TELEDYNE LECROY
Everywhere**you**look™

quantumdata™ M21 HDMI/DisplayPort Analyzer with HDMI Video Generator
supporting 48Gb/s HDMI and 54Gb/s DisplayPort

Key Features

- **HDMI TMDS and FRL video analyze**r operating up to 48Gb/s (12Gb/s / Lane with support for Display Stream Compression (DSC)

- **DisplayPort HBR and UHBR video analyzer** operating up to 54Gb/s (13.5Gb/s lane rates with support for Display Stream Compression (DSC))

- **Video analysis** enables viewing the incoming video frames and a status bar showing video timing parameters and essential video parameter values

- **Protocol metadata viewer** to verify main link metadata packets

- **Aux Channel Analyzer (ACA) utility** enables real time monitoring of HDMI DDC and DisplayPort Aux Channel for EDID exchanges, FRL and DisplayPort link training, HDCP authentication (including HDCP 2.3), HDMI SCDC register reads and writes and DisplayPort DPCD register reads and writes

- **Aux Channel Analyzer (ACA) passive protocol feature** enables passive monitoring of the HDMI DDC or DisplayPort Aux Channel between a source and sink device

- **HDMI TMDS, FRL Video Generator** for testing Ultra High Definition TVs supporting 8K resolutions at 48Gb/s link rates with Display Stream Compression (DSC)

- **Enhanced Audio Return Channel** (eARC) enables basic testing of eARC Tx and Rx devices

- **Video pattern and Format Library** with test patterns for High Dynamic Range

- **Battery powered** up to one (1) hour with eight (8) hour charge

- **Command line interface** for automated testing

The Teledyne LeCroy quantumdata M21 Video Analyzer for HDMI 2.1 and DisplayPort 2.0 testing offers a rich set of features and benefits to design engineers in R&D as well as professional A/V installers for testing HDMI and DisplayPort devices. The M21 instrument is also equipped with an HDMI 48Gb/s video generation function enabling test engineers and proA/V integrators to run a variety of video, audio and protocol tests on digital video sources, displays and distribution equipment up to 8K resolutions.

The portable size, battery operation and large user-friendly touch screen provides convenience to complement the rich feature set. The user interface design and test functions greatly reduce Time-to-Insight whether running tests on distinct devices or entire digital video distribution networks.

Diagnose and Troubleshoot

The M21 provides an at-a-glance status bar on the top of the touch screen. The status bar provides basic information about what the instrument is transmitting to a display and what it is receiving from a source. The instruments can run quick video audio and protocol tests on individual sources, displays , repeaters, distribution gear as well as cables. Protocol tests include tests for EDID, HDCP authentication—1.4 & 2.3—infoframes and timing data. You can place the M21 at any point in a video distribution network and run tests upstream toward the source while emulating a display (or sink). Or you can run tests downstream as a video generator while emulating an HDMI 2.1 FRL source.

Ease of Use

The M21's large 10" diagonal color touch screen provides ease of use and quick status information. The rich set of routine tests and diagnostic tests are accessible with just a few touch clicks. You can quickly configure settings on the output. A rich command set, available either through the Ethernet port or RS-232 serial ports, supports automated testing.

Video Analysis and Diagnostic Test Features
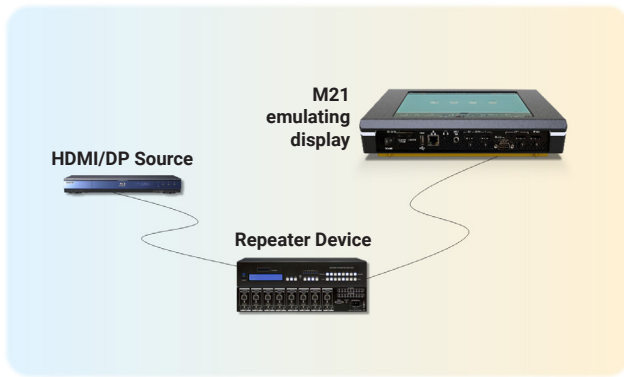
Example Source Test Setup

View Incoming Video and Data

The M21 Video Display panel provides quick *time-to-insight* when conducting routine tests or diagnosing interoperability problems. The embedded display shows the incoming video frames and includes a status bar which provides essential information about the incoming HDMI or DisplayPort video. The essential video and audio metadata is also available on this panel.

Test Response to EDIDs

The M21 enables you to emulate any HDMI or DisplayPort EDID to test a source's response. You can use commercial EDIDs or test EDIDs with specific video and audio support. Test with EDIDs with known anomalies or read an EDID from a UHD TV or repeater device and save for future testing.

Verify Cable/Network

The M21 enables you to test HDMI distribution equipment to verify integrity of extenders, repeaters, matrix switches and distribution amps. You can test individual devices or entire networks including digital video cables.

View Aux Channel Transactions

Complex interoperability problems require visibility into the auxiliary channel. You can monitor HDMI Display Data Channel (DDC) data to view FRL link training, EDID exchange, HDCP authentication and SCDC reads and writes.
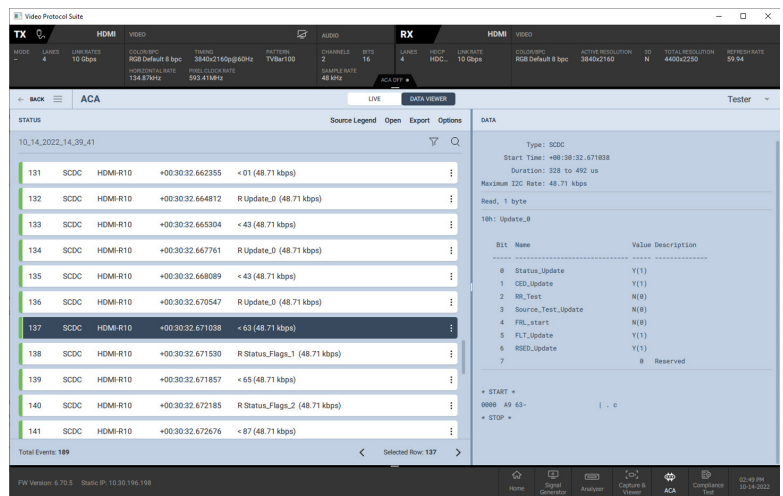
Aux Channel Analyzer Showing HDMI (or DP) Link Training Transactions
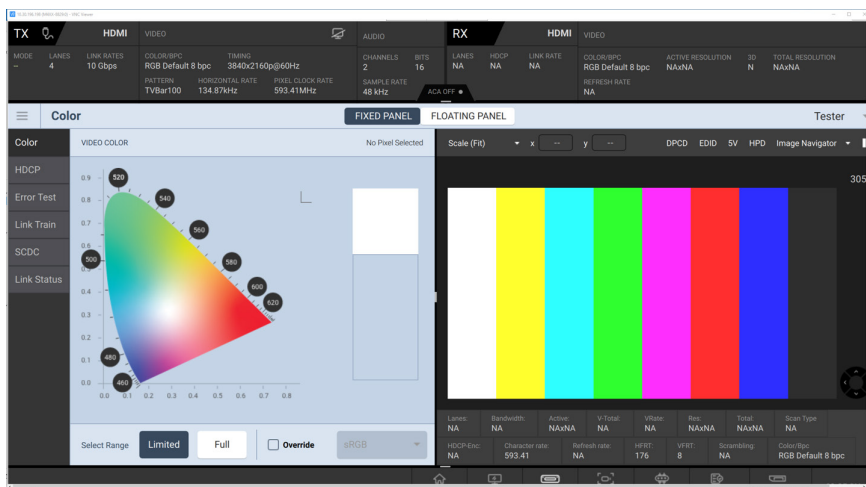
Analyzer "Real Time" Showing Incoming Video, Colorimetry, Timing and Metadata

For DisplayPort, the M21 can monitor Power Delivery (PD) negotiations into DP Alt mode as well as Aux Channel transactions such as EDID exchange, Link Training transactions and HDCP authentication. Check details of each transaction and distribute captured test logs to colleagues and subject matter experts.

Verify HDMI eARC Audio

Transmit eARC audio to an eARC Rx device such as a sound bar or A/V receiver.

Video Generator Features (HDMI-only)

Verify Video on an HDMI TV

Select from CTA and VESA formats or create custom formats including 8K resolutions for UHD testing. Use the test pattern library to verify specific video display elements. Set bit depth, pixel encoding, colorimetry and sampling parameters. Use special test patterns for testing High Dynamic Range (HDR). Scroll bitmaps to test motion artifacts.

Sink (Display) Test Setup

Verify HDMI EDID Content

View EDID contents of a connected display to verify audio and video capabilities (including HDR elements). Verify the structure of an EDID and check for errors.
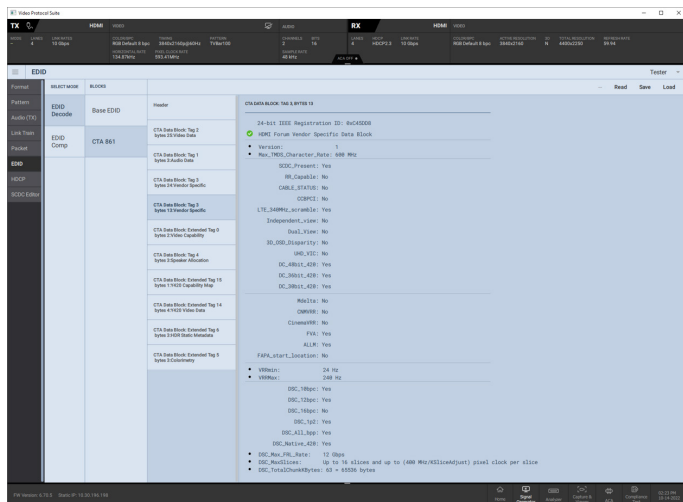
Reading the EDID of a Connected Display

Configuring HDMI FRL Link Training

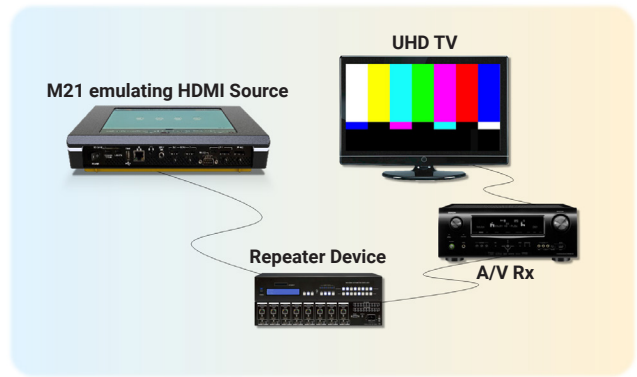## Verify HDMI Audio on an HDMI TV or Audio System

Verify audio on displays or audio systems using programmable LPCM test tones. Set sampling rate, bit depth, amplitude and number of channels. Select Dolby and DTS compressed audio clips including Dolby TrueHD and DTS Master Audio.
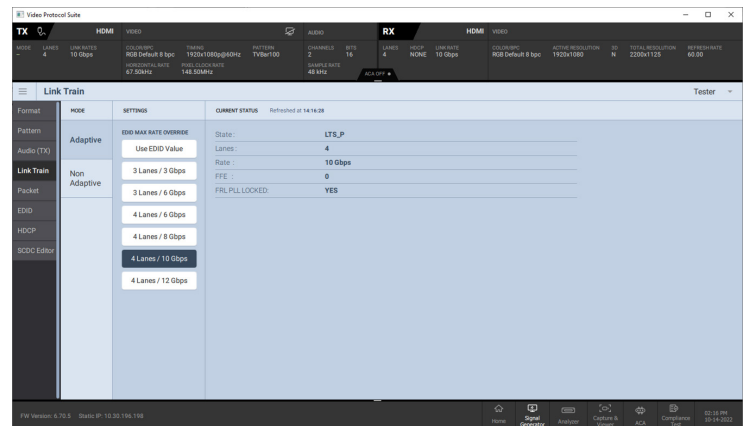
Verify HDMI eARC Audio

Verify the eARC audio from an eARC Tx port on an HDMI TV. Listen to the audio and view the metadata.

Select the Video Format
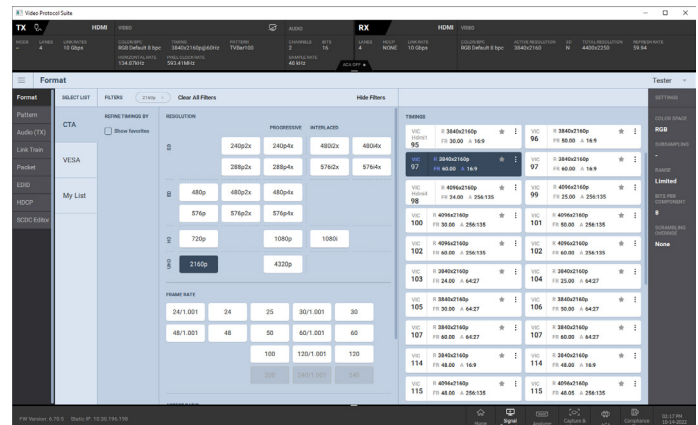
Verify HDCP Authentication

The M21 can monitor the HDCP authentication transactions to verify proper operation for HDCP 1.4 and 2.3. Enabling and disabling HDCP can quickly reveal the nature of an interoperability problem. Monitor the HDCP transactions during the HDCP test using the Aux Channel Analyzer.
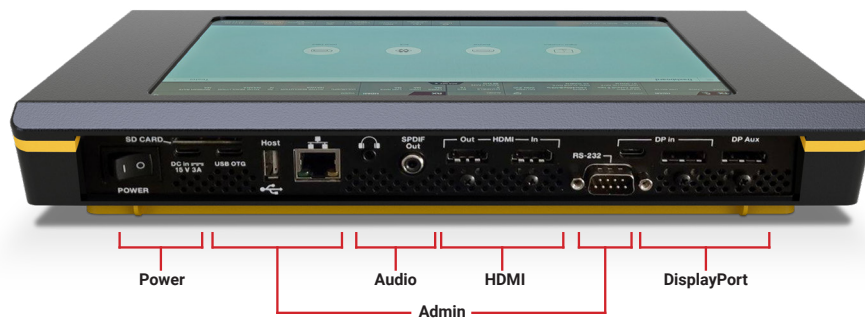
Specifications

HDMI	
Version	HDMI 2.1a
Standard Formats	VESA, CTA
HDMI Connectors	HDMI: (1) Type A Tx; (1) Type A Rx.
Protocols (HDMI)	HDMI (Tx & Rx) TMDS, FRL, DSC, FEC, eARC, HDCP
Video Colorimetry	ITU-R BT.601-5, ITU-R BT.709-5, BT.2020 (YCbCr)
Lane Rates	12 Gb/s / Lane; 48Gb/s aggregate data rate
Color Depths	8, 10, 12 , 16 bits per component
Video Encoding / Sampling	RGB, YCbCr; 4:4:4, 4:2:2, 4:2:0
HDCP	Versions 1.4 and 2.3
Audio Formats	LPCM, Dolby (DD, DD+, TrueHD), DTS (ES, HD, Master Audio)
Audio LPCM Settings	Sampling rates (32 – 192 kHz); Bits per sample (16, 20, 24)

DisplayPort	
Version	Audio Formats / LPCM Settings
Standard Formats	VESA (DMT, CVT-R, CVT), CTA
Protocols (DisplayPort)	DIsplayPort: HBR, UHBR, DSC, FEC, HDCP
DisplayPort Connectors	One (1) Rx USB-C; One (1) Rx DisplayPort; One (1) DP for passive Aux monitor
Link rates / Lanes	RBR/HBR: 1.62, 2.70, 5.40, 8.1 Gb/s Link Rates; 1, 2, 4 Lanes. UHBR: 10Gb/s & 13.5Gb/s (USB-C)
Color Depths	6, 8, 10, 12, 16 bits
Video Encoding/Sampling Modes	RGB, YCbCr; 4:4:4, 4:2:2; 4:2:0
HDCP	Version 1.3 and 2.3
Audio Formats / LPCM Settings	8 Ch. LPCM; Sampling rates (32 – 192 kHz)

Physical/Electrical	
AC Adapter from USB-C port	100-240 VAC, 47-63Hz on USB-C port with wall adapter (provided)
Battery	Nickel metal hydride batteries for short term use- up to one hour on an eight (8) hour charge
Dimensions	Height: 1.25 in. (3.175 cm) Width: 12.1 in. (30.734 cm) Depth: 8.2 in. (20.828 cm)
Weight	4.40 lbs; 2.00 Kg
Environmental	Operating Temp: 32 to 104 (F); 0 to 40 (C)

Administration and Connectors	
Embedded Display	10 inch diagonal screen with 1280 x 800 resolution with 24 bit color
Ethernet	For command line control and software upgrades
RS-232	For command line control
USB-C DC In	For powering/charging the M21
USB-C OTG	USB On-the-Go for connection to external devices
USB Host	For connection to external devices
Stereo Speakers	For monitoring incoming LPCM audio
Headpone Jack	For monitoring incoming LPCM audio
SPDIF Out	For monitoring incoming LPCM audio

Ordering Information

Product Description | Product Code

quantumdata M21 Base Unit (requires either 95-00260 or 95-00265) — 00-00262

Software Options (HDMI)

Description	Code
TMDS Tx and Rx - Video analysis and video generation for TMDS up to 18Gb/s data rates (requires 00-00262)	95-00260
FRL Tx and Rx functionality - Video generation and video analysis for FRL up to 48Gb/s data rates (requires 95-00260)	95-00261
HDMI ACA Monitoring - Monitor HDMI DDC channel emulating a source or sink or passively between a source and sink (requires 95-00260)	95-00262
Functional Cable test - Run functional cable test in loopback mode (requires 95-00260)	95-00263
eARC Tx & Rx - Basic test of eARC Tx and Rx functionality (requires 95-00261)	95-00264

Software Options (DisplayPort)

Description	Code
HBR Rx functionality - Video analysis for HBR3 up to 8.1Gb/s (requires 00-00262)	95-00265
UHBR Rx functionality - Video analysis for HBR3 & UHBR up to 13.5Gb/s data rates (requires 95-00265)	95-00266
ACA Monitoring - Monitor DP Aux channel transactions thru Rx emulation/passive (requires 95-00265)	95-00267

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