

# **DisplayPort™ CTS Tools for UCD-400**

**Guide to  
Product Options**

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## Edition

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# 1. GENERAL

## Reference Standards

High-bandwidth Digital Content Protection, Revision 2.3 on DisplayPort,  
Compliance Test Specification, Revision 1.1, 4 March 2019

VESA DisplayPort v1.4a Link Layer Compliance Test Specification (Link CTS),  
Revision 1.0, June 12, 2019

VESA® DisplayPort® DSC Link Layer Compliance Test Specification, Version 1.4a,  
Revision 1.1, Draft 6, Nov 18, 2019

VESA DisplayPort v1.4a DisplayID EDID Compliance Test Specification (DisplayID EDID CTS)  
Revision 1.3, 18 February 2021

## Released Versions

This document explains features found in the following versions of the software:

Tool	Version
DP 1.4a CTS: UCD Console	1.12
HDCP 2.3 CTS: UCD Console	1.12

## 2. DP 1.4 LINK LAYER CTS

### DP 1.4 Reference Hardware Products

Product	P/N	Description
UCD-400 DP 1.4 Test Device *	066600	DP 1.4a / HBR3 capable test unit for DisplayPort Sink, Source and Repeater. USB 3.0 Interface to Host PC.
UCD-411 Tester	066606	DP 1.4 / HBR3/MST capable Pattern Generator. USB 3.0 interface to Host PC.
UCD-424 Tester	066630	DP 1.4, HBR3 & PD3.0 capable test unit for DisplayPort Alt Mode Sink, Source and Repeater. USB 3.0 Interface to Host PC.

\*) Approved for testing DP Link and DSC CTS on Sink, Source and Branch devices

### DP 1.4 CTS Test Software Product Options

Product	P/N	Description
DP 1.4 LL CTS for testing Sink DUT	MT6635	DP 1.4 Link Layer compliance tests (HBR3) for testing Sink DUT. Audio and FEC CTS included
DP 1.4 LL CTS for testing Source DUT	MT6637	DP 1.4 Link Layer compliance tests (HBR3) for testing Source DUT. Audio and FEC CTS included
DP 1.4 LL CTS for testing Sink, Source and Branch DUT	MT6639	DP 1.4 Link Layer compliance tests (HBR3) for testing Sink, Source and Branch DUT. Audio and FEC CTS included (*)
DP 1.4 DSC CTS Source DUT	MT6642	Display Stream Compression for testing Source DUT
DP 1.4 DSC CTS Sink DUT	MT6643	Display Stream Compression for testing Sink DUT
DP 1.4 DSC CTS Source and Sink DUT	MT6645	Combine for testing Sink, Source and Branch DUT (*)
DisplayID / EDID CTS for testing Source DUT	MT6646	DisplayID CTS for testing Source DUT (*)
DisplayID / EDID CTS for testing Sink DUT	MT6647	DisplayID CTS for testing Sink DUT (*)

\*) DP 1.4 LL Branch CTS and DisplayID CTS for testing Source will be available in a future release

## Test Software Content

Source DUT Testing		DP 1.4a LL CTS*	DP 1.4 DSC CTS Source DUT*	DP DisplayID / EDID CTS*	Adaptive Sync CTS*
DP 1.4 Link Layer CTS (UCD-400, UCD-424)	4.2.1.1 – 4.2.1.5, 4.2.2.1 – 4.2.2.10, 4.3.1.1 – 4.3.1.13, 4.3.2.1 – 4.3.2.5, 4.3.3.1, 4.4.1.1 – 4.4.1.3, 4.4.2, 4.4.3, 4.4.4.1 – 4.4.4.6, 4.5.1.1 – 4.5.1.2	●			
DP 1.4 DSC CTS (UCD-400, UCD-424)	4.6.1.1 – 4.6.1.9		●		
DP 1.4 DisplayID-EDID CTS (UCD-400, UCD-424)	4.7.1.1 – 4.6.1.4, 4.7.2.1 – 4.7.2.2, 4.7.3.1 – 4.7.3.3, 4.7.4.1			●	
DP Adaptive Sync CTS (UCD-400, UCD-424)	4.8.1.1 – 4.8.1.2, 4.8.2.1 – 4.8.2.2,				●

\*) Separate licenses for testing Sink, Source, Branch DUT

Sink DUT Testing		DP 1.4a LL CTS*	DP 1.4 DSC CTS Sink DUT*	DP DisplayID / EDID CTS*	Adaptive Sync CTS*
DP 1.4 Link Layer CTS (UCD-400, UCD-411, UCD-424)	5.2.1.1 – 5.2.1.12, 5.2.2.1 – 5.2.2.9, 5.3.1.1 – 5.3.1.9, 5.3.2.1 – 5.3.2.2, 5.4.1.1 – 5.4.1.4, 5.4.2, 5.4.3.1 – 5.4.3.2, 5.4.4.1 – 5.4.4.6, 5.5.1.1 – 5.5.1.7	●			
DP 1.4 DSC CTS (UCD-400, UCD-411, UCD-424)	5.6.1.1 – 5.6.1.26, 5.6.2.1 – 5.6.2.14		●		
DP 1.4 DisplayID-EDID CTS (UCD-400, UCD-411, UCD-424)	5.7.1.1 – 5.7.1.2, 5.7.1.3.1 – 5.7.1.3.4, 5.7.1.4.1 – 5.7.1.4.9, 5.7.2.1 – 5.7.2.3.5, 5.7.2.4.1 – 5.7.2.4.2, 5.7.2.5.1 – 5.7.2.5.2, 5.7.2.6.1 – 5.7.2.6.2, 5.7.2.7.1, 5.7.2.8, 5.7.3.1 – 5.7.3.5, 5.7.4.1 – 5.7.4.3, 5.7.4.5, 5.7.5.1 – 5.7.5.2, 5.7.6.1 – 5.7.6.5, 5.7.7.1 – 5.7.7.6, 5.7.8.1 – 5.7.8.6, 5.7.9.1 – 5.7.9.3, 5.7.10.1 – 5.7.10.3, 5.7.11.1 – 5.7.11.5, 5.7.12.1 – 5.7.12.3			●	
DP Adaptive Sync CTS (UCD-400, UCD-411, UCD-424)	5.8.1.1 – 5.8.1.3				●

\*) Separate licenses for testing Sink, Source, Branch DUT

# Description of DP 1.4 Link CTS

## DP 1.4a LL CTS for testing Source DUT (P/N: MT6637)

### AUX Reads after HPD Plug Event

Test Reference	Test Name
4.2.1.1	Source DUT Retry on No-Reply During AUX Read after HPD Plug Event
4.2.1.2	Source Retry on Invalid Reply During AUX Read after HPD Plug Event
4.2.1.3	Source Device HPD Event Pulse Length Test
4.2.1.4	Source Device IRQ_HPDPulse Length Test
4.2.1.5	Source Device Inactive HPD / Inactive AUX Test

### EDID and DPCD Reads

4.2.2.1	DPCD Receiver Capability and EDID Read upon HPD Plug Event
4.2.2.2	DPCD Receiver Capability Read upon HPD Plug Event
4.2.2.3	EDID Read
4.2.2.4	EDID Read Failure #1: I2C-Over-AUX NACK
4.2.2.5	EDID Read Failure #2: I2C-Over-AUX DEFER
4.2.2.6	Source Device Inactive HPD / Inactive AUX test
4.2.2.7	Branch Device Detection upon HPD Plug Event
4.2.2.8	EDID Read on IRQ HPD Event after Branch Device Detection
4.2.2.9	E-DDC Four Block EDID Read
4.2.2.10	Link Status-Adjust Request AUX read interval during Link Training

### Link Training

4.3.1.1	Successful Link Training at All Supported Lane Counts and Link Speeds
4.3.1.2	Successful Link Training Upon HPD Plug Event
4.3.1.3	Successful Link Training with Request of Higher Differential Voltage Swing During Clock Recovery Sequence
4.3.1.4	Successful Link Training to a Lower Link Rate #1: Iterate at Maximum Voltage Swing
4.3.1.5	Successful Link Training to a Lower Link Rate #2: Iterate at Minimum Voltage Swing
4.3.1.6	Successful Link Training with Request of a Higher Pre-emphasis Setting During Channel Equalization Sequence
4.3.1.7	Successful Link Training at Lower Link Rate Due to Loss of Symbol Lock During Channel Equalization Sequence
4.3.1.8	Unsuccessful Link Training at Lower Link Rate #1: Iterate at Maximum Voltage Swing
4.3.1.9	Unsuccessful Link Training at Lower Link Rate #2: Iterate at Minimum Voltage Swing
4.3.1.10	Unsuccessful Link Training due to Failure in Channel Equalization Sequence (loop count > 5)
4.3.1.11	Successful LT with Simultaneous Request for Differential Voltage Swing and Pre-emphasis during Clock Recovery Sequence
4.3.1.12	Source Device Link Training CR Fallback Test
4.3.1.13	Source Device Link Training EQ Fallback Test

## Link Maintenance

Test Reference	Test Name
4.3.2.1	Successful Link Re-training After IRQ HPD Pulse Due to Loss of Symbol Lock
4.3.2.2	Successful Link Re-training After IRQ HPD Pulse Due to Loss of Clock Recovery Lock
4.3.2.3	Successful Link Re-training After IRQ HPD Pulse Due to Loss of Inter-lane Alignment Lock
4.3.2.4	Handling of IRQ HPD Pulse with No Error Status Bits Set
4.3.2.5	Lane Count Reduction

## Video Time Stamp Generation

4.3.3.1	Video Time Stamp Generation
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## Main Stream Data Mapping

4.4.1.1	Pixel Data Packing and Steering
4.4.1.2	Main Stream Data Packing and Stuffing – Least Packed TU
4.4.1.3	Main Stream Data Packing and Stuffing – Most Packed TU

4.4.2	Main Video Stream Format Change Handling
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4.4.3	Power Management
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## Audio Stream Transmission over Secondary Packets

(4.4.4.1)	Configuring Video and Audio Parameters (Part of every test. Not as a separate test)
4.4.4.2	Audio Stream Header Synchronization
4.4.4.3	Audio Time Stamp Generation
4.4.4.4	Audio InfoFrame Packet
4.4.4.6	Audio Start Sequence

## Source FEC Protocol

4.5.1.1	FEC enable verification for all supported Lane count and Link Speed
4.5.1.2	FEC ready verification for non FEC capable sink

## DSC Decoder CTS on DP (P/N MT6642)

### Source Device DSC Test Procedures

Test Reference	Test Name
4.6.1.1	DSC enable sequence verification
4.6.1.2	DSC PPS block prediction flag verification
4.6.1.3	DSC PPS convert RGB flag verification
4.6.1.4	DSC PPS YCbCr 4:4:4 convert RGB = 0) flag verification
4.6.1.5	DSC PPS Simple 4:2:2 flag verification
4.6.1.6	DSC PPS Native 4:2:2 flag verification
4.6.1.7	DSC PPS Native 4:2:0 flag verification
4.6.1.8	DSC PPS convert RGB flag verification for DSC Algorithm Revision 1.1
4.6.1.9	DSC PPS (YCbCr 4:4:4 convert RGB = 0) flag verification for DSC Algorithm Revision 1.1



## DisplayID / EDID CTS for testing Source DUT (P/N MT6646)

### Video Tests

Test Reference	Test Name
4.7.1.1	Basic Supported Formats
4.7.1.2	Preferred Timing
4.7.1.3	Out-of-Range Request
4.7.1.4	Invalid EDID

### Audio Tests

4.7.2.1	Basic Supported Formats
4.7.2.2	Out-of-Range Request

### Source Device Test Procedures (E-DDC Protocol)

4.7.3.1	EDID Read with More than 256 Bytes of Data Including DisplayID Block
4.7.3.2	EDID Read with Greater than 8 Blocks of Data Including DisplayID Block
4.7.3.3	EDID Read with Unknown Extensions and Unknown Data Blocks, Including DisplayID Block

### Source Device Test Procedures (DisplayID)

4.7.4.1	DisplayID Detailed Timing support
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## DP 1.4a LL CTS for testing Sink DUT (P/N MT6635)

### AUX Channel Protocol

Test Reference	Test Name
5.2.1.1	Read One Byte from Valid DPCD Address
5.2.1.2	DPCD Receiver Capability Read (Read 12 Bytes from Valid DPCD Address)
5.2.1.3	Write One Byte to Valid DPCD Address
5.2.1.4	Write Nine Bytes to Valid DPCD Addresses
5.2.1.5	Write EDID Offset (One Byte I2C-Over-AUX Write)
5.2.1.6	Read One EDID Byte (One Byte I2C-Over-AUX Read)
5.2.1.7	EDID Read (1 Byte I2C -Over-AUX Segment Write, 1 Byte I2C-Over-AUX Offset Write, 128 Byte I2C-Over-AUX Read)
5.2.1.8	Illegal AUX Request Syntax
5.2.1.9	Glitch Rejection
5.2.1.10	Interleaved EDID and DPCD Receiver Capability Read
5.2.1.11	Downstream Stop on MOT Reset
5.2.1.12	Downstream Stop on Timeout

## Sink Device DPCD Field Implementation Addendum

5.2.2.1	Sink Organizationally Unique Identifier (OUI)
5.2.2.2	Sink Count
5.2.2.3	Sink Status
5.2.2.4	Sink Error Count
5.2.2.5	DPCD Address Range
5.2.2.6	Number of Receiver Ports
5.2.2.7	Main Link Channel Coding
5.2.2.8	ESI Field Mapping
5.2.2.9	Sink Device Symbol Error Count

## Link Training

5.3.1.1	Successful Link Training at All Supported Lane Counts and Link Speeds
5.3.1.2	Successful Link Training with Request of Higher Differential Voltage Swing During Clock Recovery Sequence
5.3.1.3	Successful Link Training to a Lower Link Rate Due to Clock Recovery Lock Failure During Clock Recovery Sequence
5.3.1.4	Successful Link Training with Request of a Change to Pre-Emphasis and/or Voltage Swing Setting During Channel Equalization Sequence
5.3.1.5	Successful Link Training at Lower Link Rate Due to Loss of Symbol Lock During Channel Equalization Sequence
5.3.1.6	Lane Count Reduction
5.3.1.7	Lane Count Increase
5.3.1.8	2-Lane Link Training CR/EQ Fallback Test
5.3.1.9	1-Lane Link Training CR/EQ Fallback Test

## Link Maintenance

5.3.2.1	IRQ HPD Pulse Due to Loss of Symbol Lock and Clock Recovery Lock
5.3.2.2	IRQ HPD Pulse Due to Loss of Inter-lane Alignment Lock

## Main Video Stream Reconstruction

Test Reference	Test Name
5.4.1.1	Pixel Data Reconstruction
5.4.1.2	Main Stream Data Unpacking and Unstuffing – Least Packed TU
5.4.1.3	Main Stream Data Unpacking and Unstuffing – Most Packed TU
5.4.1.4	Pixel Clock Recovery

5.4.2	Main Video Stream Format Change Handling
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5.4.3.1	Entering and Exiting Power Save Mode
5.4.3.2	Resumption of Main Link Activity After Extended Idle

## Main Audio Stream Reconstruction

5.4.4.1	Audio Test Patterns
5.4.4.2	Audio Startup and Format Change
5.4.4.3	RS Error Correction
5.4.4.4	Audio InfoFrame Packet
5.4.4.5	Audio Clock Recovery
5.4.4.6	Audio Stream Reception

## Sink FEC Protocol

Test Reference	Test Name
5.5.1.1	Sink Device FEC capability verification
5.5.1.2	Successful Link Training at All Supported Lane Counts and Link Rates with FEC Enable
5.5.1.3	Uncorrectable Block error count
5.5.1.4	Correctable Block error count
5.5.1.5	Correctable Bit error count
5.5.1.6	Correctable Parity Block error count
5.5.1.7	Correctable Parity Bit error count

## DSC Encoder CTS on DP (P/N MT6643)

### Sink Device DSC Test Procedures

Test Reference	Test Name
5.6.1.1	DSC capability verification
5.6.1.2	DSC RGB Color Depth Test
5.6.1.3	DSC RGB Block Prediction Test
5.6.1.4	DSC RGB bits-per-pixel test
5.6.1.5	DSC RGB slice test
5.6.1.6	DSC RGB lane test
5.6.1.7	DSC YCbCr 4:4:4 Color Depth Test
5.6.1.8	DSC YCbCr 4:4:4 Block Prediction Test
5.6.1.9	DSC YCbCr 4:4:4 bits-per-pixel test
5.6.1.10	DSC YCbCr 4:4:4 slice test
5.6.1.11	DSC YCbCr 4:4:4 lane test
5.6.1.12	DSC Simple 4:2:2 Color Depth Test
5.6.1.13	DSC Simple 4:2:2 Block Prediction Test
5.6.1.14	DSC Simple 4:2:2 bits-per-pixel test
5.6.1.15	DSC Simple 4:2:2 slice test
5.6.1.16	DSC Simple 4:2:2 lane test
5.6.1.17	DSC Native 4:2:2 Color Depth Test
5.6.1.18	DSC Native 4:2:2 Block Prediction Test
5.6.1.19	DSC Native 4:2:2 bits-per-pixel test
5.6.1.20	DSC Native 4:2:2 slice test
5.6.1.21	DSC Native 4:2:2 lane test
5.6.1.22	DSC Native 4:2:0 Color Depth Test
5.6.1.23	DSC Native 4:2:0 Block Prediction Test
5.6.1.24	DSC Native 4:2:0 bits-per-pixel test
5.6.1.25	DSC Native 4:2:0 slice test
5.6.1.26	DSC Native 4:2:0 lane test

**Sink DSC protocol extension**

Test Reference	Test Name
5.6.2.1	DSC Height test
5.6.2.2	DSC Padding test
5.6.2.3	DSC RGB min and max bits-per-pixel test
5.6.2.4	DSC YCbCr 4:4:4 min and max bits-per-pixel test
5.6.2.5	DSC Simple 4:2:2 min and max bits-per-pixel test
5.6.2.6	DSC Native 4:2:2 min and max bits-per-pixel test
5.6.2.7	DSC Native 4:2:0 min and max bits-per-pixel test
5.6.2.8	DSC RGB most pack test
5.6.2.9	DSC Native 4:2:2 most pack test
5.6.2.10	DSC Native 4:2:0 most pack test
5.6.2.11	DSC one corrupt slice test
5.6.2.12	DSC interrupt test for Chunk Length error
5.6.2.13	DSC interrupt test for RC buffer under-run error
5.6.2.14	DSC interrupt test for RC buffer overflow error

## DisplayID / EDID CTS for testing Sink DUT (P/N MT6647)

### EDID Block 0

Test Reference	Test Name
5.7.1.1	VESA E-EDID Verification Guide (Syntax Verification Only)
5.7.1.2	Physical Display Characteristics

### EDID Block 0 (Basic Display Parameters and Features)

5.7.1.3.1	Test for a Valid Video Input Definition
5.7.1.3.2	Test for a Valid Feature Support Byte
5.7.1.3.3	Test For Valid Established Timings I & II
5.7.1.3.4	Test For Valid Standard Timings

### 18-Byte Descriptor Test Cases

5.7.1.4.1	Test for Detailed Timing Descriptors
5.7.1.4.2	Test for Valid Display Descriptor Structure
5.7.1.4.3	Test for Valid Display Range Limits (tag #FDh)
5.7.1.4.4	Test for Valid Standard Timing Identifier Descriptor (tag #FAh)
5.7.1.4.5	Test for Valid CVT 3 Byte Code Descriptor (tag #F8h)
5.7.1.4.6	Test for Valid Established Timings III Descriptor (tag #F7h)
5.7.1.4.7	Test for Valid String Descriptors (tags #FFh, #FEh, #FCh)
5.7.1.4.8	Unused – Reserved Data Tag Number (Tags #11h to #F6h)
5.7.1.4.9	Test for Valid Dummy Descriptors (tag #10h)

5.7.1.5	Test for Valid Extension Flag and Checksum
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### CTA Block Validation (CTA Extension Format)

5.7.2.1	CEA Extension Version Number
5.7.2.2	Byte #2 (18-byte Descriptor Offset 'd')
5.7.2.3.1	Byte #3 - Underscan support
5.7.2.3.2	Byte #3 - Basic audio support
5.7.2.3.3	Byte #3 - YCbCr Support
5.7.2.3.4	Byte #3 - Native DTD Count
5.7.2.3.5	Byte #3 - Byte 3 Consistency

### Data Block Collection (Type Validation)

5.7.2.4.1	Duplicate Data Block Validation
5.7.2.4.2	Validity of Data Block Types

### Short Video Descriptors (SVDs)

5.7.2.5.1	Validity of SVDs
5.7.2.5.2	SVD/DTD Ordering

### Audio Data Block

Test Reference	Test Name
5.7.2.6.1	Duplicate Audio Format Codes
5.7.2.6.2	Audio Output Validation

### Speaker Allocation Data Block

5.7.2.7.1	Verify Max Number of Channels
5.7.2.8	Test for Detailed Timing Descriptors

### DisplayID Extension Block Framework Validation

5.7.3.1	DisplayID EDID Extension Block Tag (Byte#0) and extension version (Byte#1)
5.7.3.2	DisplayID Section Size, Byte#2
5.7.3.3	DisplayID Product Identifier/ Primary Use Case, Byte#3
5.7.3.4	DisplayID Extension Count, Byte#4
5.7.3.5	DisplayID Section Checksums

### DisplayID Extension Block Tiled Display Topology Block

5.7.4.1	Block Revision (Byte#1)
5.7.4.2	Number of Payload Bytes in Block (Byte#2)
5.7.4.3	Tiled Display Capabilities (Byte#3, bit 6 and bit 7)
5.7.4.5	Tile Size (Byte#7 to Byte#10)

### DisplayID Extension with Stereo Display Interface Data Blocks

5.7.5.1	Block Revision and Other Data (Byte #1)
5.7.5.2	Number of Payload Bytes in Block (Byte#2)

### DisplayID Extension with Type VII Detailed Timing Block

5.7.6.1	Block Revision (Byte#1)
5.7.6.2	Block Number of Payload Bytes in Block (Byte#2)
5.7.6.3	Pixel Clock (Bytes #0 through #2 of each Descriptor)
5.7.6.4	Descriptor Payload Verification (Bytes #3 through #19 of each Descriptor)
5.7.6.5	Timing Support Validation

### DisplayID Extension with Type VIII Detailed Timing Block

5.7.7.1	Block Revision and Other Data (Byte#1)
5.7.7.2	Block Number of Payload Bytes in Block (Byte#2)
5.7.7.3	DMT Timing Codes
5.7.7.4	CTA Timing Codes
5.7.7.5	HDMI Timing Codes
5.7.7.6	Timing Support Validation

### DisplayID Extension with Type IX Detailed Timing Block

Test Reference	Test Name
5.7.8.1	Block Revision and Other Data (Byte#1)
5.7.8.2	Block Number of Payload Bytes in Block (Byte#2)
5.7.8.3	Timing Options (Byte #0 of each Descriptor)
5.7.8.4	Horizontal Active Image Pixels and Vertical Active Image Lines (Bytes #1-4 of each Descriptor)
5.7.8.5	Refresh Rate and Pixel Clock (Byte #5 of each Descriptor)
5.7.8.6	Timing Support Validation

### CTA Data Blocks in a DisplayID Extension

5.7.9.1	Block Revision (Byte#1)
5.7.9.2	Block Number of Payload Bytes in Block (Byte#2)
5.7.9.3	Validity of Data Block Types

### DisplayID Vendor-Specific Data Blocks

5.7.10.1	Block Revision (Byte#1)
5.7.10.2	Block Number of Payload Bytes in Block (Byte#2)
5.7.10.3	Manufacturer/Vendor ID Field

### Dynamic Video Timing Range Limits Data Block

5.7.11.1	Block Revision (Byte#1)
5.7.11.2	Block Number of Payload Bytes in Block (Byte#2)
5.7.11.3	Minimum and Maximum Pixel Clock (Bytes #3 through #8)
5.7.11.4	Minimum and Maximum Vertical Refresh Rate (Bytes #9 and #10)
5.7.11.5	Dynamic Video Timing Range Support Flags (Byte #11)

### DisplayID Data Block Version Validation

5.7.12.1	DisplayID Version 1.x Blocks
5.7.12.2	DisplayID Version 2.x Blocks
5.7.12.3	DisplayID Version 2.x Multiple Instances of Data Blocks

## Adaptive-Sync

### Adaptive-Sync Operation Validation

Test Reference	Test Name
(5.8.1.1)*	Fixed-Average VTotal Mode Support over the Declared Frame Rate Range
(5.8.1.2)*	Duration Increase and Decrease Constraint Value Support in Adaptive VTotal Mode
(5.8.1.3)*	Adaptive VTotal Mode Support

\*) Test available. VESA Status: In TE Correlation process



### 3. HDCP 2.3 CTS FOR DISPLAYPORT

#### DP HDCP 2.3 CTS Capable Hardware Products

Product	P/N	Description
UCD-400 DP 1.4 Test Device *	066600	DP1.4 / HBR3/MST capable test unit for DisplayPort Sink, Source and Repeater. USB 3.0 Interface to Host PC.
UCD-411 Tester	066606	DP1.4 / HBR3/MST capable Pattern Generator. USB 3.0 interface to Host PC.
UCD-424 Tester*	066630	DP1.4, HBR3 & PD3.0 capable test unit for DisplayPort Alt Mode Sink, Source and Repeater. USB 3.0 Interface to Host PC.
UCD-323 HDDP **	066512	4K capable test unit for digital video inputs and outputs. USB 3.0 Interface to Host PC.
UCD-340 USB-C DP Alt Mode Tester with Electrical Test **	066515	4K capable test unit for USB-C DP Alt Mode Sinks or Sources with Electrical Test. USB 3.0 Interface to Host PC. TSI SDK Basic Test Set included.
UCD-301 Digital ***	066510	4K capable test unit for digital video outputs. USB 3.0 Interface to Host PC.

\*) Approved as Authorized Test Tool for DP Sinks, Sources and Repeaters

\*\*) Approved as Authorized Test Tool for DP Sinks and Sources

\*\*\*) Approved as Authorized Test Tool for DP Sources

#### DP HDCP 2.3 CTS Test Software Product Options

Product	P/N	Description
HDCP 2.3 CTS for testing Source DUT on DP	MT6634	HDCP 2.3 on DisplayPort compliance tests for testing Source DUT. (Sets 1A + 1B)
HDCP 2.3 CTS for testing Sink DUT on DP	MT6636	HDCP 2.3 on DisplayPort compliance tests for testing Sink DUT. (Set 2C)
HDCP 2.3 CTS for testing Sink, Source and Repeater DUT on DP	MT6638	HDCP 2.3 on DisplayPort CTS for testing Sink, Source and Repeater DUT. (Sets 1A + 1B + 2C + 3A + 3B + 3C)

## Test Software Content

Source DUT Testing		DP HDCP 2.3 CTS*
DP HDCP 2.3 CTS 1A Test Set (UCD-400, UCD-424)	HDCP2.3 CTS 1A-01 – HDCP2.3 CTS 1A-12	●
DP HDCP 2.3 CTS 1B Test Set (UCD-400, UCD-424)	HDCP2.3 CTS 1B-01 – HDCP2.3 CTS 1B-10	●

\*) Separate licenses for testing Sink, Source, Branch DUT

Sink DUT Testing		DP HDCP 2.3 CTS*
DP HDCP 2.3 CTS 2C Test Set (UCD-400, UCD-411, UCD-424)	HDCP2.3 CTS 2C-01 – HDCP2.3 CTS 2C-06	●

\*) Separate licenses for testing Sink, Source, Branch DUT

Repeater DUT Testing		DP HDCP 2.3 CTS*
DP HDCP 2.3 CTS 3A Test Set (UCD-400, UCD-411, UCD-424)	HDCP2.3 CTS 3A-01 – HDCP2.3 CTS 3A-06	●
DP HDCP 2.3 CTS 3B Test Set (UCD-400, UCD-411, UCD-424)	HDCP2.3 CTS 3B-01 – HDCP2.3 CTS 3B-07	●
DP HDCP 2.3 CTS 3C Test Set (UCD-400, UCD-411, UCD-424)	HDCP2.3 CTS 3C-01 – HDCP2.3 CTS 3C-25	●

\*) Separate licenses for testing Sink, Source, Branch DUT

# Description of HDCP 2.3 CTS Tests

## DP HDCP 2.3 CTS for testing Source DUT (P/N MT6634)

### 1A. Downstream procedure with Receiver

Test Reference	Test Name
HDCP2.3 CTS 1A-01	Regular Procedure – With previously connected Receiver (With stored km)
HDCP2.3 CTS 1A-02	Regular Procedure – With newly connected Receiver (Without stored km)
HDCP2.3 CTS 1A-03	Regular Procedure – Receiver disconnect after AKE_Init
HDCP2.3 CTS 1A-04	Regular Procedure – Receiver disconnect after km
HDCP2.3 CTS 1A-05	Regular Procedure – Receiver disconnect after locality check
HDCP2.3 CTS 1A-06	Regular Procedure – Receiver disconnect after ks
HDCP2.3 CTS 1A-07	Regular Procedure – Receiver sends REAUTH_REQ after ks
HDCP2.3 CTS 1A-08	Irregular Procedure – Verify Receiver Certificate
HDCP2.3 CTS 1A-09	Irregular Procedure – SRM
HDCP2.3 CTS 1A-10	Irregular Procedure – Invalid H'
HDCP2.3 CTS 1A-11	Irregular Procedure – Pairing Failure
HDCP2.3 CTS 1A-12	Irregular Procedure – Locality Failure

### 1B. Downstream procedure with Repeater

HDCP2.3 CTS 1B-01	Regular Procedure – With Repeater
HDCP2.3 CTS 1B-02	Irregular Procedure – Timeout of Receiver ID list
HDCP2.3 CTS 1B-03	Irregular Procedure – Verify V'
HDCP2.3 CTS 1B-04	Irregular Procedure – MAX_DEVS_EXCEEDED
HDCP2.3 CTS 1B-05	Irregular Procedure – MAX_CASCADE_EXCEEDED
HDCP2.3 CTS 1B-06	Irregular Procedure – Incorrect seq_num_V
HDCP2.3 CTS 1B-07	Regular Procedure – Re-authentication on HPD
HDCP2.3 CTS 1B-08	Regular Procedure – Re-authentication on REAUTH_REQ
HDCP2.3 CTS 1B-09	Irregular Procedure – Rollover of seq_num_V
HDCP2.3 CTS 1B-10	Irregular Procedure – Failure of Content Stream Management

## DP HDCP 2.3 CTS for testing Sink DUT (P/N MT6636)

**2C. Upstream procedure with Transmitter**

Test Reference	Test Name
HDCP2.3 CTS 2C-01	Regular Procedure – With transmitter
HDCP2.3 CTS 2C-02	Irregular Procedure – New Authentication after AKE_Init
HDCP2.3 CTS 2C-03	Irregular Procedure – New Authentication during Locality Check
HDCP2.3 CTS 2C-04	Irregular Procedure – New Authentication after SKE_Send_Eks
HDCP2.3 CTS 2C-05	Irregular Procedure – New Authentication during Link Synchronization
HDCP2.3 CTS 2C-06	Regular Procedure – Encryption Disable Bootstrapping

## DP HDCP 2.3 CTS for testing Sink, Source and Repeater DUT (P/N MT6638)

### 1A. Downstream procedure with Receiver

Please see above

### 1B. Downstream procedure with Repeater

Please see above

### 2C. Upstream procedure with Transmitter

Please see above

### 3A. Downstream procedure with Receiver

Test Reference	Test Name
HDCP2.3 CTS 3A-01	Regular Procedure - With previously connected Receiver (With stored $k_m$ )
HDCP2.3 CTS 3A -02	Regular Procedure - With newly connected Receiver (Without stored $k_m$ )
HDCP2.3 CTS 3A -03	Irregular Procedure - Verify Receiver Certificate
HDCP2.3 CTS 3A -04	Irregular Procedure - invalid $H'$
HDCP2.3 CTS 3A -05	Irregular Procedure - Pairing Failure
HDCP2.3 CTS 3A -06	Irregular Procedure - Locality Failure

### 3B. Downstream Procedure with Repeater

HDCP2.3 CTS 3B-01	Regular Procedure - With Repeater
HDCP2.3 CTS 3B -02	Irregular Procedure - Timeout of Receiver ID list
HDCP2.3 CTS 3B -03	Irregular Procedure - Verify $V'$
HDCP2.3 CTS 3B -04	Irregular Procedure - MAX_DEVS_EXCEEDED
HDCP2.3 CTS 3B -05	Irregular Procedure - MAX_CASCADE_EXCEEDED
HDCP2.3 CTS 3B -06	Irregular Procedure - Rollover of $seq\_num\_V$
HDCP2.3 CTS 3B -07	Irregular Procedure - Failure of Content Stream Management

### 3C. Downstream Procedure with Transmitter

Test Reference	Test Name
HDCP2.3 CTS 3C-01	Regular Procedure - Transmitter - DUT - Receiver
HDCP2.3 CTS 3C -02	Regular Procedure - Receiver Disconnect Propagation when an Active Receiver is Disconnected Downstream
HDCP2.3 CTS 3C -03	Regular Procedure - Receiver Connected when an Active Receiver is Connected Downstream
HDCP2.3 CTS 3C -04	Irregular Procedure - New Authentication after AKE_init
HDCP2.3 CTS 3C -05	Irregular Procedure - New Authentication during Locality Check
HDCP2.3 CTS 3C -06	Irregular Procedure - New Authentication after SKE_Send_Eks
HDCP2.3 CTS 3C -07	Irregular Procedure - New Authentication during Link Synchronization
HDCP2.3 CTS 3C -08	Irregular Procedure - Rx Certificate invalid
HDCP2.3 CTS 3C -09	Irregular Procedure - invalid H'
HDCP2.3 CTS 3C -10	Irregular Procedure - Locality Failure
HDCP2.3 CTS 3C-11	Regular Procedure - Transmitter - DUT - Repeater (With stored km)
HDCP2.3 CTS 3C-12	Regular Procedure - Receiver disconnect after AKE_Init
HDCP2.3 CTS 3C-13	Regular Procedure - Receiver disconnect after km
HDCP2.3 CTS 3C-14	Regular Procedure - Receiver disconnect after locality check
HDCP2.3 CTS 3C-15	Regular Procedure - Receiver disconnect after Ks
HDCP2.3 CTS 3C-16	Irregular Procedure - Timeout of Receiver ID list
HDCP2.3 CTS 3C-17	Irregular Procedure - Verify V'
HDCP2.3 CTS 3C-18	Irregular Procedure - DEVICE_COUNT
HDCP2.3 CTS 3C-19	Irregular Procedure - DEPTH
HDCP2.3 CTS 3C-20	Irregular Procedure - MAX_DEVS_EXCEEDED
HDCP2.3 CTS 3C-21	Irregular Procedure - MAX_CASCADE_EXCEEDED
HDCP2.3 CTS 3C-22	Regular Procedure - Repeater with zero downstream device
HDCP2.3 CTS 3C-23	Regular Procedure - Propagation of HDCP2_0_REPEATER_DOWNSTREAM flag
HDCP2.3 CTS 3C-24	Regular Procedure - Propagation of HDCP1_DEVICE_DOWNSTREAM flag
HDCP2.3 CTS 3C-25	Regular Procedure - Content Stream Management