



780A HANDHELD TEST INSTRUMENT

Now you can test 4K Ultra HD HDMI 2.0 devices @ 50/60Hz



(Note: Above image shown with optional 4-port board to support ACA passive monitoring.)

The 780A Handheld Test Instrument is a portable multimedia generator and analyzer that enables you to conduct quick verification tests of all your HDMI® Products—source, sinks, repeaters, distribution devices—on-site or in an R&D lab. The instrument's color touch display makes it easy and convenient to use.

The 780A Handheld Test Instrument builds on the 780 Handheld Test Instrument and adds the following new capabilities:

- 300MHz HDMI Tx port.
- 300MHz HDMI Rx port.
- **NEW!** Test 4K Ultra HD HDMI 2.0 devices at 50/60Hz with 4:2:0 pixel encoding and EDID feature enhancements.
- View full scaled captured video frames by panning - even 4K resolutions.
- Headphone jack for monitoring incoming LPCM audio.
- RS-232 port for command line control.
- Emulate HDMI 1.4 ARC Tx to test ARC Rx on A/V receiver.

TESTING HDMI SINK DEVICES

The 780A is equipped with an HDMI output port for testing HDMI sink devices. You can test and calibrate the video on your high definition TVs with a variety of resolutions and standard 2D or 3D test patterns as well as custom patterns from THX® and ISF®. You can also verify hot plug, EDID and HDCP and CEC messaging on HDMI sink devices.

ANALYZING HDMI SOURCE DEVICES

The 780A is also equipped with an HDMI input port for verifying HDMI source devices. The HDMI input port and built-in display enable you to verify the incoming video parameters and view the entire, unscaled video image—including 4K images by panning, even when encrypted with HDCP. You can also verify the incoming audio by examining the decoded IEC audio headers, audio inframes and channel status blocks.

TESTING HDMI CABLES & DISTRIBUTION NETWORKS

Because the 780A has both an HDMI output and an HDMI input, you can test your HDMI cables and distribution systems (splitters, extenders and switches) with the Cable Test feature. You can prequalify cables and distribution systems prior to installation or once they are installed with the Frame Compare (Pixel Error) test feature.

MONITORING HDMI PROTOCOLS

With the Auxiliary Channel Analyzer (ACA) options, you can monitor the HDMI hot plug related events and DDC transactions, EDID and HDCP, between HDMI devices and the 780A while the 780A is emulating a known-good HDMI source or sink. The second ACA option enables you to passively monitor the HDMI hot plug-related events and DDC transactions on three HDMI connected devices.

KEY FEATURES + BENEFITS

HDMI Output Port - Pattern Testing including 3D and Deep Color
Up to 300MHz for testing on 4K Ultra HD HDMI 2.0 HDTVs at 50/60Hz.

HDMI Input Port - Analysis of HDMI sources
Up to 300MHz for testing on 4K Ultra HD HDMI 2.0 sources at 50/60Hz.

HDMI 2.0 Feature Testing
Test HDMI 2.0 compliant 4K at 50/60Hz devices with 4:2:0 pixel encoding and EDID features.

HDMI 3D Pattern Generation
Test Side-by-Side, Top/Bottom and Frame Packing 3D format structures.

Analog Component Video Output
Pattern testing for analog component inputs on HDTVs.

Custom Formats and Bitmap Patterns
Create custom formats using Format Editor tool. Import your bitmaps for pattern testing.

Test Pattern Scrolling
Animated test pattern for testing motion artifacts.

Licensed Bitmap Images (optional)
Image packs w/ bitmap test images. Current pattern packs: THX®, China Res and ISF®.

Multichannel Digital Audio
Verify audio-capable devices using multichannel audio over HDMI, SPDIF, and Optical outputs with various audio formats at sampling rates up to 192kHz. Test LPCM and Dolby and DTS compressed audio formats. Check HDMI ARC channel on A/V receivers.

Color Touch Screen - View Incoming Video
User friendly color touch screen enables you to operate the instrument and view incoming video and metadata from an HDMI source. View incoming video—scaled or unscaled, encrypted or unencrypted—even at resolutions up to 4K.

Installer Test Utility
Diagnose HDMI interoperability problems with simplified test interface. Verify sources, sinks, repeaters with "one button" tests. Pass/fail results provided.

HDCP Sink Test (Network Analyzer option)
Verify that an HDMI display properly responds to HDCP content protection.

HDCP Source Test (Network Analyzer option)
Check max HDMI devices supported by source.

EDID Verification (Network Analyzer option)
Verify the HDMI display's EDID for checksum and header errors. View the display's entire EDID content. Compare two EDIDs. Run portions of the EDID compliance test.

HDMI Sink Emulator (Network Analyzer option)
Emulate an HDMI sink device to test EDID on HDMI source device; test a source response to a variety of stored EDIDs. EDID.

HDMI Source Video Testing (Network Analyzer option)
View the video timing data and video infocode data from an HDMI source device including 3D metadata. View various data island packet contents.

HDMI Source Audio Testing (Network Analyzer option)
Verify incoming audio (format, sampling rate, bit depth) by viewing the decoded IEC audio headers, audio infocode and channel status bits. Monitor audio through headphone jack.

HDMI Cable & Network Test (Cable & Link test option)
Prequalify or verify your HDMI cable and HDMI distribution network (extenders, splitters, switches, etc) using a pseudo random noise test pattern or pixel error test with Frame Compare feature.

Aux channel analyzer (ACA option)
Monitor the CEC HDMI hot plug related events and DDC transactions, EDID and HDCP, either while emulating a known-good HDMI device or while passively monitoring between multiple HDMI connected devices.
Note: Passive monitoring requires optional hardware configuration.

Battery powered
Rechargeable batteries provide untethered operation when needed. Can also be powered from AC through power adapter.

Command Line Control
Run automated tests through command line interface via USB for RS-232.

780A Handheld Test Instrument

STANDARD FEATURES

| | |
|-------------------------------|---|
| Video Pattern testing | |
| Formats | |
| Number of formats | 147 |
| Standards | CEA-861E; VESA |
| Deep Color | 1080p60 30/36 bit |
| Patterns | |
| Number of patterns | More than 40 patterns |
| Gray levels | 256 |
| Imported bitmaps | Fixed resolution 24 bit |
| Imageshift | Scroll bitmap images |
| HDMI 3D Testing | |
| Test pattern | 3D bitmap test images and NEW rendered images |
| 3D Formats | Top & Bottom, Side-by-Side (half & full), Frame Packing |
| Audio Test Tones | |
| Test | Tone |
| Sound Pressure & Main Speaker | Pink Noise |
| Frequency Response | 500-2kHz |
| Speaker Distortion | 20-20kHz |
| Early Reflections | Sine wave 63 Hz, 125Hz, 1kHz, 4kHz |
| Polarity of speaker wires | Impulse |
| Sound Convergence | Polarity |
| | Autotime Delay |
| View incoming video | |
| HDMI Source Test | View incoming video image and video metadata from HDMI source even when content is protected with HDCP. |
| HDMI Installer Test Utility | |
| Type | Function |
| Source Test | HDCP, video, video timing |
| Sink Test | Hot plug, EDID, HDCP, video, video type |
| Repeater Test | Hot plug, EDID, HDCP, video, video type, video timing |
| Link Test | Hot plug, EDID, HDCP, video, video type, video timing |

SPECIFICATIONS

Video/Audio Outputs

HDMI / DVI Video Output

| | |
|--------------------|--|
| Connector type | (1) one HDMI Type A |
| TMDS protocols | HDMI, DVI |
| Number of links | single |
| Colorimetry | ITU-R BT.601-5; ITU-R BT.709-5 |
| Color depth (HDMI) | 24/30/36bit 4:4:4 RGB/YCbCr 36-bit 4:2:2 |
| Color depth (DVI) | 24-bits per pixel RGB 4:4:4 |
| Encoding | RGB, YCbCr |
| Sampling modes | 4:4:4; 4:2:2; 4:2:0 |
| Pixel rate | 300MHz |
| TMDS clock rate | 3.00Gb/s |
| Timings | Up to 4K x 2K (30Hz) and 50/60Hz with HDMI 2.0 4:2:0 encoding |
| Scan types | Progressive, interlaced |

Analog Video - VGA & Component

| | |
|------------------|---|
| Connector type | VGA (HD15F) VGA-to-RCA adapter provided |
| Color encoding | RGB, YPbPr |
| Pixel rate (MHz) | 80 (pixel rep for higher resolutions) |
| Sync types | Separate, composite |

HDMI Input

| | |
|-----------------|---------------------|
| Connector type | (1) one HDMI Type A |
| TMDS protocols | HDMI, DVI |
| Number of links | single |
| Pixel rate | 300MHz |
| Sampling modes | 4:4:4; 4:2:2; 4:2:0 |

OPTIONAL FEATURES

| | |
|--|--|
| HDMI Network Analyzer Option | |
| HDMI Source Video Test | |
| View the HDMI video timing data and video inframe data (including 3D metadata) from an HDMI source device. | |
| HDMI Source Audio Test | |
| View the audio format, sampling rate, Bit depth of the decoded audio IEC headers, audio inframes, and channel status bits of an HDMI audio source. | |
| CEC Ping test | |
| HDMI CEC source & sink devices | |
| Ping HDMI devices in a network to discover CEC devices. | |
| HDCP | |
| HDMI HDCP Sink Test | |
| Verifies DTV's and repeater's handling of HDCP encrypted video. | |
| HDMI Source Test | |
| Check a sources max HDCP device capabilities. | |
| EDID | |
| HDMI EDID Sink Test | |
| View entire EDID contents and check for errors. Run portions of the EDID compliance test. | |
| HDMI EDID Source Test | |
| Emulate any EDID and test a source's response. Store/Load EDIDs. | |

Digital Audio (HDMI)

| | |
|--------------------------------|--|
| Connector | (1) one HDMI Type A |
| Bits per sample | 16, 20, 24 |
| Sampling rates (kHz) | 32.0, 44.1, 48, 88.2, 96, 176.4, 192 |
| Audio stream types | |
| Programable LPCM (IEC 60958) | All sampling freq, up to 8 channel |
| Dolby Digital (IEC 61937) | Noise patterns, 5.1 |
| Dolby Digital Plus (IEC 61937) | Sine wave clips 192kHz, 2.0, 5.1 & 7.1 |
| Dolby TrueHD | High Bit Rate Audio |
| DTS-ES (IEC 61937) | Noise pattern 5.1 |
| DTS-HD HRA (IEC 61937) | Sine wave clips 192kHz, 5.1 & 7.1 |
| DTS Master Audio | High Bit Rate Audio |

Digital Audio (SPDIF, OPTICAL, HDMI ARC)

| | |
|------------------------------|------------------------------------|
| Connector | |
| SPDIF | RCA |
| OPTICAL | JIS F0S |
| HDMI IN (ARC) | |
| HDMI Type A | |
| Bits per sample | 16, 20, 24 |
| Sampling rates (kHz) | 32, 44.1, 48, 88.2, 96, 176.4, 192 |
| Audio stream types | |
| Programable LPCM (IEC 60958) | All sampling freq, up to 8 channel |
| Dolby Digital (IEC 61937) | Noise patterns, 5.1 |
| DTS-ES (IEC 61937) | Noise pattern 5.1 |

Administration

| | |
|------------------|------------------------------------|
| Firmware upgrade | In the field upgrade through USB. |
| Control | |
| USB peripheral | Download bitmaps, firmware upgrade |
| Command Line | USB, RS-232 |

User Interface – Touch Screen

| | |
|----------------------|-----------------|
| Screen size (active) | 480(H) x 272(V) |
| Color | 24 bit RGB |

OPTIONAL FEATURES

| | |
|--|---|
| HDMI Cable & Link Test Option | |
| HDMI Link (network) Test | Run pixel error and Frame Compare test on HDMI cable networks comprised of cables, extenders, repeaters, switches, processors, etc. Tests for pixel errors on video using pseudo random noise. Tests continuity of 5V, hot plug, CEC bus and DDC lines. |
| Auxiliary Channel Analyzer Option | |
| 1 - Emulation Monitoring | Monitor the CEC hot plug events and the DDC transactions during a connection sequence between the 780 and another HDMI device while emulating either a known-good HDMI source device, known-good display device, or both. |
| 2 - Passive Monitoring (includes option 1 - Emulation Monitoring) | Passively monitor the CEC 5V and hot plug events and the DDC transactions during a connection sequence between HDMI devices (source, repeater and display device). |
| Note: Requires an extra board with four (4) additional HDMI ports. | |
| Image Packs Option | |
| Image Packs | China Res Pattern Pack THX® Pattern Pack ISF® Pattern Pack |

Environmental

| | |
|----------------|------------------------------|
| Humidity | 30% to 80% RH non condensing |
| Operating temp | |
| Celsius | 0 to 40 |
| Fahrenheit | 32 to 104 |

Regulatory

| | |
|------|--|
| RoHS | |
|------|--|

Power

| | |
|----------------------|-------------------------|
| DC | 6AA NiMH batteries |
| Battery life | 2 hours between charge |
| Battery recharge | 30 hours minimum charge |
| AC charger/converter | |
| VAC | 100 to 240 |
| Current (amps) | 0.4 (max) |
| Frequency (Hz) | 47 to 63 |
| Power (VA) | 30 |

Weight

| | |
|-----|----------|
| LBS | 3.25 LBS |
| Kg | 1.47 Kg |

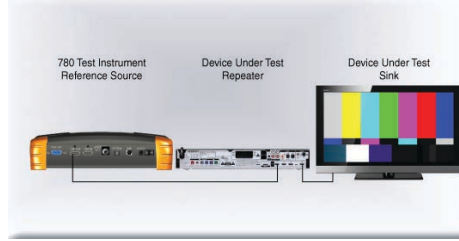
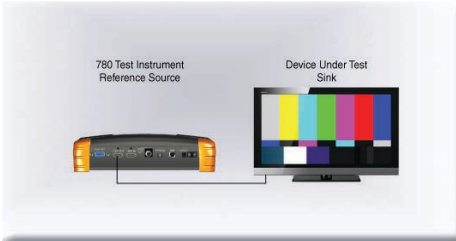
Size (dimensions)

| | |
|--------|-------|
| Height | |
| inches | 2.7 |
| cm | 6.98 |
| Width | |
| inches | 9.75 |
| cm | 24.76 |
| Depth | |
| inches | 6 |
| cm | 15.24 |

STANDARD TESTS

Video Pattern Testing – Test a DTV to ensure that it can render a video test pattern. Scroll a pattern to test for motion artifacts.

Configurations:



Operation:

Step 1. Select Format



Step 2. Select Video Pattern



Step 3. Select Image

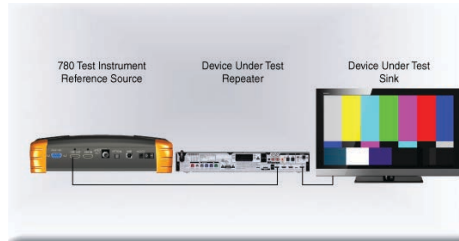
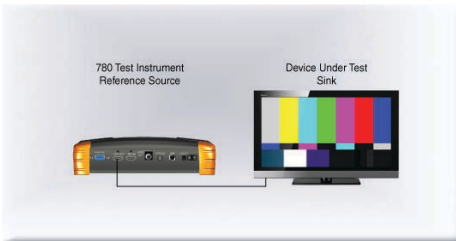


Step 4. Select Pattern Options



3D Video Pattern Testing – Test a DTV to ensure that it can render a video test pattern.

Configurations:



Operation:

Step 1. Select 3D Output



Step 2. Select 3D Test Options

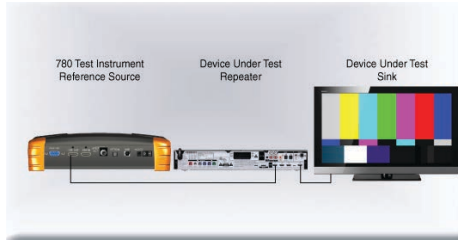
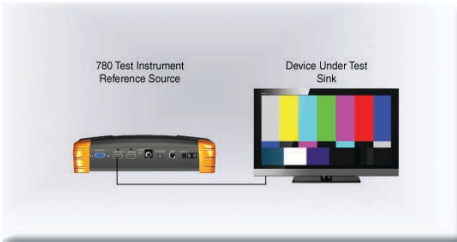


Step 3. Select 3D Test pattern



Audio Test Tones – Test an HDTV or A/V Receiver to ensure that it can render LPCM basic and multichannel audio and multichannel compressed audio and HDMI high bit rate audio formats.

Configurations:



Operation:

Step 1. Select Audio Test Tones



Step 2. Select HDMI Audio Pattern DD+ 7.1

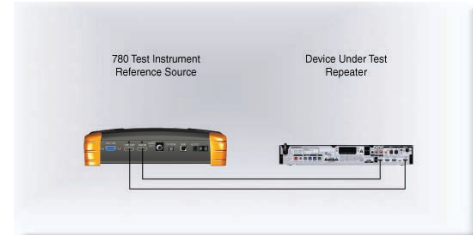
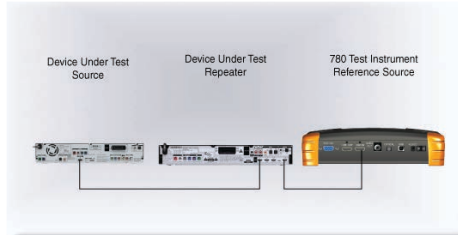
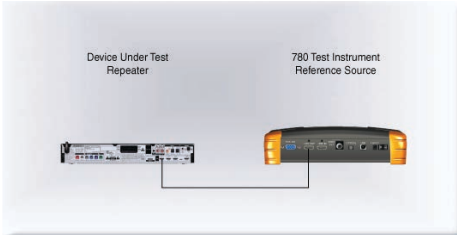


Step 3. Select Pattern Options



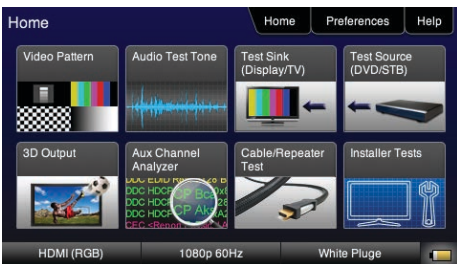
Viewing HDMI Video from Source – Test an HDMI source device directly or through a repeater. View incoming HDMI video including 3D video on the built-in display.

Configurations:

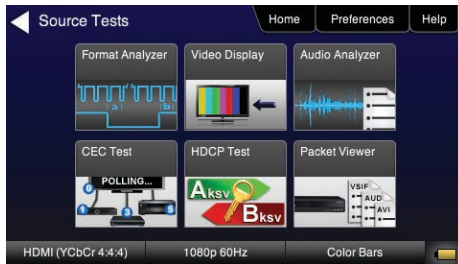


Operation:

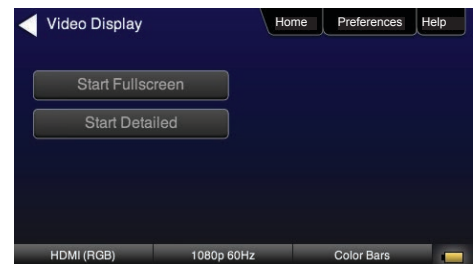
Step 1. Select Test Source (DVD/STB)



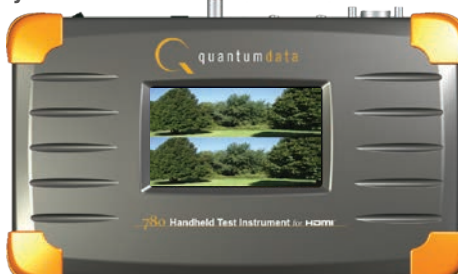
Step 2. Select Video Display



Step 3. Select Fullscreen or Detailed

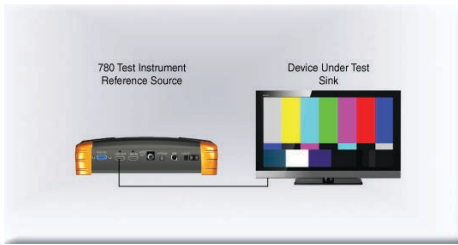


Step 4. View incoming HDMI video on built-in display



Installer Test Utility – Test an HDMI sink device directly.

Configurations:



Step 3. Select OK

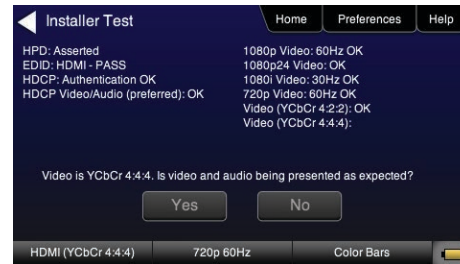


Operation:

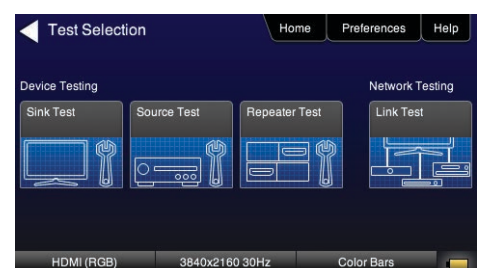
Step 1. Select Installer Test



Step 4. View video and verify if it is correct



Step 2. Select Sink Test

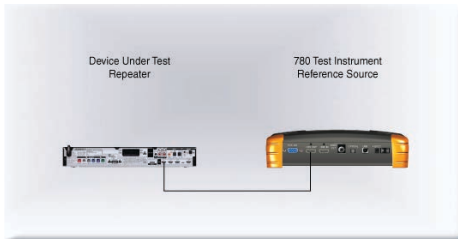


Step 5. View Results



Installer Test Utility – Test an HDMI source device directly.

Configurations:



Step 3. Select OK

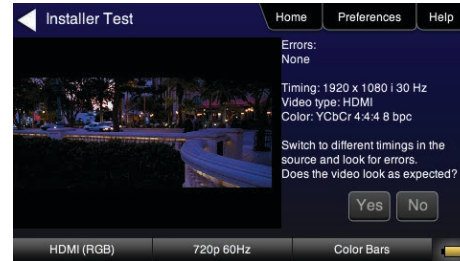


Operation:

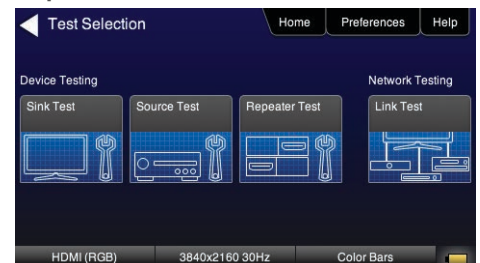
Step 1. Select Installer Test



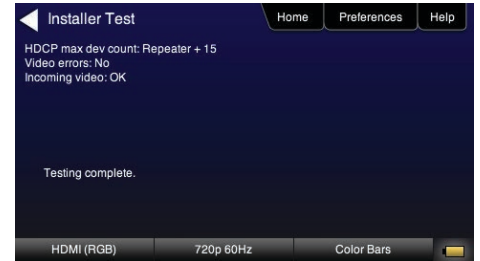
Step 4. View video and verify if it is correct



Step 2. Select Source Test

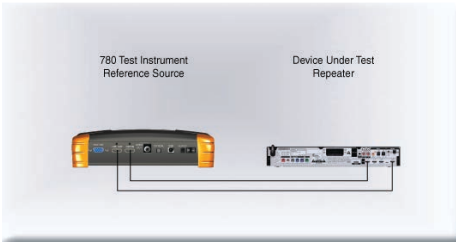


Step 5. View Results



Installer Test Utility – Test an HDMI repeater device directly.

Configurations:

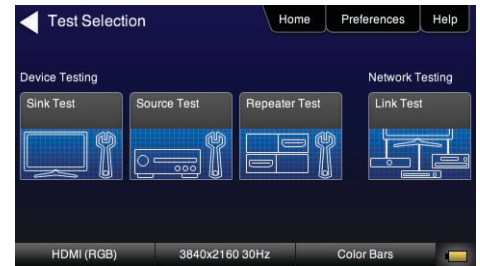


Operation:

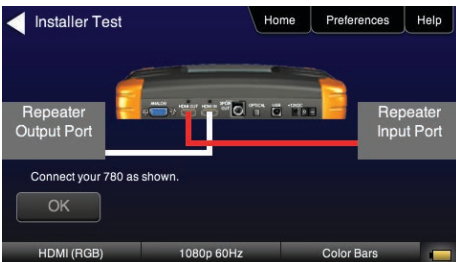
Step 1. Select Installer Test



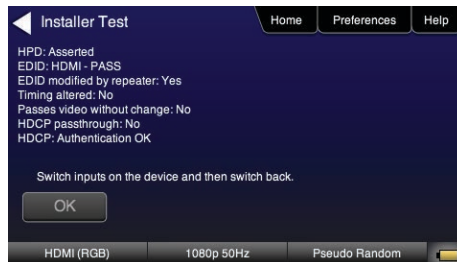
Step 2. Select Repeater Test



Step 3. Select OK

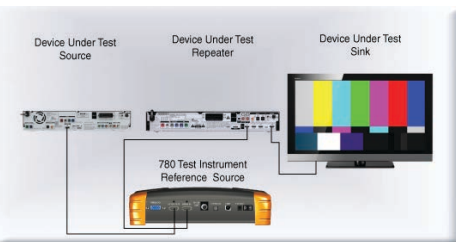


Step 4. View video and verify if it is correct



Installer Test Utility – Test HDMI Links.

Configurations:

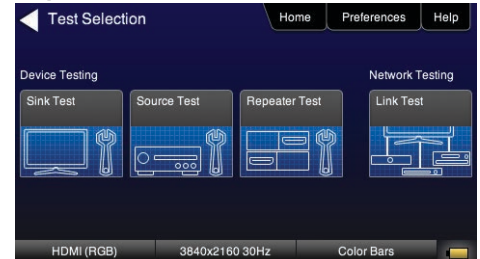


Operation:

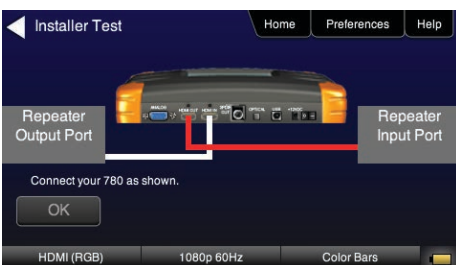
Step 1. Select Installer Test



Step 2. Select Link Test



Step 3. Select OK



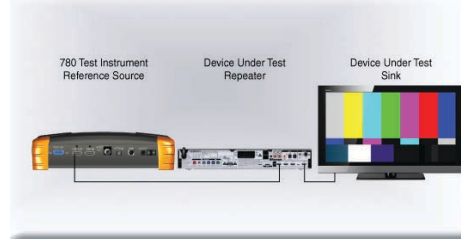
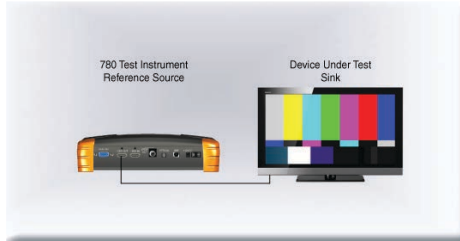
Step 4. View video and verify if it is correct



HDMI NETWORK ANALYZER FEATURES (OPTIONAL)

HDCP Testing – Run an HDCP functional test connected directly to an HDMI HDTV or through a repeater to verify that it can render HDCP protected video content.

Configurations:

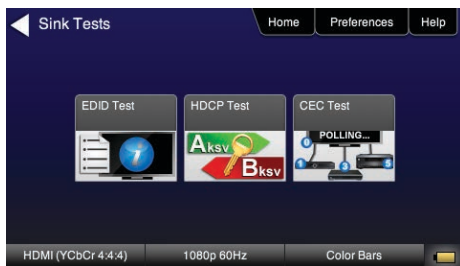


Operation:

Step 1. Select Test Sink (DVD/STB)



Step 2. Select HDCP Test

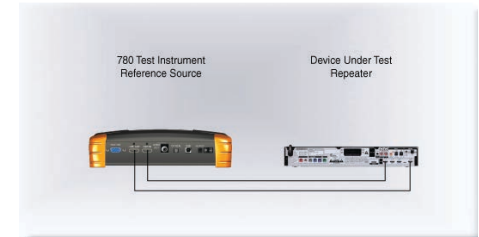
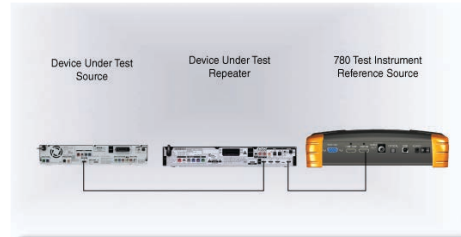
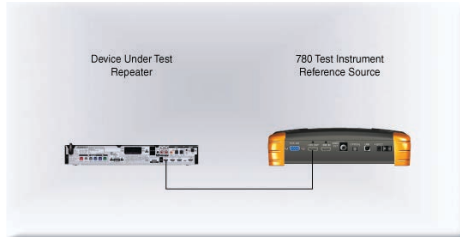


Step 3. Select Enable and View results



HDMI CEC Verification – Run an HDMI CEC verification test on an HDMI system.

Configurations:

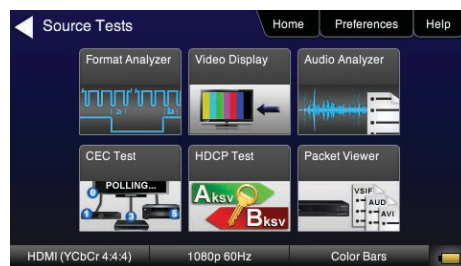


Operation:

Step 1. Select Test Sink (DVD/STB)



Step 2. Select CEC Test

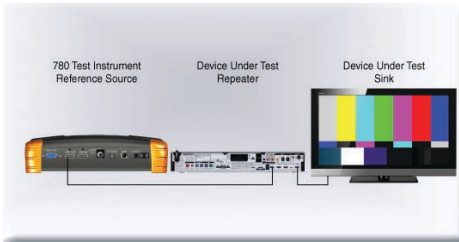


Step 3. View Results



HDMI Source and Repeater Video Test – Test an HDMI source device directly or through a repeater. Verify timing, AVI Infoframes and HDCP authentication for standard video, deep color and 3D.

Configurations:

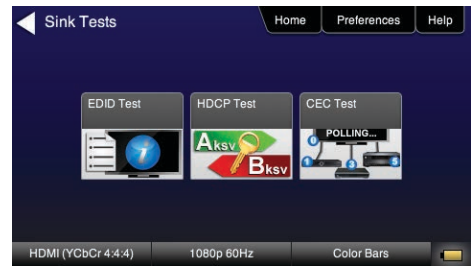


Operation:

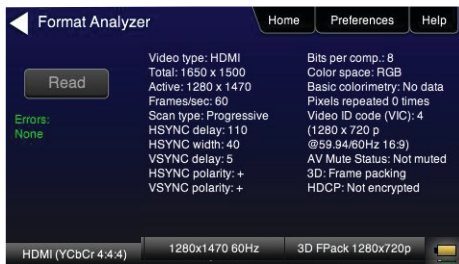
Step 1. Select Test Source (DVD/STB)



Step 2. Select Format Analyzer

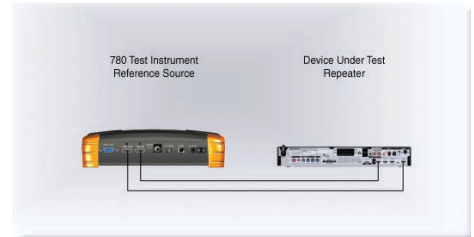
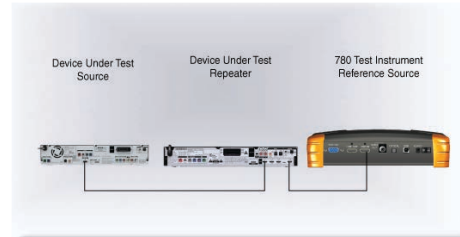
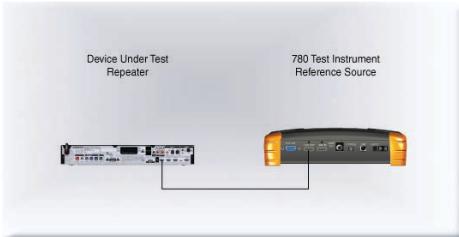


Step 3. View Results



HDMI Source Audio Test – Run an audio test on an HDMI source device or A/V receiver to verify audio headers, audio infoframe and channel status bits.

Configurations:

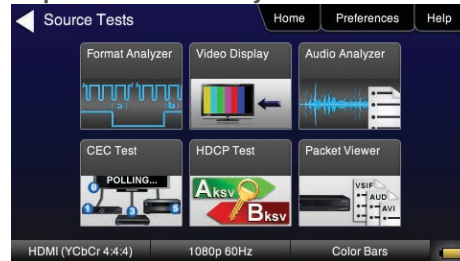


Operation:

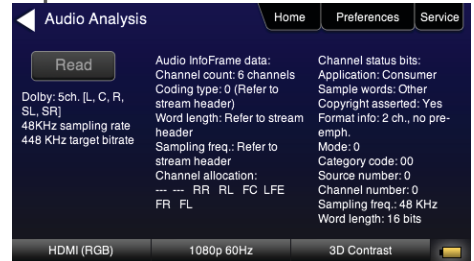
Step 1. Select Test Source (DVD/STB)



Step 2. Select Audio Analyzer

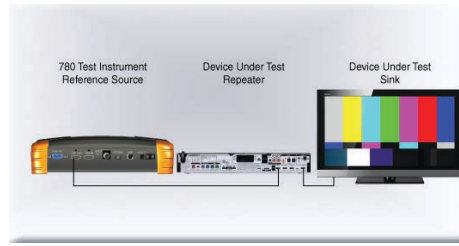
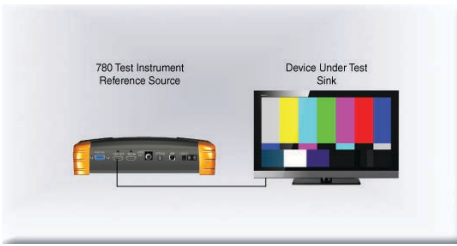


Step 3. View Results



Packet Viewer Test – View HDMI infoframe and selected data island metadata

Configurations:

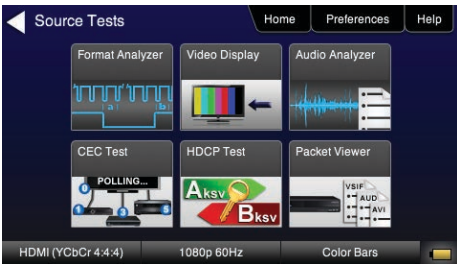


Operation:

Step 1. Select Test Source (DVD/STB)



Step 2. Select Packet Viewer



Step 3. View Results

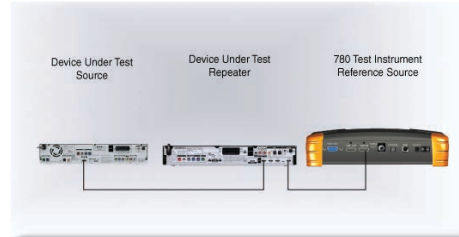
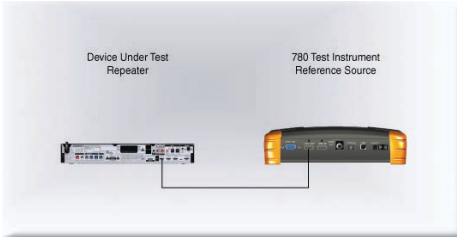


Step 4. View multiple pages



Testing Source's Response to an EDID – Provision 780's HDMI Input port with EDID from any display. Verify source responds properly to EDID. Load EDID from multiple stored EDIDs.

Configurations:

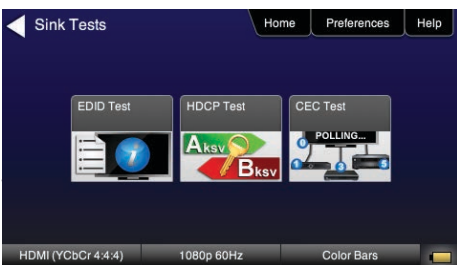


Operation:

Step 1. Select Test Sink (DVD/STB)



Step 2. Select EDID Test



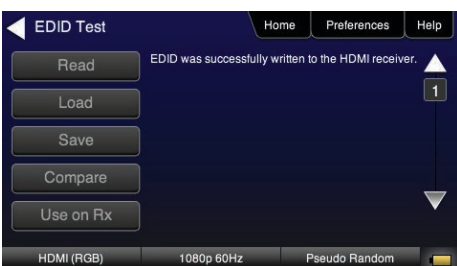
Step 3. Load EDID



Step 3. Load an EDID to RX port

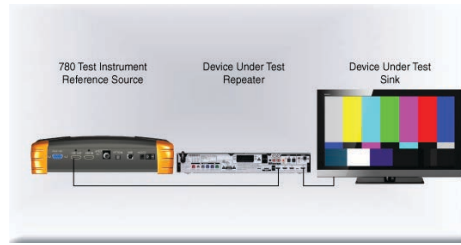
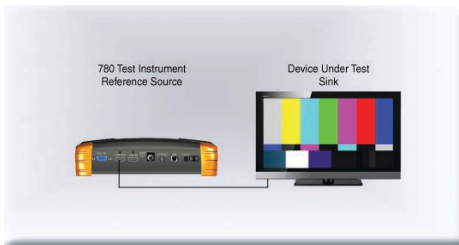


Step 3. Verify EDID has been assigned



EDID Sink Testing – Run an EDID functional test on an HDMI HDTV and/or an A/V receiver to verify EDID checksum, header, and HDMI video and audio support. View entire EDID contents. Run portions of the EDID compliance test

Configurations:

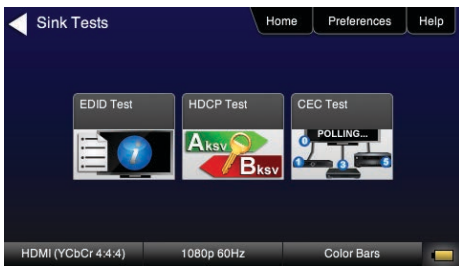


Operation:

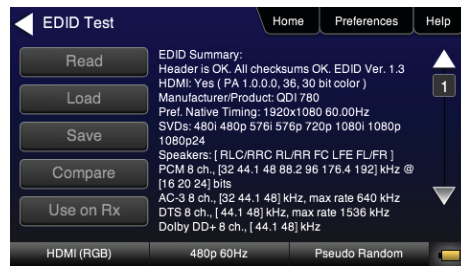
Step 1. Select Test Sink (DVD/STB)



Step 2. Select EDID Test



Step 3. Select Read and View Results (Page 1)



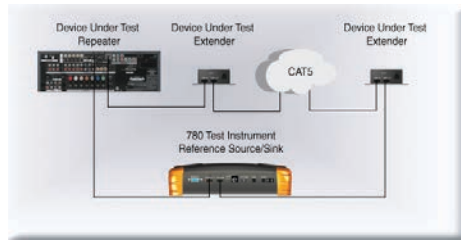
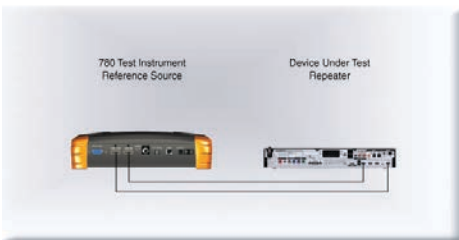
Step 4. View multiple pages (Page 25)



HDMI CABLE & LINK TEST (OPTIONAL)

HDMI Cable or HDMI Link Test – Run a pixel error test on an HDMI cable or an HDMI system with splitters, switches and extenders using pseudo random noise.

Configurations:



Operation:

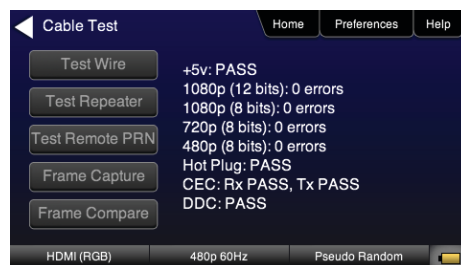
Step 1. Select Cable/Repeater Test



Step 2. Select Test Wire or Test Repeater



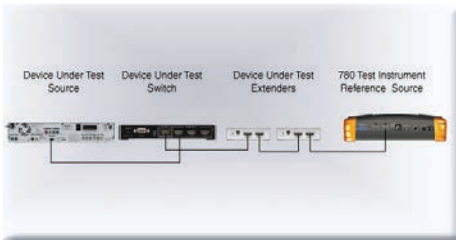
Step 3. View Results (Cable Test)



HDMI FRAME COMPARE TEST (OPTIONAL)

HDMI Frame Compare Test – Run a pixel error test on video frames.

Configurations:



Operation:

Step 1. Select Cable/Repeater Test



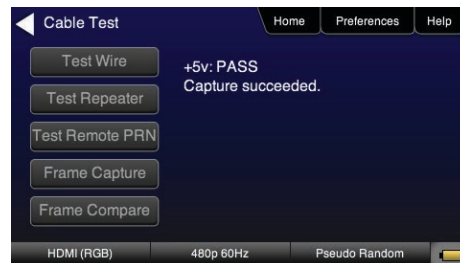
Step 2. Select Frame Capture



Step 3. Select Frame Compare



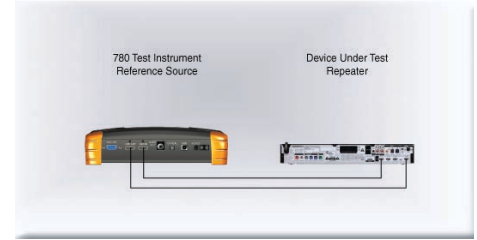
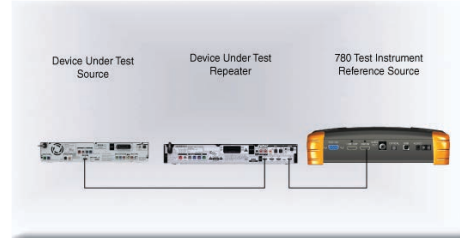
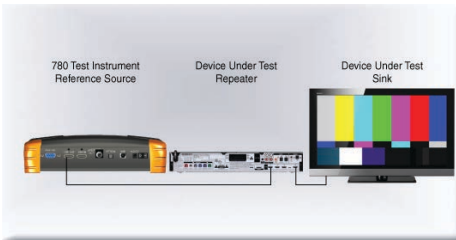
Step 4. Select Frame Capture



HDMI AUXILIARY CHANNEL ANALYZER TEST (EMULATION OPTION)

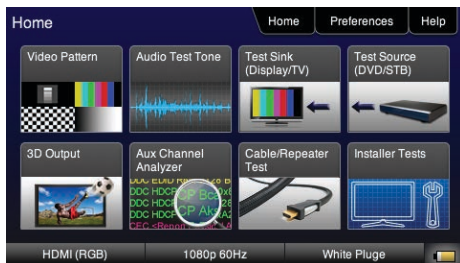
Emulation Monitoring – Monitor HDCP and EDID transactions and hot plug events while emulating either an HDMI source, HDMI sink or both an HDMI source and sink.

Configurations:



Operation:

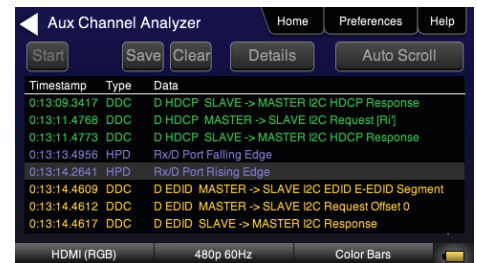
Step 1. Select Aux Channel Analyzer



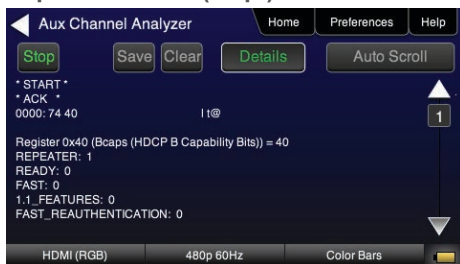
Step 2. Select Configuration: Capture Data



Step 3. View Results (Downstream)

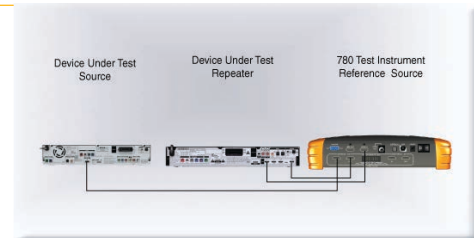
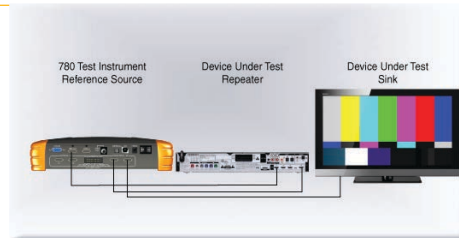
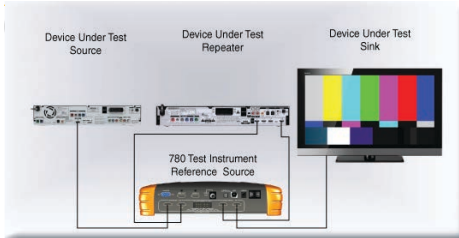


Step 4. View Details (Bcaps)



HDMI AUXILIARY CHANNEL ANALYZER TEST (PASSIVE OPTION)

Passive Monitoring – Passively monitor hot plug-related events, HDCP and EDID transactions between HDMI connected devices.



Operation:

