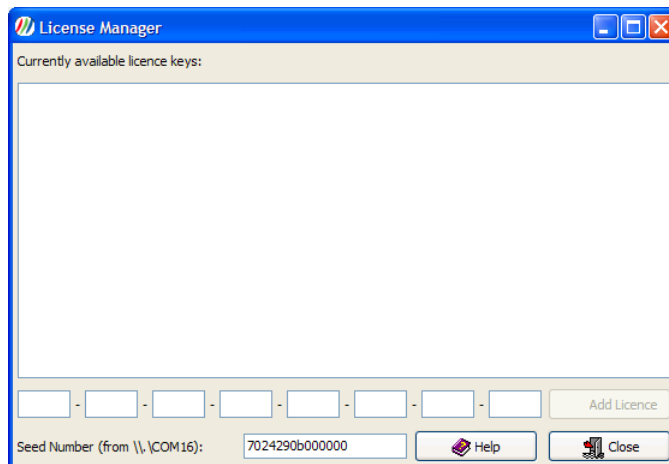


- ▶ After the upgrade is complete, press the DP Reset button on the VTG-5225 DP or DPT-200 unit. Click **OK** to return to the main dialog.

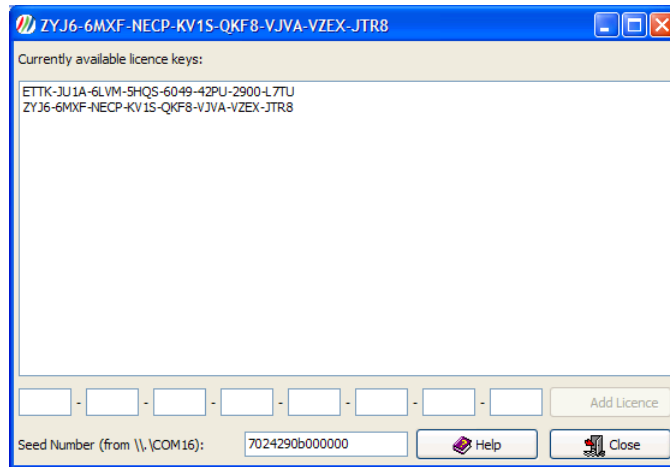
Adding the License Code

Unigraf CTS tools software are license protected. Each license is valid for one test equipment (TE) hardware only. By using the CTS GUI you can read the *Product Seed Number* of the TE. For a given Seed Number, Unigraf will provide you a *License Key* that enables you to use the software in any number of PCs to control the given TE.

- ▶ Open the *License Manager* from the pull down menu by selecting **Tools > Add License(s)**.
- ▶ Please provide Unigraf the *Product Seed Number* shown on the bottom of the dialog



- Insert each of the 32 character long *License Keys* in the field provided and click the **Add License** button. The license keys are now stored in your PC and you can constantly use the TE from this PC. Please Click **Close** to return to the main dialog.



Note Please note that each Reference Source CTS software license is bound to one specific Unigraf Test Equipment (TE). Several licenses e.g. LL CTS and HDCP CTS can be in use at the same time. The same license can be used with any number of PCs when they are connected to the specific TE the license has been provided for.

Note The License Key never includes characters I, G, B, O because of their similarity with the corresponding numbers. If doubt, please use numbers. You can use copy and paste to insert the License Code.

Note The TE must be connected to your PC when entering the License Key.

4. USING THE CTS TOOL

The user interface of Unigraf CTS Tool for DisplayPort™ Reference Source includes the following main functions:

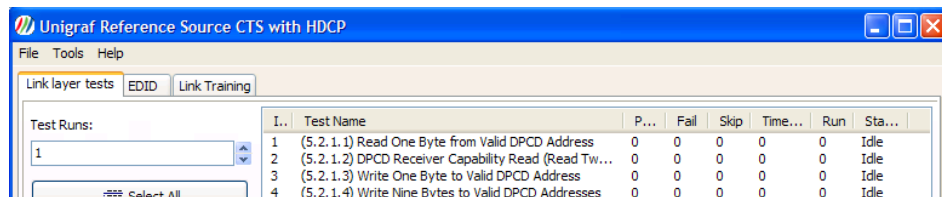
- *Link Layer Tests, HDCP Tests* or both
- EDID tool
- DPCD Access
- Link Training status
- Report generator

The serial communication setup, firmware updates and license code entry are covered in section *Setup Instructions* of this manual.

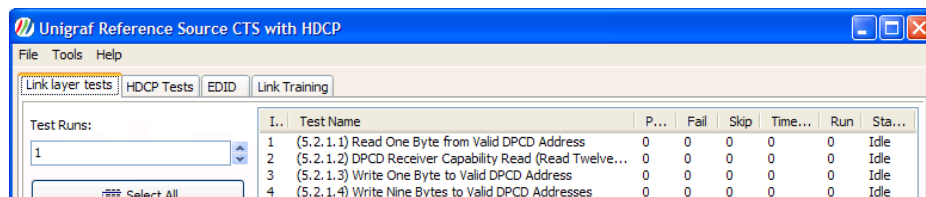
The following chapters describes the controls found in the five main dialogs. The report generator is described in its own section. The actual testing is described in chapter *Running the CTS Test*.

Two Separate Parts

Unigraf DP CTS tests are divided into two separate sets: *DP Link Layer tests* and *DP HDCP tests*. The license key can include one set or both sets combined. The following images show the structure of the tool tabs when only DP LL CTS tests are enabled and when both the DP LL and HDCP tests are enabled.



Tool with only Link Layer tests enabled



Tool with Link Layer and HDCP tests enabled

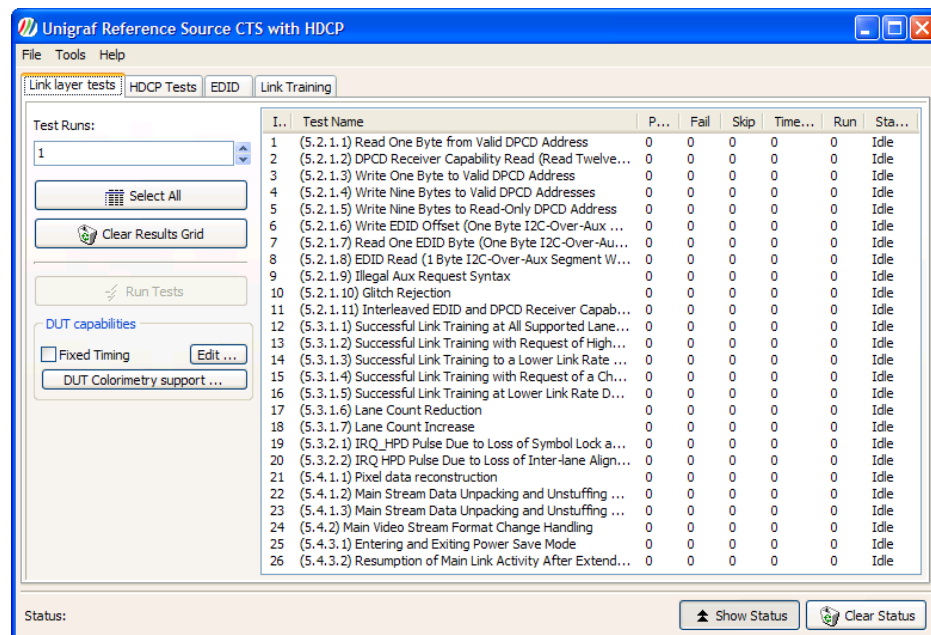
Status Panel

You can follow the communication between the firmware in the TE and the test tool on the *Status Panel* on the lower part of the dialog. All executed test steps and reasons for Pass or Fail will be indicated here. The contents of the Status Panel will be copied also to the *Test Report*. You can clear the contents of the panel by clicking **Clear Status**. You can hide the panel by clicking the **Hide Status**.

Note Please note that all of the executed test steps will be included in the report even if the Status Panel is cleared.

Link Layer Tests Dialog

For performing the Link Layer (LL) CTS Test for Sink devices select the **Link Layer Tests** tab.



List of Tests

The list of test on the right hand side of the dialog contains all of the DP LL CTS tests, indicating the corresponding chapter in *VESA Link Layer Compliance Test Specification* and the name of the test as it is mentioned in the specification. Place the mouse pointer on top of the name to see it in full. The *Results Grid* includes counters for: *Pass*, *Fail*, *Skip*, *Timeout* and a *Status* indicator.

You can select a test either by clicking with the mouse or by moving up or down in the list with the **Up** and **Down** arrow keys in the keyboard. **Home** key selects the first test and **End** key the last test. You can select multiple consecutive tests by holding down the **Shift** key while selecting and multiple individual tests by holding the **Ctrl** key while selecting.

Test Control

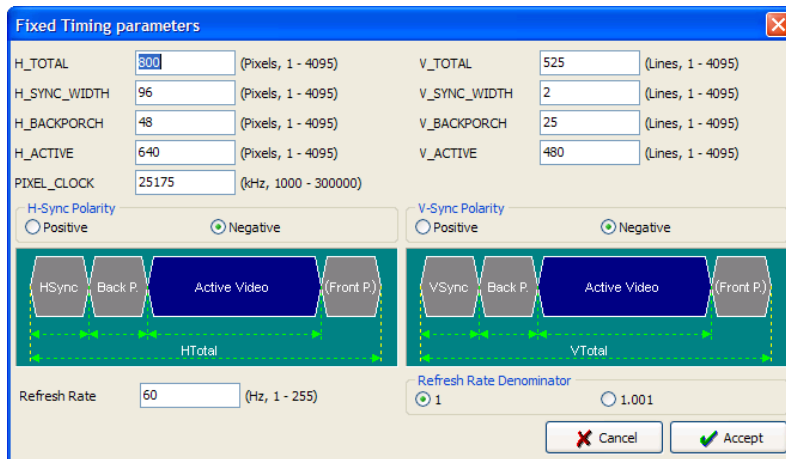
By using the test controls on the left side of the dialog you can *Select All* tests, *Clear Results Grid* of all tests, define how many times the *Test Runs* are repeated. Pressing *Run Tests* starts the selected test sequence and pressing the same key again *Abort* the sequence.

DUT Capabilities

Using the *DUT Capabilities* panel on the lower left side of the panel you can specify the timing supported for fixed-timing DUTs and the Colorimetry supported by your DUT.

Fixed Timing

If your DUT supports only one fixed timing, select the **Fixed Timing** checkbox. Then click **Edit ...** to set the timing supported.

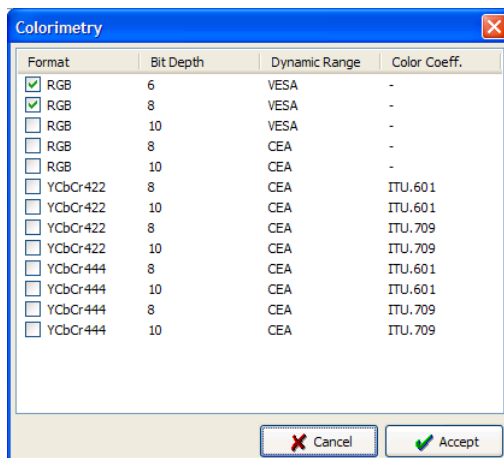


The 'Fixed Timing parameters' dialog box contains the following fields and controls:

- H_TOTAL**: 800 (Pixels, 1 - 4095)
- H_SYNC_WIDTH**: 96 (Pixels, 1 - 4095)
- H_BACKPORCH**: 48 (Pixels, 1 - 4095)
- H_ACTIVE**: 640 (Pixels, 1 - 4095)
- PIXEL_CLOCK**: 25175 (kHz, 1000 - 300000)
- V_TOTAL**: 525 (Lines, 1 - 4095)
- V_SYNC_WIDTH**: 2 (Lines, 1 - 4095)
- V_BACKPORCH**: 25 (Lines, 1 - 4095)
- V_ACTIVE**: 480 (Lines, 1 - 4095)
- H-Sync Polarity**: ☒ Negative
- V-Sync Polarity**: ☒ Negative
- Timing diagrams for HSync, Back P., Active Video, and Front P. are shown for both H and V signals.
- Refresh Rate**: 60 (Hz, 1 - 255)
- Refresh Rate Denominator**: ☒ 1, ☐ 1.001
- Buttons: **Cancel**, **Accept**

Colorimetry Support

To specify the Colorimetric values used during the testing click **DUT Colorimetry Support** and in the dialog check the rows matching the *Format*, *Bit Depth*, *Dynamic Range* and *Color Coefficient* that you want to use.



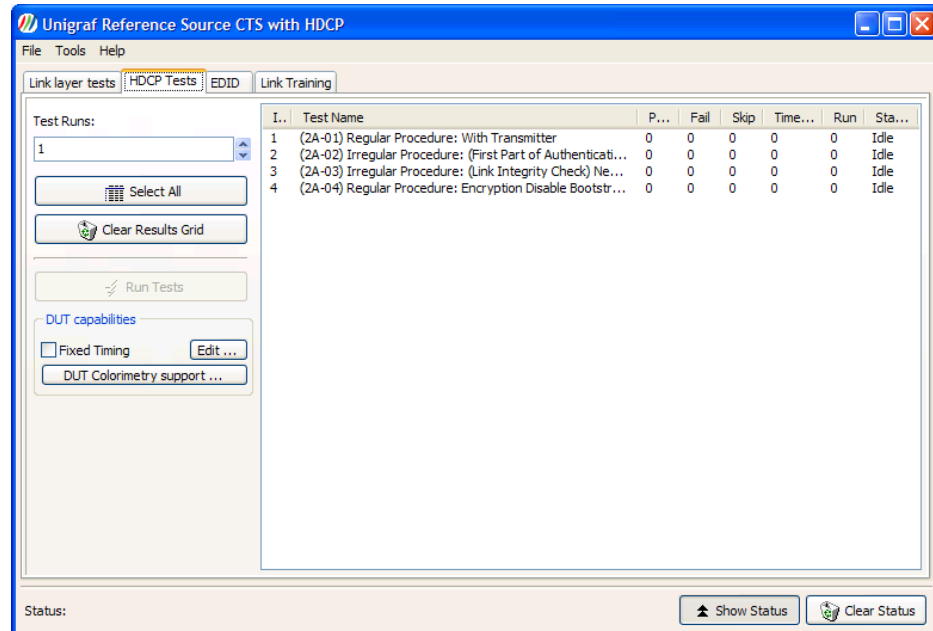
The 'Colorimetry' dialog box displays a table of colorimetric options:

Format	Bit Depth	Dynamic Range	Color Coeff.
<input checked="" type="checkbox"/> RGB	6	VESA	-
<input checked="" type="checkbox"/> RGB	8	VESA	-
<input checked="" type="checkbox"/> RGB	10	VESA	-
<input type="checkbox"/> RGB	8	CEA	-
<input type="checkbox"/> RGB	10	CEA	-
<input type="checkbox"/> YCbCr422	8	CEA	ITU.601
<input type="checkbox"/> YCbCr422	10	CEA	ITU.601
<input type="checkbox"/> YCbCr422	8	CEA	ITU.709
<input type="checkbox"/> YCbCr422	10	CEA	ITU.709
<input type="checkbox"/> YCbCr444	8	CEA	ITU.601
<input type="checkbox"/> YCbCr444	10	CEA	ITU.601
<input type="checkbox"/> YCbCr444	8	CEA	ITU.709
<input type="checkbox"/> YCbCr444	10	CEA	ITU.709

Buttons: **Cancel**, **Accept**

HDCP Tests Dialog

For performing the HDCP CTS Tests for Sink devices select the **HDCP Tests** tab.



List of Tests

The list of tests on the right side of the dialog contains all of the DP HDCT CTS tests for receiver, indicating the corresponding chapter in *VESA HDCP Compliance Test Specification* and the name of the test as it is mentioned in the specification. Place the mouse cursor on top of the name to see it in full. The *Results Grid* includes counters for: *Pass*, *Fail*, *Skip*, *Timeout* and a *Status* indicator.

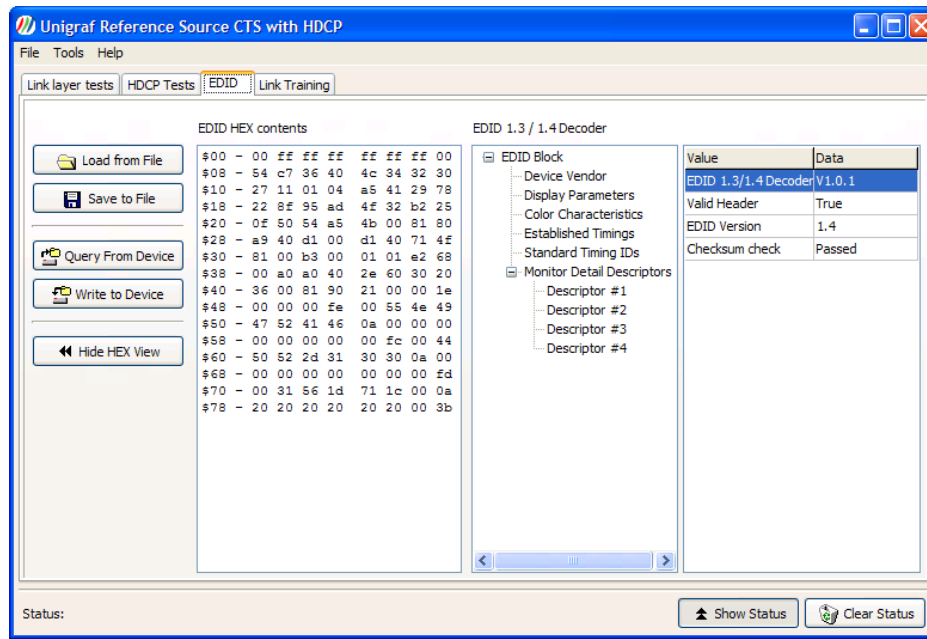
You can select a test either by clicking with the mouse or by moving up or down in the list with the **Up** and **Down** arrow keys in the keyboard. **Home** key selects the first test and **End** key the last test. You can select multiple consecutive tests by holding down the **Shift** key while selecting and multiple individual tests by holding the **Ctrl** key while selecting.

Test Control

By using the test controls on the left side of the dialog you can *Select All* tests, *Clear Results Grid* of all tests, define how many times the *Test Runs* are repeated. Pressing *Run Tests* starts the selected test sequence and pressing the same key again *Abort* the sequence.

EDID Dialog

For evaluating and modifying the *EDID* (Extended display identification data) of Sink devices select the **EDID** tab.



Controls

By using the controls on the left hand side of the dialog you can perform the following tasks: You can read the EDID information from a Sink by clicking the **Query From Device** button. You can also program the currently shown EDID information to the Sink by clicking the **Write to Device** button. You can **Load** an EDID hex file from a file in your PC and you can **Save** the EDID information from a Sink as a hex file.

Hide or show the EDID Hex view by toggling button **Hide HEX View**.

Note	Please note that the EDID information that is programmed into the Sink will replace the original EDID information in the device. Doing this might change the way that Source devices operate when connected the Sink. Please be careful when using this function
------	--

EDID HEX contents

This panel shows the EDID information in raw hexadecimal notation.

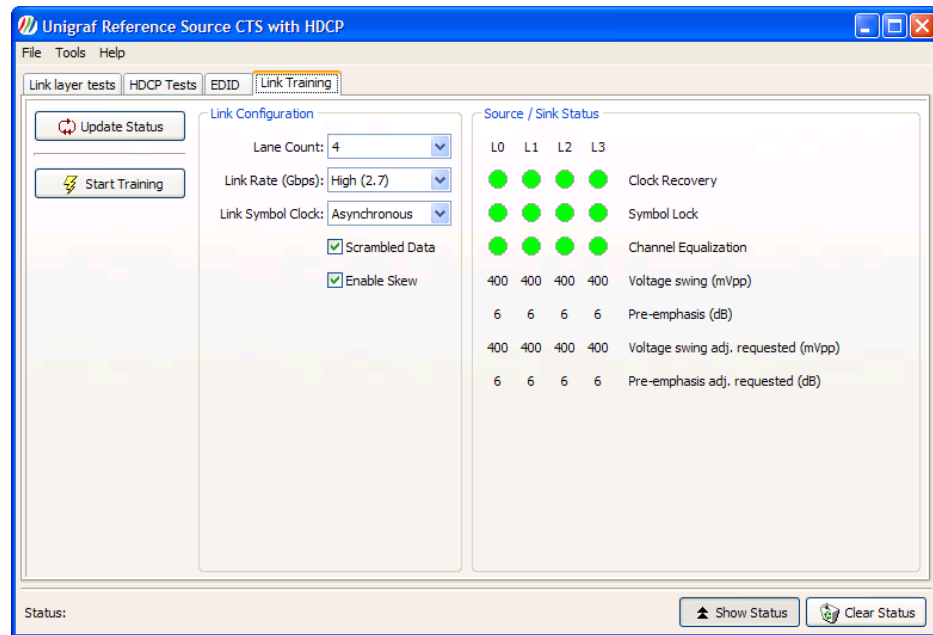
EDID Decoder

This panel shows the contents of the EDID in clear text. By selecting one of the items on the left hand panel, the right hand panel shows the contents decoded.

Link Training Dialog

In order to see the link training status select the **Link Training** tab.

Click **Update Status** to show the result of the previous Training. Click **Start Training** to initiate a new *Link Training* using the configuration given in the *Link Configuration* controls.



Link Configuration

With Link Configuration panel you can set the parameters used for the Link Training.

With **Line Count** you can select a lane count of either 1, 2 or 4 lanes.

With **Link Rate** you can select a link rate of either *High 2.7 Bbps* or *Low 1.62 Gbps*.

With **Link Symbol Clock** you can select either *Asynchronous* or *Synchronous* clock mode.

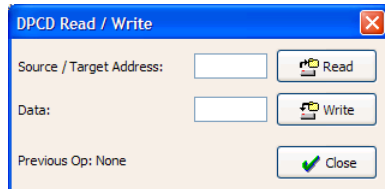
With the two check boxes you can enable the **Data Scrambling** and **Lane Skew**.

Source / Sink Status

The panel shows the link configuration negotiated by the Sink and the Source during the Link Training. Please refer to VESA DisplayPort Specification for a description of the parameters reported.

DPCD Read / Write

DPCD Read / Write dialog enables you to read and write the content of the connected Sink device *DisplayPort™ Configuration Data registers* (DPCD). From the pull down menu select **Tools > DPCD Access ...**.



Write the address of the DPCD register in field *Source / Target Address:*. For reading the register contents click **Read**. For modifying the register contents write the new value to field *Data:* and click **Write**. For returning to the main dialog, click **Close**.

Please note that the DPCD register address and data and the contents are written and given in **hexadecimal** notation. E.g. "206" means 0x206.

5. TEST REPORT

The tool includes a report generator that creates a test report of the results displayed in the Results Grid. The report is generated in HTML format and includes a detailed description of the test steps executed, the actions taken and the causes of the pass or failure. You can also include detailed description of the DUT and the used TE in the report.

Note	Please note that by clearing the Result Grid, you will clear also the Test Report
------	---

Creating a Test Report

For creating a report select from the pull down menu **File > Save Report**

The *Additional Data for Report* dialog provides you fields for entering the reference data of the TE and the DUT that will be included in the report. The left column is for DUT data and the right column for the TE.

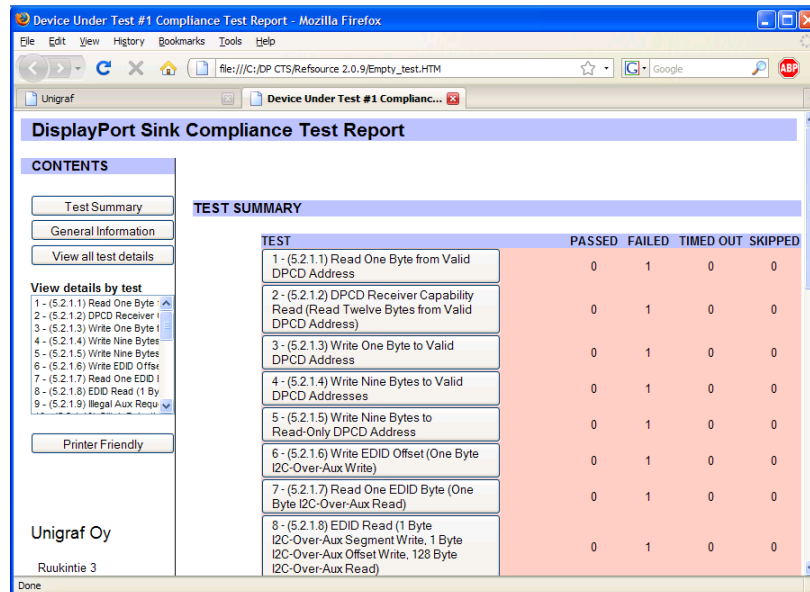
In the *Additional Comments* field you can add more notes that will be included in the report. This could be remarks of the testing situation etc.

Save the report by clicking **Save Report** or return to the main dialog without saving by clicking **Cancel**. The report will be saved to the path and file name specified at the bottom of the dialog. After the report is saved, your default internet browser will be opened to display the report file created.

The information entered in the fields of the *Additional Data for Report* dialog will be available also for the following reports until the tool is closed.

Test Report Views

Your internet browser will first open the report in the *Test Summary* view. This view provides you a test summary similar to the one shown on the *Sink Tests* tab of the CTS tool. It summarizes all performed tests and their Pass, Fail, Time out or Skipped counters. The background of the status list is coloured **red** if the test never scored a Pass result.



The *Contents* bar on the left side of the report is an active quick selection toolbar for showing the five (5) views of the report.

Click **Test Summary** to get back to the initial view.

Click **General Information** to show the information given on the *Additional Data for Report* dialog.

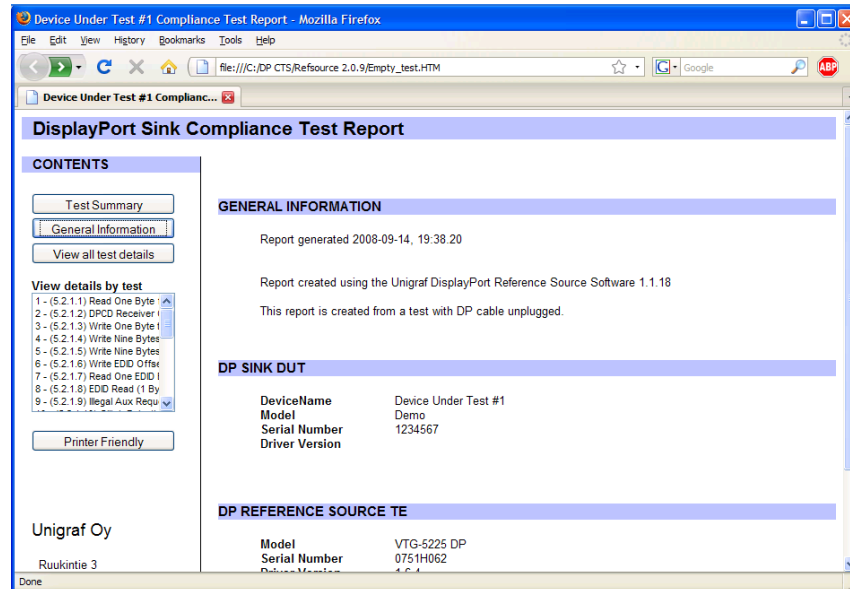
Click **View all test details** to show all information for the progress and results of all tests.

The Contents bar also contains a list of active links for showing the detailed results by test. Click one of the tests listed under **View details by test** to show the details if one test at a time. You can select this view also by clicking one of the test titles in the *Test Summary* view.

Click **Printer Friendly** for formatting the report for printing.

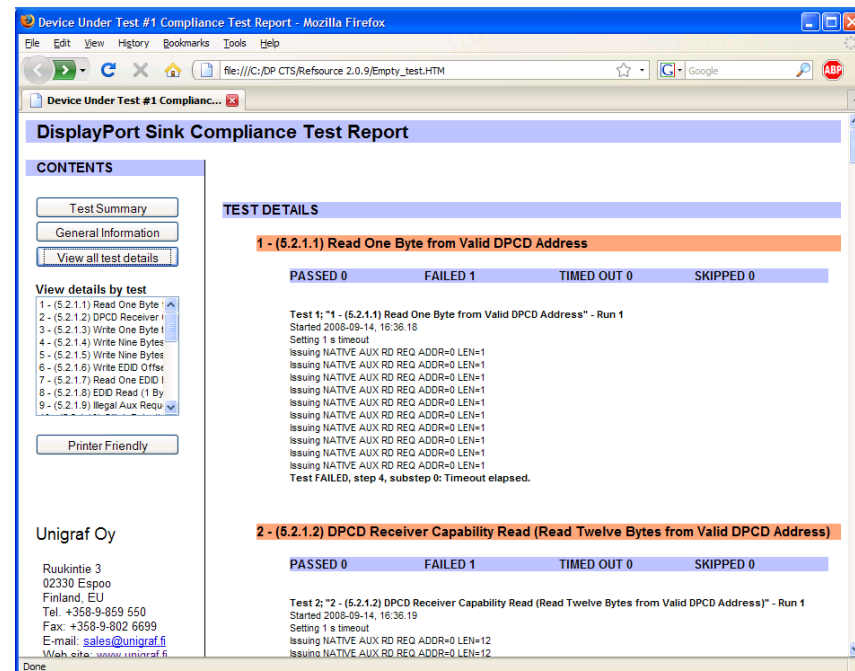
General Information View

This view provides only the data from *Additional Data for Report* dialog



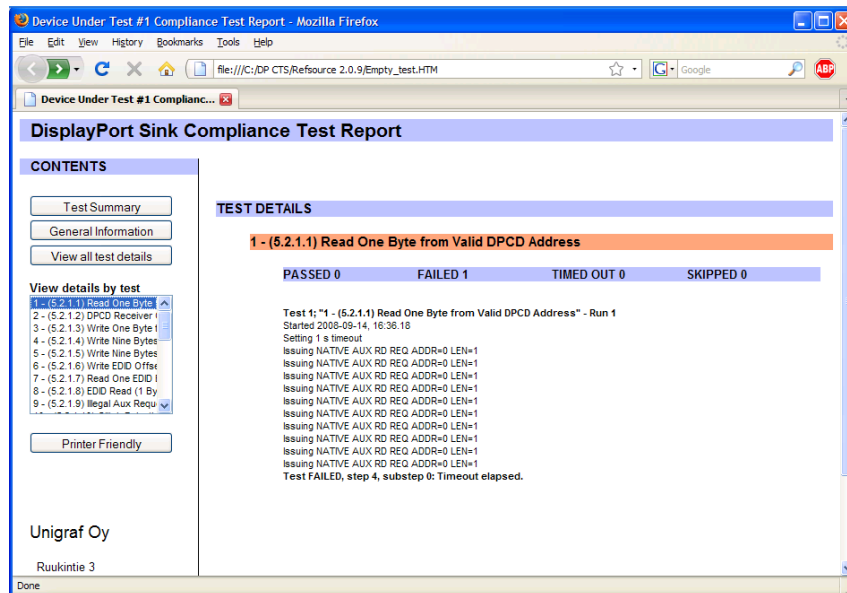
All Test Details View

This view provides the detailed procedures of the test and test result description for all the performed tests. The horizontal title bar of every test indicates the status of the test. *Green* if passed, *Red* if not passed.



Details by Test View

This view provides the same information as the *All test details* view but only for the selected test.



Printer Friendly View

This view will remove the side toolbar and includes the *General Information* and *All Test Details* into one report for printing. To get back to the *Test Summary View* click the **Back** button of your internet browser.

