DisplayPort™ Reference Source CTS Tool

User Manual

UNIGRAF

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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.

▶ Notify the COM port that your PC is using for the communication with the TE.

▶ Power up the TE.

▶ Launch the Tool

▶ Select **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.

▶ If you need to upgrade the firmware select the new *.hex file and click **Upgrade**.

▶ After the upgrade is complete reset the DP transmitter.

Adding the License Keys

▶ 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 feature.
- Give instructions for the user on how to install the tools and the load related firmware to the TE.
- Introduce the use of the tool.

Product Versions

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

	Version	Issued
UGDP RefSource		
Firmware (FW)	UGDPSource_x.x.x.hex	TBD
User Interface (GUI)	dpctsgui.exe v.1.1.21	29.9.2008

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

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2.   INTRODUCTION

Unigraf VTG-5225 DP

VTG is a family of video pattern generators with RGB, DVI, LVDS, Composite, Component and DisplayPort™ output. VTG was the first PC based pattern generator which was introduced first as PC bus cards and later as USB connected and stand alone version. VTG-5000 series pattern generators provide deep color and high pixel rate signals on 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. DTP-200 is compatible with Unigraf DP CTS tools.

Unigraf DisplayPort™ Reference Sink and Reference Source CTS Tools

Unigraf's DisplayPort™ Reference Source CTS can be used with the DP Video Test Generator VTG-5225-DP 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 test. The tools also generate the reporting. The Reference Source CTS includes both the Link Layer and the HDCP compliance tests.

The tools consist of two components: the Windows graphical user interface (GUI) application, and the target firmware for the DisplayPort™ controller (FW) on the Test Equipment. The actual tests are implemented by the FW, while the system control and the 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 test and the normal functionality as DP video generator or frame grabber.

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 the USB connection of the PC needs to be used.

Reference Source Block Diagram
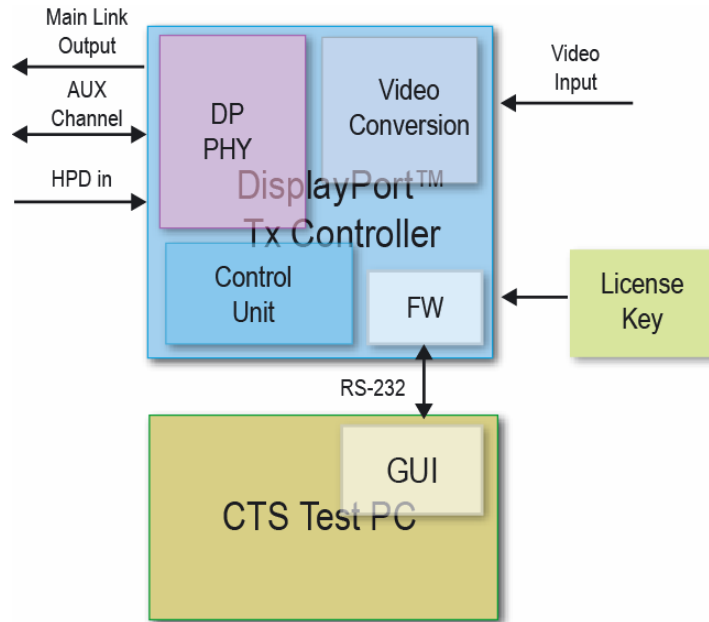
3.   SETUP INSTRUCTIONS

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 DPRX Firmware (FW) **UGDPSource_x.x.x.hex**
- Release notes UGDPRefSource_release_notes.txt
- This manual

Communications Setup

The communication between the 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 tool will assign the right communication parameters but you have to indicate it which COM port your PC is using.

▶   Connect a COM output 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* notify the COM port that Windows has assigned to the communication. In case when using a *USB to Serial Converter* please select the one marked as **USB Serial Port**.
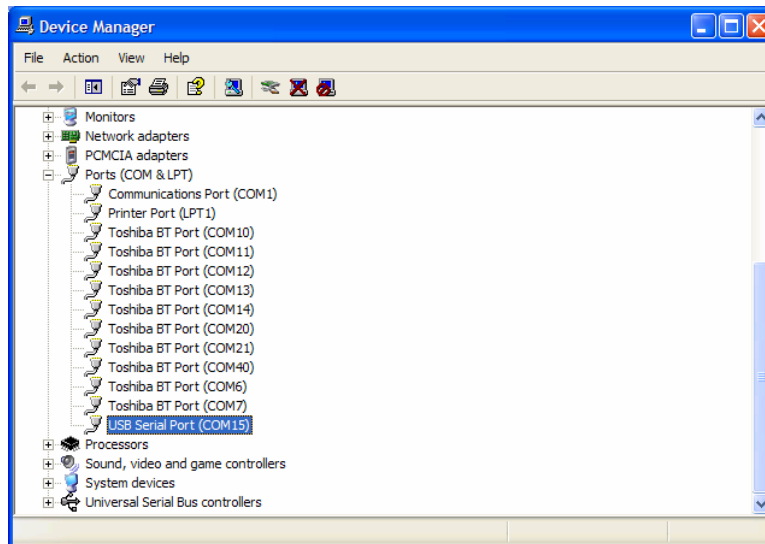
GUI Setup

The graphical user interface (GUI) of the CTS Tool is **dpctsgui.exe** executable. It can be just copied to your PC and does not need any special installation. You can run it directly from the folder by double clicking the icon.
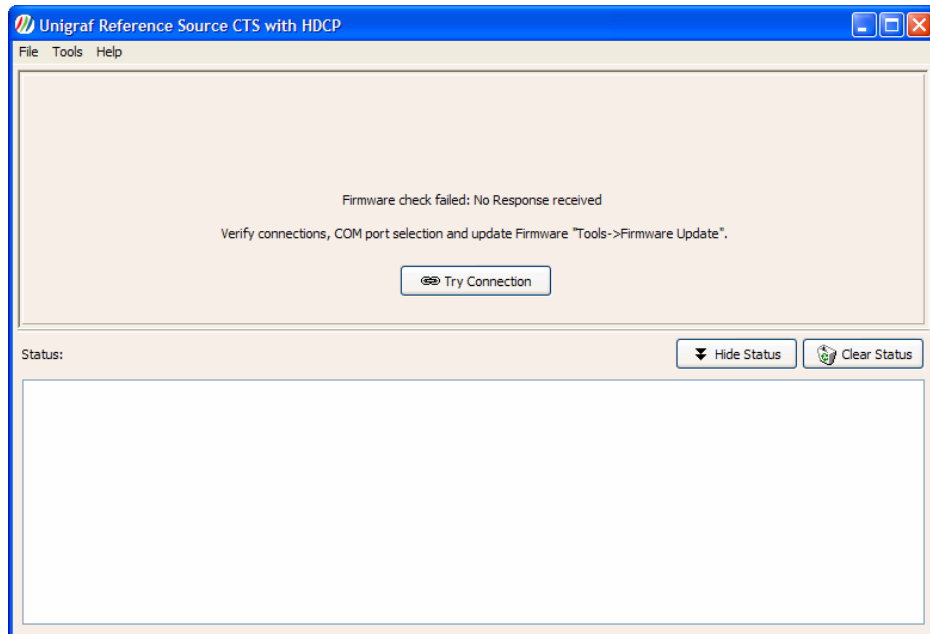
Setting up the Communication

► From the pull down menu select **Tools** > **Options …** and select the communication port for communicating with the TE. In field **Time-Out** you can define the time-out delay in the tests. In field **Delay between tests** the time the tool pauses after starting a new test.


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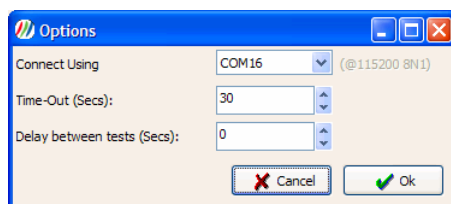
Updating the DPTx Firmware

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 by 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 test and the normal functionality as DP video generator.

The DPTx firmware version can be verified and the 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 version number of the firmware loaded.

▶ Click the click the ellipsis button (…) to browse for an firmware update file and click **Upgrade** to start loading the code. You can monitor the status of the upgrade process in the *Status* panel in the lower part of the dialog.
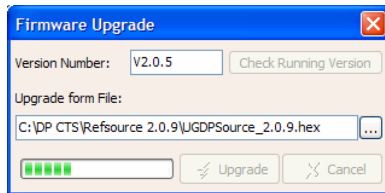

▶ After the upgrade is complete. Push the DP Reset button on the VTG-5225 DP or DPT-200 unit. Click **OK** to return to the main dialog.

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)**.
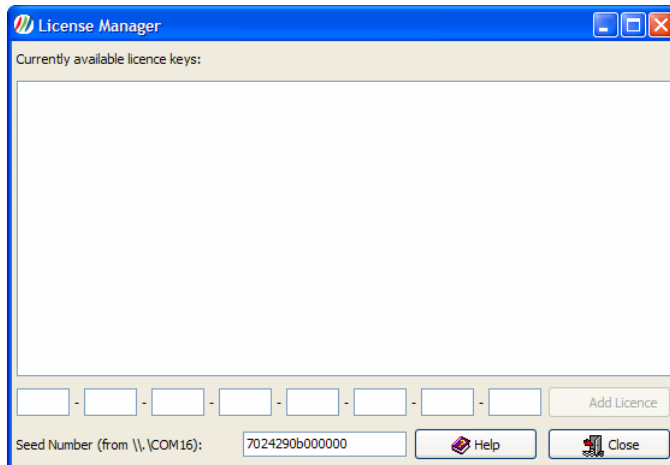
▶ Please provide Unigraf the *Product Seed Number* shown on the bottom of the dialog

▶ Insert each of the 32 character long *License Keys* in the field provided and click **Add License** button. The license keys are now stored in your PC and you can constantly use the TE in the PC. Please Click **Close** to return to the main dialog.
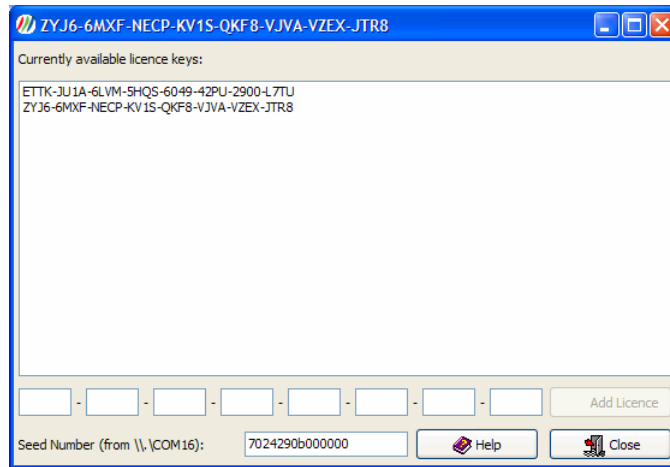
Note	Please note that each Reference Source CTS software license is bound to one specific Unigraf Test Equipment (TE). Several licenses e.g. LL CTS and HDCP CTS can be validated at the same time. The license can be used with any number of PCs when they are using this specific TE.

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 when entering the License Key.

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4.   USING THE CTS TOOL

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

- Optionally the *Sink Tests* or *HDCP Tests* or both
- EDID tool
- DPCD Access
- Link Training status
- Report generator

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

The following chapters describe 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.
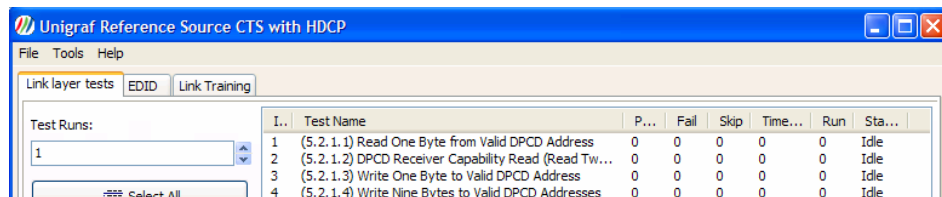
Tool with only Link Layer tests enabled
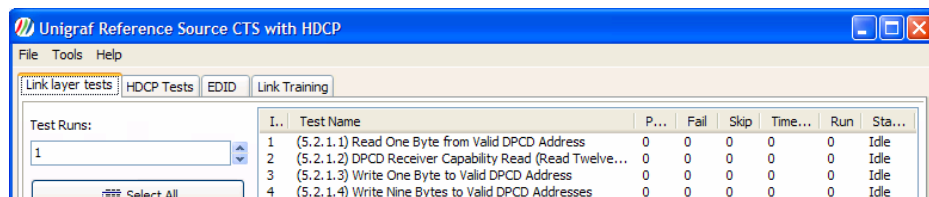
Tool with Link Layer and HDCP tests enabled

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 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 the test steps will still be showed on the report even if the Status Panel is cleared.

Link Layer Tests Dialog

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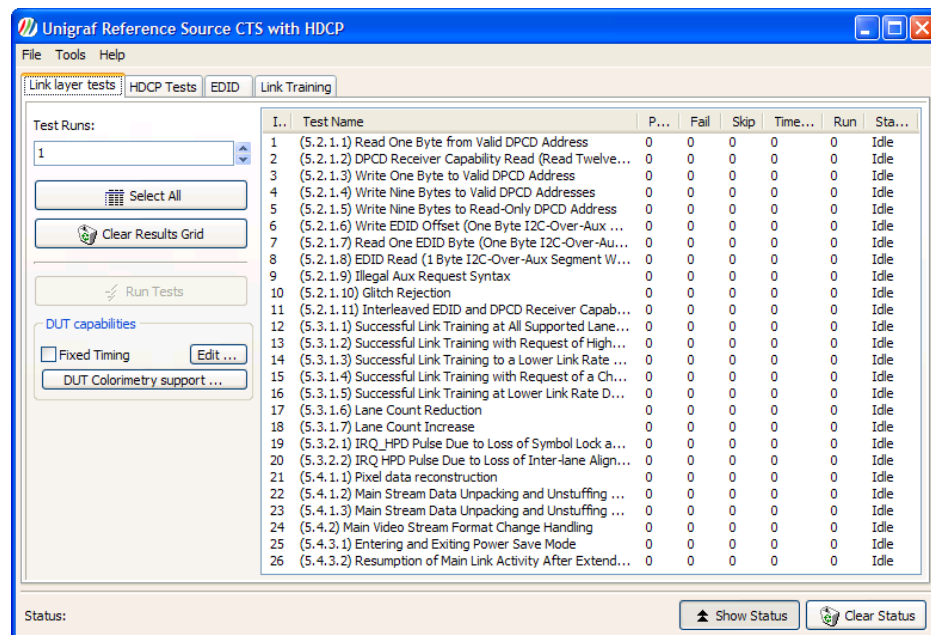
List of Tests

The list of test on the right hand side of the dialog contains all 26 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 cursor on top of the name to see it in full. The *Results Grid* includes counters for: *Pass, Fail, Skip, Timeout* and *Status*.

You can select a test either by clicking a 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.

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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 test sequence and press the same key again to *Abort* the sequence.

DUT Capabilities

In the *DUT Capabilities* panel on the lower left side of the panel you can limit the timing and Calorimetric values used during testing.

In order to set the timing used during the testing select the **Fixed Timing** checkbox. Click **Edit …** to set the used timing.
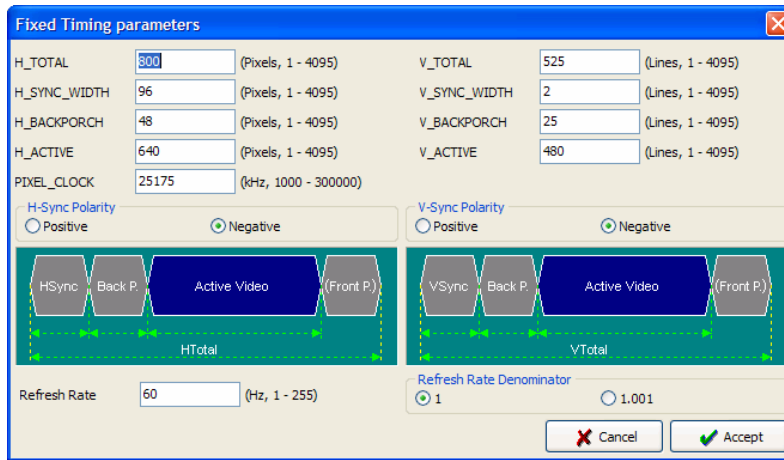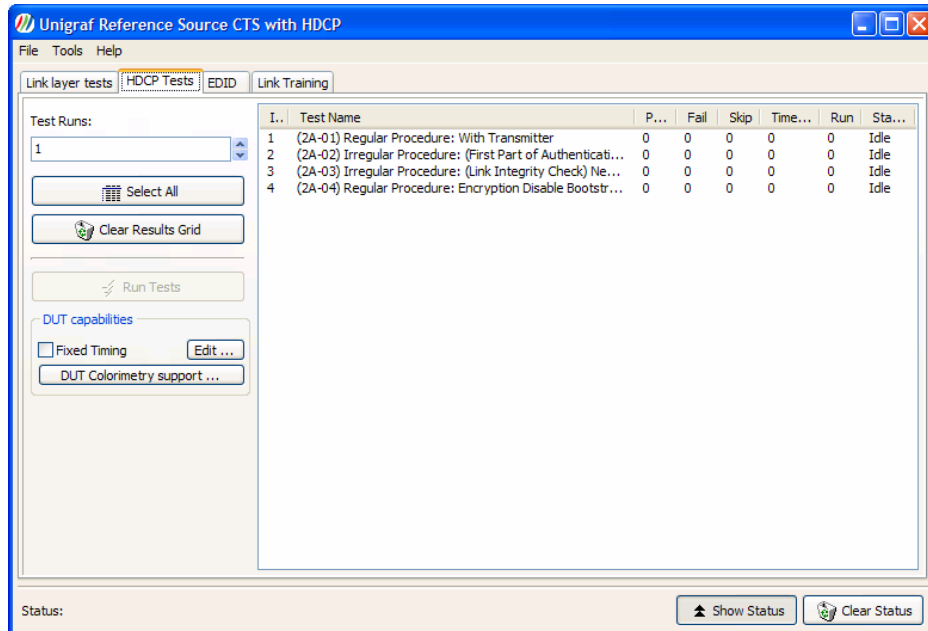

To limit the Colorimetric values used during the testing click the **DUT Colorimetry Support** and in the dialog check the rows matching the *Format, Bit Depth*, *Dynamic Range* and *Color Coefficient* that you want to use.
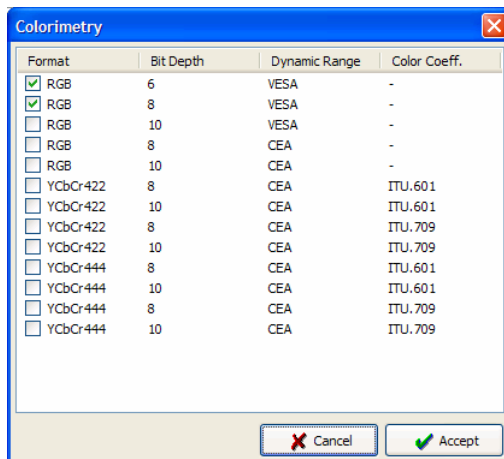
HDCP Tests Dialog

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

List of Tests

The list of tests on the righ side of the dialog contains all DP HDCT CTS tests 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 *Status*.

You can select a test either by clicking a 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 the Results* of all tests in the test grid, define how many times the *Test Runs* are repeated. Pressing *Run Tests* starts the test sequence and press the same key again to *Abort* the sequence.

DUT Capabilities

For description of *DUT capabilities* panel please refer to description of *Link Layer Testing Dialog* above.

EDID Dialog

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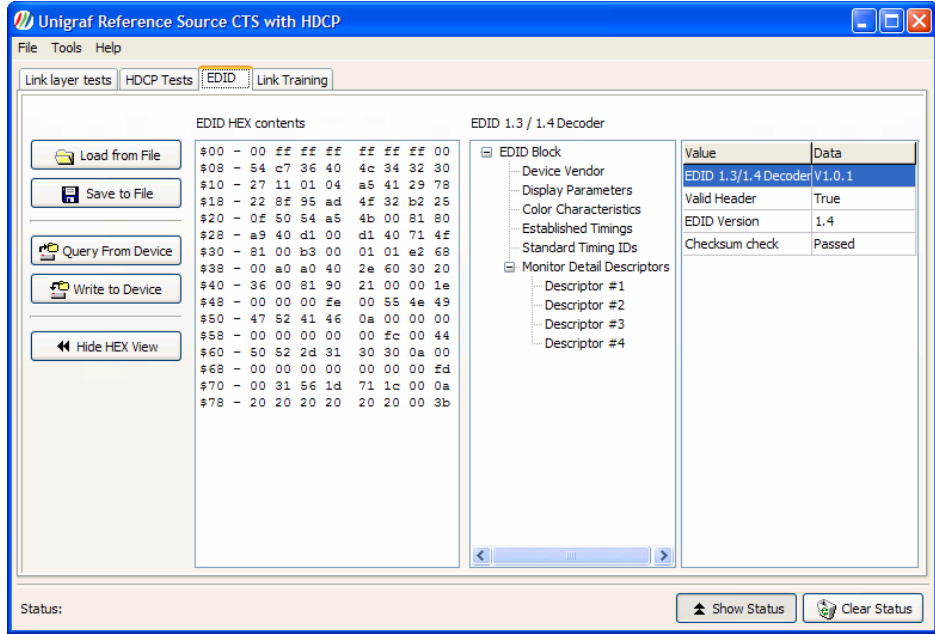
Controls

By using the controls on the left hand side of the dialog you can do 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 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.

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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.
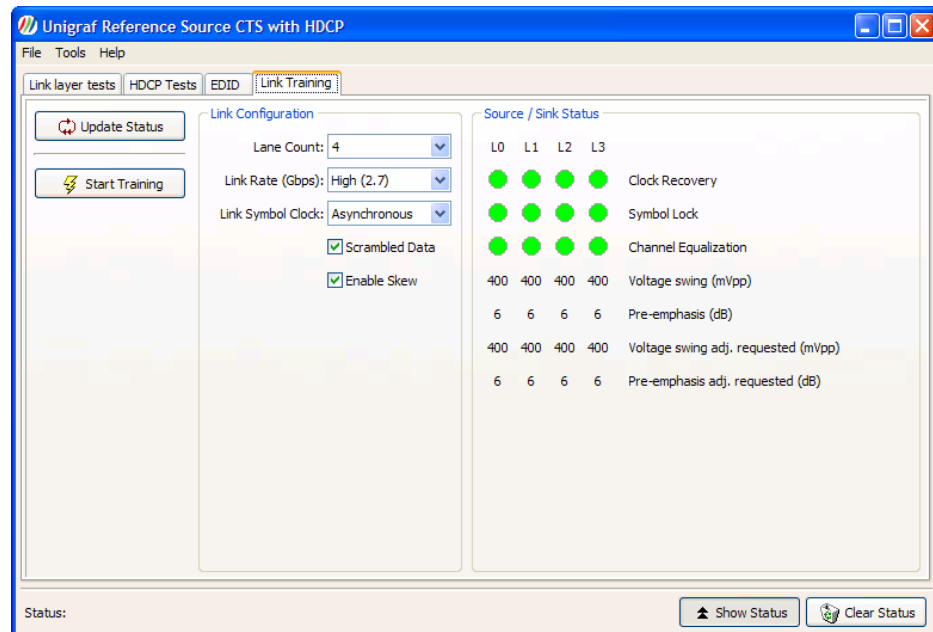
Link Configuration

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

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

With **Link Rate** you can select a maximum 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 agreed by the Sink and the Source during the Link Training. Please refer to VESA DisplayPort Specification for description of the options for each item.

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DPCD Read / Write

DPCD Read / Write dialog enables you to reading and writing the contents of the *DisplayPort™ Configuration Data registers* (DPCD). From the pull down menu select **Tools > DPCD Access …**.
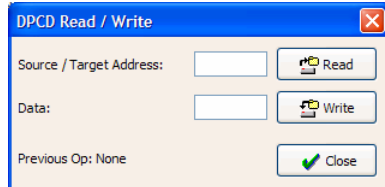
Write the address of the DPCD register in field *Source / Target Address:*. For reading the register contents click **Read**. For updating the register contents write the new value to field *Data:* and click **Write**. For returning to the main dialog, click **Close**.

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. The reports include detailed description of the steps of the test, 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 *Addional 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 date and the right column for the TE.

In the *Additional Comments* field you can describe other items that you want to include in the report. This could be remarks of the testing situation etc.

Save the report on the disk by clicking S**ave Report** or return to main dialog without saving by clicking C**ancel**. The report will be saved to the path and file name specified in the bottom of the dialog. After the report is saved, your default internet browser will be opened and the report file opened in that.

The information entered in the fields of the *Addional Data for Report* dialog will be available for follow-on reports until the tool is closed.

Test Report Views

The internet browser will open the report in the *Test Summary* view. This view provides you a similar test summary that is shown on the *Sink Tests* tab of the CTS tool. It summarizes all performed tests and their Pass, Fail, Time out or Skipped status. The background of the status list is coloured **red** if the test does not have Passed status.
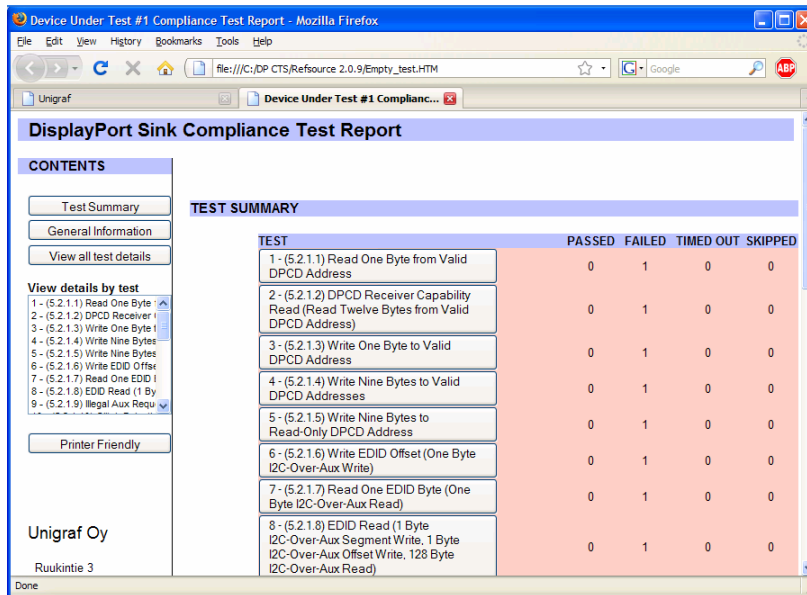
The *Contents* bar on the left side of the report is an active quick selection toolbar for showing the five (5) views of the report.

Click **Test Summary** to get back to this 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
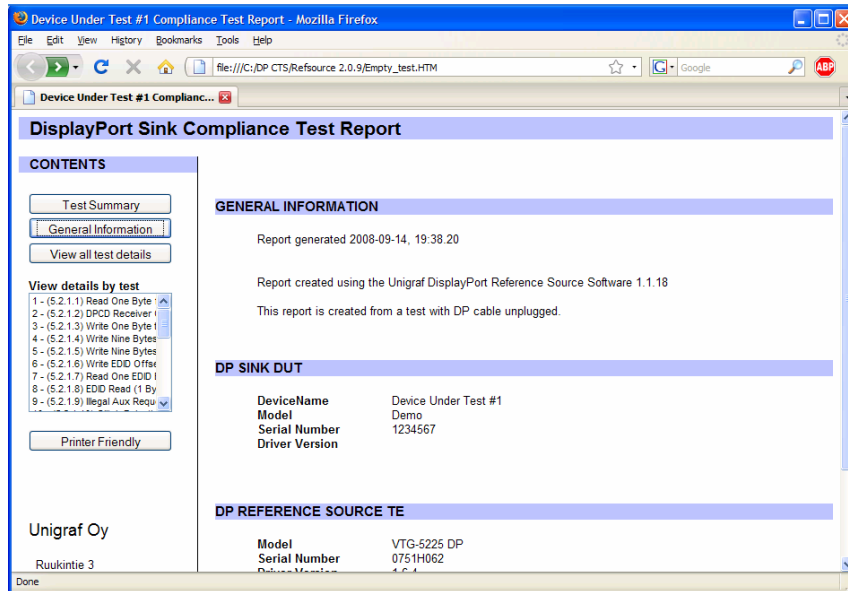
All Test Details View

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.

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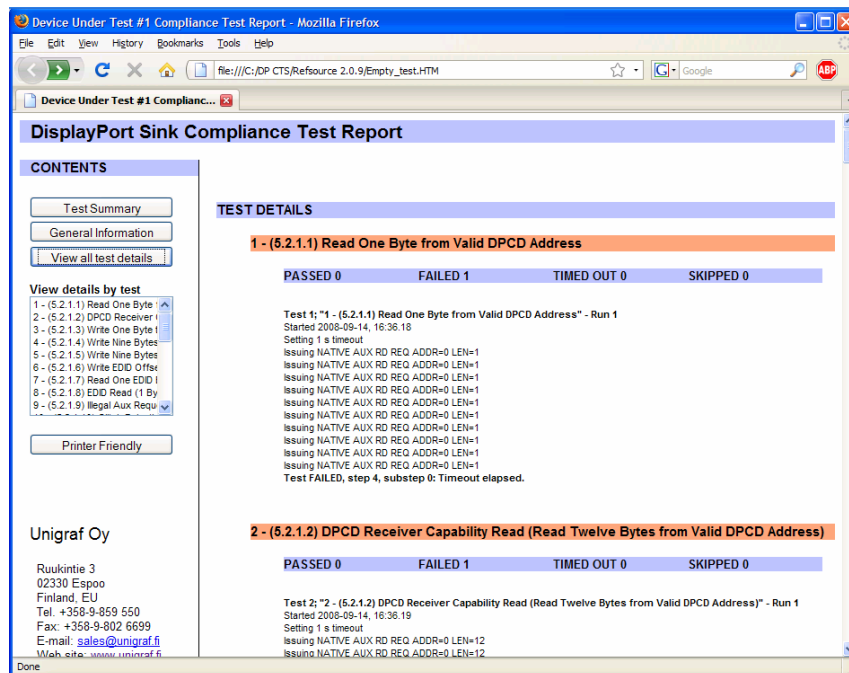
Details by Test View

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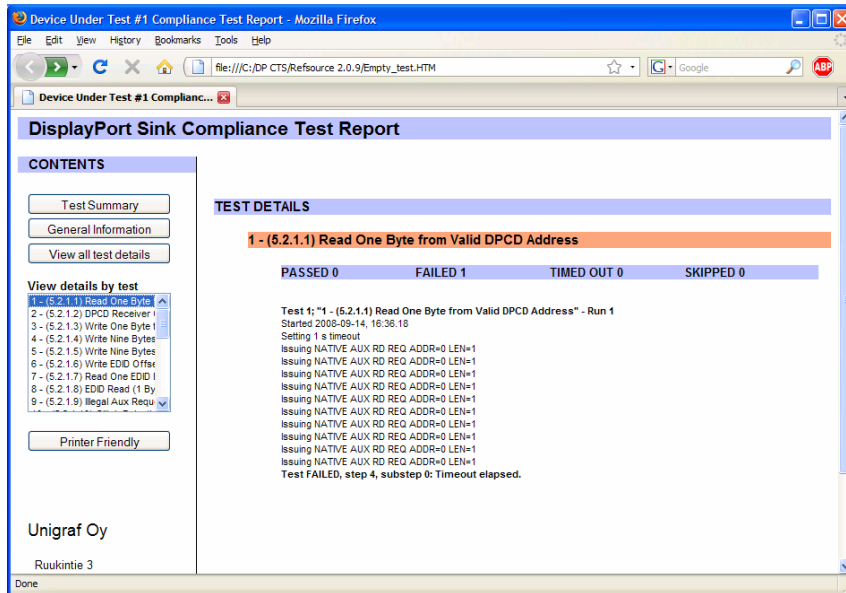
Printer Friendly View

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.