TELEDYNE LECROY
Everywhere**you**look™

quantum**data**™ 780C
Video Generator /
Protocol Analyzer
for HDMI, HDBaseT & 3G-SDI Testing

Important Note: The model name and description for this 780 model has been changed to: *"780C Video Generator / Protocol Analyzer for HDMI, HDBaseT & 3G-SDI Testing."*

Key Features

- **HDMI, HDBaseT and 3G-SDI input and output ports for testing both source display devices as well as cables and distribution networks**

- **Test Ultra High Definition video products supporting 4K resolutions up to 300 MHz**

- **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 transactions, SCDC transactions and CEC messages**

- **Passive protocol logging between a source and a sink is also optionally supported on HDMI ports**

- **NEW! Report File Creation feature provides HTML formatted report of tests performed**

The Teledyne LeCroy quantumdata 780C Video Generator / Protocol Analyzer for HDMI, HDBaseT & 3G-SDI Testing is a portable, handheld digital video generator and analyzer that enables you to run tests on various digital video devices and network distribution devices on site or in the R&D lab. The 780C is equipped with multiple interface types including HDMI and HDBaseT at 300 MHz pixel rate, 3G-SDI up to 2.97 Gb/s bit rate as well as component analog. Testing digital interfaces is supported by both an output port and an input port to allow testing of digital video sources, displays, audio devices and distribution devices.

Diagnose and Troubleshoot

The 780C provide an at-a-glance status bar on the bottom of the 7" inch touch screen. The instrument 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, infoFrames as well as timing data. The 780C can also be used for diagnosing installed digital video networks. You can place the 780C 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. Generate reports to demonstrate test series completion.

Ease of Use

The 780C'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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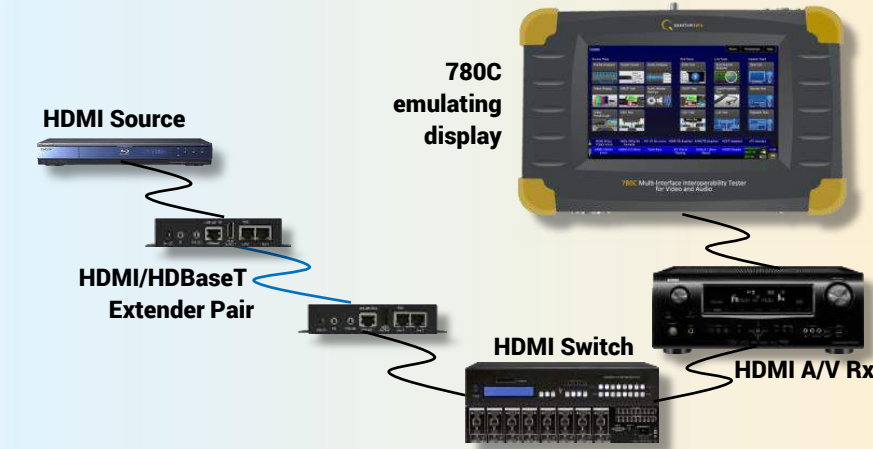# SOURCE & NETWORK DIAGNOSTIC TEST FEATURES

View Incoming Video & Data

The 780C 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. 780C 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 Auxiliary 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 and CEC transactions. You can check details of each transaction in the log and distribute the logs to colleagues and subject matter experts.
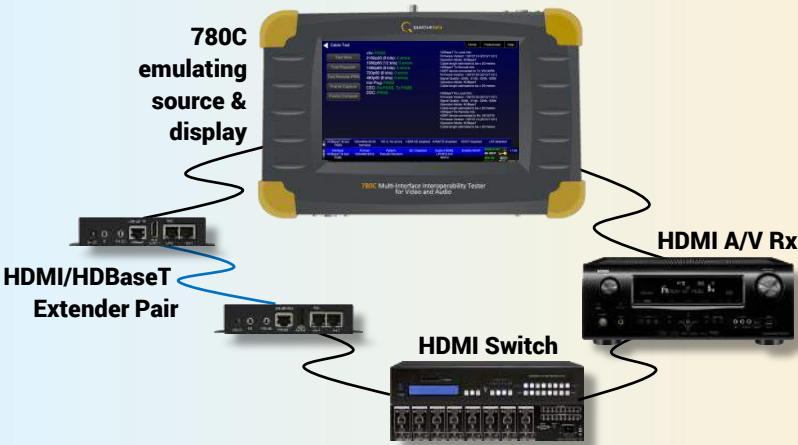
HDMI Source

780C emulating display

HDMI/HDBaseT Extender Pair

HDMI Switch

HDMI A/V Rx

Example Source Test Setup

Video Display Test – View video & metadata

Timing: 1920 x 1080
60 frames/sec, Progressive
Video type: HDMI
Bits per color: 8
Color space: YCbCr 4:4:4
Colorimetry: ITU-709
Range: Limited
VIC code: 16
AV Mute: Disabled
HDCP: Enabled

Format Analyzer – View metadata & timing

Video type: HDMI
Total: 2200 x 1125
Active: 1920 x 1080
Frames/sec: 60.0
Scan type: Progressive
HSYNC delay: 88
HSYNC width: 44
VSYNC delay: 4
VSYNC width: 5
HSYNC polarity: +
VSYNC polarity: +

Bits per comp.: 8
Color space: YCbCr 4:4:4
Colorimetry: ITU-709
Pixels repeated 0 times
Video ID code (VIC): 16
(1920 x 1080 p
@59.94/60Hz 16:9)
AV Mute Status: Not muted
HDCP: Encrypted

Errors: None

Read

Verify Cable / Network (Loop)

The 780C enables you to test distribution equipment to verify integrity of extenders, matrix switches and distribution amps. You can test individual devices or entire networks including digital video cables.
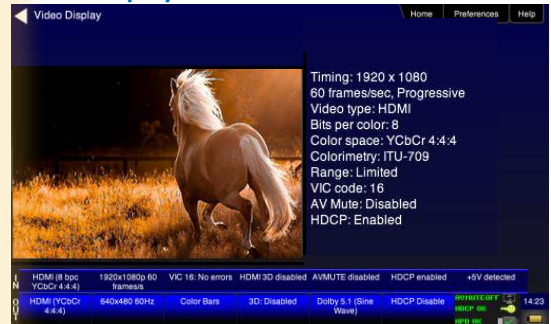
Verify Video at Far End

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

Cable Test - Verify networks and cables

+5v: PASS
2160p30 (8 bits): 0 errors
1080p60 (12 bits): 0 errors
1080p60 (8 bits): 0 errors
720p60 (8 bits): 0 errors
480p60 (8 bits): 0 errors
Hot Plug: PASS
CEC: Rx PASS, Tx PASS
DDC: PASS

HDBaseT Tx Local Info:
Firmware Version: 13072110 (2013/11/21)
Operation Mode: HDBaseT
Cable length estimated to be < 20 meters
HDBaseT Tx Remote Info:
HDBT device connected to Tx: VS100RX
Firmware Version: 13072100 (2013/11/21)
Signal Quality: -22db, -21db, -22db, -22db
Operation Mode: HDBaseT
Cable length estimated to be < 20 meters

HDBaseT Rx Local Info:
Firmware Version: 13072100 (2013/11/21)
Signal Quality: -22db, -21db, -22db, -22db
Operation Mode: HDBaseT
Cable length estimated to be < 20 meters
HDBaseT Rx Remote Info:
HDBT device connected to Rx: VS100TX
Firmware Version: 13072100 (2013/11/21)
Operation Mode: HDBaseT
Cable length estimated to be < 20 meters

Test Wire
Test Repeater
Test Remote PRN
Frame Capture
Frame Compare

780C emulating source & display

HDMI/HDBaseT Extender Pair

HDMI A/V Rx

HDMI Switch

Example Network Test Setup

Verify distribution network from far end

+5v: PASS
1920 x 2160p: 0 errors
10 frames compared.

Test Wire
Test Repeater
Test Remote PRN
Frame Capture
Frame Compare

Verify Video

Select from CEA, VESA & SMPTE 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. You can view the EDID contents of any connected display to verify its audio/video capabilities (including HDR elements). You can verify the structure of an EDID and check for compliance.

Verify Audio

You can use the 780C to verify audio on displays or audio systems using programmable LPCM test tones. Set sampling rate, bit depth, amplitude and number of channels. You can select Dolby and DTS compressed audio clips including Dolby TrueHD & DTS Master Audio.

Video Test – Select formats & parameters

Audio Test
Select compressed or LPCM tones

780C emulating source

HDMI UHD TV

HDMI/HDBaseT Extender Pair

HDMI Switch

HDMI A/V Rx

Sink (Display) Test Setup

EDID Verification Test

Verify HDCP Authentication

HDCP authentication problems occur in complex digital video distribution networks. Use the HDCP test to quickly check HDCP 1.4 authentication. Enabling and disabling HDCP can quickly reveal the nature of an interoperability problem. Monitor the HDCP transactions during the HDCP test using the Auxiliary Channel Analyzer.

Aux Channel Analyzer

HDCP Authentication Test

HDMI

Version	HDMI 2.0a
Standard Formats	VESA (DMT, CVT-R, CVT), CEA (HDMI / DVI)
Connector	(1) Type A Tx; (1) Type A Rx
Video Colorimetry	ITU-R BT.601-5, ITU-R BT.709-5
Video Max Pixel Rate	300MHz (3.00 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	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)

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)

3G-SDI

Version – Standards	SMPTE 259M, 344M, 292M, 372M, 424M Level A (Level B is future)
Connector	BNC 75 ohm
Video Colorimetry	ITU-R BT.601-5, ITU-R BT.709-5
Video Max Bit Rates	SDI: 360Mb/s; HD-SDI: 1.485Gbps; 3G-SDI: 2.97Gbps
Encoding Bit Depths	10 bits/component
Video Encoding/Sampling	YCbCr - 4:2:2
Audio Formats / Settings	8 Channel 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)

Analog Video

Connectors	VGA HD-15
Format Standards	VESA, CEA
Video Encoding	RGB, YPbPr
Max Pixel Rate	80MHz (higher resolutions supported through pixel repetition)

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 NEW!	Provides HTML formatted report of tests performed

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.
Size	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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