**TELEDYNE LECROY**
Everywhere**you**look™

# quantum**data**™ 780E
# Multi-Protocol Analyzer & Generator
## Test HDMI, HDBaseT & DisplayPort with one instrument

## Key Features

- HDMI, HDBaseT and DisplayPort input and output ports for testing both source and display devices as well as cables and distribution networks

- Test Ultra High Definition video products supporting 4K resolutions up to 600 MHz for HDMI

- Video pattern and format library with programmable settings

- Protocol tests for digital video sources and displays

- Protocol logging application auxiliary channel analyzer (ACA) enables real time monitoring of EDID exchanges, HDCP (including HDCP 2.2), DisplayPort Aux Chan link training transactions and CEC messages (for HDMI)

- Passive protocol logging between a source and a sink is also optionally supported

The quantumdata 780E Multi-Protocol Analyzer / Generator offers a wide array of benefits to engineers in R&D as well as professional A/V installers in the field for testing HDMI, HDBaseT and DisplayPort devices. The portable size and user-friendly touch screen interface provide convenience to complement the rich feature set. Because the 780E instrument is equipped with both input and output ports, engineers and proA/V integrators can run a variety of video, audio and protocol tests on digital video sources, displays, distribution equipment and cables. 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 780 models provide an at-a-glance status bar on the bottom of the 7" in 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 & 2.2—infoframes and timing data. You can place the 780E 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 while emulating a source

## Ease of Use

The 780E's large 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 outputs. A rich command set, available either through USB or RS-232 serial ports, supports automated testing.
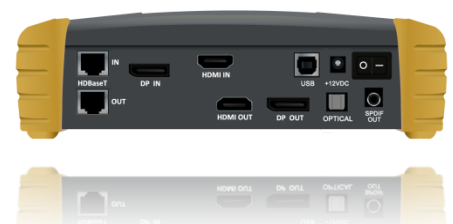
# SOURCE & NETWORK DIAGNOSTIC TEST FEATURES

### View Incoming Video & Data
The 780E status bar provides essential information about the incoming video. The Video Display Test shows the incoming video and essential video and audio metadata. Both provide quick *time to insight* when conducting routine tests or diagnosing interoperability problems.

### Test Response to EDIDs
Many interoperability problems are related to EDIDs. 780E enables you to emulate any 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 grab an EDID from a UHD TV for future testing.

### View Aux Chan Transactions
Complex interoperability problems require visibility into the auxiliary channel. You can monitor HDMI and HDBaseT Display Data Channel data to view EDID, HDCP and CEC transactions. Also view DisplayPort link training logs on the Aux Channel. Check details of each transaction and distribute to colleagues.
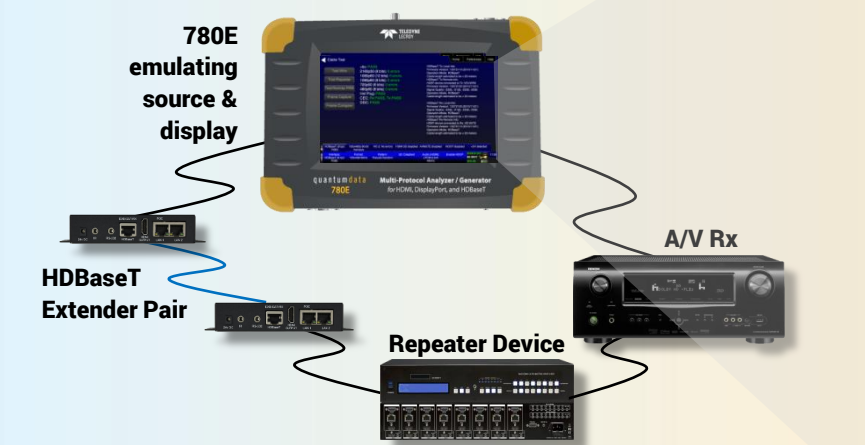

**780E emulating display**
**HDMI/DP Source**
**HDBaseT Extender Pair**
**Repeater Device**
**A/V Rx**

**Example Source Test Setup**


**Video Display Test – View Video & Metadata**


**Format Analyzer – View Metadata & Timing**

### Verify Cable / Network (Loop)
The 780E enables you to test 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.

### Verify Video at Far End
The 780E supports testing of installed distribution networks from the far-end at the display.


**Cable Test (HDBaseT) - Verify Networks/Cables**


**780E emulating source & display**
**HDBaseT Extender Pair**
**A/V Rx**
**Repeater Device**

**Example Network Test Setup**


**Verify Distribution Network from Far End**

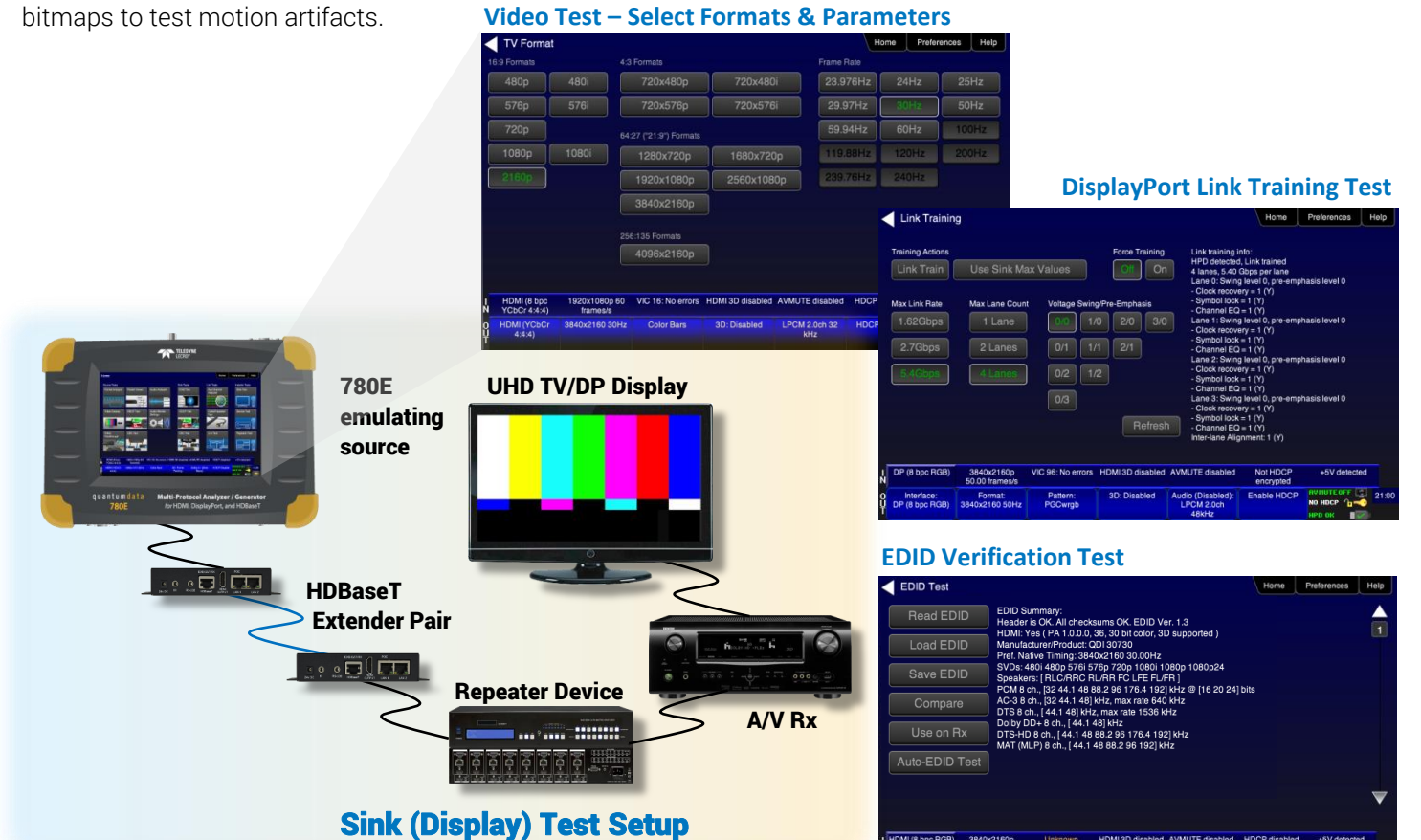# SINK (DISPLAY) TEST & DIAGNOSTIC FEATURES

### Verify Video
Select from CEA and VESA formats or create your own custom formats including 4K 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 industry standard patterns for color calibration. Create custom bitmap test patterns. Scroll bitmaps to test motion artifacts.

### Verify EDID Contents
Many interoperability problems are related to EDIDs. The 780E enables you to view the EDID contents of any connected display to verify its audio or video capabilities (including HDR elements). You can verify the structure of an EDID and check for compliance.

### Verify DisplayPort Link Training
You can use the 780E to test and verify DisplayPort link training using a variety of user settable parameters. You can specify the link rate, the number of lanes as well as the voltage swing and pre-emphasis. You can also link train based on a display's capabilities.


**Video Test – Select Formats & Parameters**


**780E emulating source**
**UHD TV/DP Display**
**HDBaseT Extender Pair**
**Repeater Device**
**A/V Rx**

**Sink (Display) Test Setup**


**DisplayPort Link Training Test**


**EDID Verification Test**

### Verify HDCP Authentication
HDCP authentication problems occur in complex digital video distribution networks. Use the HDCP test to quickly check HDCP 1.3/1.4 and HDCP 2.2 authentication. 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.


**Aux Channel Analyzer**


**HDCP Authentication Test**

## HDMI

| | |
|---|---|
| Version | HDMI 2.0 |
| Standard Formats | VESA (DMT, CVT-R, CVT), CEA |
| Connector | (1) Type A Tx; (1) Type A Rx |
| Protocol | HDMI, DVI |
| Video Colorimetry | ITU-R BT.601-5, ITU-R BT.709-5 |
| Video Max Pixel Rate | 600MHz (6.00 Gbps/channel TMDS rate) |
| Color Depths | 8, 10, 12 bits |
| Video Encoding / Sampling | RGB, YCbCr; 4:4:4, 4:2:2, 4:2:0 |
| HDCP | Versions 1.4 and 2.2 |
| 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) |

## HDBaseT

| | |
|---|---|
| Version | HDBaseT 1.0 |
| Standard Formats | VESA (DMT, CVT-R, CVT), CEA |
| Connector | (1) 8P8C (RJ-45) Tx; (1) RJ-45 Rx |
| Video Colorimetry | ITU-R BT.601-5, ITU-R BT.709-5 |
| Video Max Pixel Rate | 300MHz |
| Color Depths | 8, 10, 12 bits |
| Video Encoding / Sampling | RGB, YCbCr; 4:4:4, 4:2:2, 4:2:0 |
| HDCP | Version 1.4 |
| 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 | DisplayPort 1.2 |
| Standard Formats | VESA (DMT, CVT-R, CVT), CEA |
| Connector | (1) Standard Tx; (1) Standard Rx |
| Link rates / Lanes | 1.62, 2.70, 5.40 Gbps Link Rates; 1, 2, 4 Lanes |
| Color Depths | 6, 8, 10, 12, 16 bits |
| Video Encoding/Sampling Modes | RGB, YCbCr; 4:4:4, 4:2:2 |
| HDCP | Versions 1.3 and 2.2 |
| Audio Formats / LPCM Settings | 8 Ch. LPCM; Sampling rates (32 – 192 kHz); Bits per sample (16, 20, 24) |

## Digital Audio

| | |
|---|---|
| Connectors | Optical (JIS FOS); SPDIF (RCA) |
| Audio Formats | LPCM, Dolby (DD, DD+), DTS (ES, HD) |
| Audio LPCM Settings | Sampling rates (32 – 192 kHz); Bits per sample (16, 20, 24) |

## Options

| | |
|---|---|
| Auto EDID Test | Run automated EDID test on source devices |
| Cable Test | Test digital video cables and video distribution networks |
| ACA Monitor | Monitor aux channel transactions emulating a source or sink or passively |

## Instrument

| | |
|---|---|
| AC Adapter | 100-120 VAC, 47-63Hz |
| Weight | 3.25 LBS; 1.47 Kg |
| Embedded Display | 800 (H); x 480 (V) resolution; 24 bit RGB color. |
| Tilt Bail | For convenient viewing |
| Dimensions | Height: 2.7 in. (6.98 cm) Width: 9.75 in. (24.76 cm) Depth: 6 in. (15.24 cm) |
| Command Line Control | USB Type B, RS-232 |
| Environmental | Operating Temp: 32 to 104 (F); 0 to 40 (C) |
| File Access | USB Type B (command line / file transfer; SD Card  (upgrades/file transfer) |

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