quantumdata

780B VIDEO GENERATOR/ANALYZER

Now you can test 4K-capable HDTVs @ 60Hz with HDMI 2.0 4:2:0 pixel encoding

The 780B Video Generator/Analyzer 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 features a larger color touch screen display—7 inches at 800 x 480 resolution—for greater convenience in viewing the results of analysis tests such as Auxiliary Channel Analyzer traces. The 780B also features a status bar providing at-a-glance real time status for the HDMI Tx and Rx ports.

The 780B, like the 780A, builds on the 780 test instrument and adds the following new capabilities:

- 300MHz HDMI Tx & Rx ports
- **NEW!** Test HDMI 2.0 4:2:0 pixel encoding and 21:9 formats
- 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 780B 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 780B 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 infoframes and channel status blocks.

TESTING HDMI CABLES & DISTRIBUTION NETWORKS

Because the 780B 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 780B while the 780B is emulating a known-good HDMI source or sink device. The second ACA option enables you to passively monitor the HDMI hot plug-related events and DDC transactions on three HDMI connected devices.

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

KEY FEATURES + BENEFITS

HDMI Output Port - Pattern Testing including 3D and Deep Color
Up to 300MHz for testing on 4K-capable HDMI HDTVs

HDMI Input Port - Analysis of HDMI sources
Up to 300MHz for analysis of 4K-capable HDMI sources

NEW! HDMI 2.0 Feature Testing
Test HDMI 2.0 compliant 4K at 60Hz devices with 4:2:0 pixel encoding, 21:9 format timings (up to 300 MHz) and EDID verification.

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
Large 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.

Real Time Status Bar
Real time dashboard provides at-a-glance status of HDMI input and output ports available on every screen.

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
Verify that an HDMI display properly responds to HDCP content protection.

HDCP Source Test
Check max HDMI devices supported by source.

EDID Verification
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
Emulate an HDMI sink device to test EDID on HDMI source device; test a source response to a variety of stored EDIDs.

HDMI Source Video Testing
View the video timing data and video inforframe data from an HDMI source device including 3D metadata. View various data island packet contents.

HDMI Source Audio Testing
Verify incoming audio (format, sampling rate, bit depth) by viewing the decoded IEC audio headers, audio infoframes 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, switchers, 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 or RS-232.

STANDARD FEATURES

Video Pattern testing

Formats

Number of formats	147 (including HDMI 2.0 21:9)
Standards	CEA-861F; 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 &	Pink Noise
Main Speaker	500-2kHz
Frequency Response	20-20kHz
Speaker Distortion	Sine wave 63 Hz, 125Hz, 1kHz, 4kHz
Early Reflections	Impulse
Polarity of speaker wires	Polarity
Sound Convergence	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

STANDARD FEATURES (CONT)

HDMI Source Video Testing

View the HDMI video timing data and video inforframe data (including 3D metadata) from an HDMI source device.

HDMI Source Audio Testing

View the audio format, sampling rate, Bit depth of the decoded audio IEC headers, audio infoframes, 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 Testing

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 Testing

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.

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

Images Packs	China Res Pattern Pack THX® Pattern Pack ISF® Pattern Pack

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 16/20/24-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 (per HDMI 2.0)
Pixel rate	300MHz
TMDS clock rate	3.00Gb/s
Timings	Up to 4K x 2K 30Hz or 60Hz with HDMI 2.0 4:2:0 pixel 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

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 51

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)	7" with 800(W) x 480(H)
Color	24 bit RGB

Environmental

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

Regulatory

FCC class B	
RoHS	

Power

DC	6AA NiMh batteries
Battery life	1 hour 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

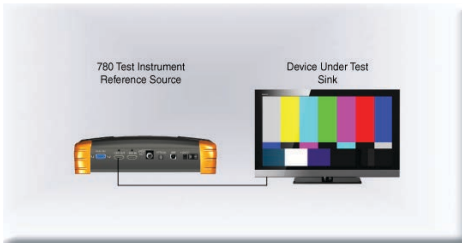
Size (dimensions)

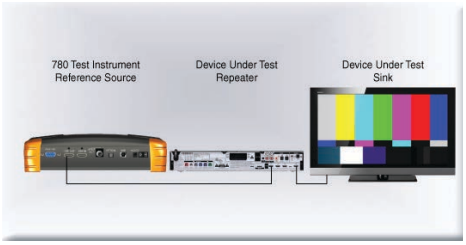
Height	
inches	2.7
cm	6.98
Width	
inches	9.75
cm	24.76
Depth	
inches	6
cm	15.24

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:

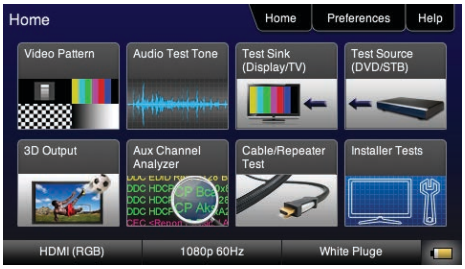




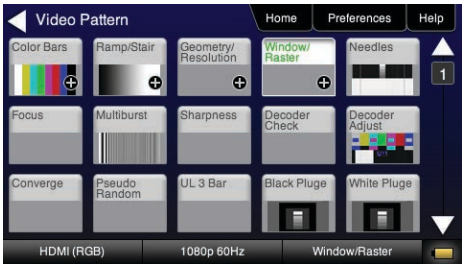
Operation:

Step 1. Select Format

Step 2. Select Video Pattern



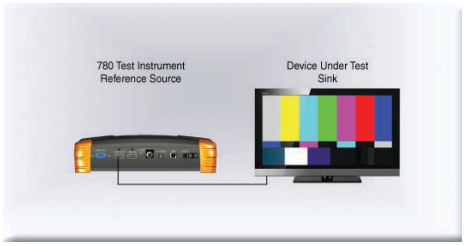
Step 3. Select Image

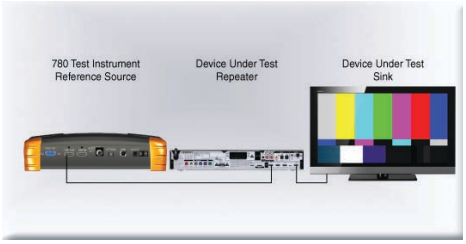


Step 4. Select Pattern Options

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

Configurations:



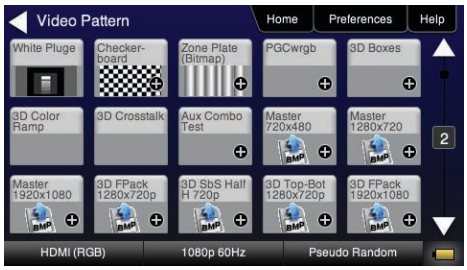


Operation:

Step 1. Select 3D Output

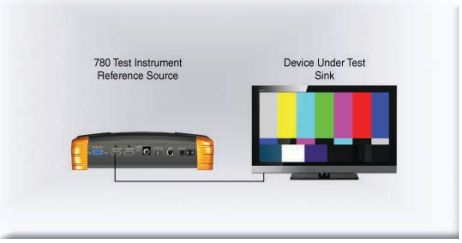
Step 2. Select 3D Test Options

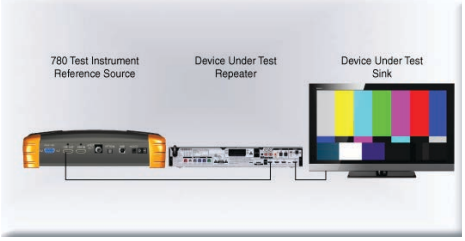
Step 3. Select 3D Test pattern



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:

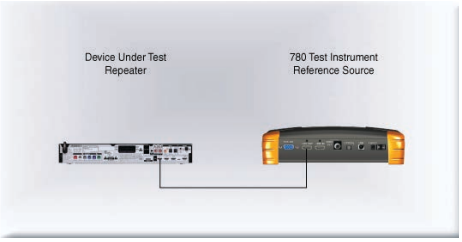
Step 1. Select Audio Test Tones

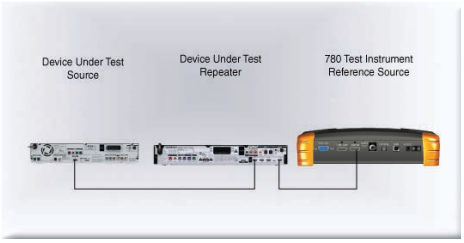
Step 2. Select HDMI Audio Pattern DD+ 7.1

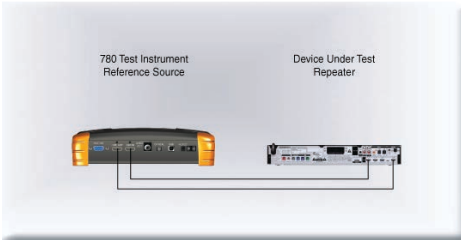
Step 3. Select Pattern Options

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:



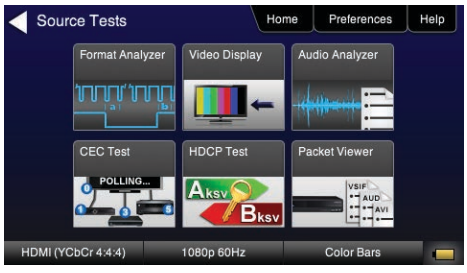




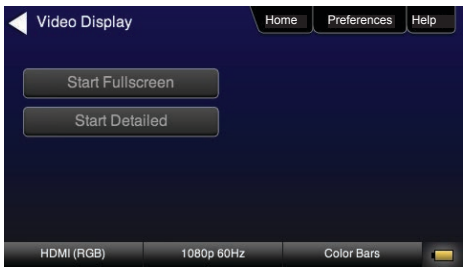
Operation:

Step 1. Select Test Source (DVD/STB)

Step 2. Select Video Display



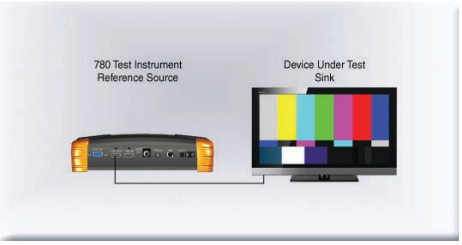
Step 3. Select Fullscreen or Detailed



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

Installer Test Utility – Test an HDMI sink device directly.

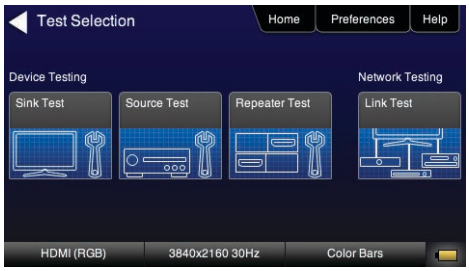
Configurations:



Operation:

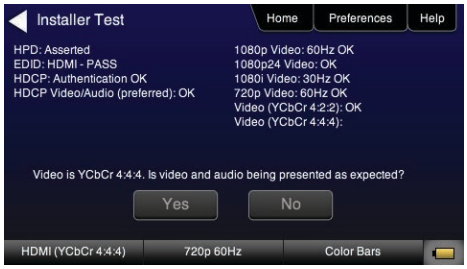
Step 1. Select Installer Test

Step 2. Select Sink Test

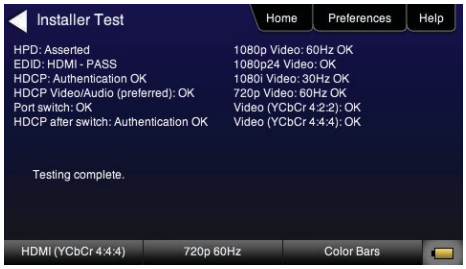


Step 3. Select OK

Step 4. View video and verify if it is correct

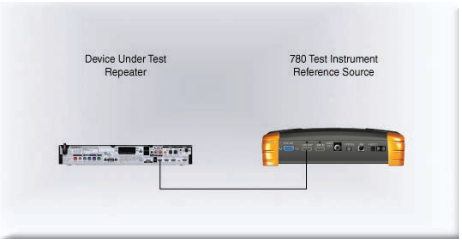


Step 5. View Results



Installer Test Utility – Test an HDMI source device directly.

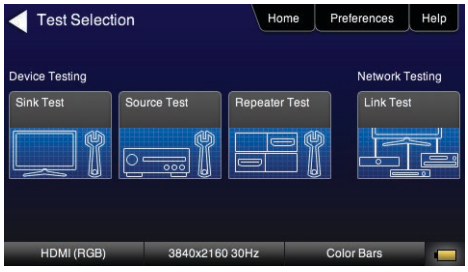
Configurations:



Operation:

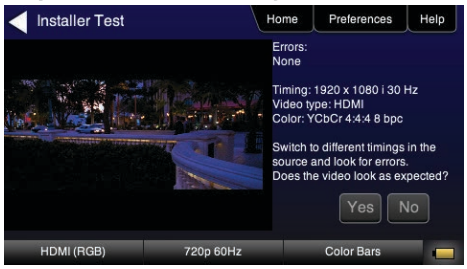
Step 1. Select Installer Test

Step 2. Select Source Test

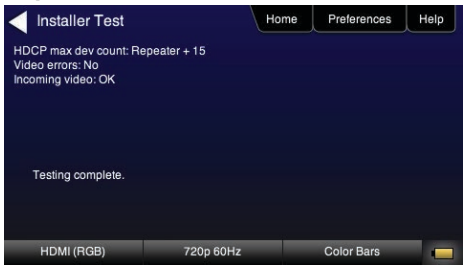


Step 3. Select OK

Step 4. View video and verify if it is correct

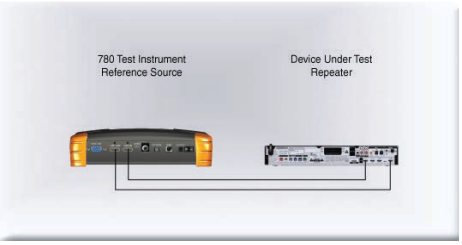


Step 5. View Results



Installer Test Utility – Test an HDMI repeater device directly.

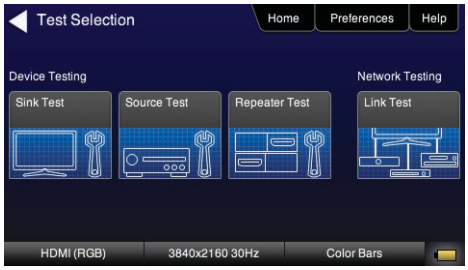
Configurations:



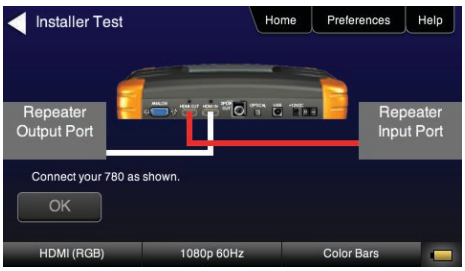
Operation:

Step 1. Select Installer Test

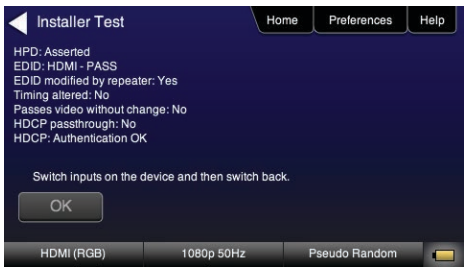
Step 2. Select Repeater Test



Step 3. Select OK

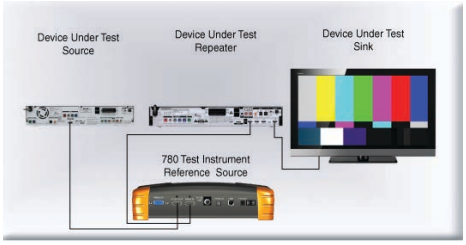


Step 4. View video and verify if it is correct



Installer Test Utility – Test HDMI Links.

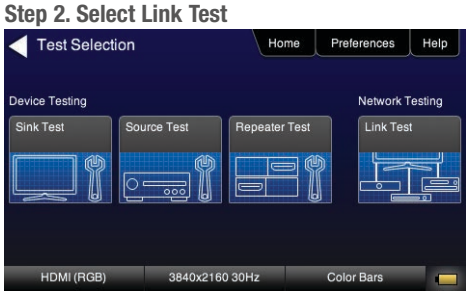
Configurations:



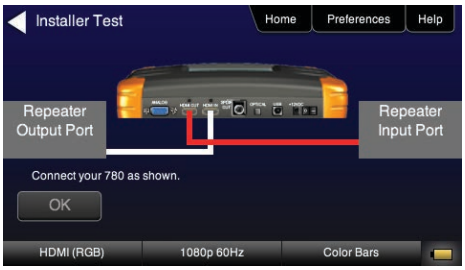
Operation:

Step 1. Select Installer Test

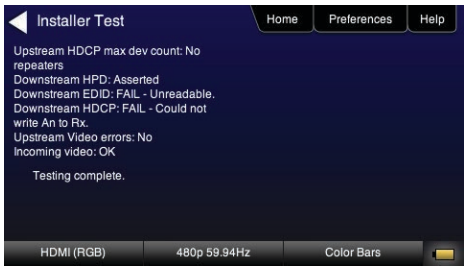
Step 2. Select Link Test



Step 3. Select OK



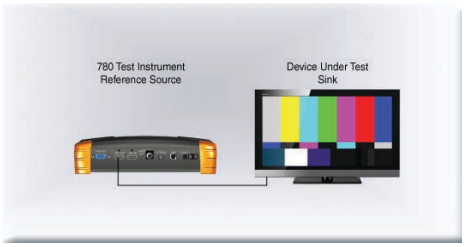
Step 4. View video and verify if it is correct

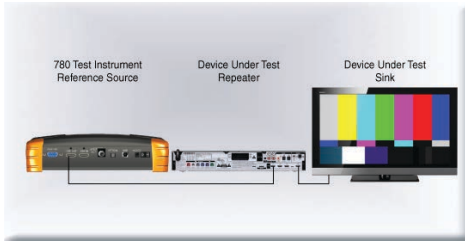


HDMI NETWORK ANALYZER FEATURES (OPTIONAL)

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:

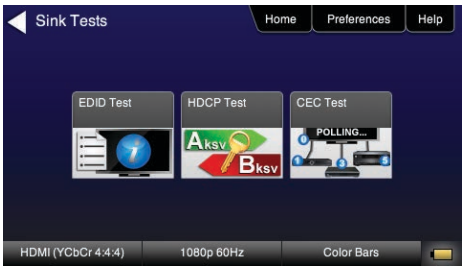




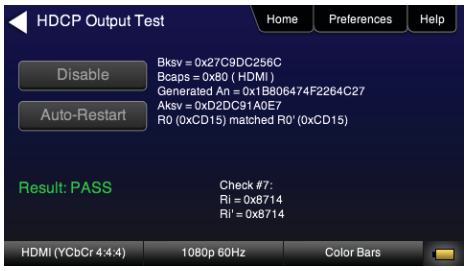
Operation:

Step 1. Select Test Sink (DVD/STB)

Step 2. Select HDCP Test

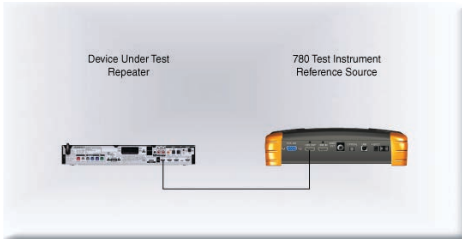


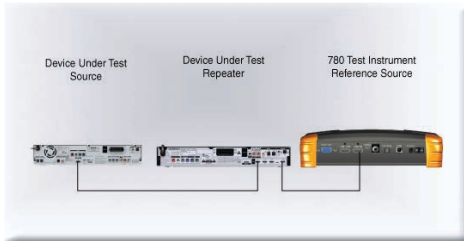
Step 3. Select Enable and View results

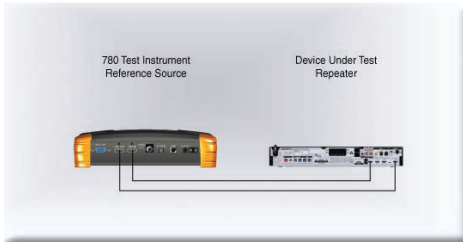


HDMI CEC Verification – Run an HDMI CEC verification test on an HDMI system.

Configurations:



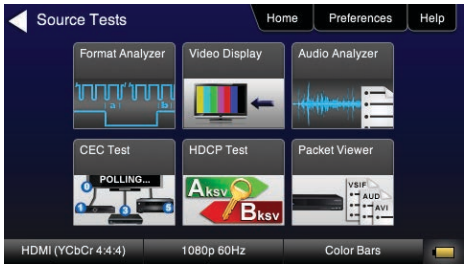




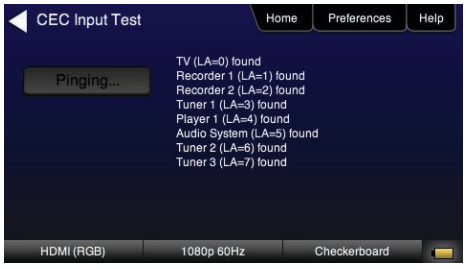
Operation:

Step 1. Select Test Sink (DVD/STB)

Step 2. Select CEC Test

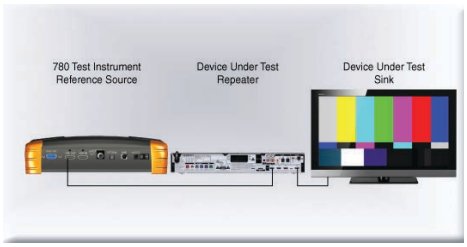


Step 3. View Results



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.

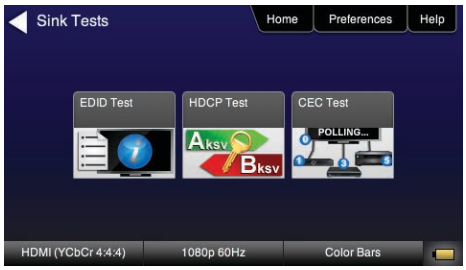
Configurations:



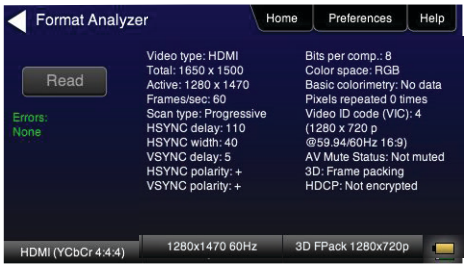
Operation:

Step 1. Select Test Source (DVD/STB)

Step 2. Select Format Analyzer

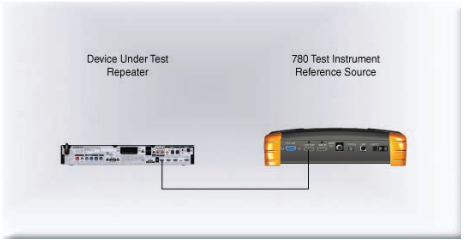


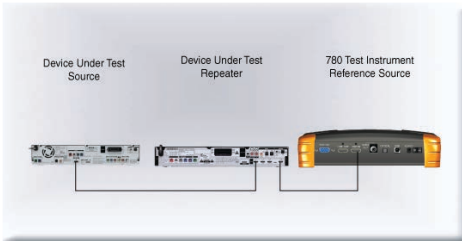
Step 3. View Results

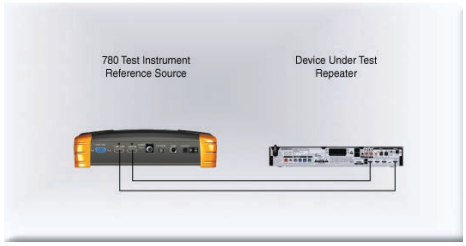


HDMI Source Audio Test – Run an audio test on an HDMI source device or A/V receiver to verify audio headers, audio infoframe and channel status bits.

Configurations:

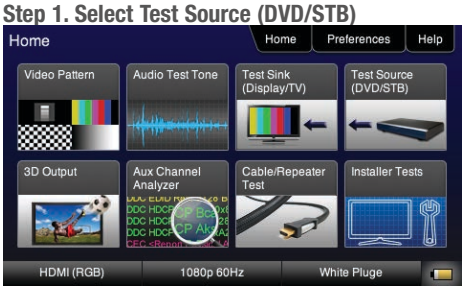




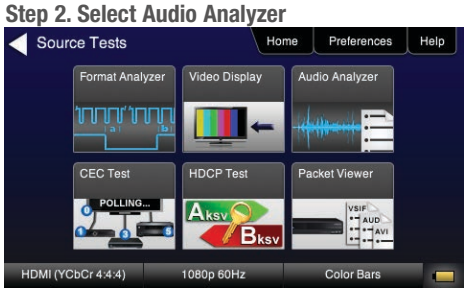


Operation:

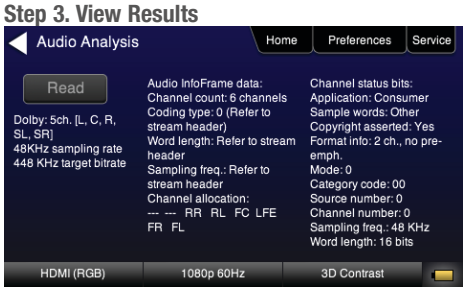
Step 1. Select Test Source (DVD/STB)



Step 2. Select Audio Analyzer

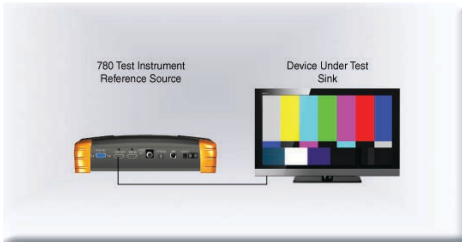


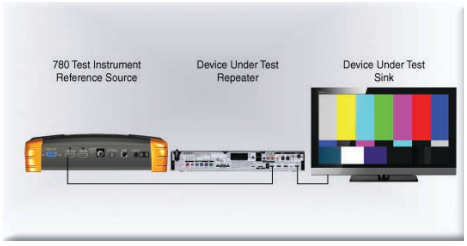
Step 3. View Results



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

Configurations:

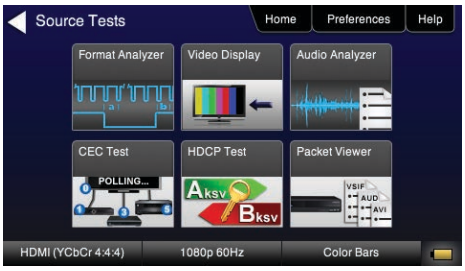




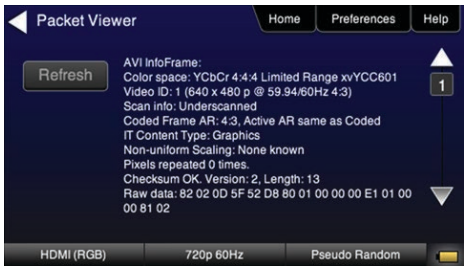
Operation:

Step 1. Select Test Source (DVD/STB)

Step 2. Select Packet Viewer



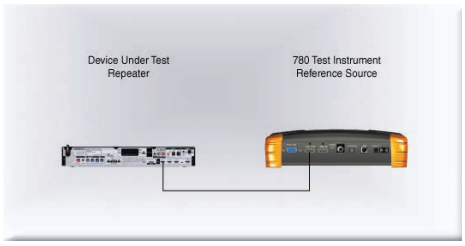
Step 3. View Results

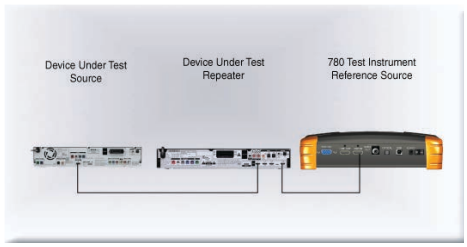


Step 4. View multiple pages

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:

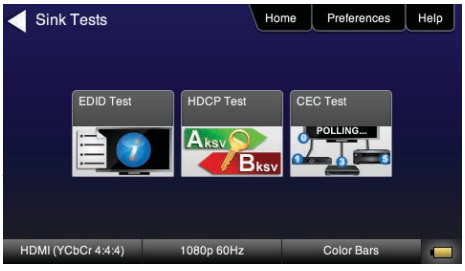




Operation:

Step 1. Select Test Sink (DVD/STB)

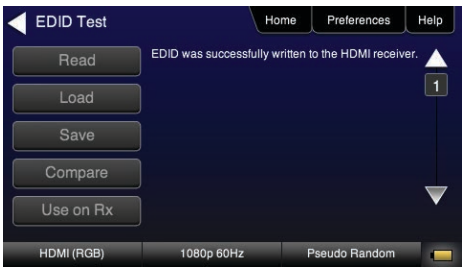
Step 2. Select EDID Test



Step 3. Load EDID

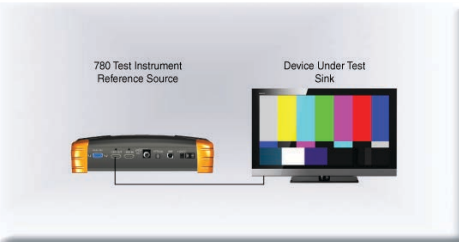
Step 3. Load an EDID to RX port

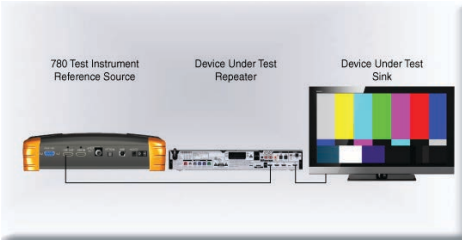
Step 3. Verify EDID has been assigned



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:

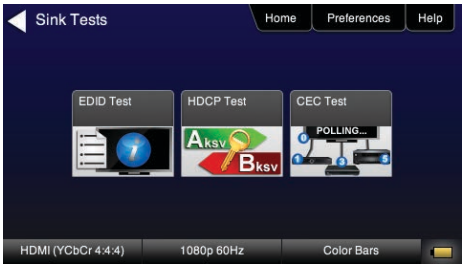




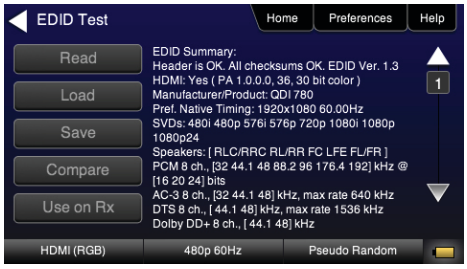
Operation:

Step 1. Select Test Sink (DVD/STB)

Step 2. Select EDID Test



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

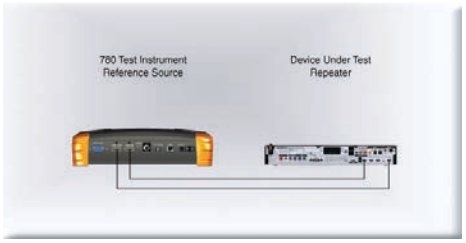


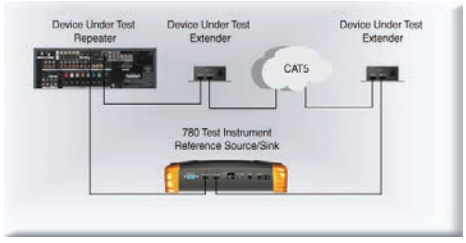
Step 4. View multiple pages (Page 25)

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:

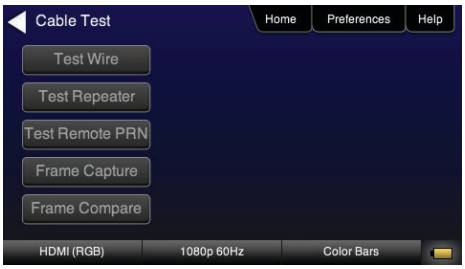




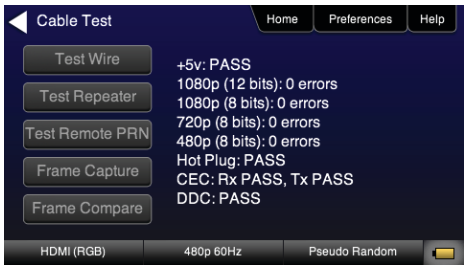
Operation:

Step 1. Select Cable/Repeater Test

Step 2. Select Test Wire or Test Repeater



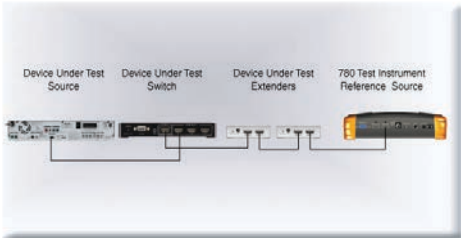
Step 3. View Results (Cable Test)



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

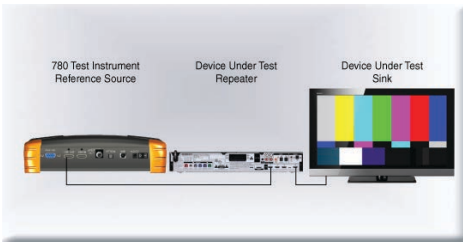
Step 3. Select Frame Compare

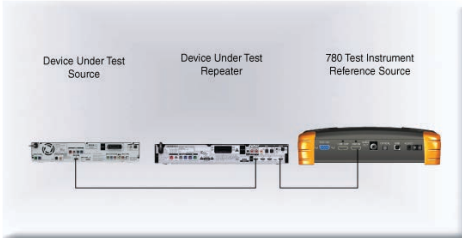
Step 4. Select Frame Capture

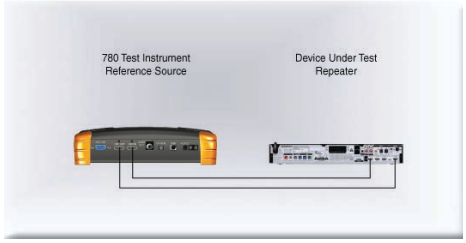
HDMI AUXILIARY CHANNEL ANALYZER TEST (EMULATION OPTION)

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:

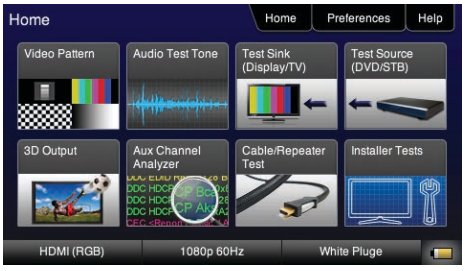






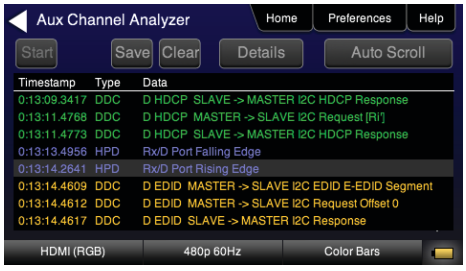
Operation:

Step 1. Select Aux Channel Analyzer

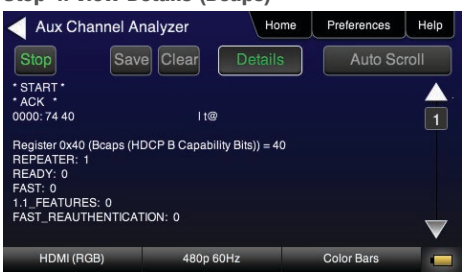


Step 2. Select Configuration: Capture Data

Step 3. View Results (Downstream)

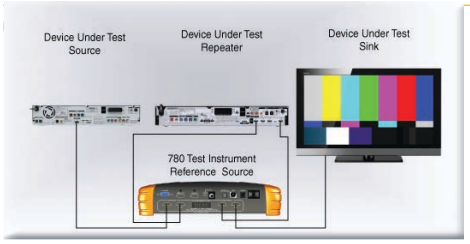


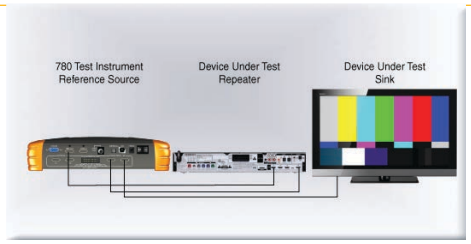
Step 4. View Details (Bcaps)

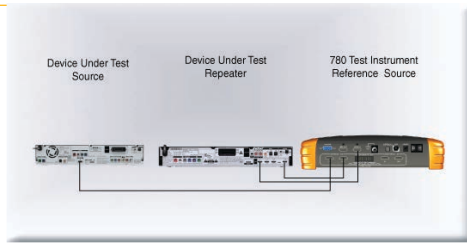
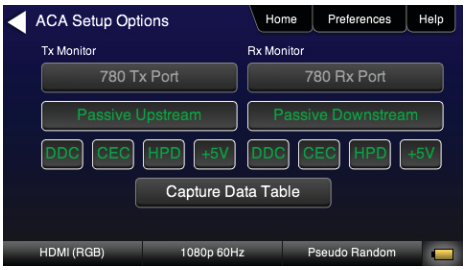
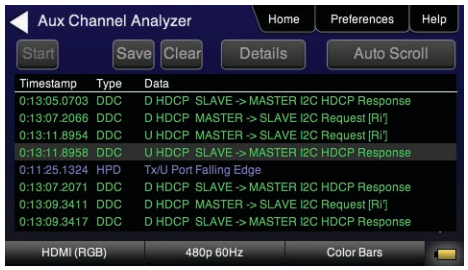


HDMI AUXILIARY CHANNEL ANALYZER TEST (PASSIVE OPTION)

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







Operation: