HDMI Protocol tests for digital video

Video pattern and format library with NEW!

Passive protocol logging between a

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Access

Environmental

Operating Temp: 32 to 104 (F); 800 (H); x 480 (V) resolution; 24 bit RGB color.

USB Type B, RS

Height: 2.7 in. (6.98 cm) Width: 9.75 in. (24.76 cm) Depth: 6 in. (15.24 cm)

Video

Max Pixel Rate

80MHz (higher resolutions 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.

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

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.

HDMI

Version

HDMI 2.0a

Supported Formats

VESA (DMT, CVT-R, CVT), CEA (HDMI / DVI)

Connectors

(1) Type A (M); (1) Type A (F)

Video Colorimetry


Max Video Bit Rate

HDMI - 2.1 Gbps, HDBaseT - 10.2 Gbps

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 (D, DD+); DTS (ES, HD, Master Audio)

Audio LPCM Settings

Sampling rates (32 – 192 kHz); Bits per sample (16, 20, 24)

HDBaseT

Version

HDBaseT 1.0

Supported Formats

VESA (DMT, CVT-R, CVT), CEA

Connectors

(1) PTP (PL-45) Tx; (1) RJ-45 Rx

Video Colorimetry


Max Video Bit 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 (D, 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, SMPTE 292M, SMPTE 372M, SMPTE 424M Level A (Level B is future)

Connectors

BNC 75 ohm

Video Colorimetry


Max Video Bit Rates

SDI: 360Mb/s; H-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)

Audio Analog Video

Connectors

Optical (JIS FOS); SPDIF (RCA)

Audio Formats

LPCM, Dolby (D, 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 feature

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)}
**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.

**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.

**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.

**SINK (DISPLAY) TEST & DIAGNOSTIC FEATURES**

**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.

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**SINK (DISPLAY) TEST & DIAGNOSTIC FEATURES**

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

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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.

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SPECIFICATIONS

HDMI

<table>
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<tr>
<th>Feature</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Version</td>
<td>HDMI 2.0</td>
</tr>
<tr>
<td>Standard Formats</td>
<td>VESA (DMT, CVT-R, CVT), CEA (HDMI / DVI)</td>
</tr>
<tr>
<td>Connectors</td>
<td>(1) Type A; (2) Type ARx</td>
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<tr>
<td>Video Max Pixel Rate</td>
<td>3000Hz (3.00 Gbps/channel TMDS rate)</td>
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<tr>
<td>Color Depths</td>
<td>8, 10, 12 bits</td>
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<tr>
<td>Video Encoding / Sampling</td>
<td>RGB, YCbCr, 4:4:4, 4:2:2, 4:2:0</td>
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<tr>
<td>HDCP</td>
<td>Version 1.4</td>
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<tr>
<td>Audio Formats</td>
<td>LPCM, Dolby (DD, DD+, TrueHD), DTS (ES, HD, Master Audio)</td>
</tr>
<tr>
<td>Audio LPCM Settings</td>
<td>Sampling rates (32 – 192 kHz); Bits per sample (16, 20, 24)</td>
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HDBaseT

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</thead>
<tbody>
<tr>
<td>Version</td>
<td>HDBaseT 1.0</td>
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<tr>
<td>Standard Formats</td>
<td>VESA (DMT, CVT-R, CVT), CEA</td>
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<tr>
<td>Connectors</td>
<td>10BPR (FL-45 Tx) (1) RJ-45 Rx</td>
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<tr>
<td>Video Max Pixel Rate</td>
<td>3000Hz</td>
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<tr>
<td>Color Depths</td>
<td>8, 10, 12 bits</td>
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<tr>
<td>Video Encoding / Sampling</td>
<td>RGB, YCbCr, 4:4:4, 4:2:2, 4:2:0</td>
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<td>Version 1.4</td>
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<td>Audio Formats</td>
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<tr>
<td>Audio LPCM Settings</td>
<td>Sampling rates (32 – 192 kHz); Bits per sample (16, 20, 24)</td>
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3G-SDI

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<thead>
<tr>
<th>Feature</th>
<th>Specification</th>
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</thead>
<tbody>
<tr>
<td>Connectors</td>
<td>BNC 75 ohm</td>
</tr>
<tr>
<td>Video Max Bit Rates</td>
<td>3GDI: 1.485Gbps; 3G-SDI: 2.97Gbps</td>
</tr>
<tr>
<td>Encoding Bit Depths</td>
<td>10 bits/component</td>
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<tr>
<td>Video Encoding / Sampling</td>
<td>YCbCr - 4:2:2</td>
</tr>
<tr>
<td>Audio Formats / Settings</td>
<td>8 Channel LPCM; Sampling rates (32 – 192 kHz); Bits per sample (16, 20, 24)</td>
</tr>
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Digital Audio

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<thead>
<tr>
<th>Feature</th>
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</thead>
<tbody>
<tr>
<td>Connectors</td>
<td>Optical (JIS FOS); SPDIF (RCA)</td>
</tr>
<tr>
<td>Audio Formats</td>
<td>LPCM, Dolby (DD, DD+), DTS (ES, HD)</td>
</tr>
<tr>
<td>Audio LPCM Settings</td>
<td>Sampling rates (32 – 192 kHz); Bits per sample (16, 20, 24)</td>
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Analog Video

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<thead>
<tr>
<th>Feature</th>
<th>Specification</th>
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</thead>
<tbody>
<tr>
<td>Connectors</td>
<td>VGA HD-15</td>
</tr>
<tr>
<td>Format Standards</td>
<td>VESA, CEA</td>
</tr>
<tr>
<td>Video Encoding</td>
<td>RGB, YPbPr</td>
</tr>
<tr>
<td>Max Pixel Rate</td>
<td>80MHz (higher resolutions supported through pixel repetition)</td>
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</table>

Options

<table>
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<tr>
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<tbody>
<tr>
<td>Auto EDID Test</td>
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<tr>
<td>Cable Test</td>
<td>Test digital video cables and video distribution networks</td>
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<tr>
<td>ACA Monitor</td>
<td>Monitor aux channel transactions emulating a source or sink or passively</td>
</tr>
<tr>
<td>Report File Creation NEW!</td>
<td>Provides HTML formatted report of tests performed</td>
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Instrument

<table>
<thead>
<tr>
<th>Feature</th>
<th>Specification</th>
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<tbody>
<tr>
<td>AC Adapter</td>
<td>100-240 VAC, 47-63Hz</td>
</tr>
<tr>
<td>Weight</td>
<td>3.25 lbs, 1.47 kg</td>
</tr>
<tr>
<td>Embedded Display</td>
<td>800 (h) x 480 (v) resolution; 24 bit RGB color</td>
</tr>
<tr>
<td>Size</td>
<td>Height: 2.7 in. (6.9 cm); Width: 9.75 in. (24.7 cm); Depth: 6 in. (15.2 cm)</td>
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<td>Command Line Control</td>
<td>USB Type B, RS-232</td>
</tr>
<tr>
<td>Environmental</td>
<td>Operating Temp: 32 to 104 (F); 0 to 40 (C)</td>
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<td>File Access</td>
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quantumdata™ 780C Video Generator / Protocol Analyzer for HDMI, HDBaseT & 3G-SDI Testing

Key Features

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- Test Ultra High Definition video products supporting 4K resolutions up to 300 MHz
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- NEW! Report File Creation feature provides HTML formatted report of tests performed

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.”

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