
# DisplayPort™ Cable Testing With UCD-400

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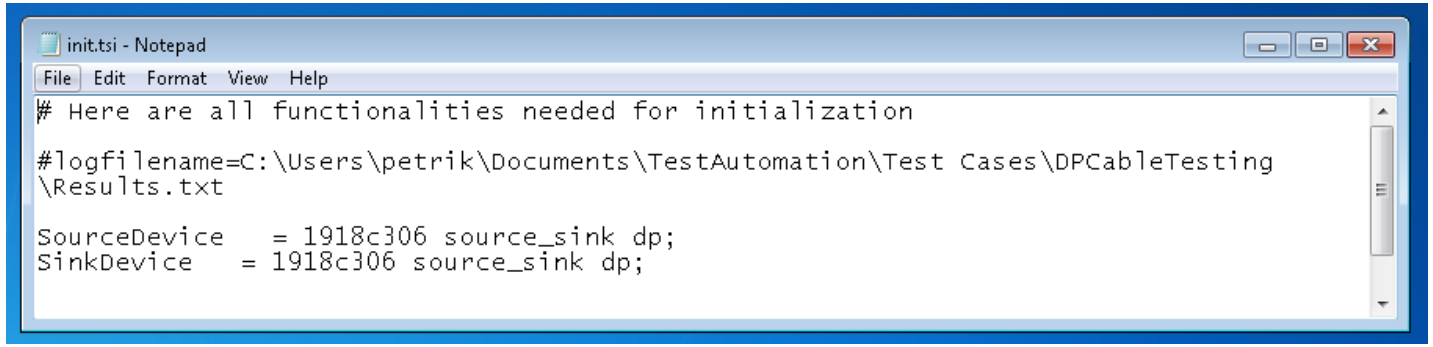
# Setting up the Device

- The first thing that needs to be done is edit the *init.tsi* file to define your Source Device and your Sink Device.
- *init.tsi* file looks like this (lines with #'s are comments):




- Replace 1918c306 with the serial number of your UCD-400 device
  - As we are using UCD-400 as a sink and source, replace both serial numbers

# Setting up the Device

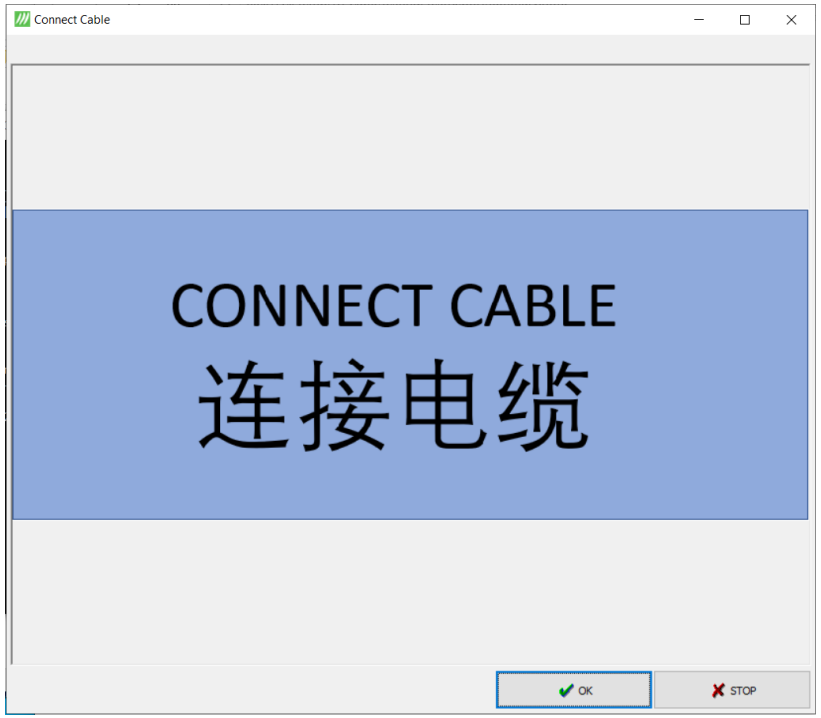
- To start, make sure ***no cables are attached*** to the UCD-400.
- The tests in the automated cable tets sequence will be run in loop-back mode which means you will plug in a DisplayPort cable from the *DP in* to the *DP out* sockets in your UCD-400 device.
  - UCD-400 can act as a DisplayPort sink and source simultaneously

# Cable Test Sequence

- The ready-made automated cable testing sequence includes the following tests for testing DisplayPort cables:
  - Video Signal Timing Test for timing 7680 x 4320 @ 30 Hz
  - Link Error Test
  - CRC Based Single Frame Video Stability Test
  - HDCP 1.x Test
  - HDCP 2.x Test

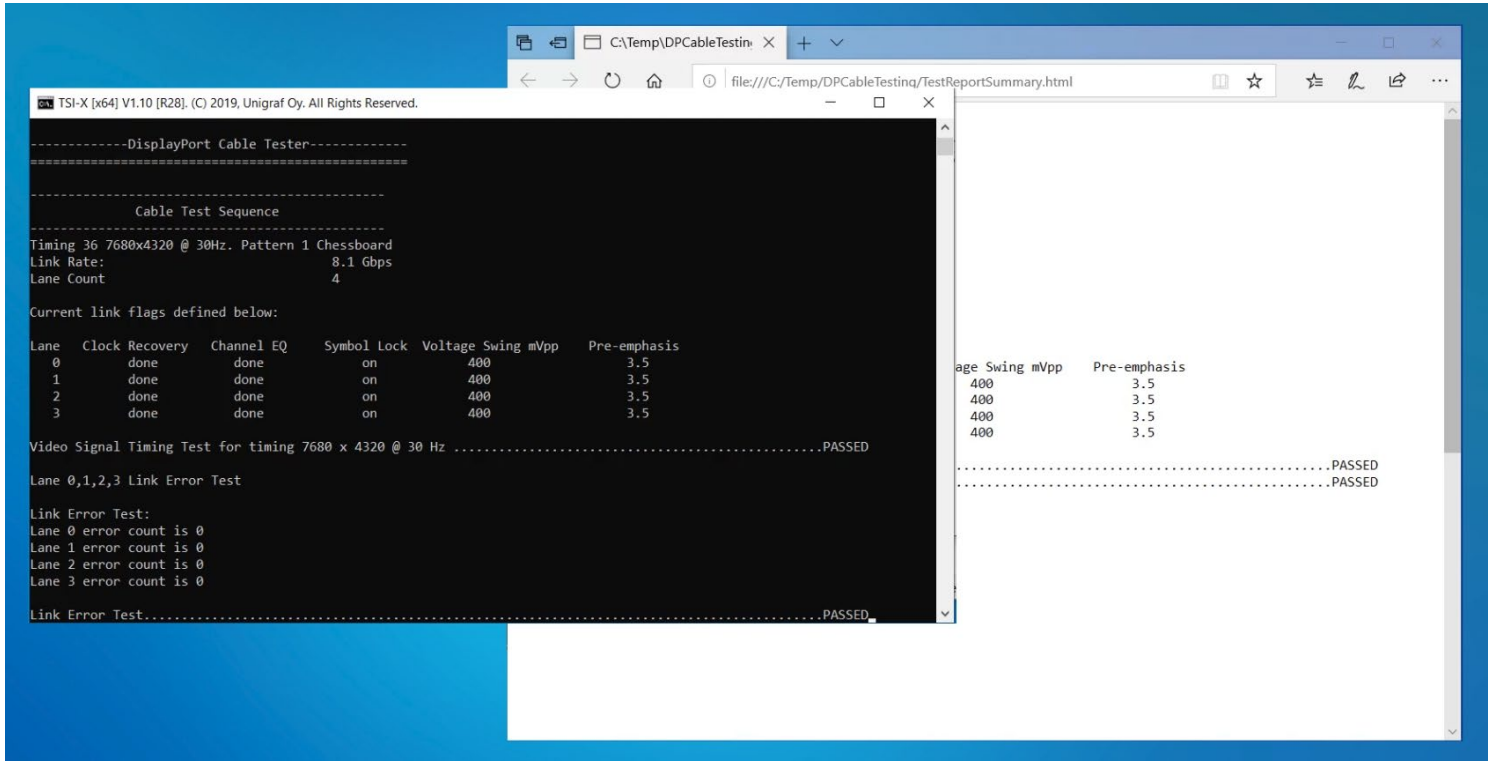
# Cable Test Sequence

- Start Cable Test with double-clicking the *RunTest.bat* file.
- A *Connect Cable* dialog will appear asking you to connect the cables.
- The script will detect when the cable has been connected and will continue to run tests automatically



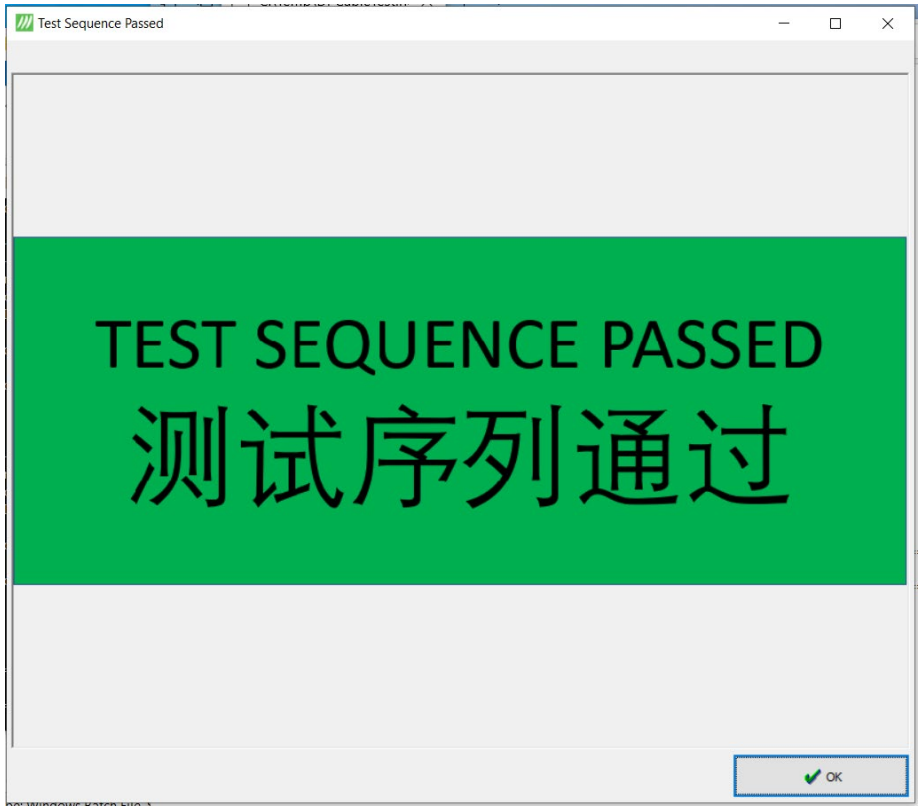
# Test Sequence Run on Command Line

- Test run will be shown on the command-line



# Test Report

- When the tests are done, you will be shown the test results in a *Passed/Failed* dialog.
- The dialog will disappear in 5 seconds or it can be dismissed via the "OK" button.
- You can adjust how long the dialog lingers via the "-timeout 5000" commands in *ShowPassed.txt* and *ShowFailed.txt*.

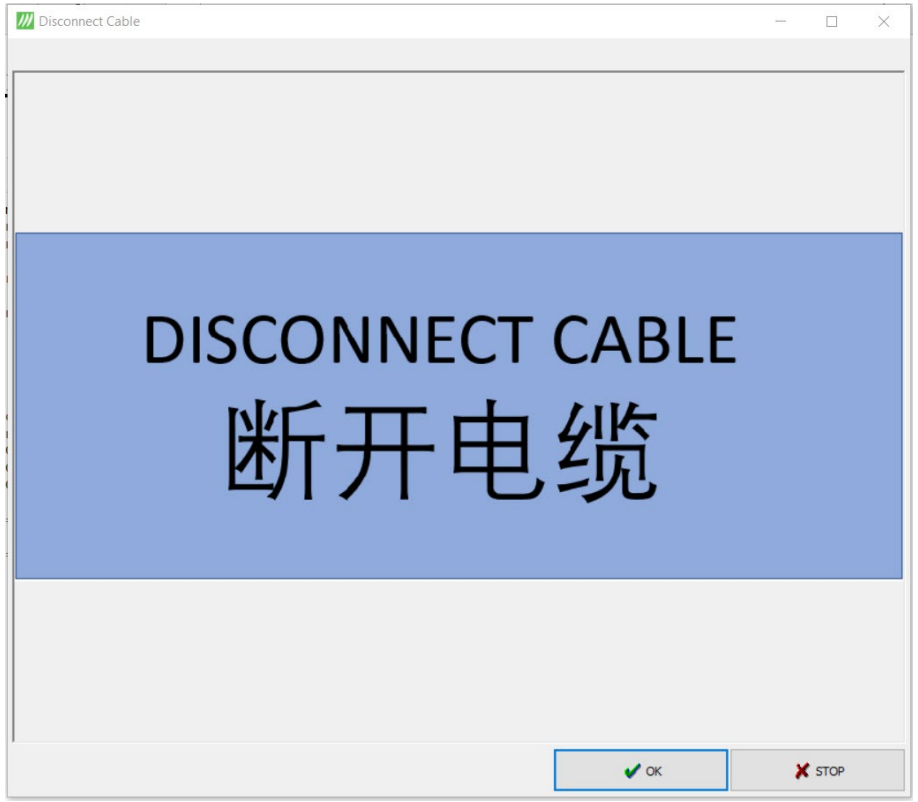


# Test Report

- File *RunTests_timestamp_log.txt*, (where timestamp is year, day, month, time) contains the detailed log of the test run.
  - E.g. *RunTests_20200506140137_log*
- File *TestReportSummary.txt* is the PASS/FAIL summary of the tests. Beginning of each test run this file is copied with timestamp.

# End Test Sequence

- A *DisconnectCable* dialog will appear asking you to disconnect.
- The script will detect when the cable has been disconnected or the dialog can be dismissed via the "OK" button
- The tests may be stopped at any time by pressing the "Stop" button on the Connect/DisconnectCable dialogs.



# Example Test Report Summary

## DisplayPort Cable Test Report

```
-----------------------------------------------
             Cable Test Sequence
-----------------------------------------------
Timing 36 7680x4320 @ 30Hz. Pattern 1
Link Rate:                          8.1 Gbps
Lane Count                          4

Current link flags defined below:

Lane   Clock Recovery   Channel EQ     Symbol Lock  Voltage Swing mVpp    Pre-emphasis
   0         done          done            on            400                 3.5
   1         done          done            on            400                 3.5
   2         done          done            on            400                 3.5
   3         done          done            on            400                 3.5

Video Signal Timing Test for timing 7680 x 4320 @ 30 Hz ..........................................PASSED
Link Error Test..................................................................................PASSED
CRC Based Single Frame Video Stability Test......................................................PASSED
HDCP 1.x Test....................................................................................PASSED
HDCP 2.x Test....................................................................................PASSED

=================================================================================================
                                        TEST SEQUENCE PASSED
=================================================================================================
```

*Test configuration details*

*Results from all tests*

# Detailed Test Log Example • CRC Test

```
--------------------CRC Based Single Frame Video Stability Test--------------------

[2020-05-06, 14:02:16.571]: Starting CRC video test (Test ID 393217)
[2020-05-06, 14:02:16.571]: Stage 1: Test initialization.
[2020-05-06, 14:02:16.571]: Test params:
[2020-05-06, 14:02:16.571]:    - Test timeout (ms) = 5000
[2020-05-06, 14:02:16.571]:    - Test duration (# frames) = 50
[2020-05-06, 14:02:16.571]:    - Allowed mismatches (# frames) = 0
[2020-05-06, 14:02:16.571]:    - Reference width (# pixels) = 7680
[2020-05-06, 14:02:16.571]:    - Reference height (# Lines) = 4320
[2020-05-06, 14:02:16.571]:    - Reference colordepth (bpp) = 24
[2020-05-06, 14:02:16.571]:    - CRC Value set count = 50
[2020-05-06, 14:02:16.571]:    - Require frame rate (mHz) = 0
[2020-05-06, 14:02:16.571]:    - Frame rate tolerance (mHz) = 0
[2020-05-06, 14:02:16.571]:    - Motion test iterations (# loops): 0
[2020-05-06, 14:02:16.571]:    - Color format (ID): 0
[2020-05-06, 14:02:16.665]: Test max runtime 300000 ms
[2020-05-06, 14:02:16.680]: 0001.741.089:    50 frames were tested.
[2020-05-06, 14:02:16.680]: 0001.741.160:    0 mismatches were found.
[2020-05-06, 14:02:16.680]: 0001.741.227:    done.
[2020-05-06, 14:02:16.680]: 0001.741.270: Stage 5: - test data collection completed
[2020-05-06, 14:02:16.680]: 0001.741.506: Test PASSED: "CRC based single frame video stability test"
[2020-05-06, 14:02:16.680]: 0000.000.001: Start test "CRC based single frame video stability test"
[2020-05-06, 14:02:16.680]: 0000.000.107: Test params:
[2020-05-06, 14:02:16.680]: 0000.000.248:    Frames to test   = 50
[2020-05-06, 14:02:16.680]: 0000.000.313: Stage 1: - connecting to input interface...
[2020-05-06, 14:02:16.680]: 0000.006.883:    done.
[2020-05-06, 14:02:16.680]: 0000.006.924: Stage 2: - measure timings and check params...
[2020-05-06, 14:02:16.680]: 0000.007.157:    done.
[2020-05-06, 14:02:16.680]: 0000.007.198: Stage 3: - synchronization...
[2020-05-06, 14:02:16.712]: 0000.040.344:    Reference frame has crc      : 0x7eb8, 0x7eb8, 0x7eb8
[2020-05-06, 14:02:16.712]: 0000.040.475:    done.
[2020-05-06, 14:02:16.712]: 0000.040.518: Stage 4: - gathering information...
[2020-05-06, 14:02:18.383]: 0001.707.010:    50 frames were tested.
[2020-05-06, 14:02:18.383]: 0001.707.080:    0 mismatches were found.
[2020-05-06, 14:02:18.383]: 0001.707.144:    done.
[2020-05-06, 14:02:18.383]: 0001.707.186: Stage 5: - test data collection completed
[2020-05-06, 14:02:18.383]: 0001.707.421: Test PASSED: "CRC based single frame video stability test"
[2020-05-06, 14:02:18.383]:
[2020-05-06, 14:02:18.383]: Test Complete
CRC Based Single Frame Video Stability Test.....................................................................PASSED
```

*Test Parameters*

*Tests Run*

*Test Result*

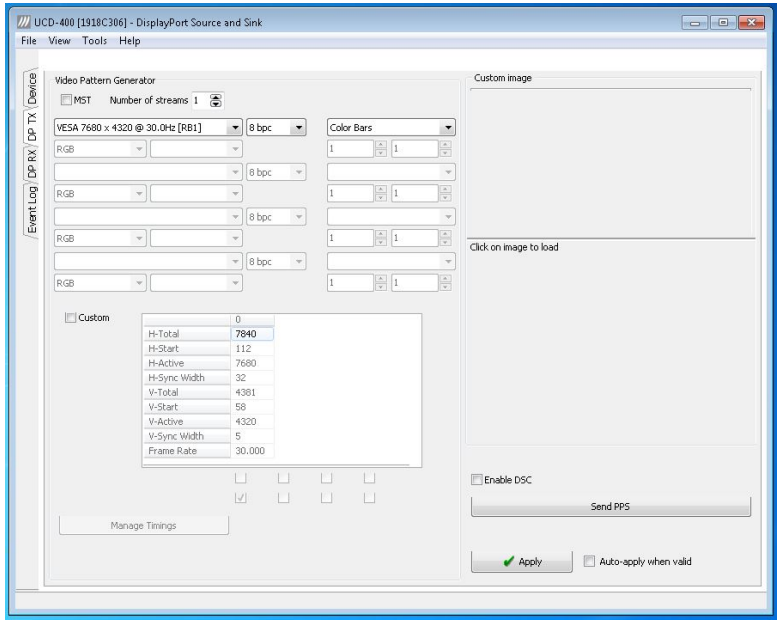
# Test Visualization in UCD Console GUI

# UCD Console GUI

- UCD Console GUI is a common PC user interface for all UCD series products
- With UCD Console you can control all functionalities and tests to verify DisplayPort, HDMI and USB-C interfaces
- Before running automated test sequences, with UCD Console you can test that the test parameters work seamesly with your device
- More detailed introduction to UCD Console, visit: Introducing: UCD Console GUI

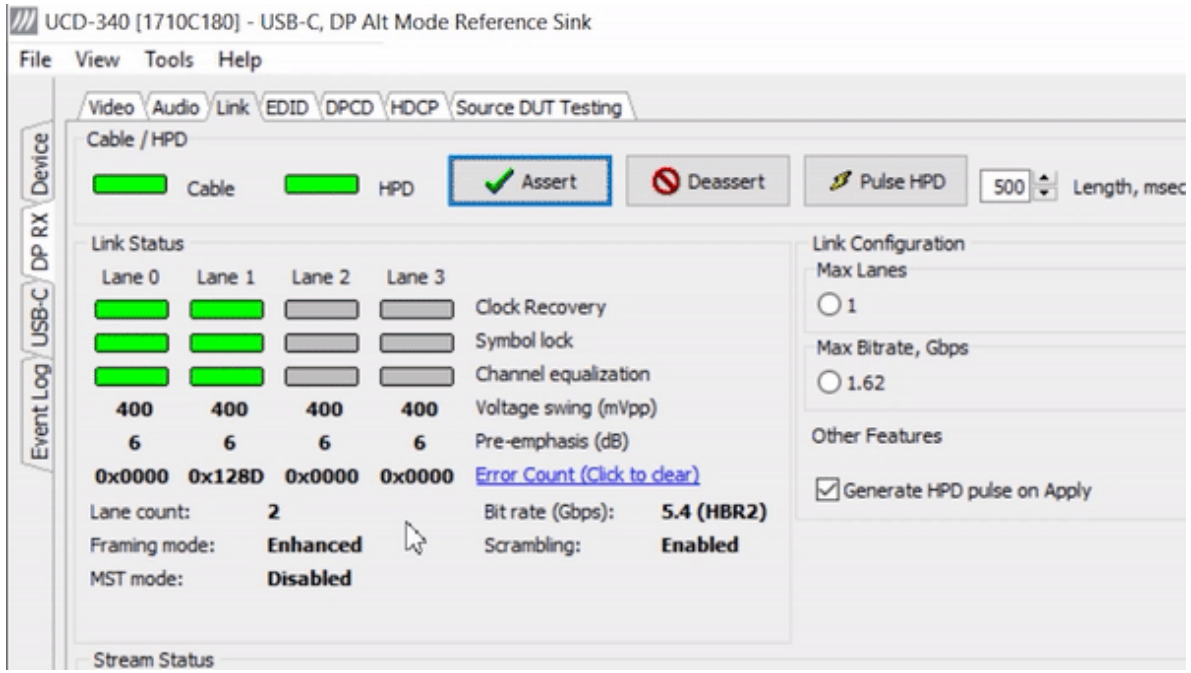
# Test Visualization • Vide Signal Timing

- Video Signal Timing Test for timing 7680 x 4320 @ 30 Hz
  - UCD Console has a built-in video pattern generator for DP TX functionality and video capture and preview for DP RX functionality



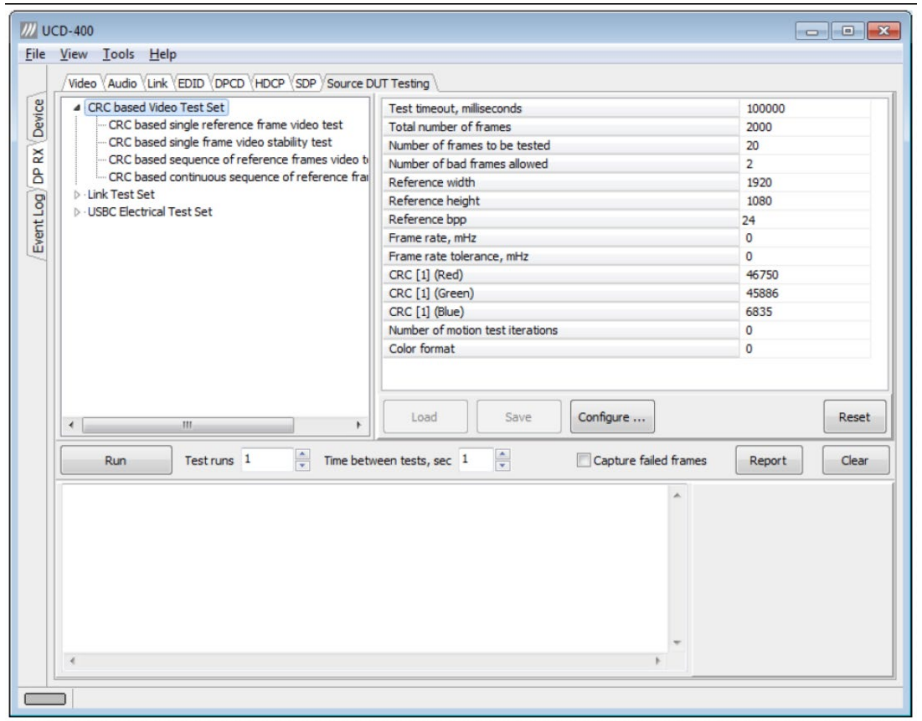

# Test Visualization • Link

- Link Error Test
  - UCD Console has a *Link* tab where you can monitor up to four lanes. The GIF below shows an error on the link between the sink and source



# Test Visualization • CRC Tests

- CRC Based Single Frame Video Stability Test
  - *CRC based single frame video stability test* uses one captured frame and compares that with the incoming video stream. If the frames match, the video is stabile
- UCD Console features ready-made CRC based video test set

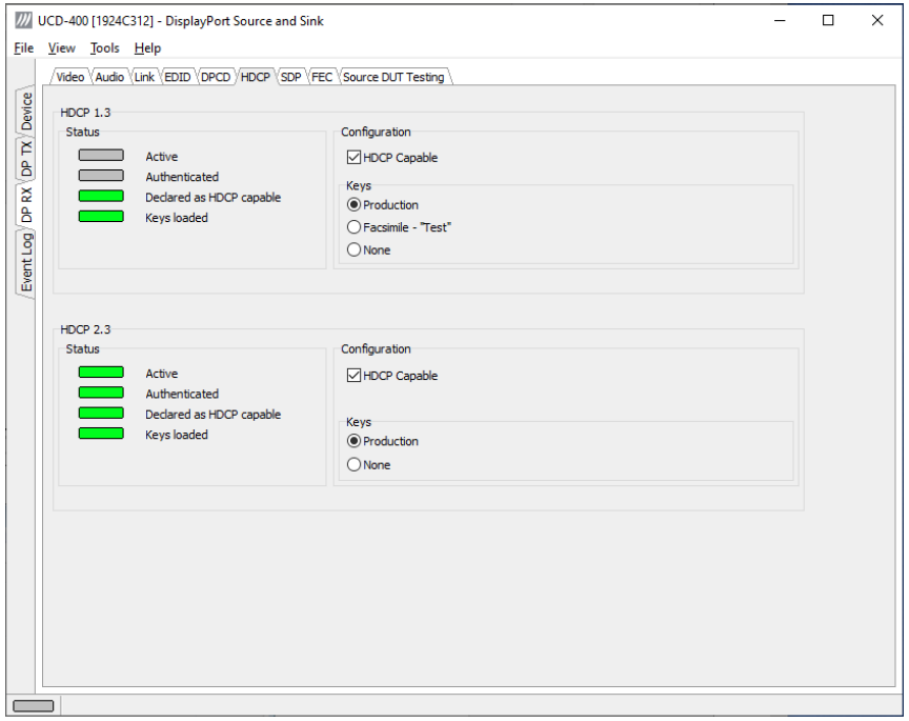


# Test Visualization • CRC Tests

- You can configure the CRC tests and save the configuration. Automated test sequence will use these settings to run the automated tests.
- You can also run CRC tests in UCD Console to make sure that the test configuration works with you device under test.

# Test Visualization • UCD Console GUI

- HDCP 1.x Test & HDCP 2.x Test
  - UCD Console has a *HDCP* tab where you can monitor and control HDCP encryption up to HDCP 2.3
  - HDCP 2.3 CTS tests are also available



# UCD-400 series Test Tools for Cable Testing

# UCD-400 series Test Tools

- The automated test sequence described above is available for all UCD-400 series test tools.
- UCD-400 series test tools enable testing of DisplayPort, HDMI and USB-C cables.
- The automated test sequence is delivered with each purchased test tool
- UCD Console GUI is delivered with each test tool

# UCD-400 Test Tool for Cable Testing

- DP 1.4a / HBR3 capable video analyzer and generator
  - DisplayPort input and output in the same unit
- Supports resolutions up to:
  - 8K@30 Hz without DSC and 8K@60 Hz with DSC
  - 4K@120 Hz
- Supports FEC, DSC, LTTPR
- Official Compliance Test Tool
  - Certified by VESA for DP 1.4a Link Layer CTS
  - Approved by DCP for HDCP 2.3 CTS for DP Sinks, Sources and Repeaters

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# UCD-422 Test Tool for HDMI Cable Testing

- HDMI 2.1 (FRL/TMDS) 10K video analyzer and generator
  - DisplayPort input and output in the same unit
- Supports resolutions up to:
  - 4K@120Hz, 8K@60Hz and 10K@30Hz with uncompressed video
- Supports FEC, DSC, eARC
- Dolby Vision™ Test Tool

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# UCD-424 Test Tool for USB-C Cable Testing

- UCD-424 is an 8K Reference Sink, Source and Branch for verifying DisplayPort™ Alt Mode over USB-C
- Supports resolutions up to:
  - 8K@30 Hz without DSC and 8K@60 Hz with DSC
  - 4K@120 Hz
- USB-C v1.3 input and output with Power Delivery 3.0
- Supports MST (4 streams), FEC, DSC, LTTPR
- Compliance Test Tool
  - DP 1.4a Link Layer CTS
  - HDCP 2.3 CTS