TELEDYNE LECROY
Everywhereyoulook™

quantumdata™ 780E Video Generator / Protocol Analyzer

for HDMI, DisplayPort & HDBaseT

Key Features

- **HDMI, HDBaseT and DisplayPort (DP optional on 780E p/n 00-00251) 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**
- **HDR Lab test pattern pack and Dolby Vision test image for testing HDR on HDMI Ultra HD TVs**
- **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) and HDMI SCDC, DisplayPort Aux Chan link training transactions and CEC messages (for HDMI)**
- **Passive protocol logging between a source and a sink is also optionally supported on HDMI DDC and DisplayPort aux channel**
- **Interface to color calibration software packages CalMan and ChromaPure**
- **Report File Creation feature provides HTML formatted report of tests performed**

Important Note: There are two models of the 780E Video Generator/Analyzer. The initial 780E model (part number 00-00243) offers HDMI, DisplayPort and HDBaseT as standard interfaces. The newer 780E model (part number 00-00251) introduced in August of 2018, offers HDMI and HDBaseT interfaces as standard but with the DisplayPort interfaces optionally activated through a software license (part number 95-00172). This second, newer 780E model is offered at a lower price.

The Teledyne LeCroy quantumdata 780E Video Generator / Protocol Analyzer for HDMI, DisplayPort and HDBaseT Testing 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 780E 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. Generator reports to demonstrate test series completion.

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.

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SOURCE & NETWORK DIAGNOSTIC TEST FEATURES

View Incoming Video & Data

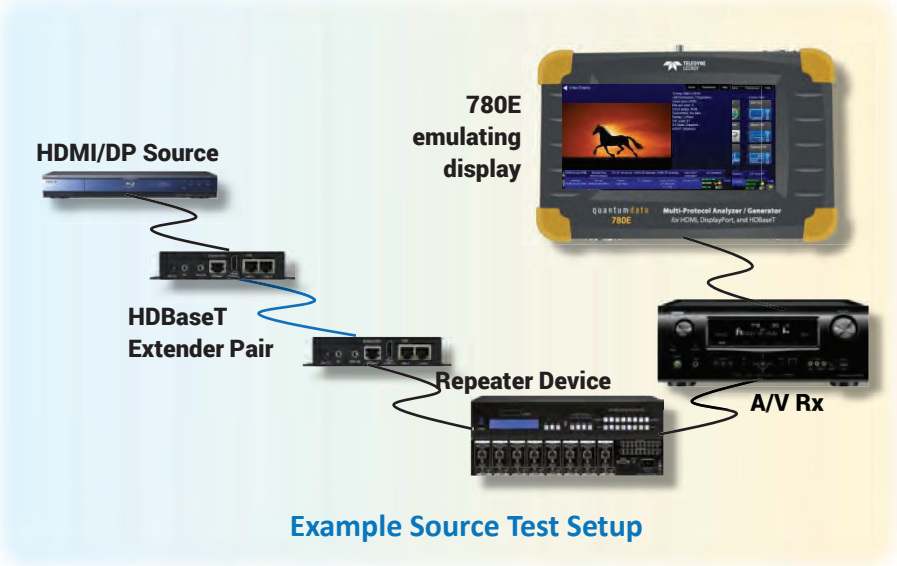
The 780E status bar provides essential information about the incoming video. The Video Display Test shows the incoming video and essential video and audio metadata. Both provide quick *time to insight* when conducting routine tests or diagnosing interoperability problems.

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.

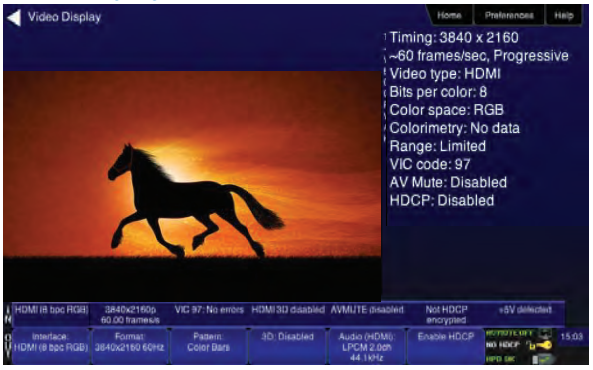
View Aux Channel Transactions

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

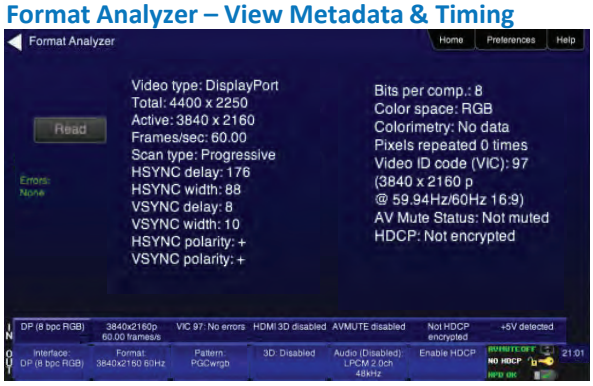


Example Source Test Setup

Video Display Test – View Video & Metadata



Format Analyzer – View Metadata & Timing



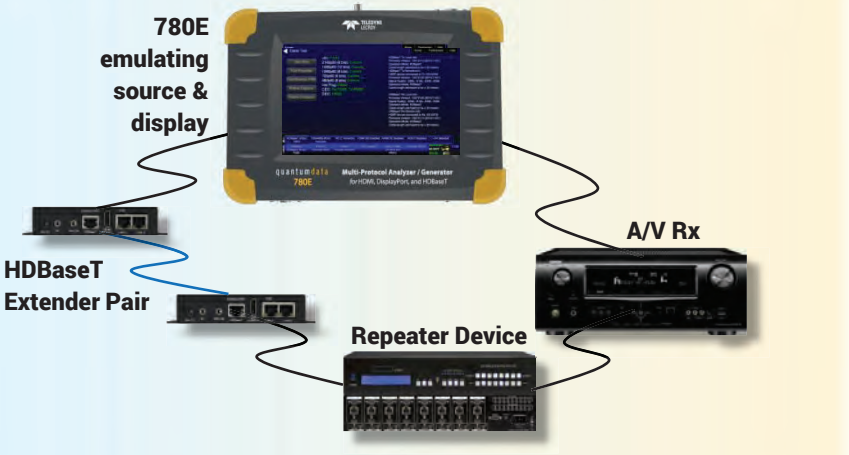
Verify Cable / Network (Loop)

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

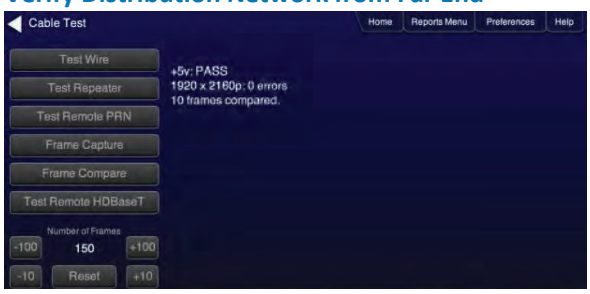
The 780E supports testing of installed distribution networks from the far-end at the display.

Cable Test (HDBaseT) - Verify Networks/Cables



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 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. Scroll bitmaps to test motion artifacts.

Verify EDID Contents

Many interoperability problems are EDID related. 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 compliance.

Verify Audio

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 & DTS Master Audio.

Select Video Formats

EDID Verification Test

NEW! Test HDR on an Ultra HD TV

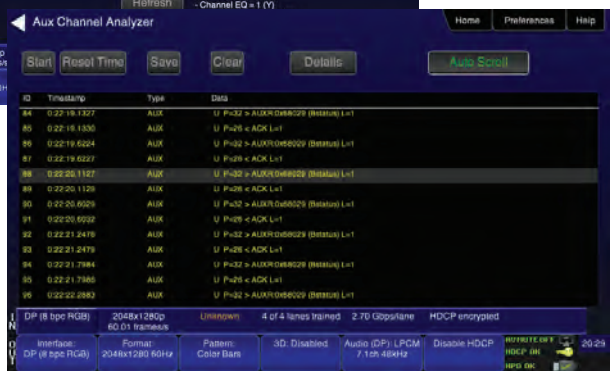
You can verify an Ultra HD TVs HDR capabilities with optional HDR pattern packs: 1) HDR Lab (below) and 2) Dolby Vision. HDR Lab includes HDR Test Patterns and selected HDR Still Picture reference images. Dolby Vision test image verifies embedded HDR metadata.

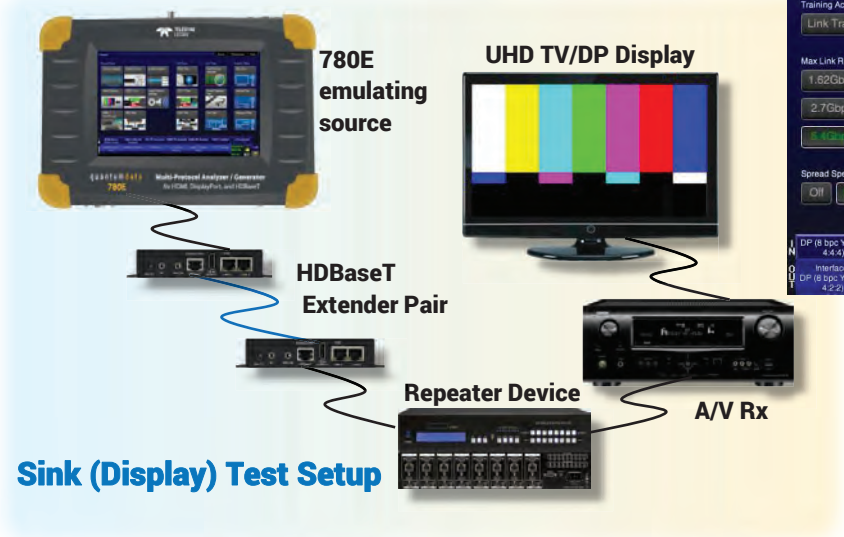
Verify DisplayPort Link Training

Verify DP link training using a variety of settable parameters. Specify link rate, number of lanes, voltage swing and pre-emphasis. Or allow link training based on a display's capabilities (below). View link training transactions in ACA (below).

Configure DP Link Training

View DP Link Training Transactions



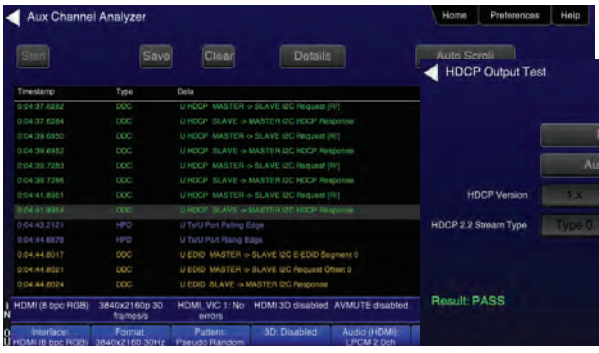


Sink (Display) Test Setup

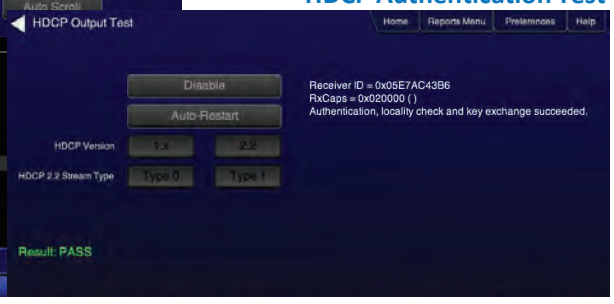
Verify HDCP Authentication

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

Aux Channel Analyzer (ACA)



HDCP Authentication Test



SPECIFICATIONS

HDMI

Version	HDMI 2.0b
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, BT.2020 (YCbCr)
Video Max Pixel Rate	600MHz (6.00 Gbps/channel TMDS rate); 18Gbps aggregate data rate
Color Depths	8, 10, 12 , 16 bits per component (bpc) (deep color: 10 bpc up to 480MHz; 12 bpc up to 400MHz; 16 bpc up to 300MHz)
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 (NEW! including support for Long Reach mode)
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 (optional with 780E p/n 00-00251; standard with 780E p/n 00-00243)

Version	DisplayPort 1.2a
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
Report File Creation	Provides HTML formatted report of tests performed
HDR Lab & Dolby Vision	Optional test patterns for testing HDR on HDMI Ultra HD TVs

Instrument

AC Adapter	100-240 VAC, 47-63Hz
Weight	3.25 LBS; 1.47 Kg
Embedded Display	800 (H); x 480 (V) resolution; 24 bit RGB color.
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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