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### DisplayPort<sup>™</sup> Cable Testing With UCD-400

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- UCD-400 series Test Tools for Cable Testing

### 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 doubleclicking 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

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### **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.

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### 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**

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#### **DisplayPort Cable Test Report**

done

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done



Video Signal Timing Test for timing 7680 x 4320 @ 30 Hz 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

on

400

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### Detailed Test Log Example • CRC Test



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

#### Tests Run





### 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: <u>Introducing:</u> <u>UCD Console GUI</u>

### 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

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#### **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

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Device	/Video Audio Link EDID C Cable / HPD Cable	PCD (HDCP)	Source DUT Testing	S Deassert	Ø Pulse HPD 500 ★ Length, n					
Event Log USB-C DP RX	Link Status Lane 0 Lane 1 Lane 400 400 400 6 6 6 0x0000 0x128D 0x00 Lane count: 2 Framing mode: Enhance MST mode: Disable	2 Lane 3	Clock Recovery Symbol lock Channel equalizatio Voltage swing (mVp Pre-emphasis (dB) <u>Error Count (Click t</u> Bit rate (Gbps): Scrambling:	on op) o dear) 5.4 (HBR2) Enabled	Link Configuration Max Lanes 1 Max Bitrate, Gbps 1.62 Other Features Generate HPD	s pulse on Apply				
	Stream Status									

### 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 readymade CRC based video test set

CRC based Video Test Set	Test timeout, milliseconds	100000	
	Total number of frames	2000	
CRC based single frame video stability test	Number of frames to be tested		
CRC based sequence of reference frames video b	Number of had frames allowed	2	
CRC based continuous sequence of reference fra	Reference width	1920	
▷ · Link Test Set	Reference height	1080	
USBC Electrical Test Set	Reference bpp	24	
	Frame rate, mHz	0	
	Frame rate tolerance, mHz	0	
	CRC [1] (Red)	46750	
	CRC [1] (Green)	45886	
	CRC [1] (Blue)	6835	
	Number of motion test iterations	0	
	Color format	0	
٠ <u> </u>	Load Save Configure	R	
Run Test runs 1 A Time betv	veen tests, sec 1 Capture failed frames	Report	
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### 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

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### 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



# 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<sup>™</sup> Test Tool



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

- UCD-424 is an 8K Reference Sink, Source and Branch for verifying DisplayPort<sup>™</sup> 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

