quantumdata

980 HDMI Video Generator Module
Video Pattern Testing of HDMI HDTVs & Displays

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quantumdata

980 HDMI Video Generator Module

980 HDMI Video Generator Module Overview

980 HDMI Video Generator Module - Features & Benefits

- Supports speeds up to 300 MHz for testing 4K UHD displays:
  - Supports 4K x 2K Ultra HD at frame rates up to 30Hz.
  - Supports 4K x 2K Ultra HD at 50/60Hz with HDMI 2.0 4:2:0 pixel encoding.
  - Supports 1080p at 120Hz.
  - Supports HDMI 2.0 21:9 formats.
- Supports deep color up to pixel clock rate of 165MHz; TMDS clock rates of 2.25Gb/s.
  - 1080p at 60Hz frame rate at 36-bit color.
- Video analyzer for basic functional testing of HDMI source devices.

980 HDMI Video Generator Module Configurations

980 HDMI Video Generator Module – Slot 2 of 980

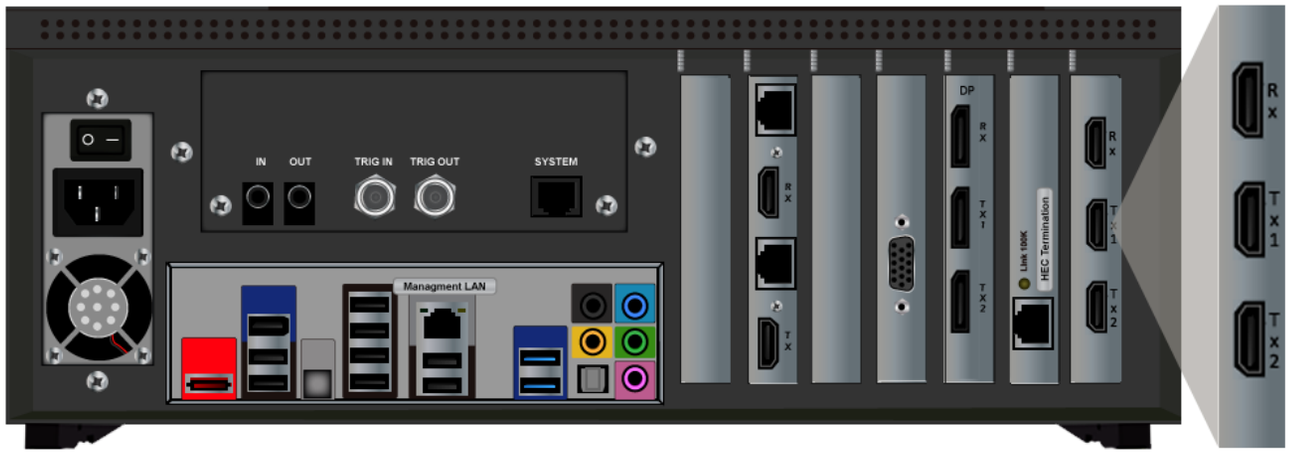
- 980 HDMI Video Generator module placed in the second slot of the 980 chassis.
- 980 HDMI Protocol Analyzer module always equipped in first slot.

980 HDMI Video Generator Module – Slot Config in 980B

- 980 HDMI Video Generator module placed in slots 1,3,5,6, or 7 of the 980B chassis.

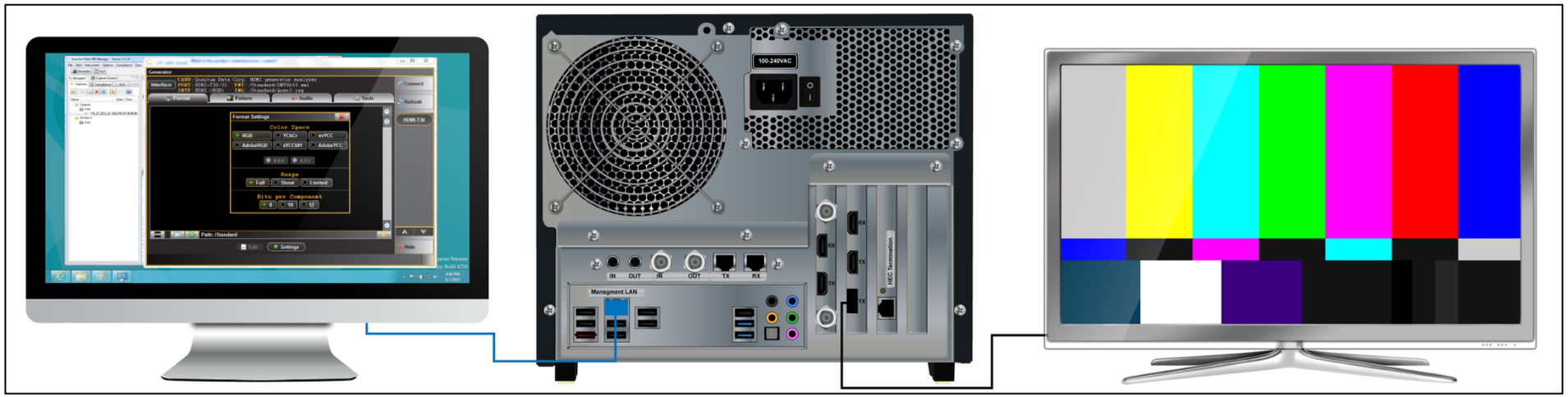
980 HDMI Video Generator Module – Slot Config in 980R

- 980 HDMI Video Generator module placed in slots 1,3,4,5,6, or 7 of the 980R chassis.



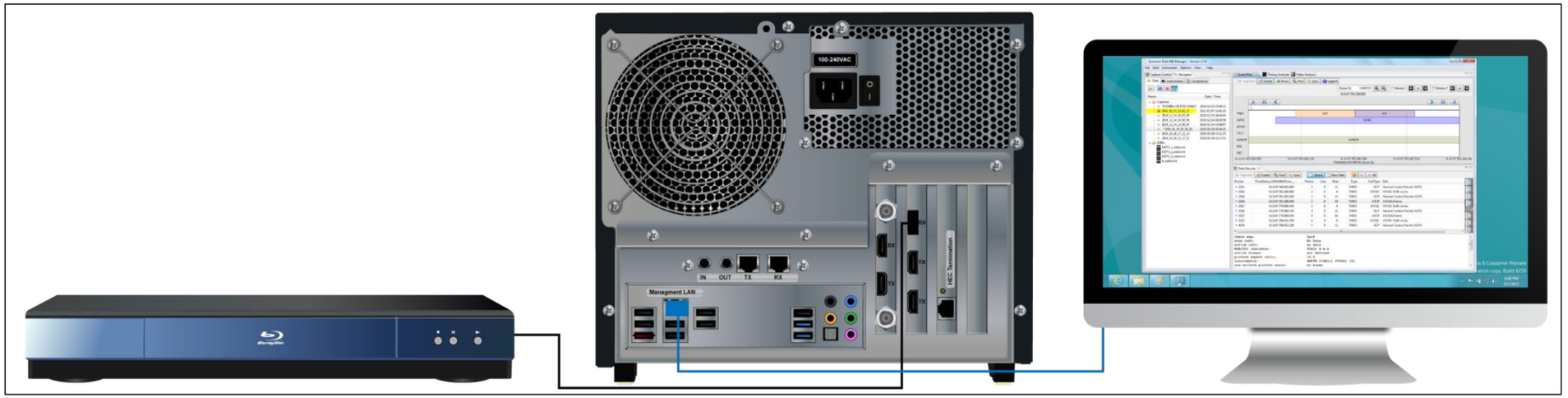
980 HDMI Video Generator Module - Configuration

- 980 HDMI Video Generator testing sink – front and rear view



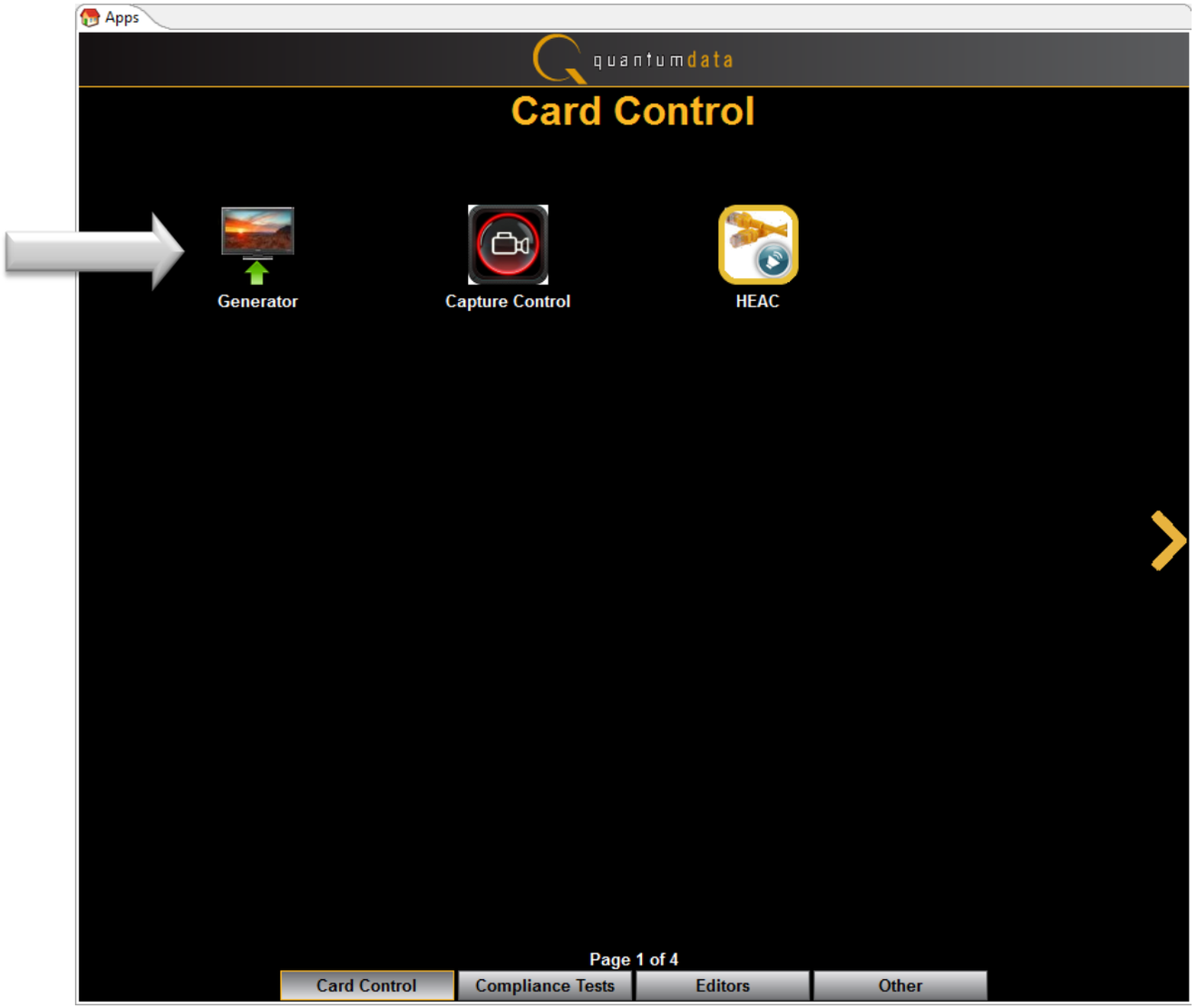
980 HDMI Video Generator Module – Video Analyzer

- (980 HDMI Video Generator now with an analyzer for confidence testing of HDMI source devices.



980 HDMI Video Generator Module Operation – Video Pattern Testing

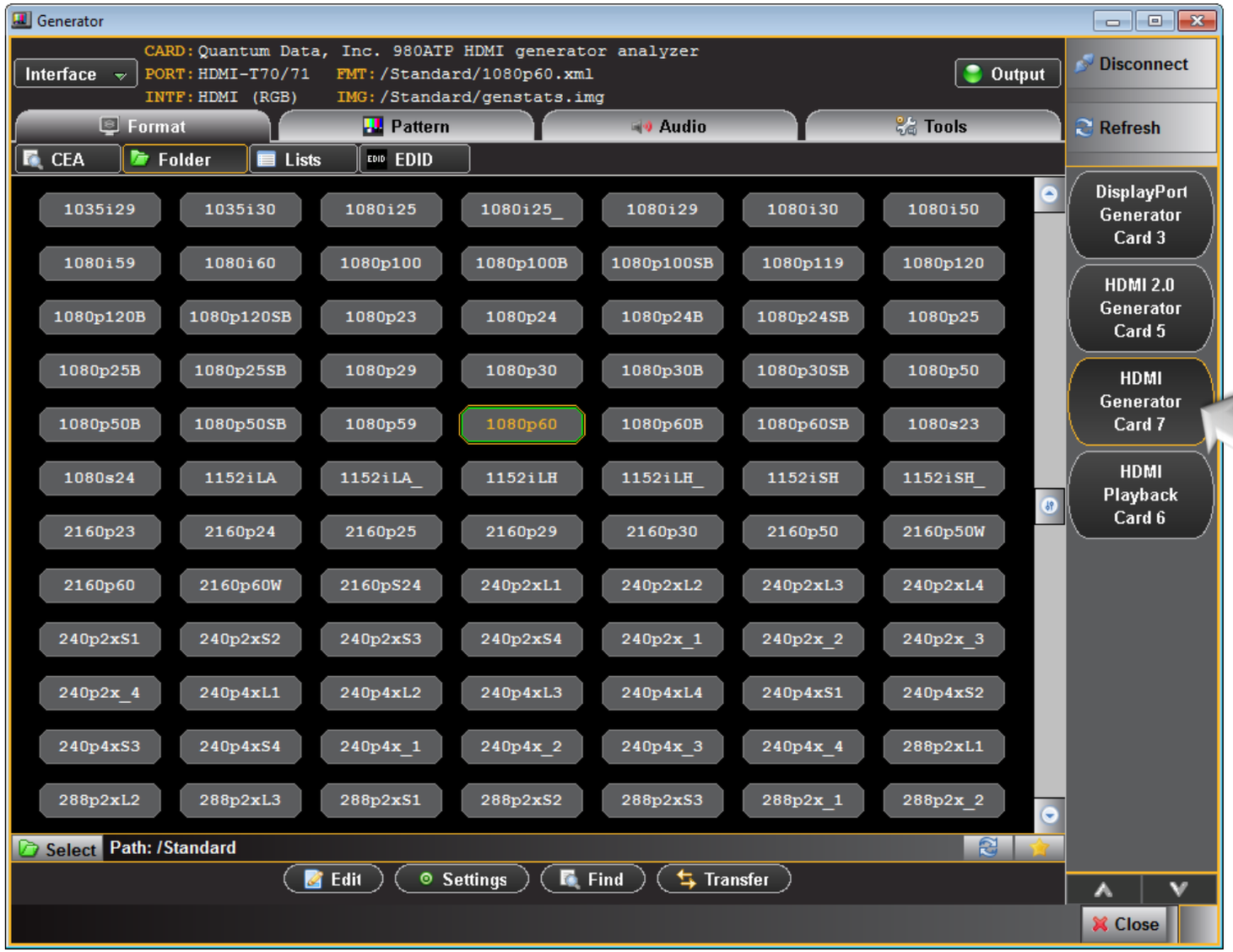
980 HDMI Video Generator Module – HDMI Transmitter



Select video mode:

- Select HDMI Video Generator module.

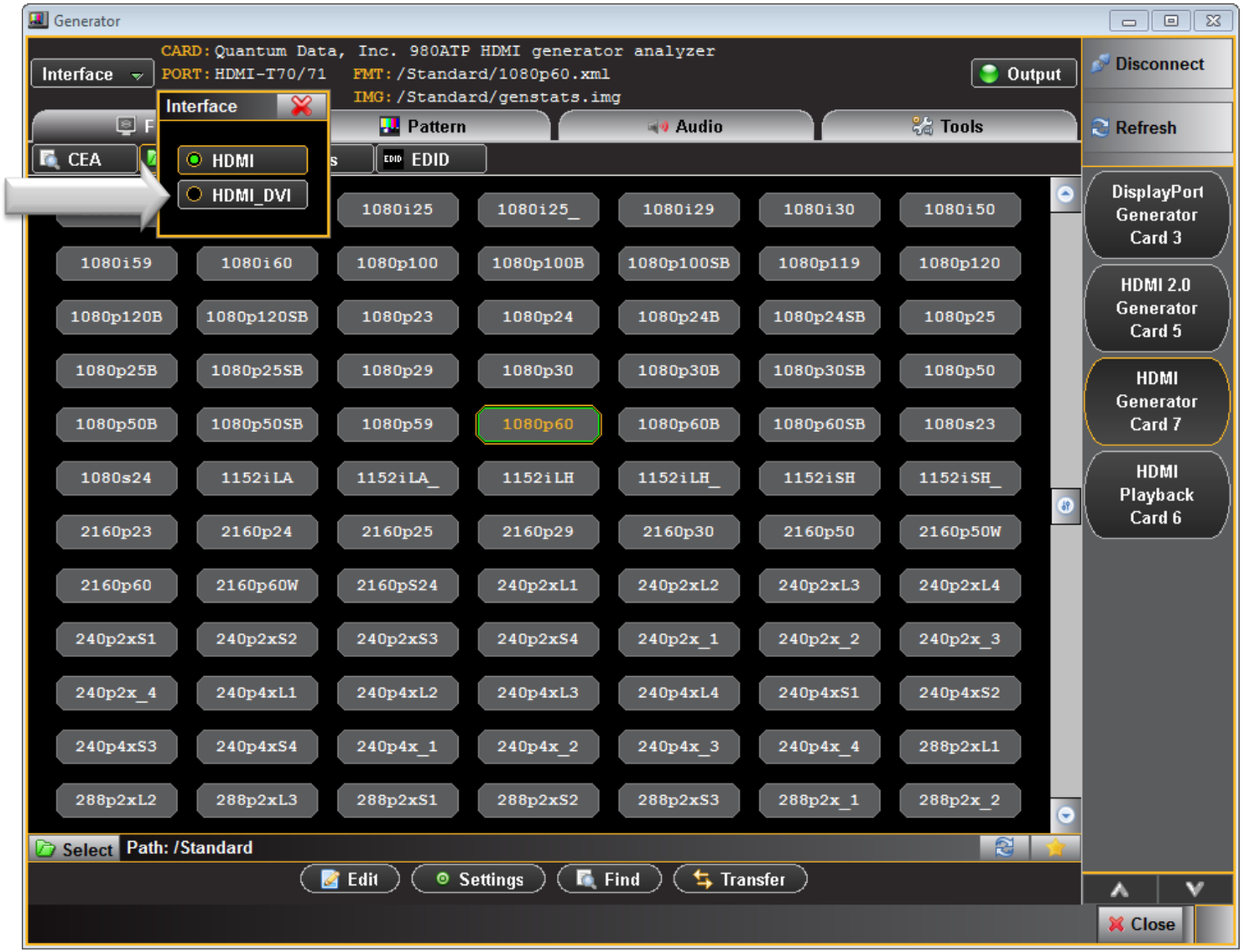
980 HDMI Video Generator Module – HDMI Transmitter



Select video mode:

- Select HDMI Video Generator Tx interface.

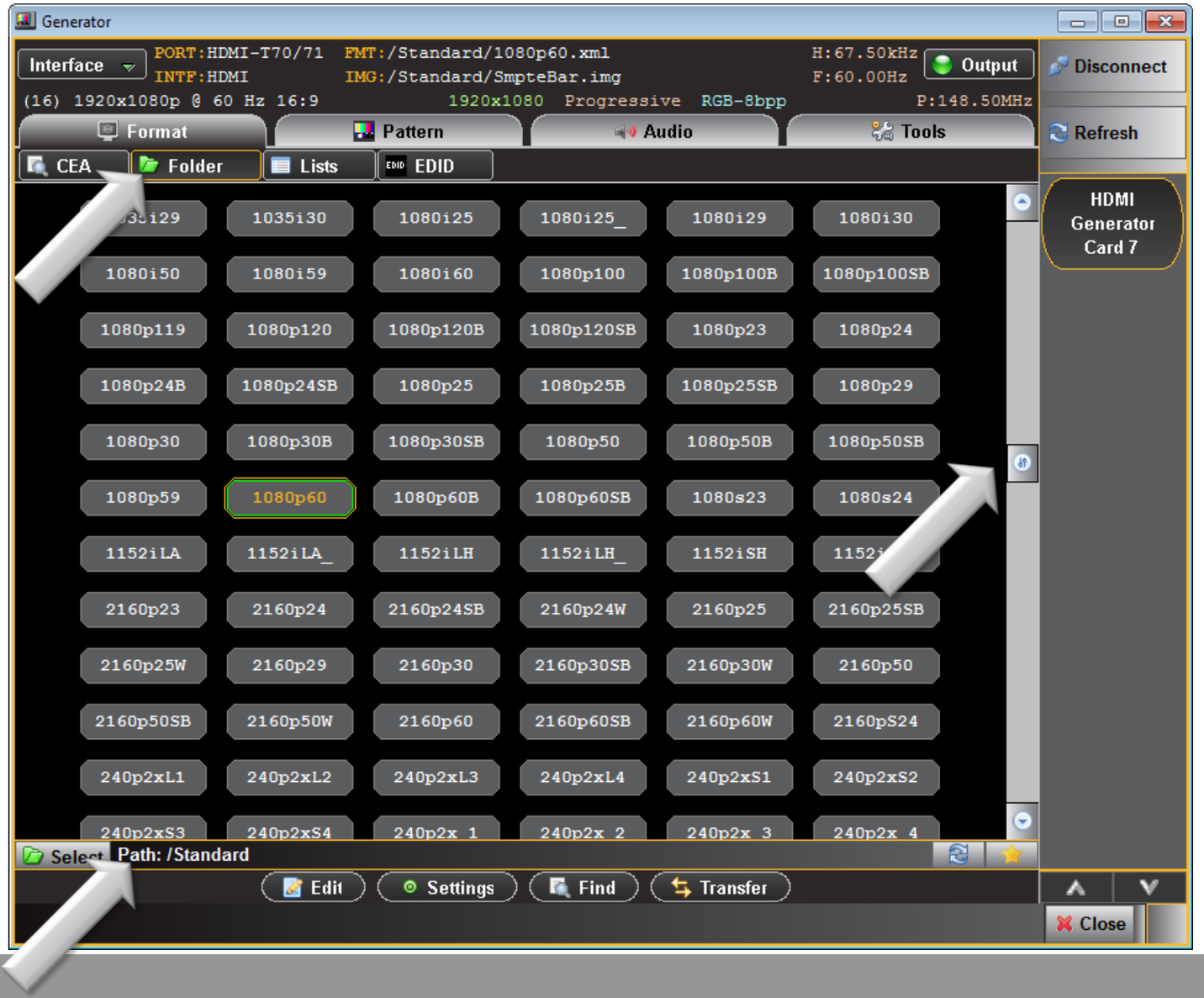
980 HDMI Video Generator Module – HDMI Transmitter



Select video mode:

- Select between HDMI and DVI.

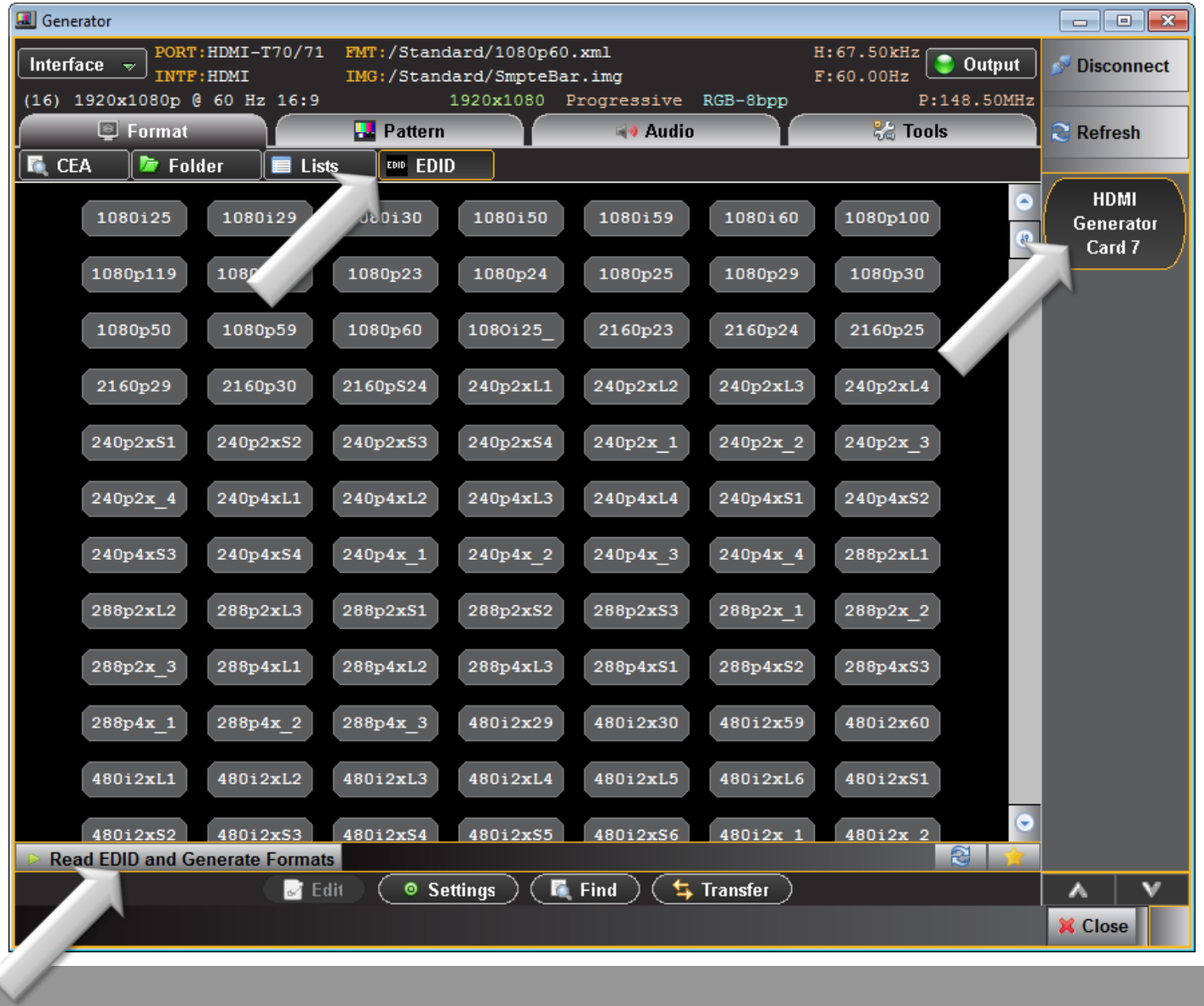
980 HDMI Video Generator Module – Format Selection



Select Format (Timing) by browsing:

- Select timing format from Format Library.
- Over 600 formats to select from.
- Use Format Editor to create additional custom formats.
- Scroll through list of test patterns.

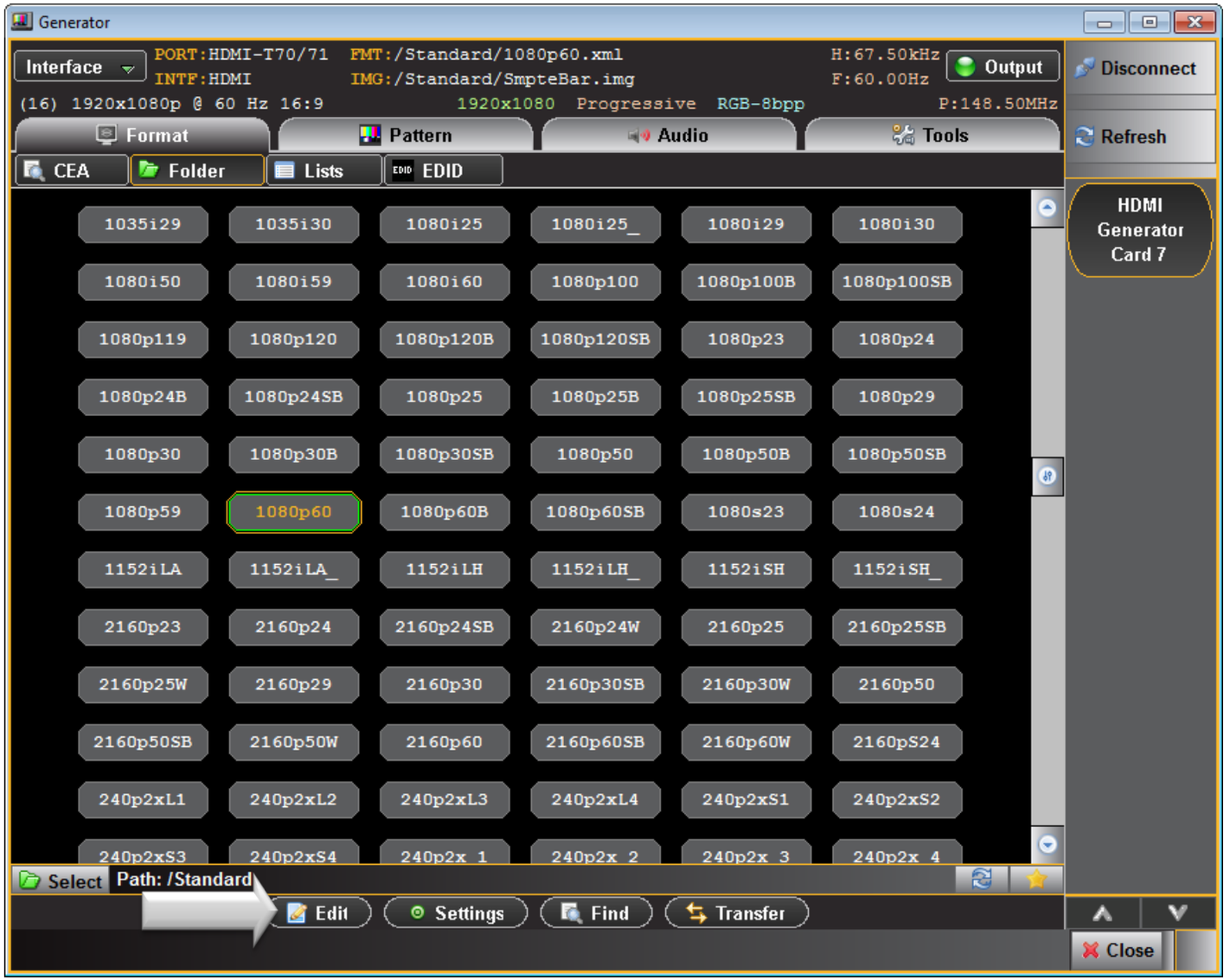
980 HDMI Video Generator Module – Format Selection



Select Format (Timing) by browsing:

- Configure list of formats based on EDID of connected display.
- EDID format list active shown on lower status panel.

980 HDMI Video Generator Module – Format Selection



Viewing detailed video parameters:

- Select Edit to view parameters in Format Editor (next page).

980 HDMI Video Generator Module – Format Selection

Viewing detailed video parameters:

- View detailed video and audio parameters on Format Editor.

980 HDMI Video Generator Module – HDMI Transmitter

Intelligent selection of CEA format timings:

- Use CEA button for filtered intelligent selection.
- Work from left to right.
- Format VIC list presented on right as you progress.

980 HDMI Video Generator Module – Format Selection

Configure Format video settings:

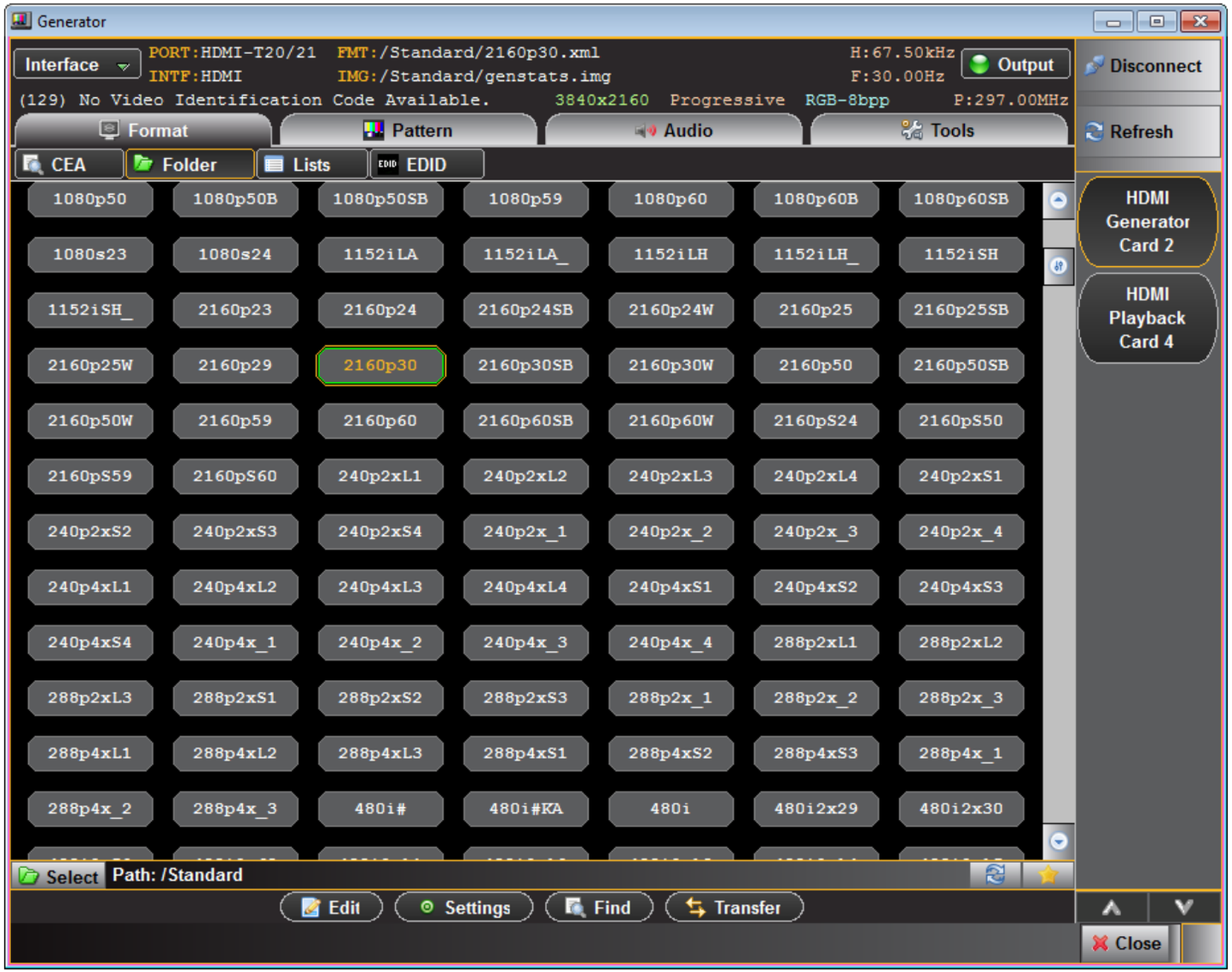
- Select timing format from Format Library.
- Configure format parameters such as Color Space, Sampling, Range and Bits per Component.

980 HDMI Video Generator Module – Settings Deep Color

Configure Format video settings:

- Select Deep Color at 10, 12 or 16 bits per component.

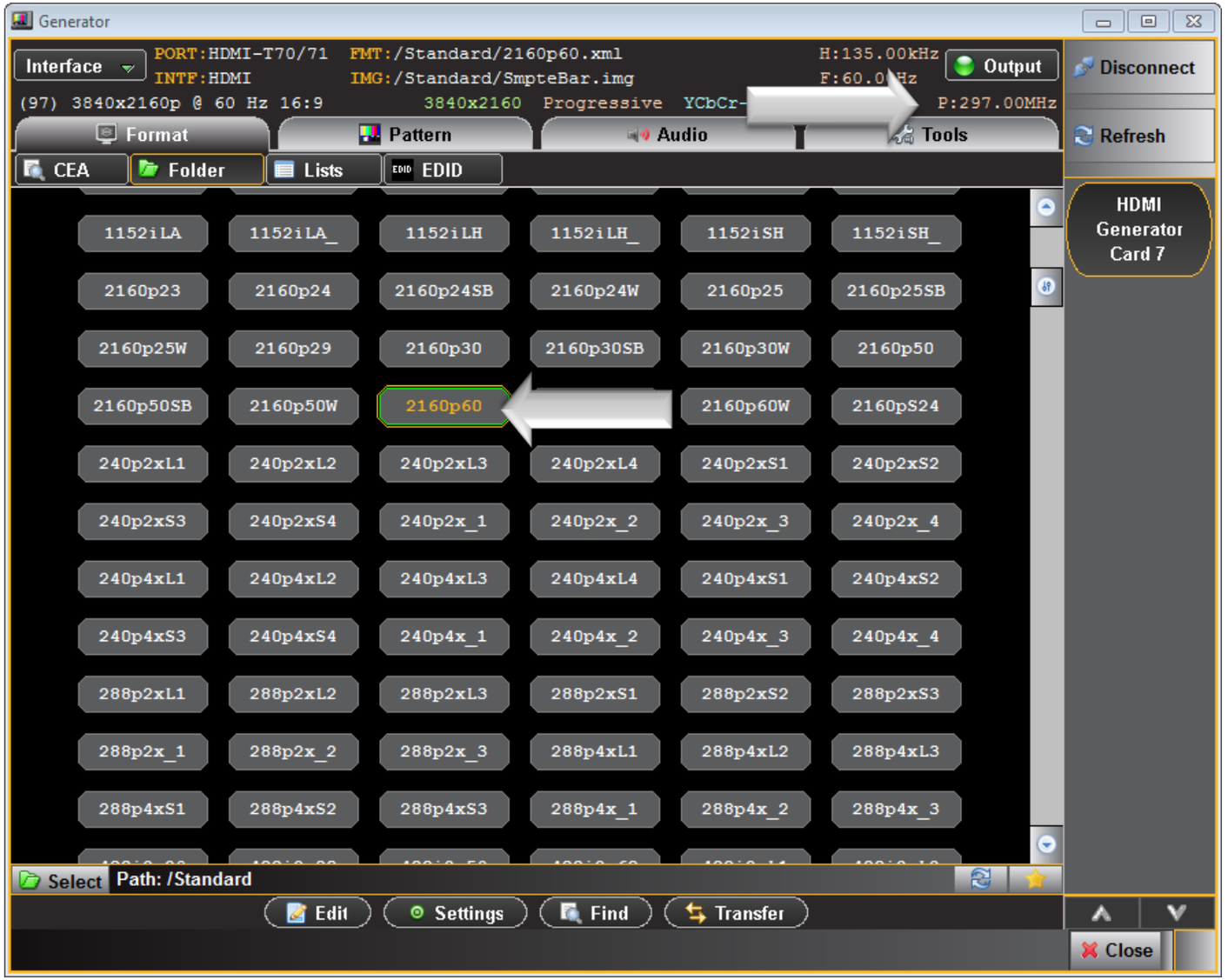
980 HDMI Video Generator Module – Format Selection 4K



Select Formats:

- Select HDMI 4K x 2K format at 30Hz.
- Note pixel clock at 297MHz.

980 HDMI Video Generator Module – Format Selection 4K



Select Formats:

- Select HDMI 4K x 2K format at 50/60Hz which automatically selects HDMI 2.0 4:2:0 pixel encoding (next slide).

980 HDMI Video Generator Module – Format Selection 4K

Select Formats:

- Select HDMI 4K x 2K format at 50/60Hz which automatically selects HDMI 2.0 4:2:0 pixel encoding.
- Note pixel clock at 297MHz.

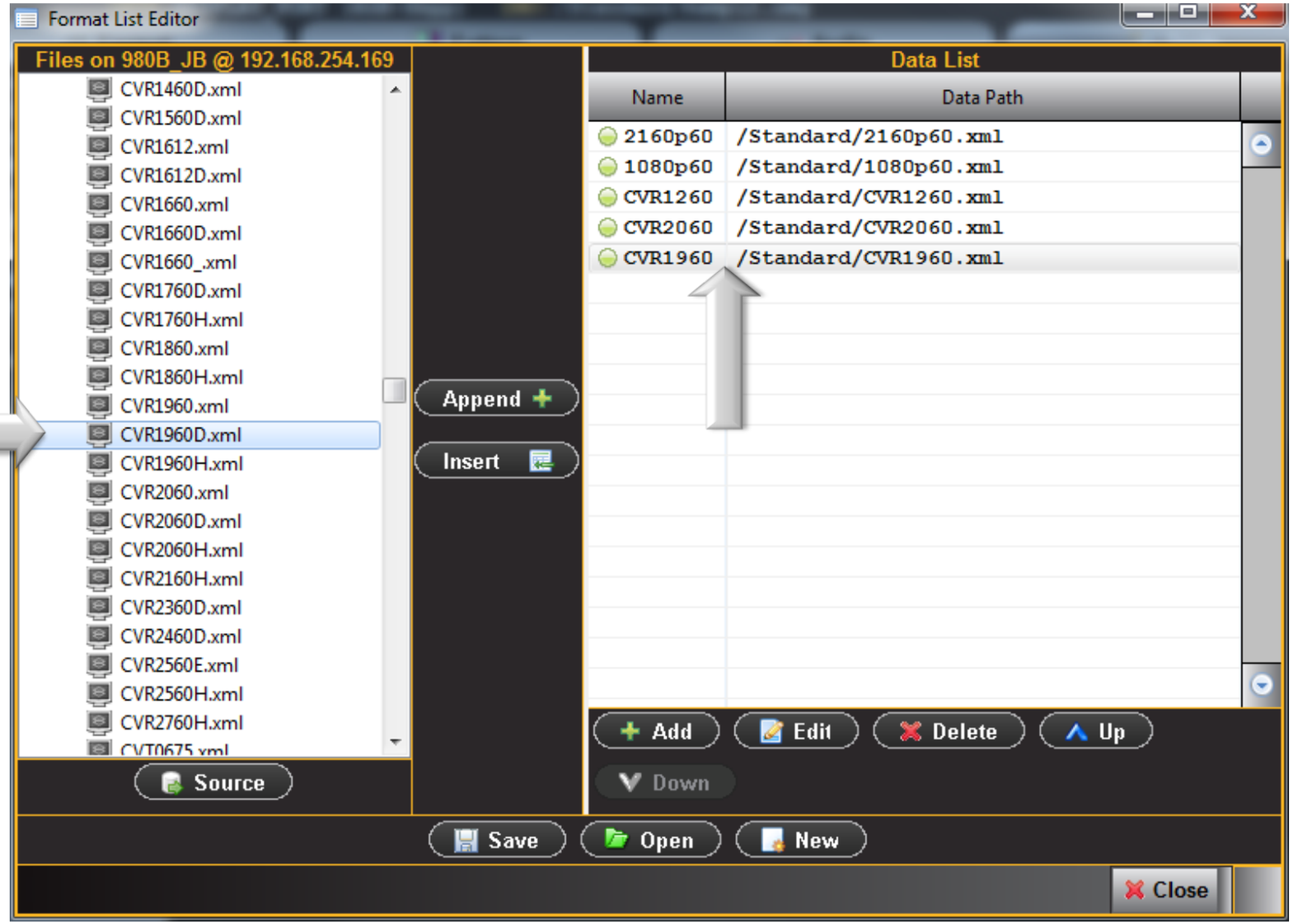
980 HDMI Video Generator Module
Creating Custom Format Lists

980 HDMI Video Generator Module – Format List Creation

Create custom lists of format timings:

- Access Format List Editor from Apps Editors page.

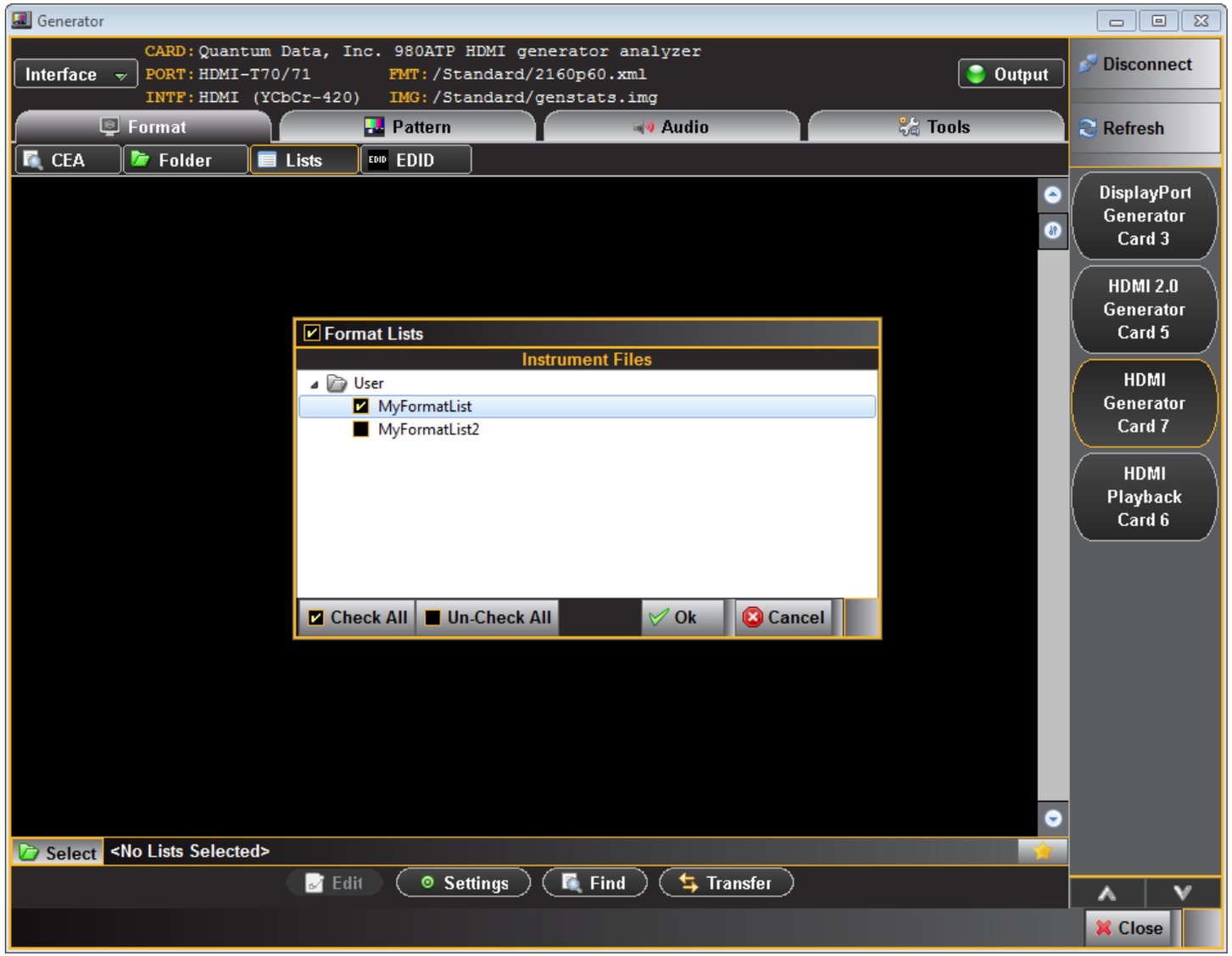
980 HDMI Video Generator Module – Format List Creation



Create custom lists of formats:

- Configure a specific test of formats for viewing and selecting.
- Save for later reuse.

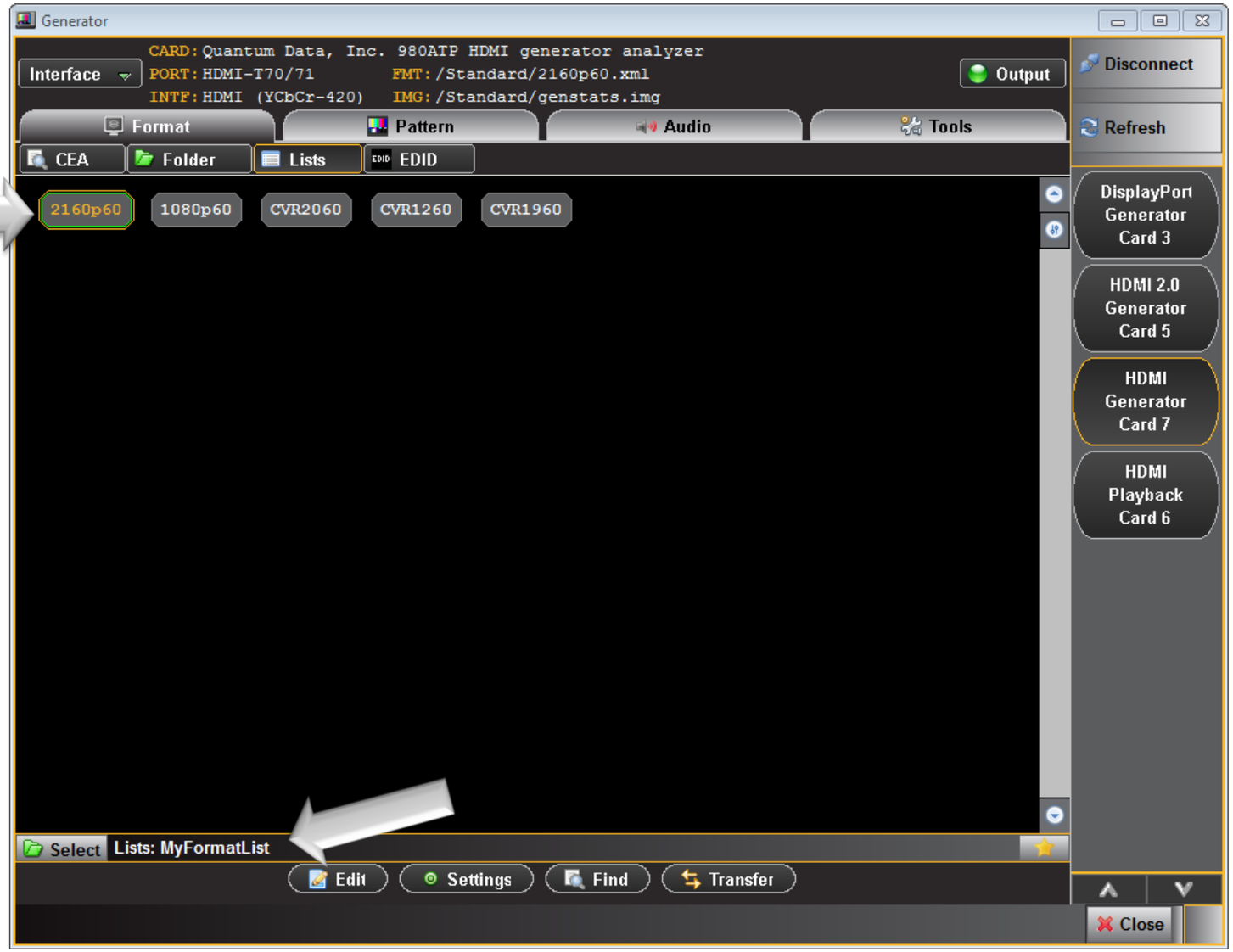
980 HDMI Video Generator Module – Format List Creation



Use custom lists of format timings:

- Select custom format lists from User directory.

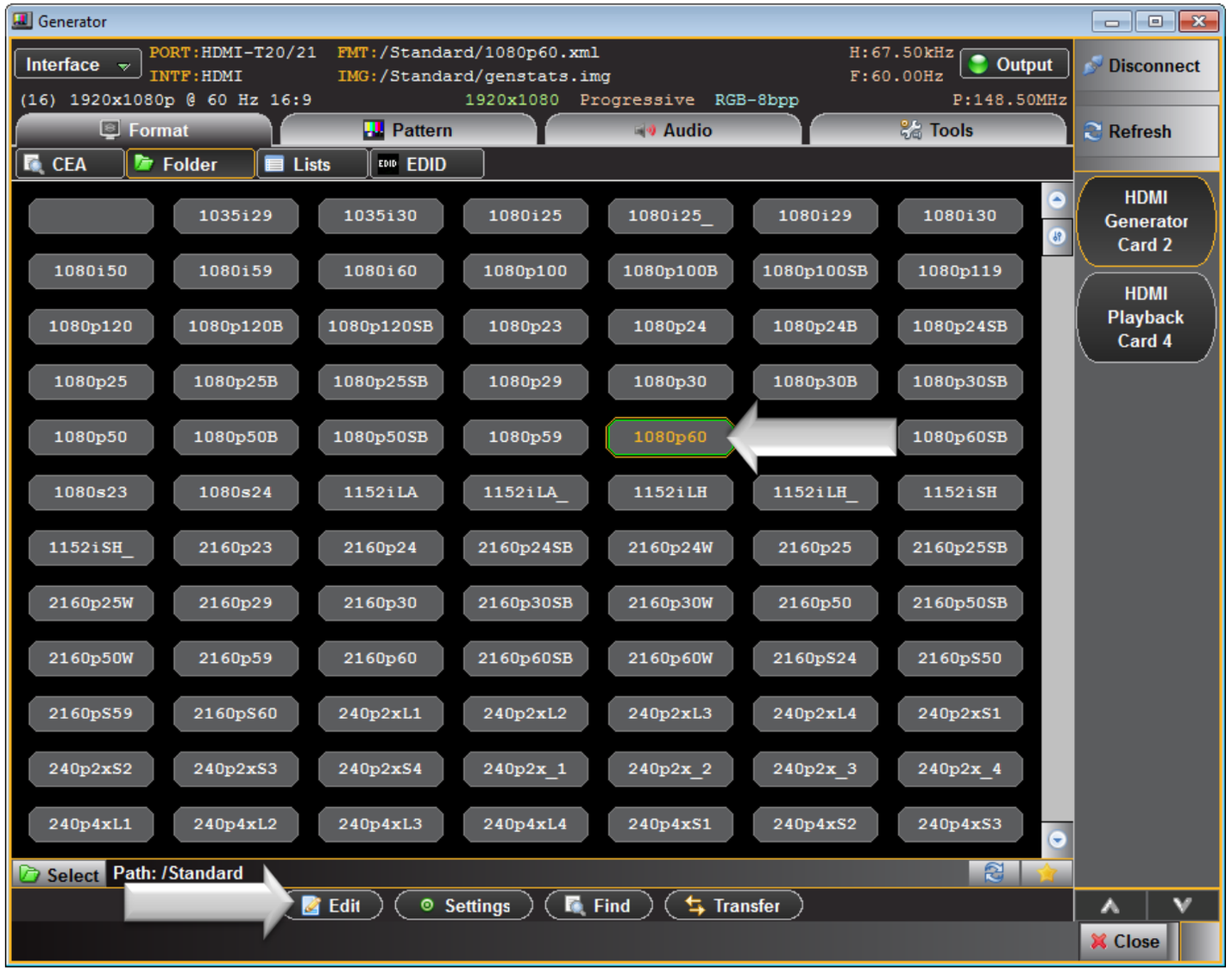
980 HDMI Video Generator Module – Format List Selection



View custom list of formats:

- Select from specific set of formats.
- Active list is shown on lower status bar.

980 HDMI Video Generator Module – Format Editor



Create custom formats:

- Select format to edit using the Format Editor (next page).

980 HDMI Video Generator Module – Format Editor

Create custom formats:

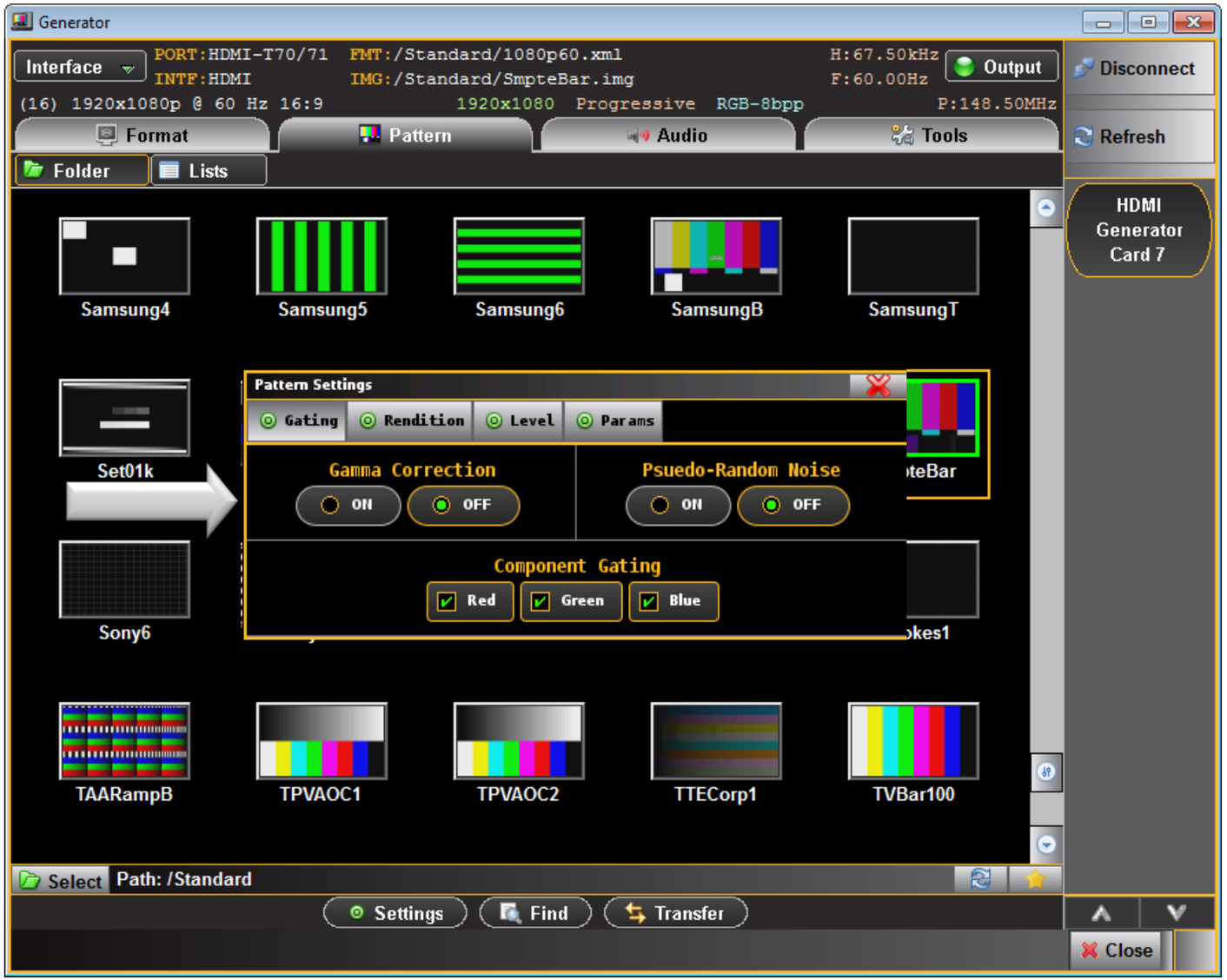
- Use Format Editor to create additional custom formats.
- Apply immediately for testing or save custom formats for later reuse.

980 HDMI Video Generator Module – Pattern Testing

Select Test Patterns:

- Select test pattern from Pattern Library.
- Over 300 test patterns to select from.
- Scroll through list of test patterns.
- Select from standard library folder or Lists (next page).

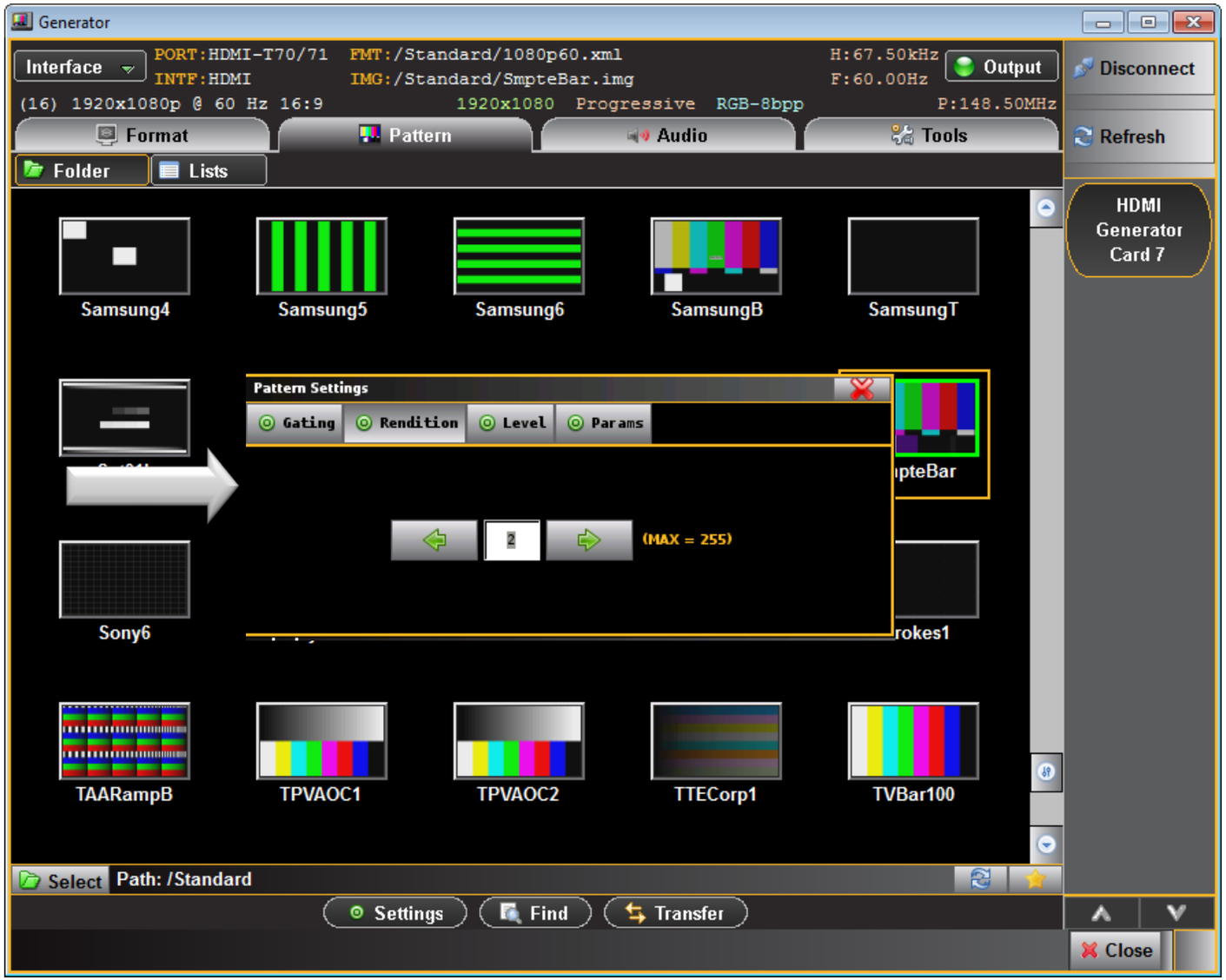
980 HDMI Video Generator Module – Pattern Testing



Configure pattern parameters:

- Set test pattern parameters such as gating colors on/off, noise pattern and gamma.

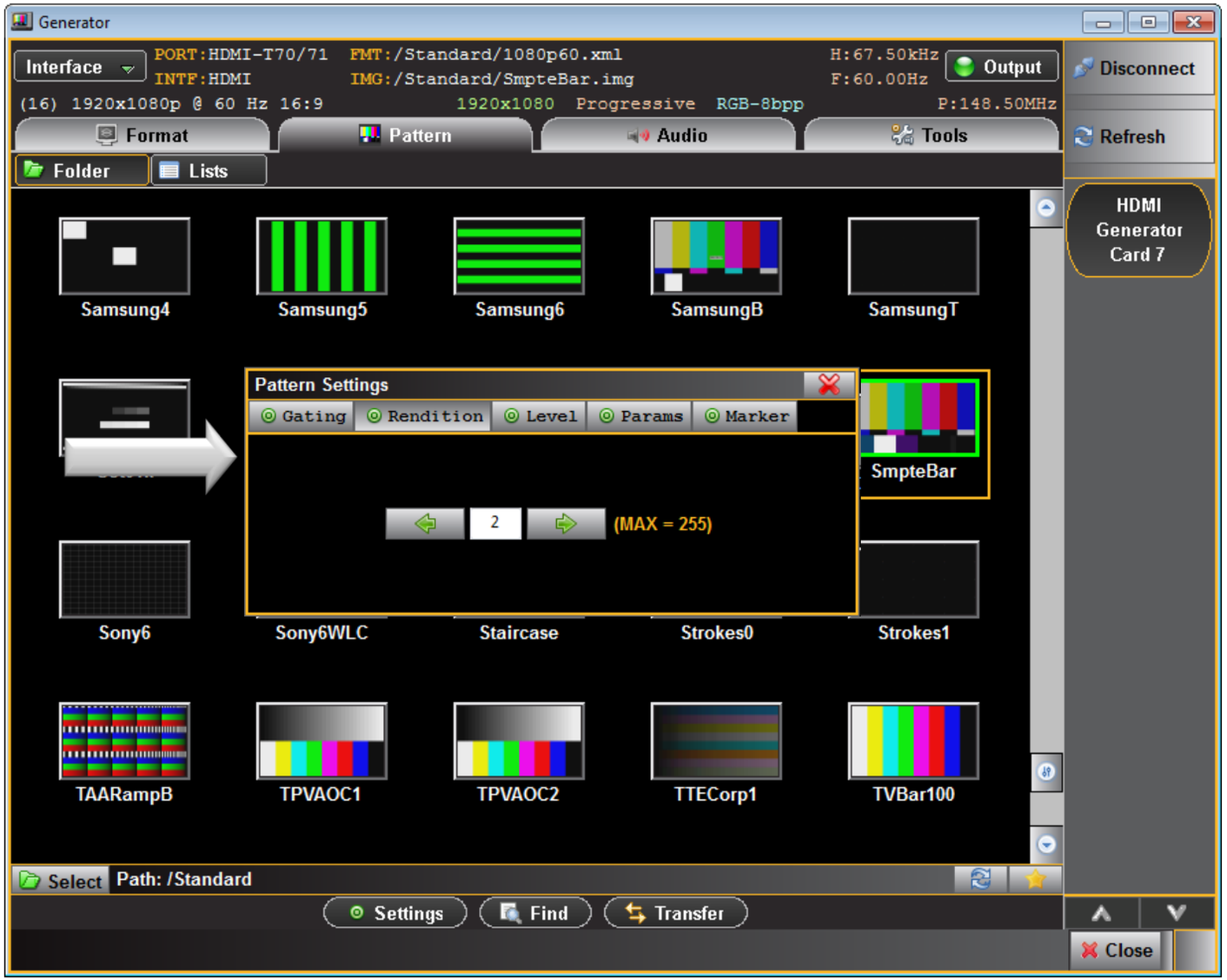
980 HDMI Video Generator Module – Pattern Testing



Select video level for test pattern:

- Set level in 1 IRE increments.

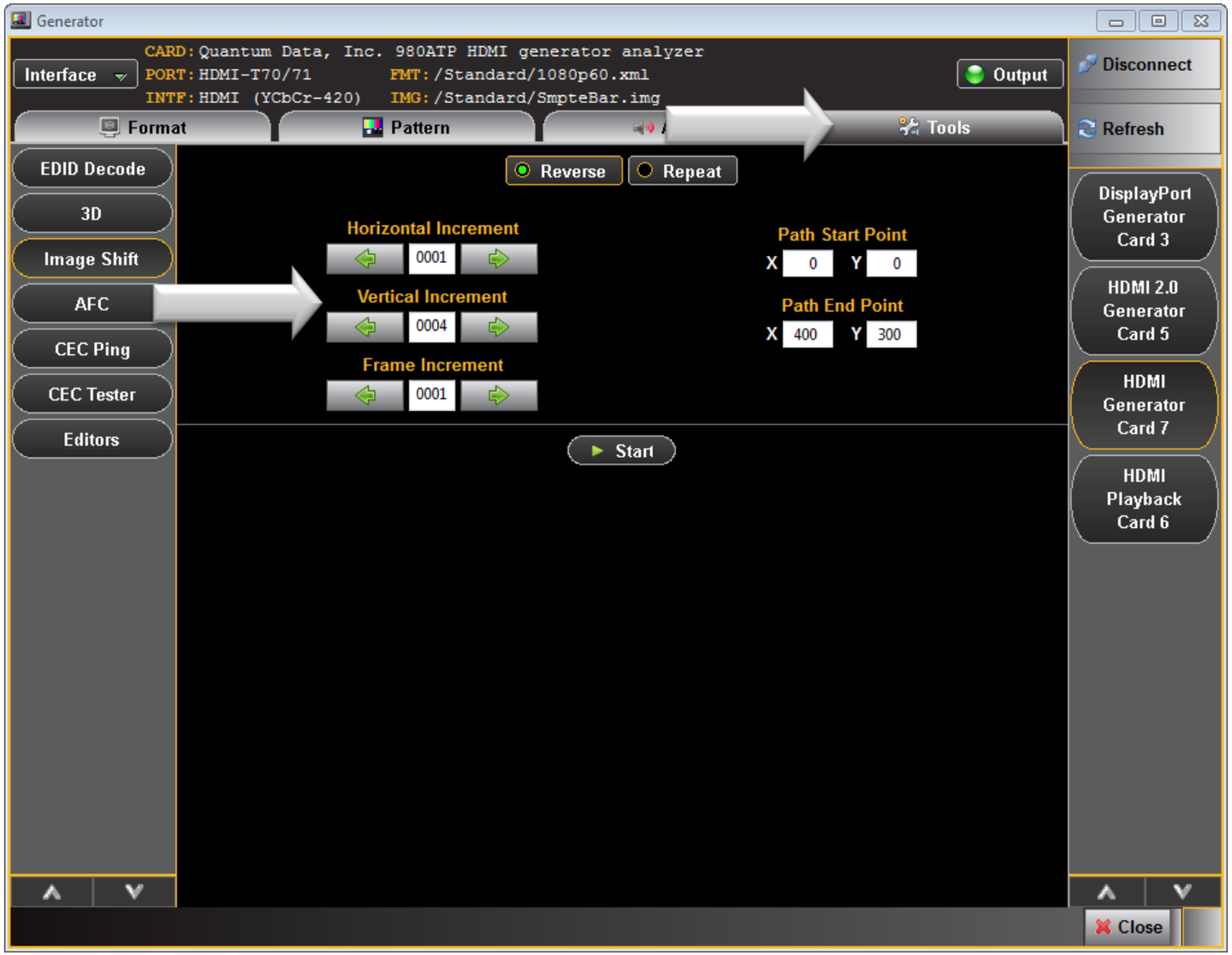
980 HDMI Video Generator Module – Pattern Testing



Select subimage (Image Version) of Test Pattern where available:

- Select using arrows provided.

980 HDMI Video Generator Module – Pattern Testing



Scroll a selected Test Pattern from Tools menu:

- Select scroll speed in horizontal and vertical axes.
- Select extent of travel with End Points.
- Select reverse or repeat scrolling.

980 HDMI Video Generator Module
Testing 3D Formats

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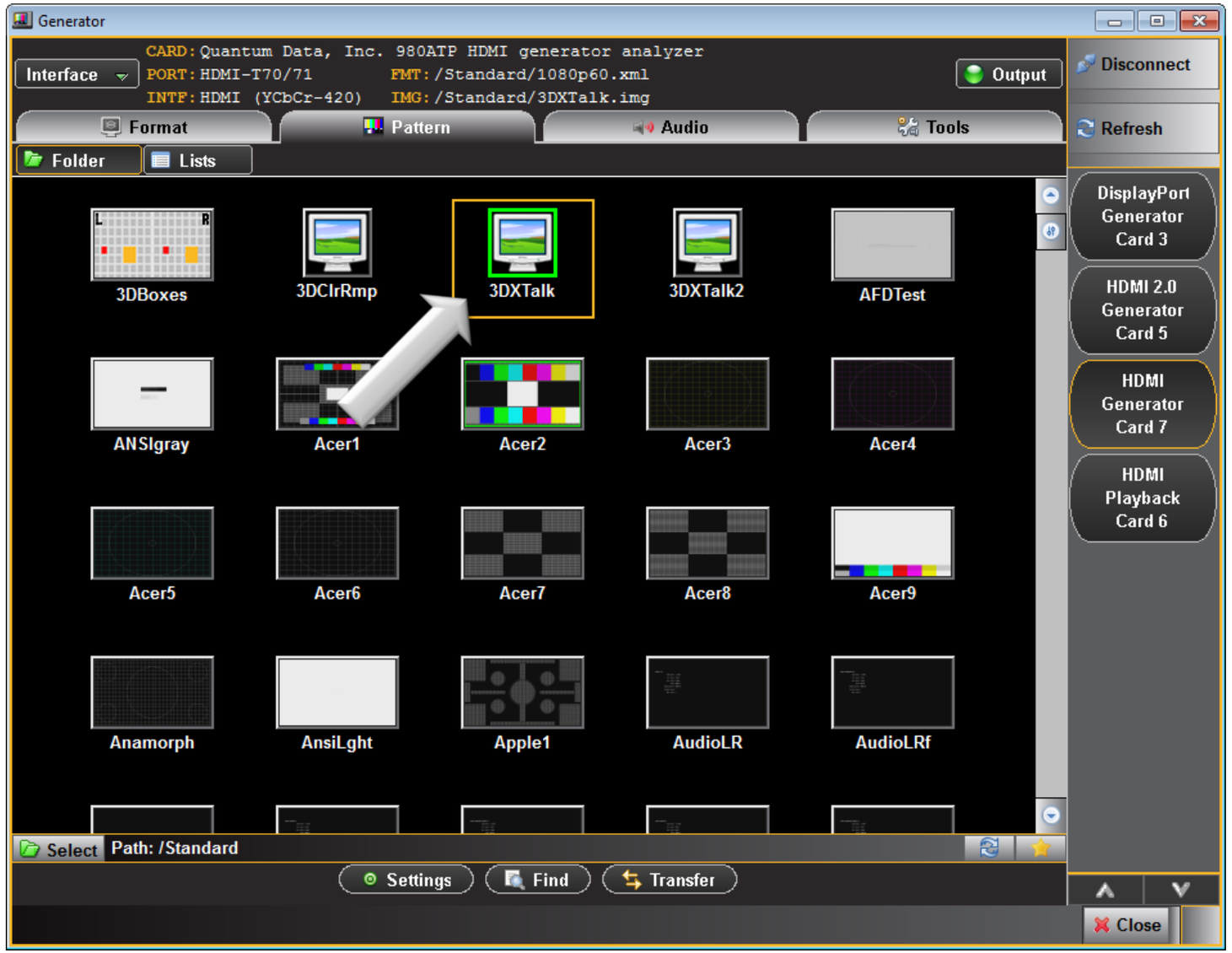
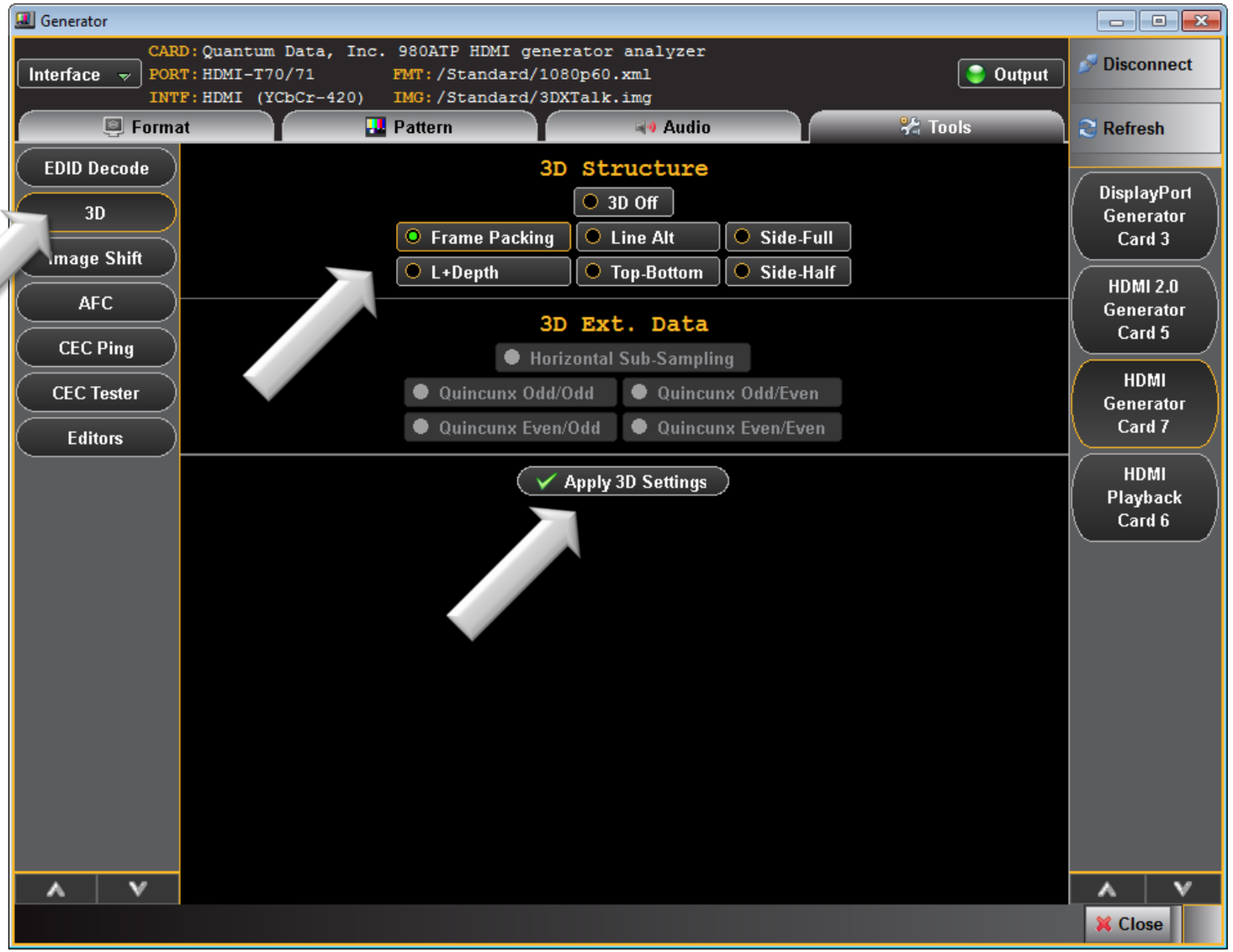
980 HDMI Video Generator Module – 3D Testing



Test 3D displays:

- Select 3D Test Pattern.

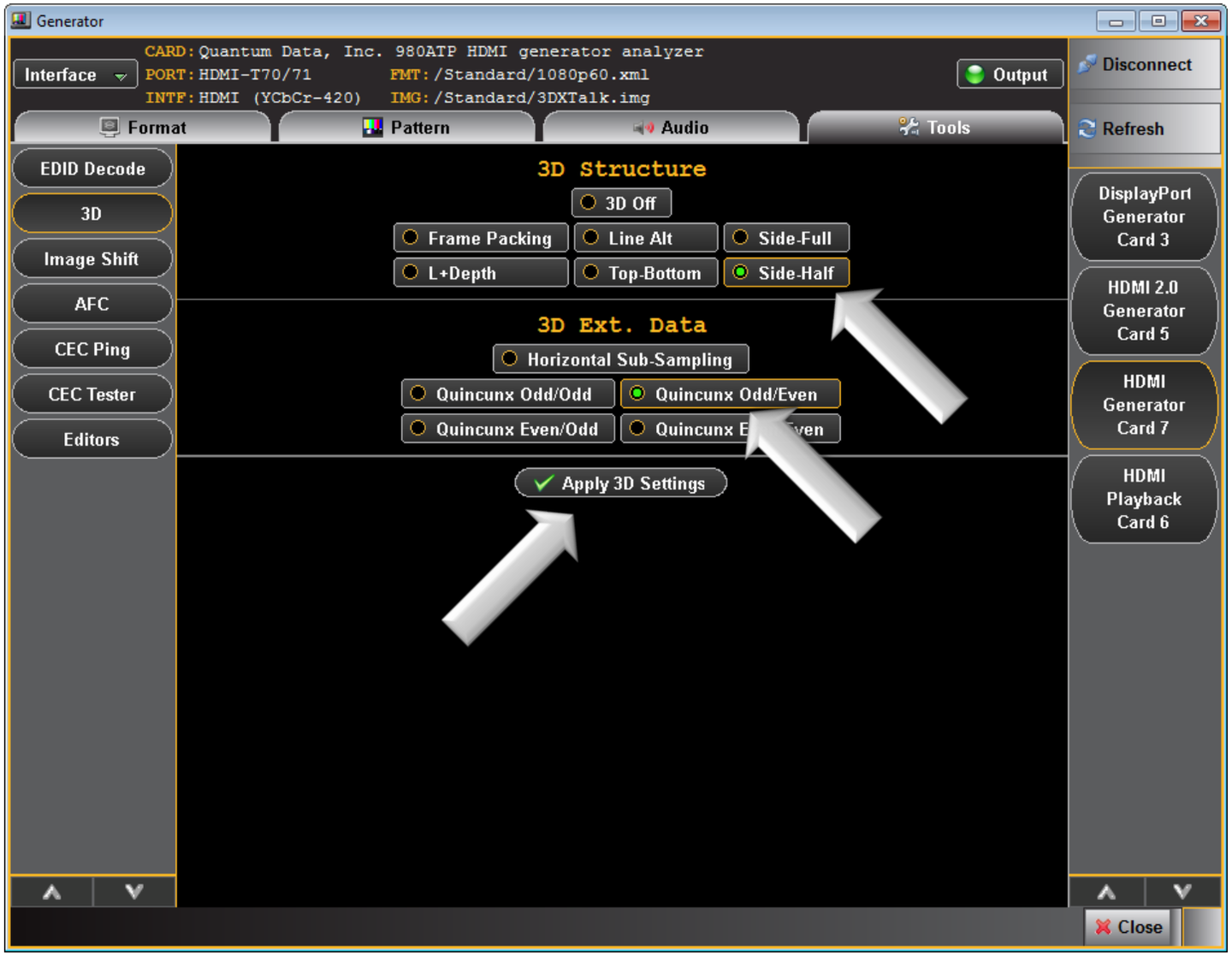
980 HDMI Video Generator Module – 3D Testing



HDMI 3D Video Formats:

- Access from Tools tab.
- Enable 3D mode.
- Select 3D Structure and substructure where applicable.

980 HDMI Video Generator Module – 3D Testing



HDMI 3D Video Formats:

- Enable 3D mode.
- Select 3D Structure and substructure (extra data).

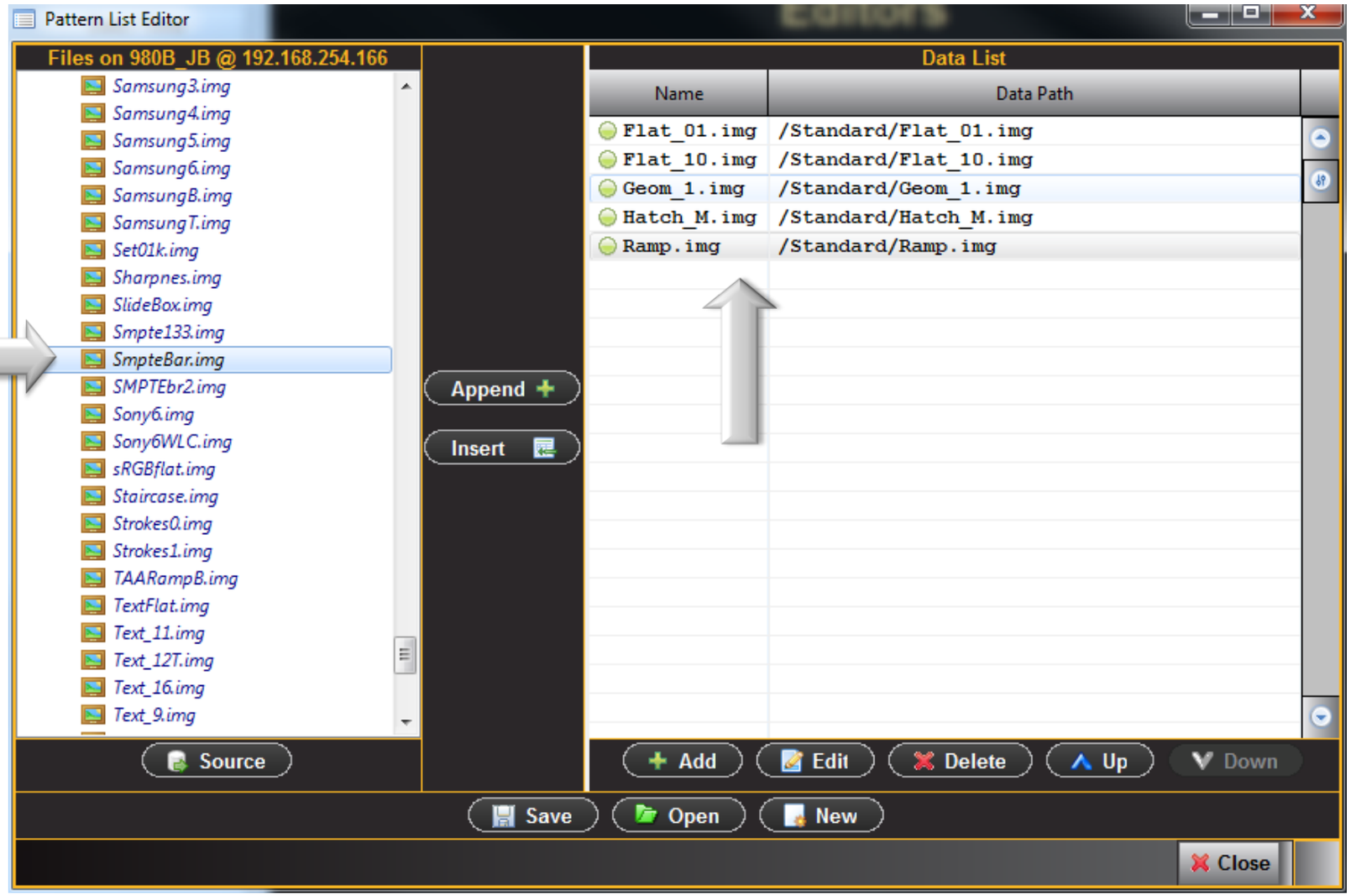
980 HDMI Video Generator Module
Creating Custom Pattern Lists

980 HDMI Video Generator Module – Pattern List Creation

Create custom lists of test patterns:

- Access Pattern List Editor from Apps Editors page.

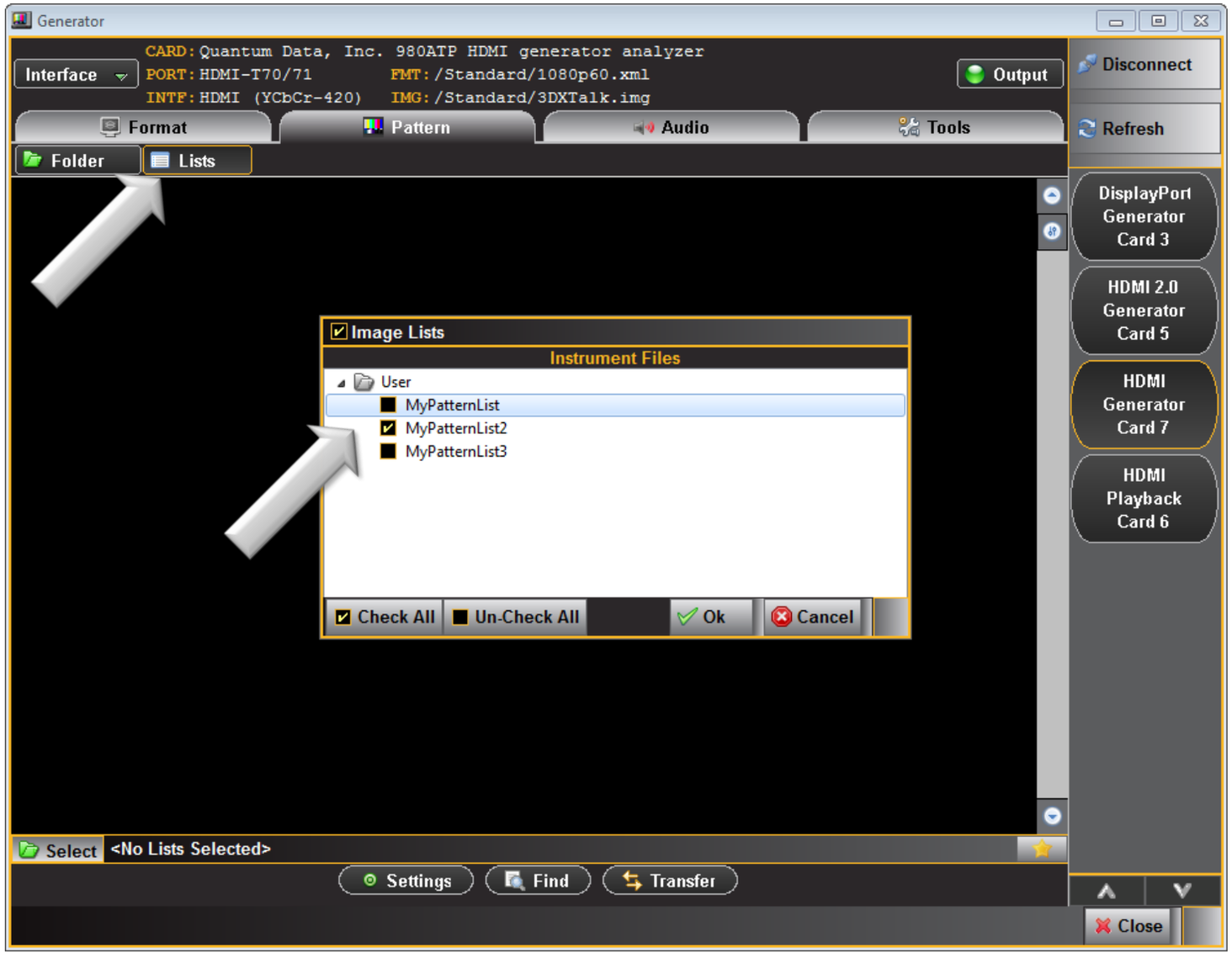
980 HDMI Video Generator Module – Pattern List Creation



Create custom lists of test patterns:

- Configure a specific test of patterns for viewing and selecting.
- Save for later reuse.

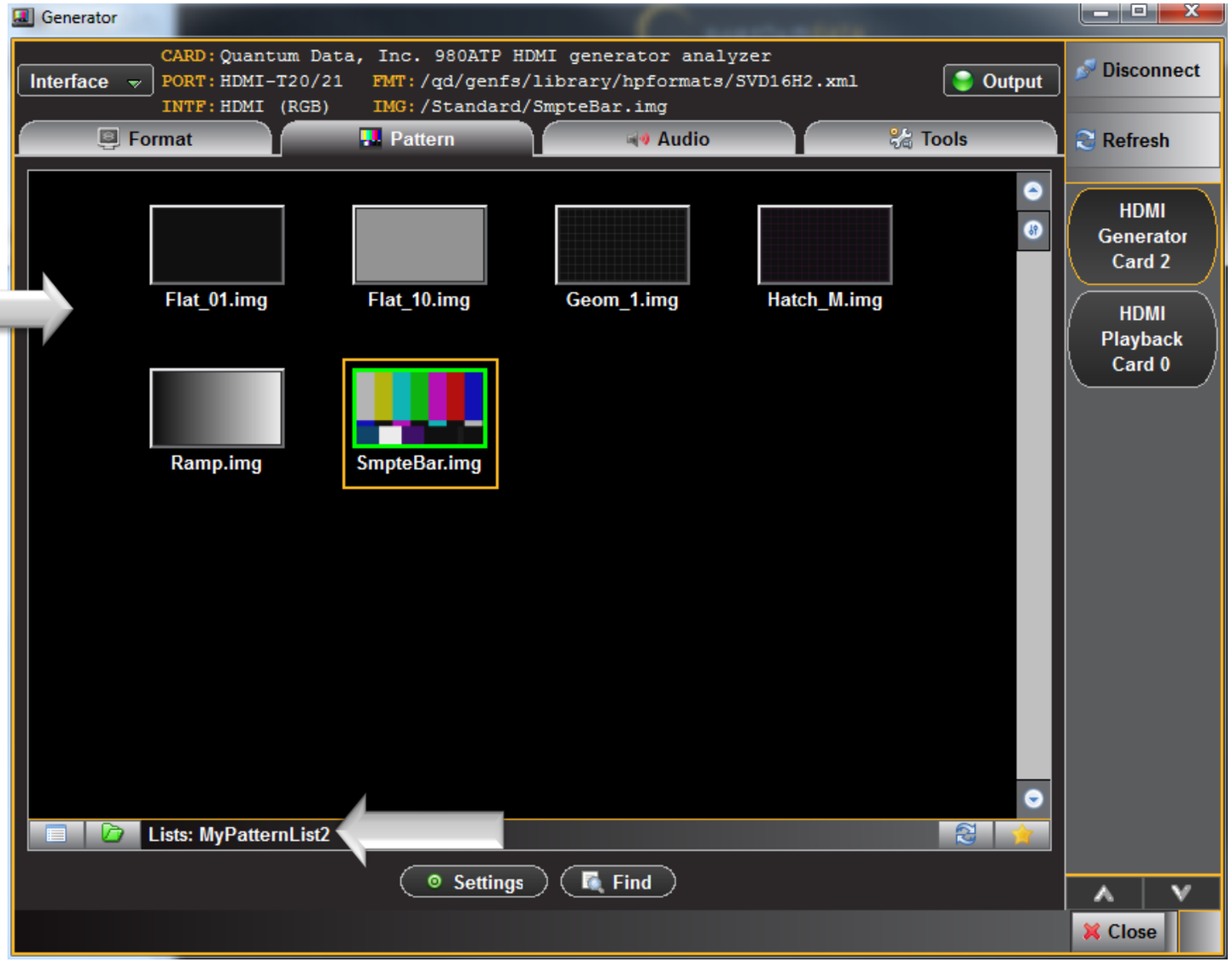
980 HDMI Video Generator Module – Pattern Testing



Select Test Patterns:

- Select test pattern from custom list.

980 HDMI Video Generator Module – Pattern List Selection



Create custom lists of test patterns:

- Configure a specific test of patterns for viewing and selecting.

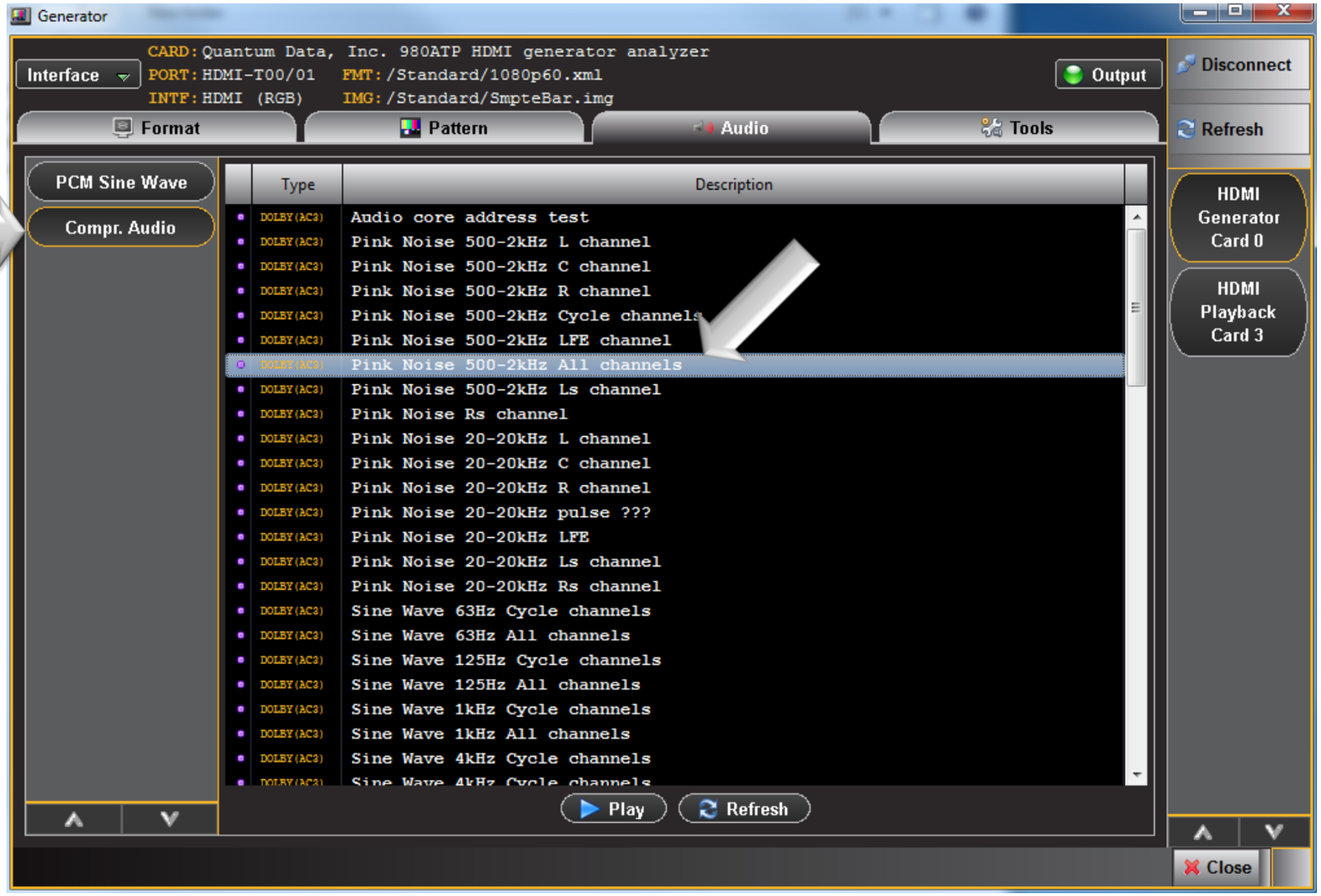
980 HDMI Video Generator Module
Selecting Audio Formats

980 HDMI Video Generator Module – Audio Testing

Select audio formats:

- Supports testing of LPCM and compressed formats.
- Enables precise control over channels, sampling rate, bits per sample level.
- Set sine wave amplitude and frequency.

980 HDMI Video Generator Module – Audio Testing

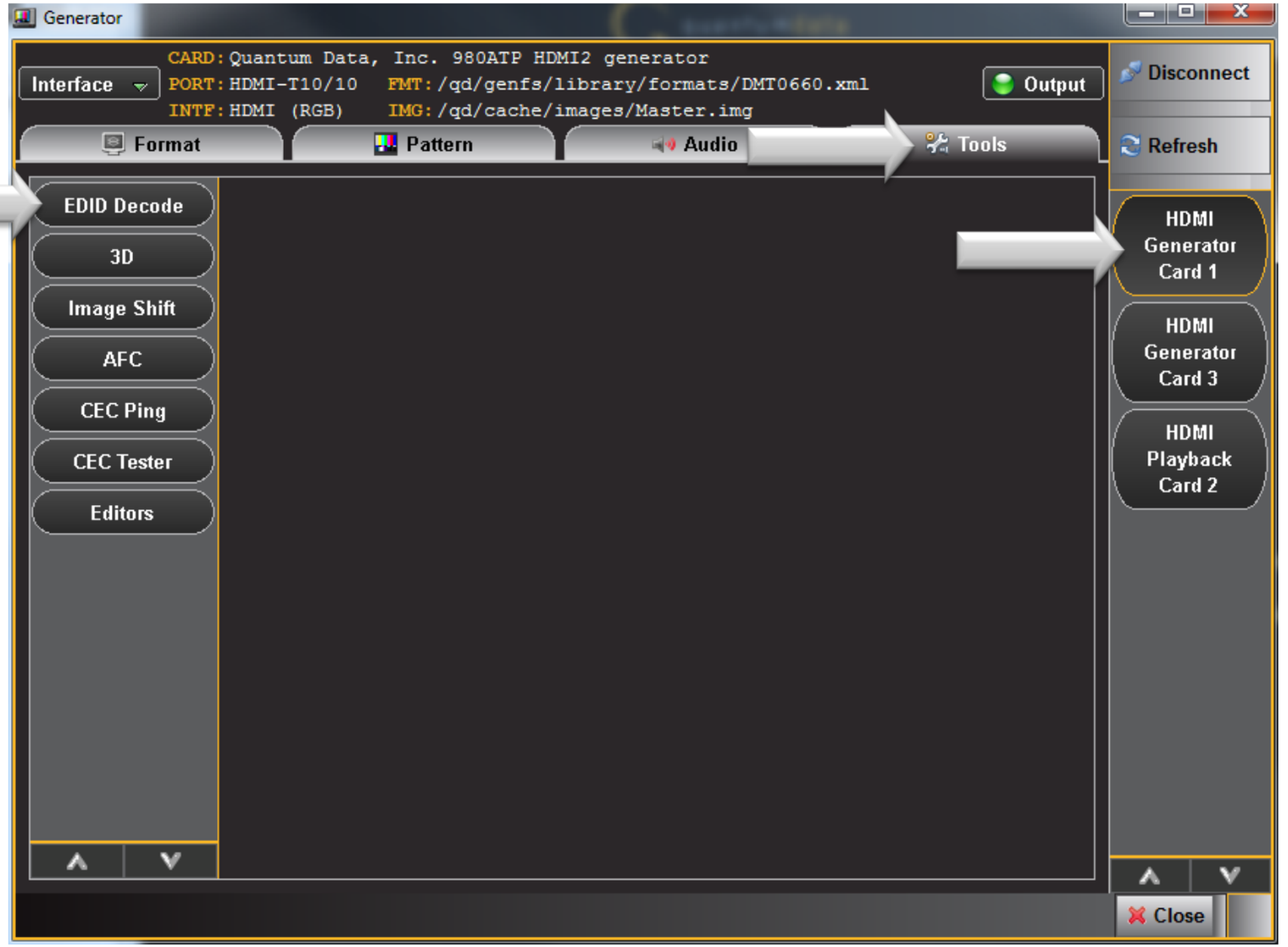


Select audio format:

- Select from variety of compressed audio formats.
- Enables precise control over channels, sampl-ing rate, bits per sample level.

980 HDMI Video Generator Module
Viewing EDIDs

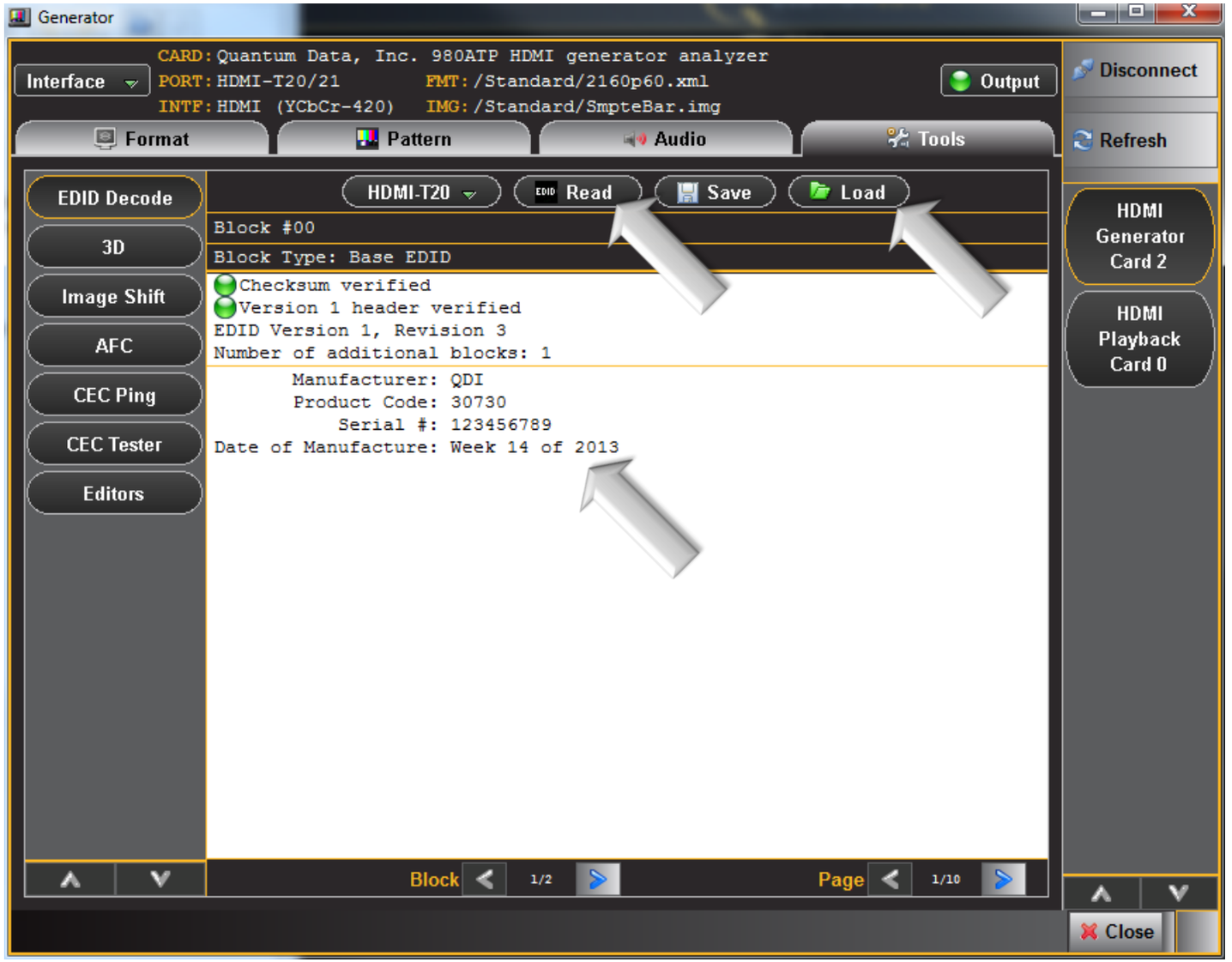
980 HDMI Video Generator Module – EDID Testing



View EDIDs – Select Interface:

- Navigate through the EDID blocks and pages.
- Select which Tx port to view EDID of connected display.

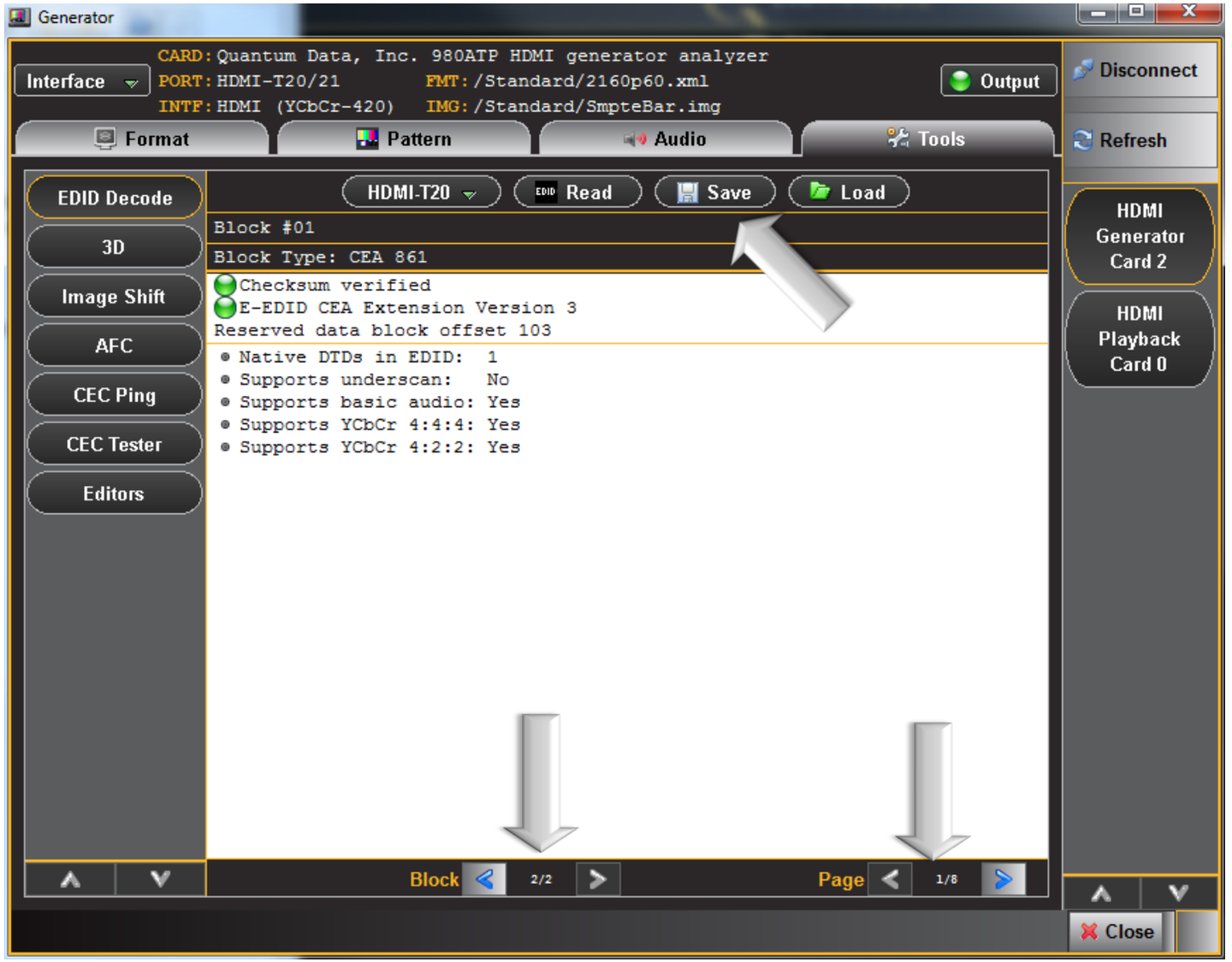
980 HDMI Video Generator Module – EDID Testing



Decode and view EDIDs:

- Read EDID of connected display.
- Load stored EDIDs for viewing.
- View EDIDs of in human readable text.

980 HDMI Video Generator Module – EDID Testing



Decode and view EDIDs:

- View both VESA and CEA block.
- Save EDIDs for emulation testing of sources.

980 HDMI Video Generator Module – EDID Testing

Select test images for HDMI protocols:

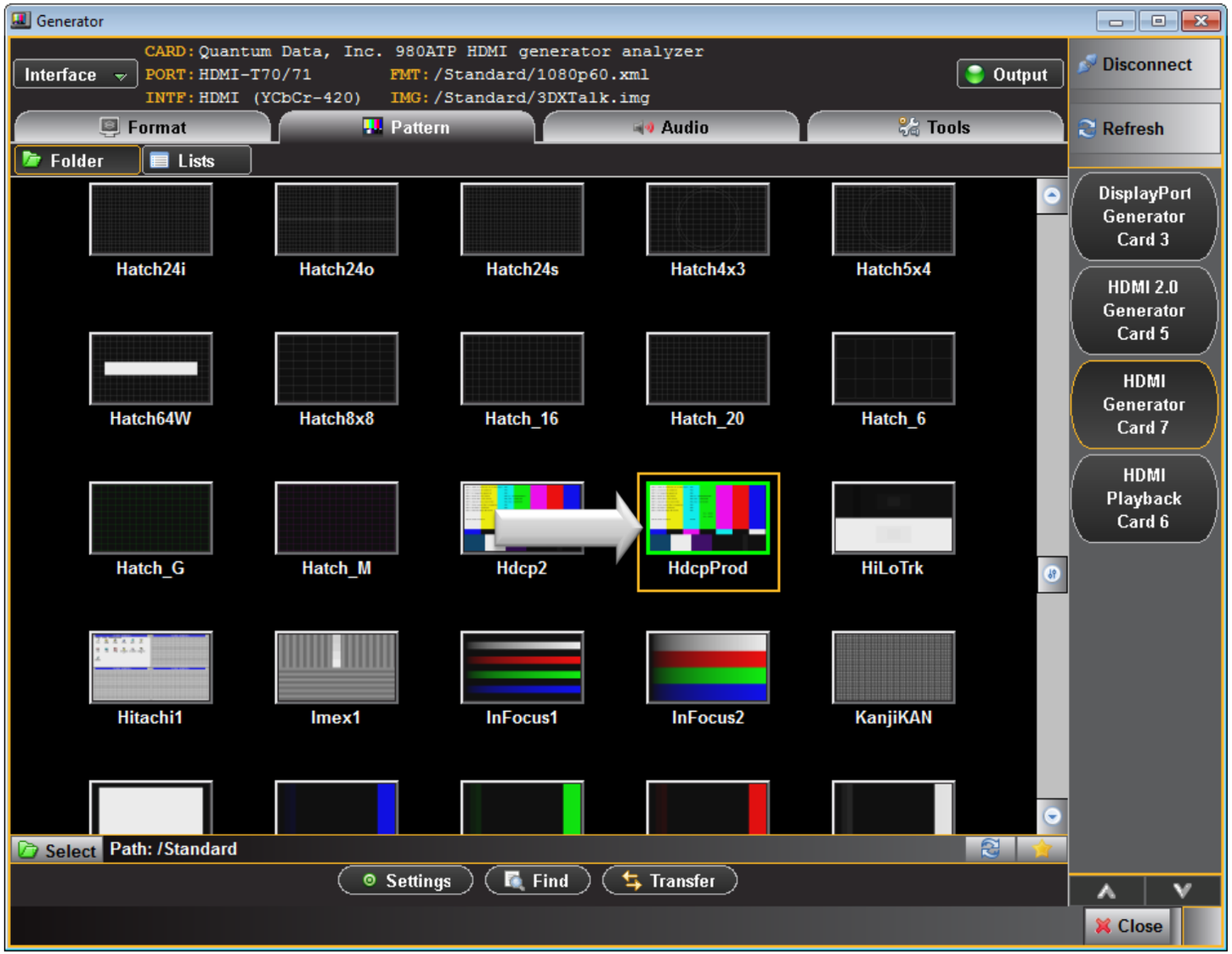
- Select EDID test image (example).
- View pages of EDID on connected display.
- Select page through Rendition parameter.

980 HDMI Video Generator Module
Monitoring DDC Transactions

980 HDMI Video Generator - Auxiliary Channel Analyzer

- Monitor DDC transactions (HDCP and EDID) through Auxiliary Channel Analyzer (ACA).
- 980 Video Generator module emulates HDMI source and monitors HDCP and EDID transactions.
- Auxiliary Channel Analyzer (CEC) – save traces for dissemination to subject matter experts and Quantum Data customer support.

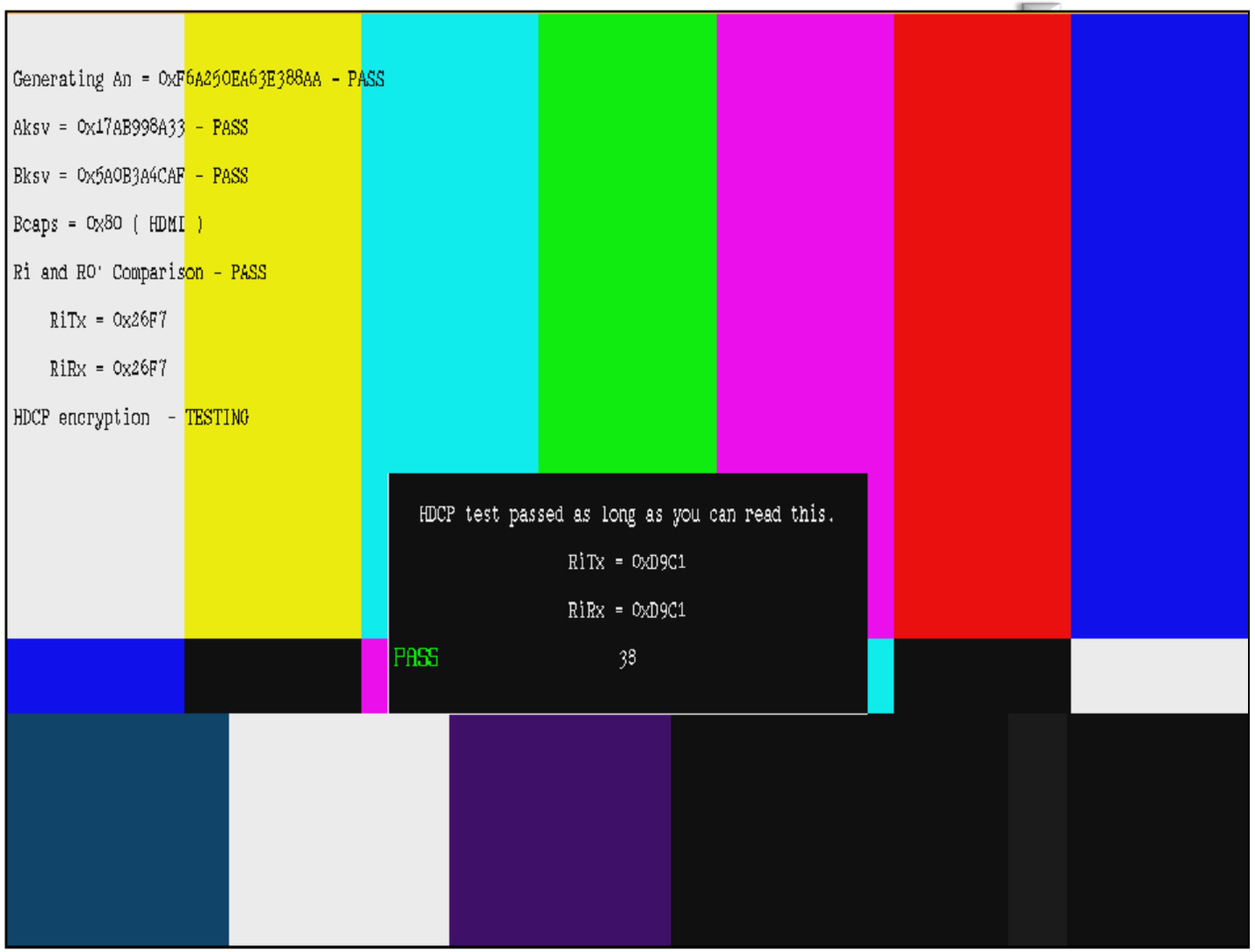
980 HDMI Video Generator Module – HDCP Testing



Select test images for HDMI protocols:

- Select HDCP test image.

980 HDMI Video Generator - Auxiliary Channel Analyzer



Monitoring DDC transactions with HDMI sink device:

- View progress of authentication and encryption on connected sink e.g. HDTV (shown).

980 HDMI Video Generator - Auxiliary Channel Analyzer

Three (3) Aux Channel Analyzer (ACA) Tools:

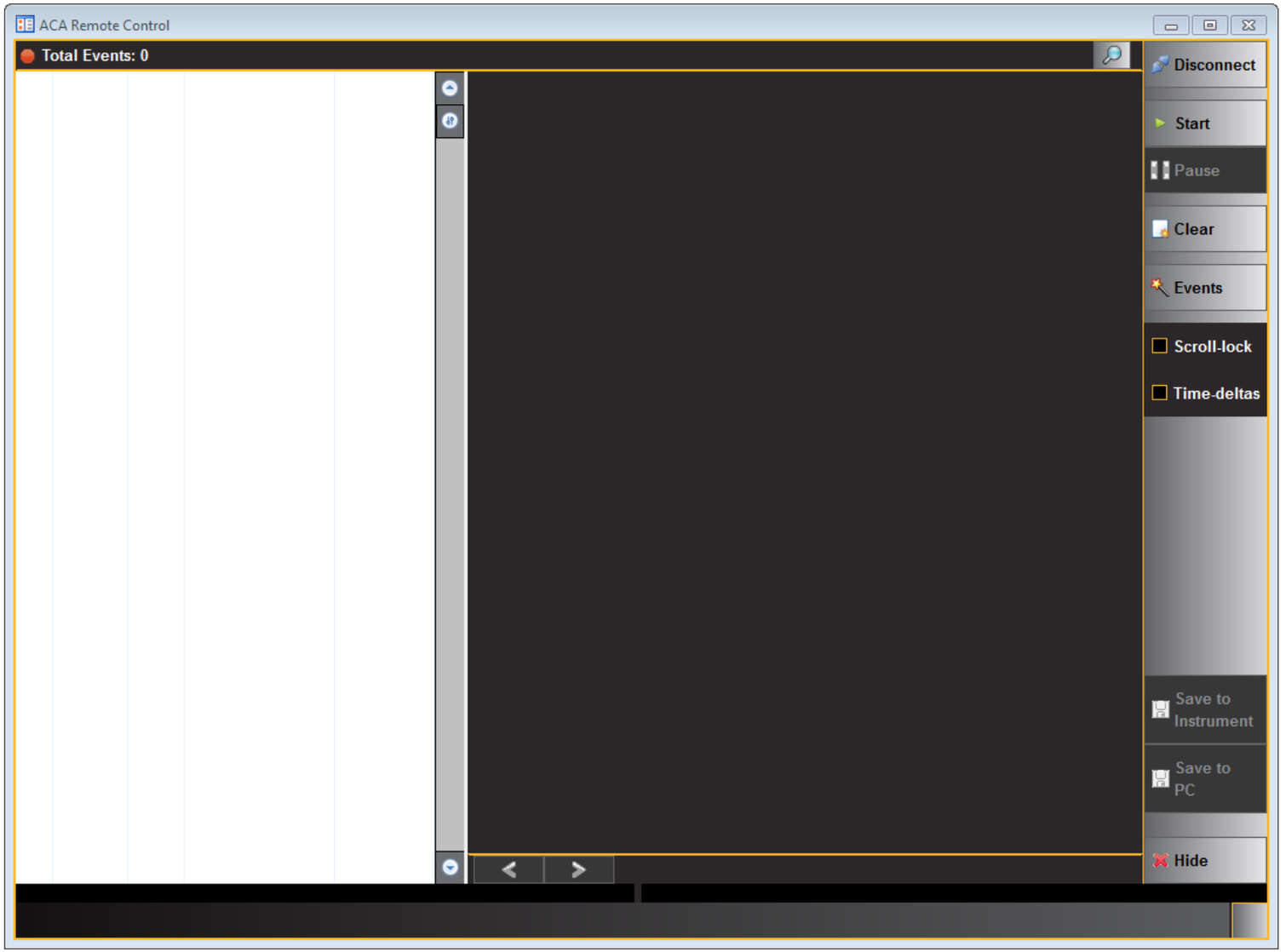
- Embedded GUI ACA from 980 touch panel.
- ACA Remote Control from external GUI Manager (shown left)
- ACA Data Viewer for viewing saved ACA trace files.

980 HDMI Video Generator - Auxiliary Channel Analyzer

ACA Remote Control:

- View ACA trace transactions in real time from host PC.
- Control the ACA remotely from the External 980 GUI Manager GUI.
- Remains in sync with embedded ACA utility running on 980 test instrument.

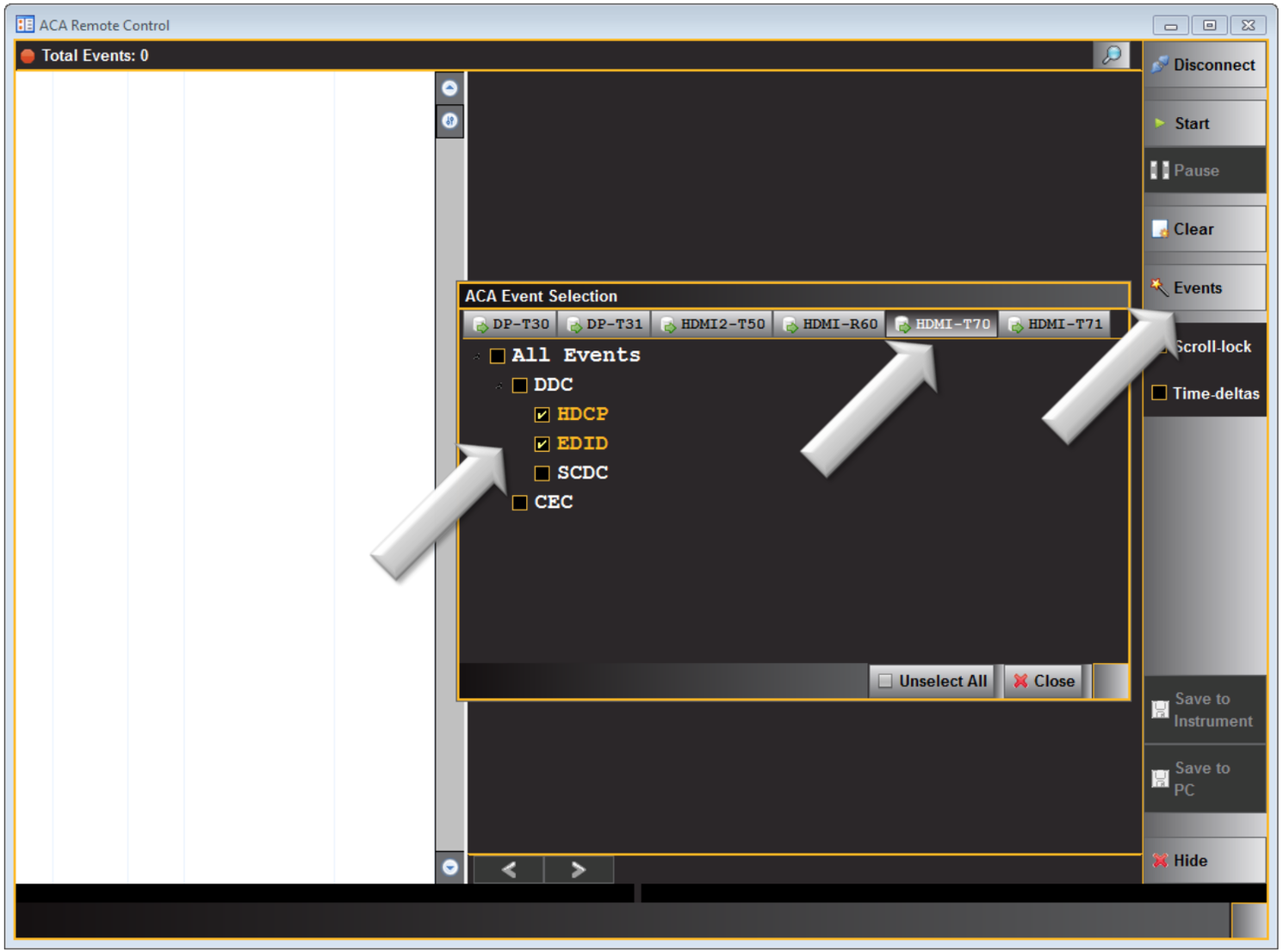
980 HDMI Video Generator - Auxiliary Channel Analyzer



ACA Remote Control:

- Connect to 980 instrument.

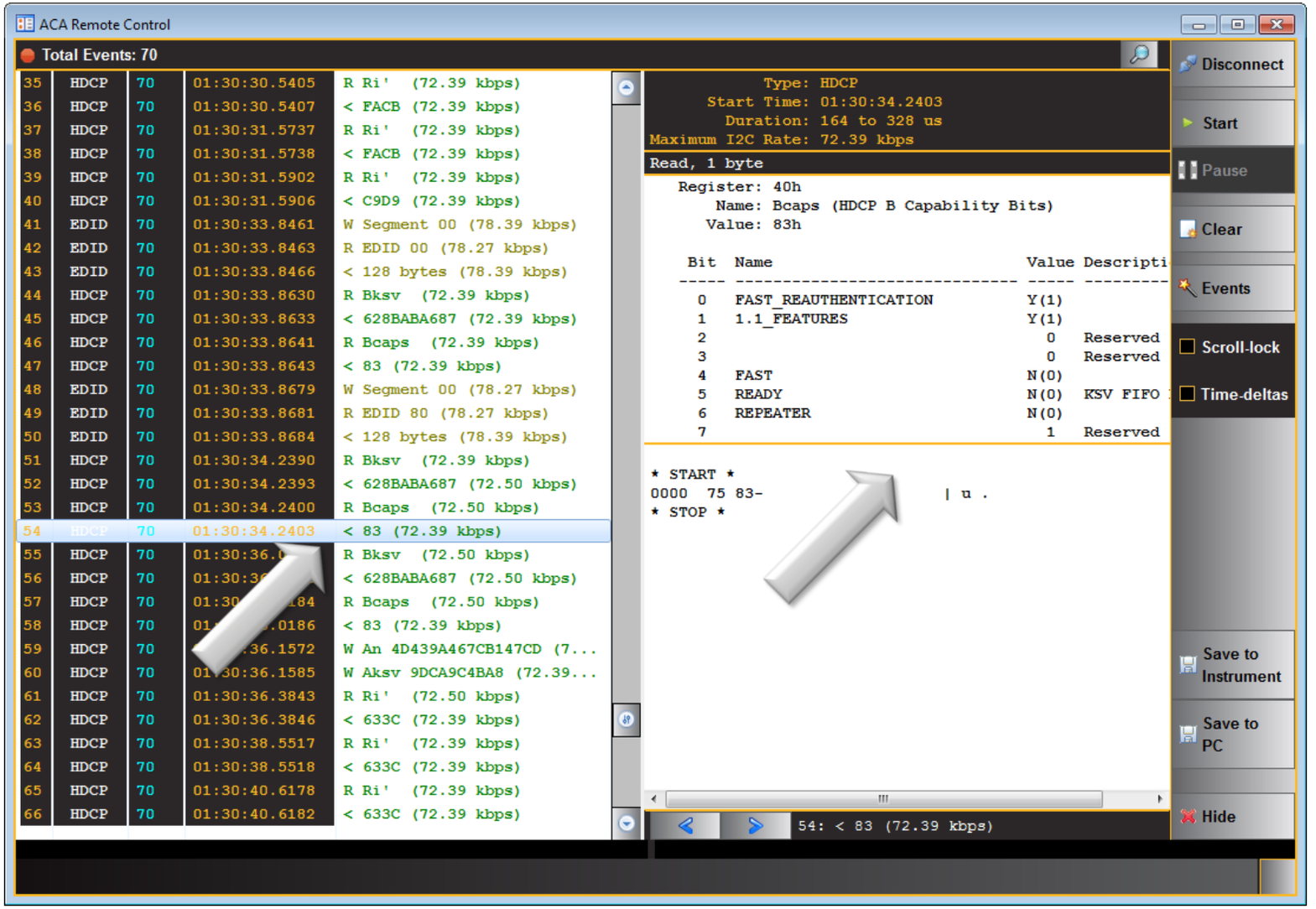
980 HDMI Video Generator - Auxiliary Channel Analyzer



ACA Remote Control:

- Select which interface using Events activation button on right.
- Choose which type of transactions (Events) you wish to view (HDCP and EDID shown).

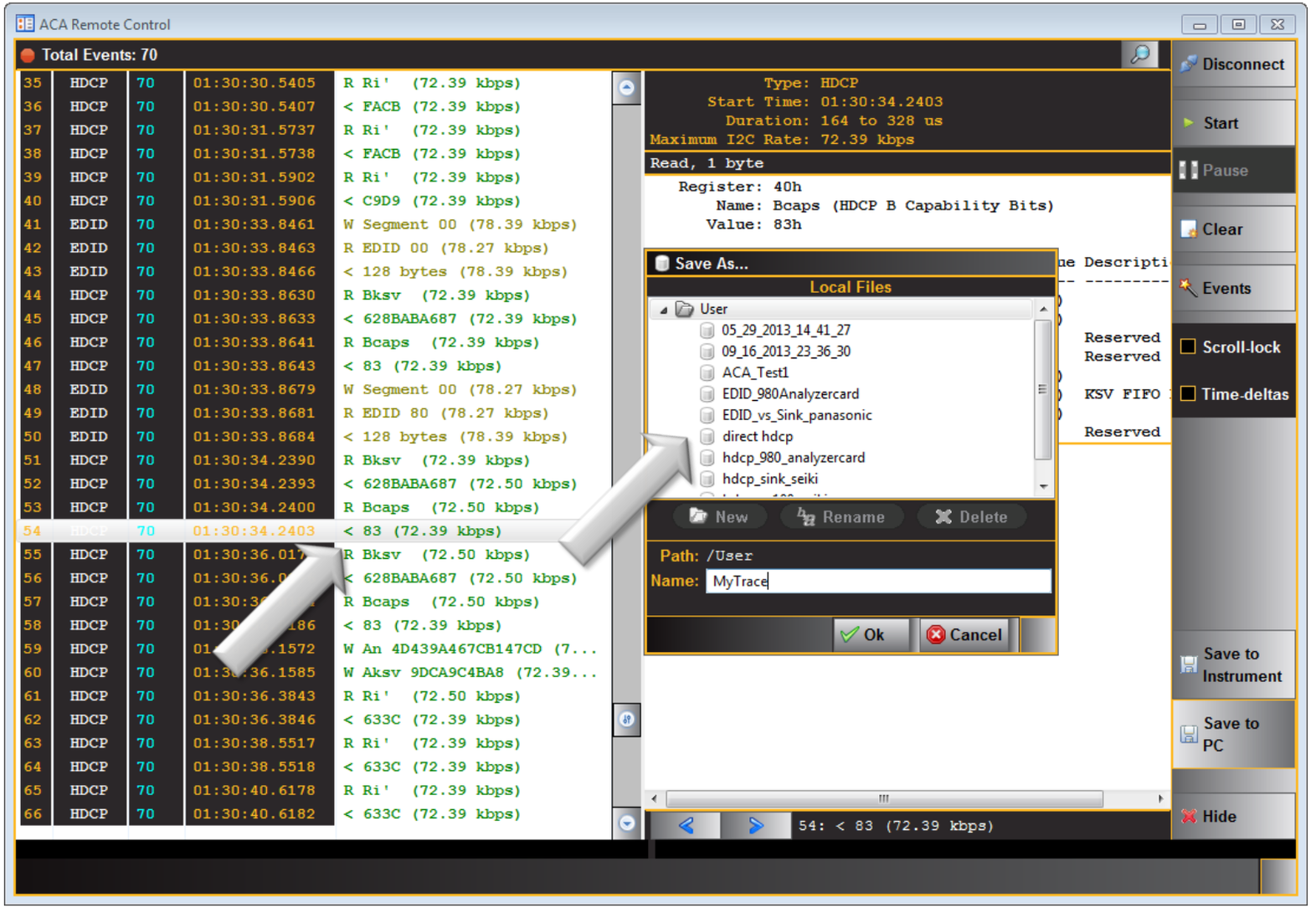
980 HDMI Video Generator - Auxiliary Channel Analyzer



ACA Remote Control:

- View transactions. In real time.
- Select transaction to view its details (BCAPS shown).

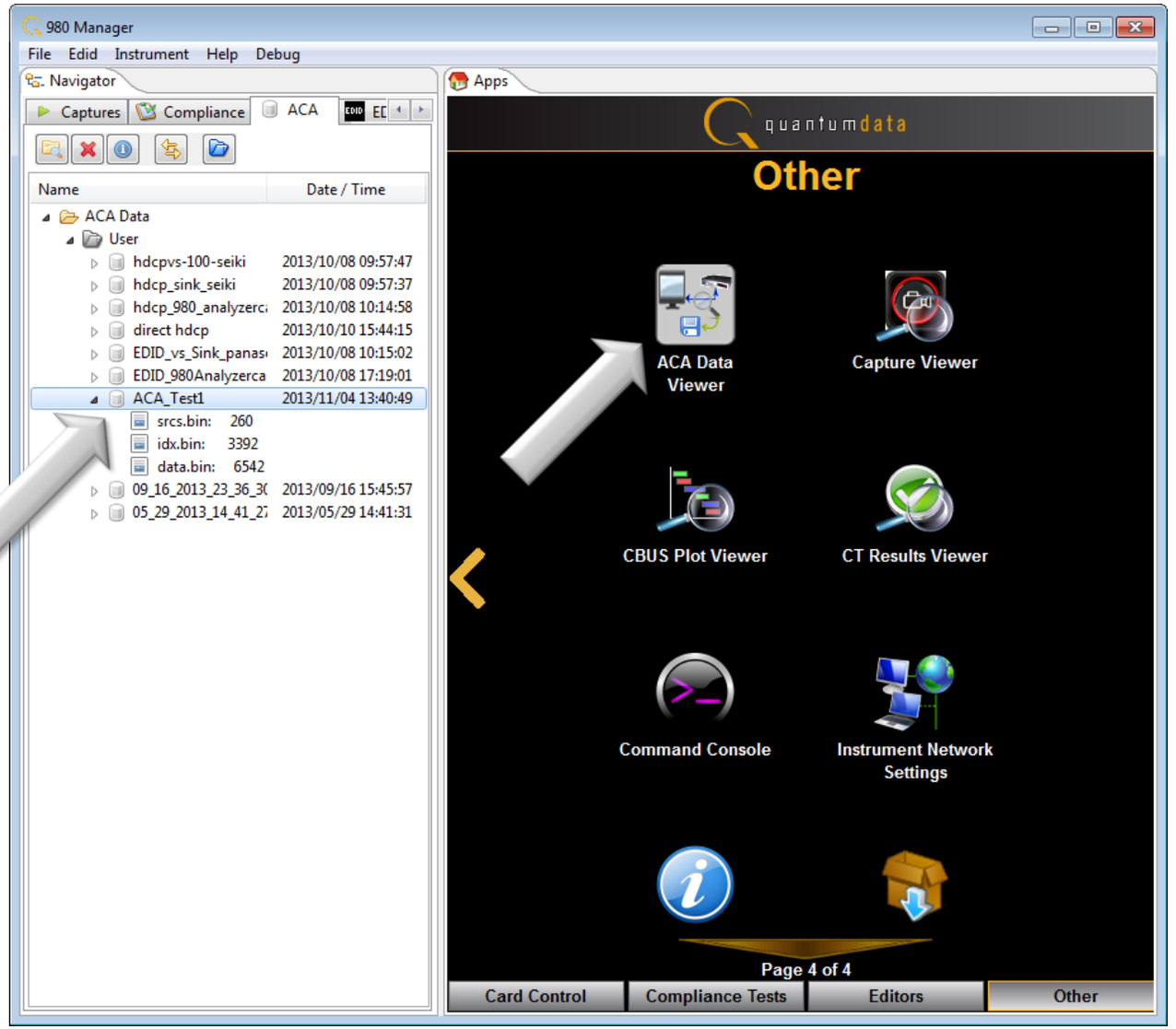
980 HDMI Video Generator - Auxiliary Channel Analyzer



ACA Remote Control:

- Save transactions as an ACA trace file to disseminate to colleagues.
- View saved trace files later for comparison through ACA Viewer utility.

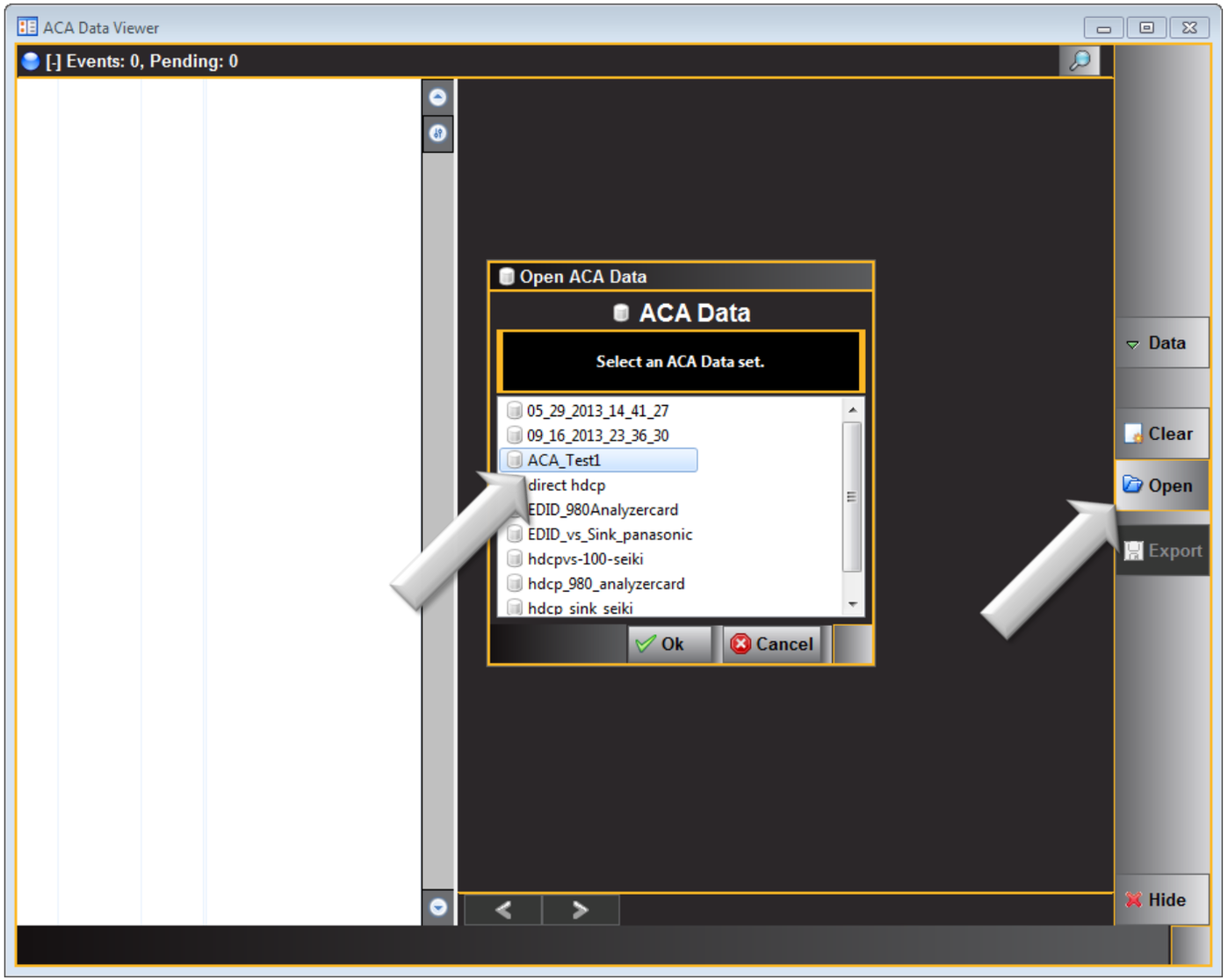
980 HDMI Video Generator - Auxiliary Channel Analyzer



ACA Viewer utility:

- View saved transactions.
- Do not need 980 test instrument.
- Ideal for collaboration with subject matter experts.

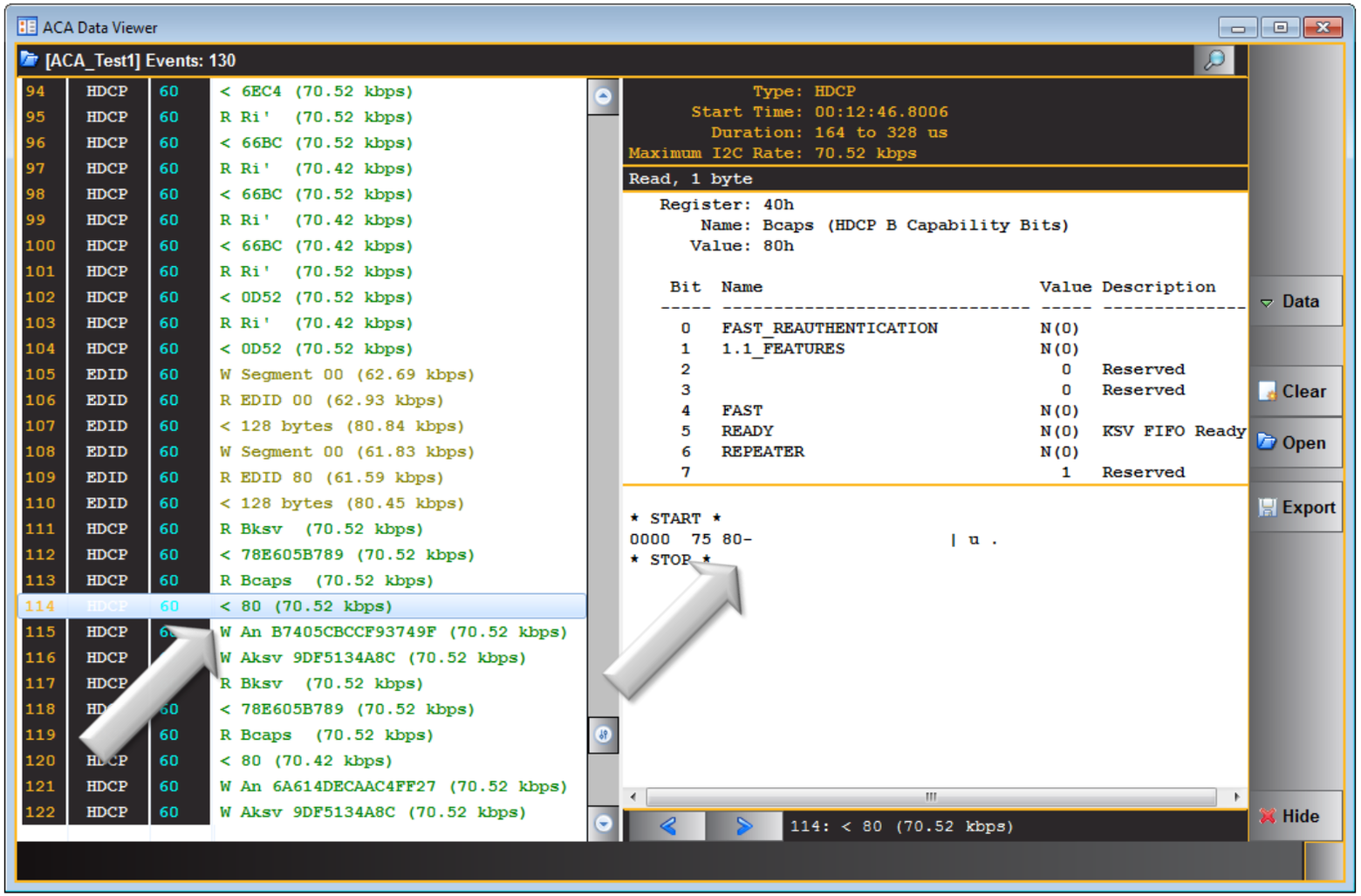
980 HDMI Video Generator - Auxiliary Channel Analyzer



ACA Viewer utility:

- Open ACA Viewer.
- Select file from Open.

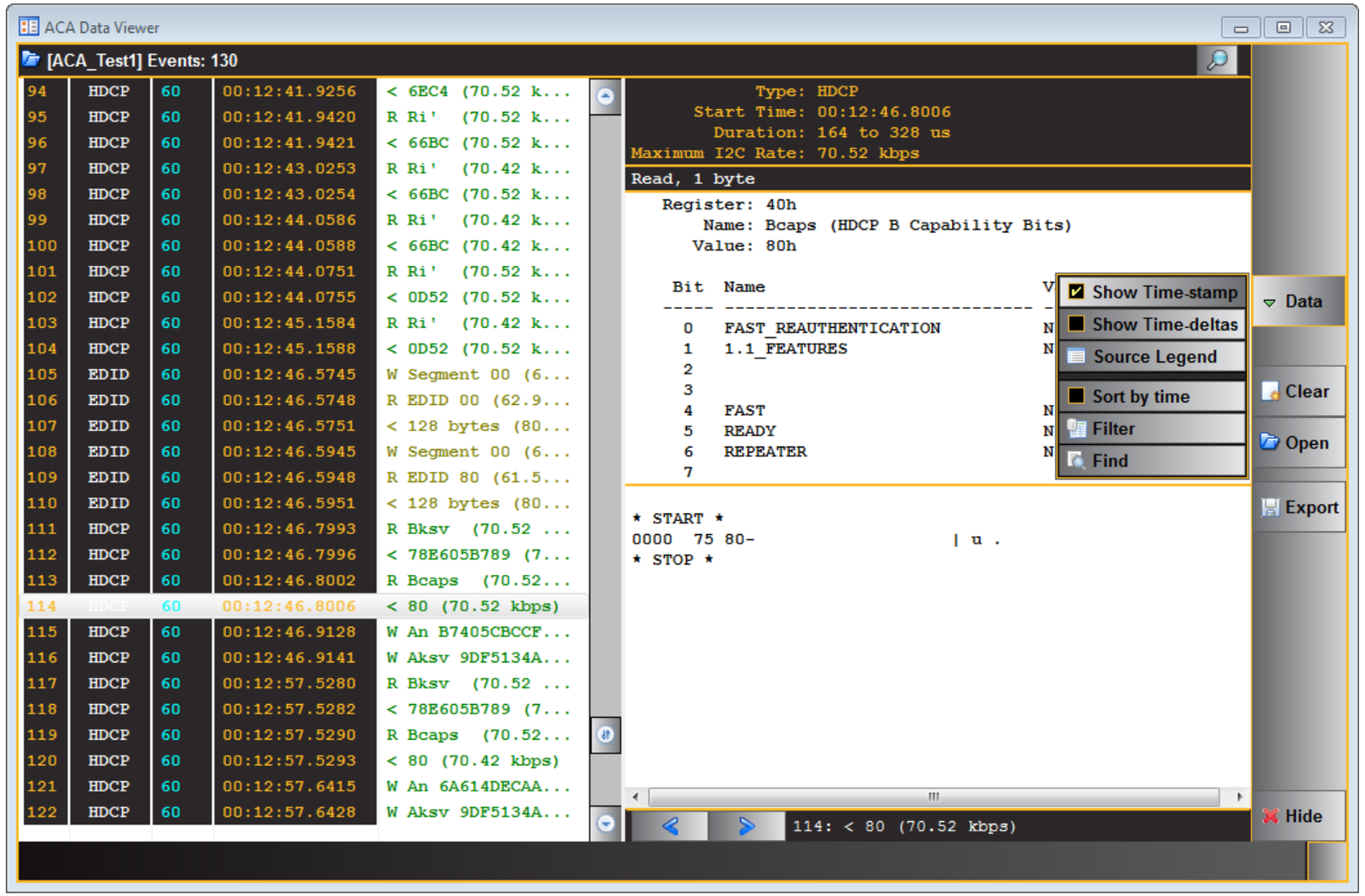
980 HDMI Video Generator - Auxiliary Channel Analyzer



ACA Viewer utility:

- View details of any record.

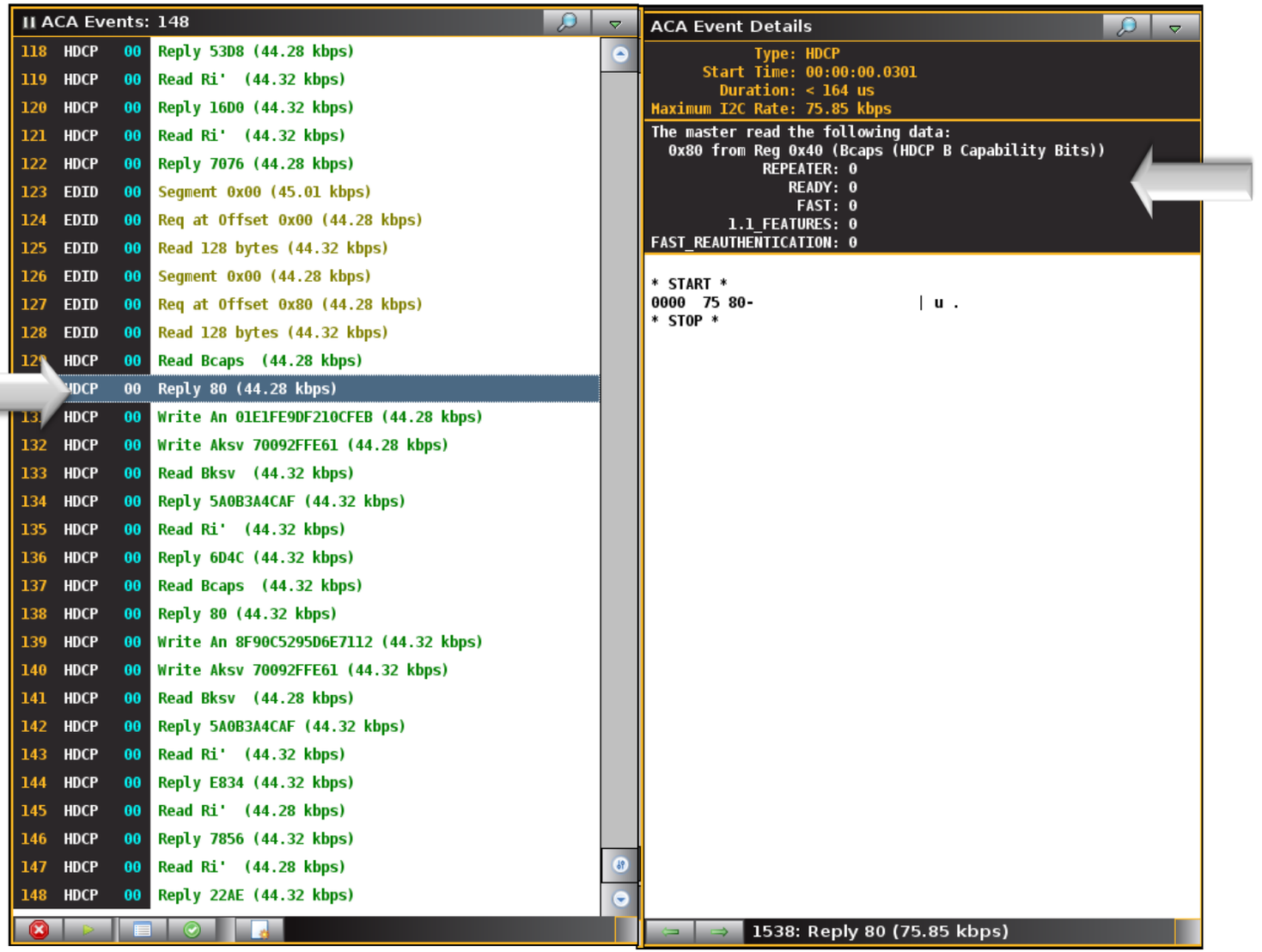
980 HDMI Video Generator - Auxiliary Channel Analyzer



ACA Viewer utility:

- View details of any record.
- Configure to view timestamps.

980 HDMI Video Generator - Auxiliary Channel Analyzer



Embedded GUI ACA from 980 touch panel.

- Works same way of ACA Remote Control application for external 980 GUI Manager (example left).

980 HDMI Video Generator Module Testing CEC

980 HDMI Video Generator Module – CEC Tester

- Optional feature for testing CEC-capable HDMI devices.
- Emulate any CEC device and send any message to any CEC device.
- Monitor CEC transactions through CEC Tester and view details.
- Monitor CEC messages using Auxiliary Channel Analyzer (CEC) – save traces for dissemination to subject matter experts and Quantum Data customer support.

980 HDMI Video Generator Module – CEC Tester

- Run “irregular” tests for robustness testing of CEC devices:
  - Send messages with user-specified corrupt bits.
  - Send messages with variations in timing for any bit and any message.
  - Test non-acknowledgement scenarios when CEC devices under test send messages to the 980 Video Generator.
  - Test arbitration scenarios where 980 Video Generator seizes bus at various times to test the behavior of the CEC device under test.

980 HDMI Video Generator Module – CEC Tester

Testing CEC devices:

- CEC Tester accessible from Tools menu.

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Testing CEC devices:

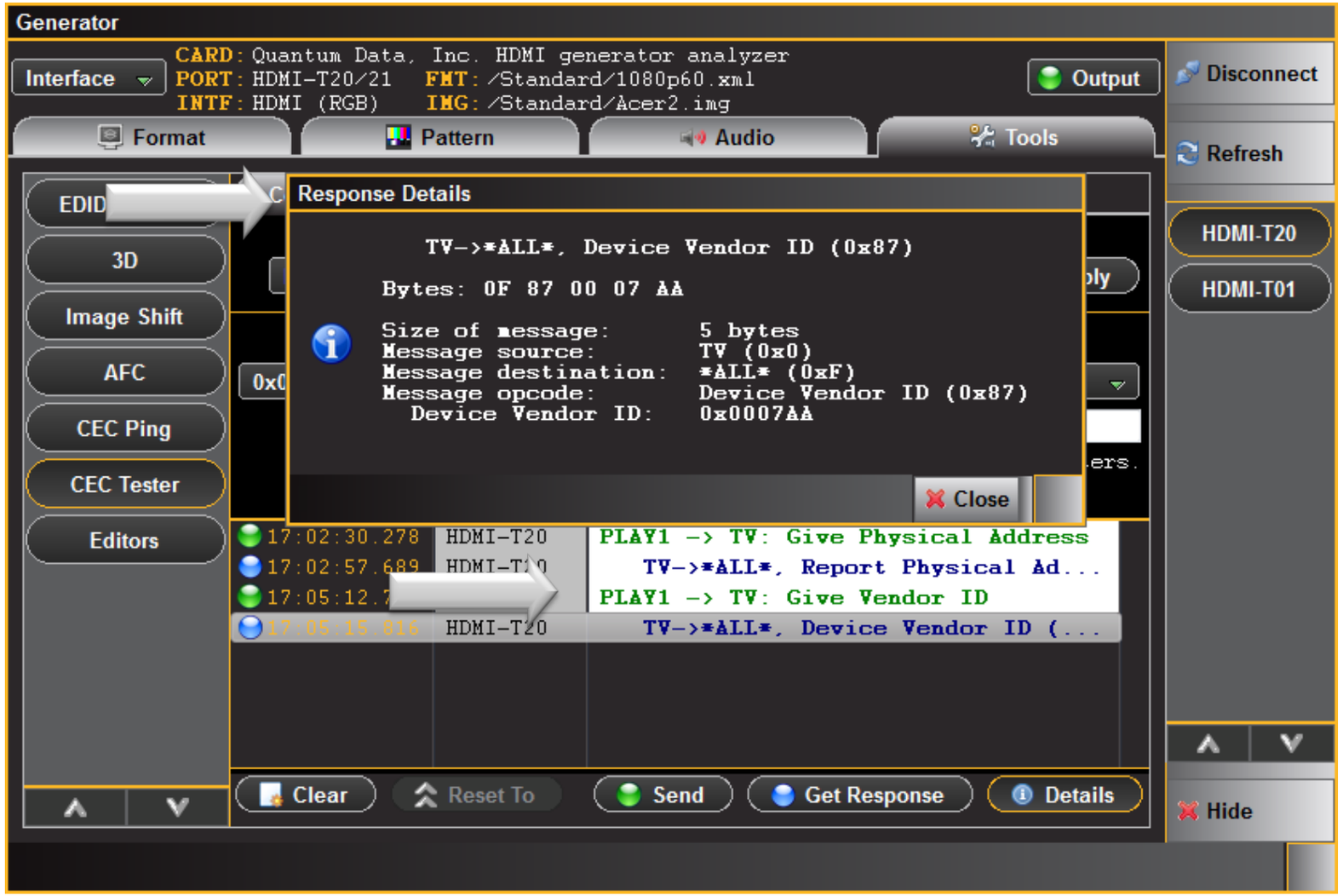
- Configure 980 CEC Tester to emulate a specific CEC device.
- Example shows emulating a Player.

980 HDMI Video Generator Module – CEC Tester

Testing CEC devices:

- Select CEC message to send.
- Example shows Give Vendor ID.

980 HDMI Video Generator Module – CEC Tester



Testing CEC devices:

- Send message and monitor response.
- View details of response.

980 HDMI Video Generator Module – CEC Tester

Testing CEC devices:

- Send message with corrupt bits to test CEC device under test handling.
- Specify any bit of any byte in a message.

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Testing CEC devices:

- Send messages with variances in timing to test CEC device under test handling.
- Change timing of any type of bit, e.g. start, data, low period or high period.

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Testing CEC devices:

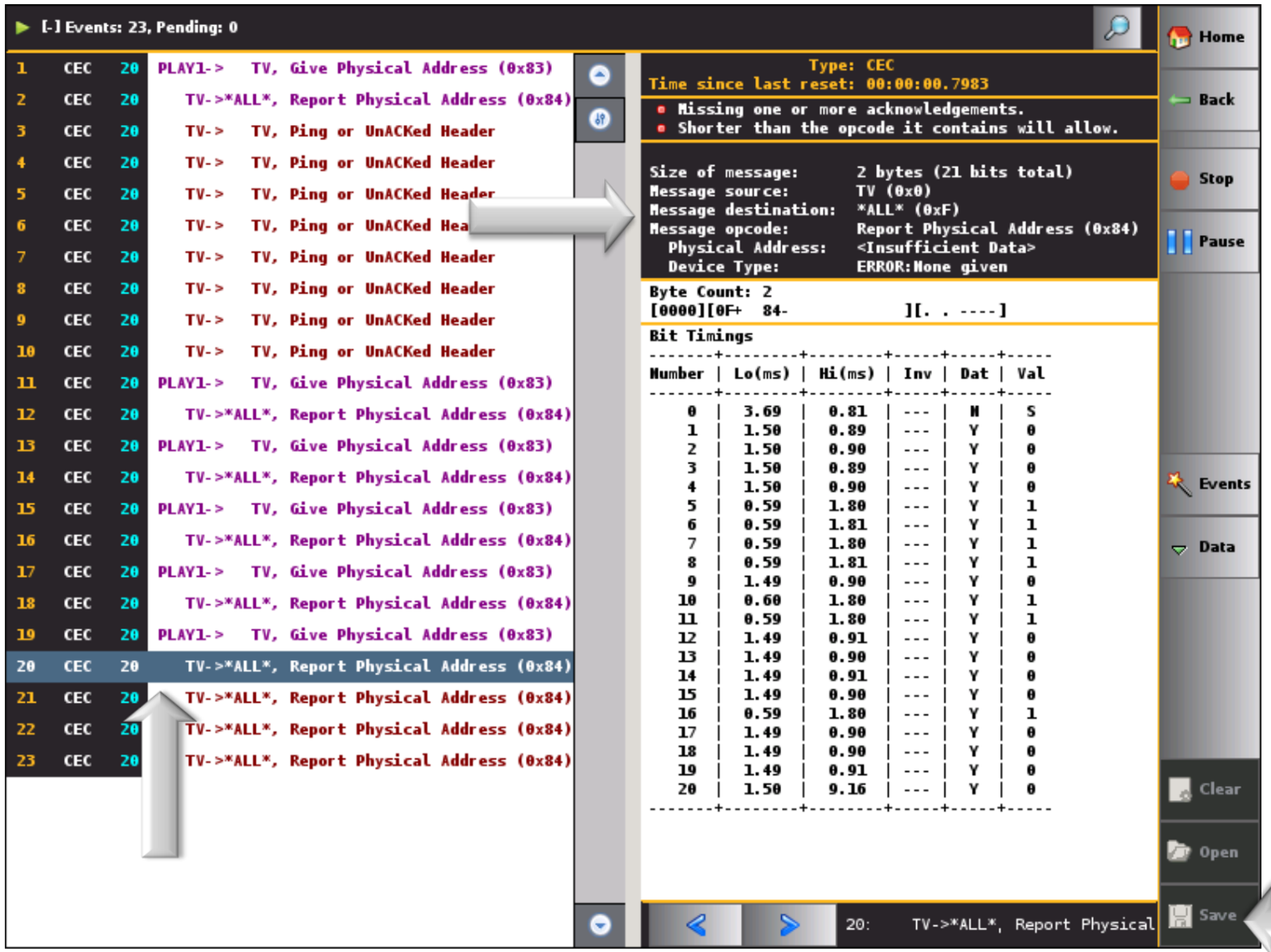
- Test CEC device under test handling of non-acknowledgement (nack) scenarios.
- Specify nack for any type of message and message component, e.g. Broadcast Data byte.
- Tests CEC device under test handling of acknowledgement.

980 HDMI Video Generator Module – CEC Tester

Testing CEC devices:

- Test CEC device under test handling for various arbitration scenarios.
- Specify 980 CEC Tester attempts to seize bus under a variety of conditions, e.g. seize bus during transmission of a data bit.
- Tests CEC device under test proper handling of arbitration.

980 HDMI Video Generator Module – CEC Tester



Testing CEC devices:

- Monitor CEC messages using the Auxiliary Channel Analyzer (ACA).
- View all messages and details of all messages.
- Save file for dissemination to colleagues and other subject matter experts as well as Quantum Data customer support.

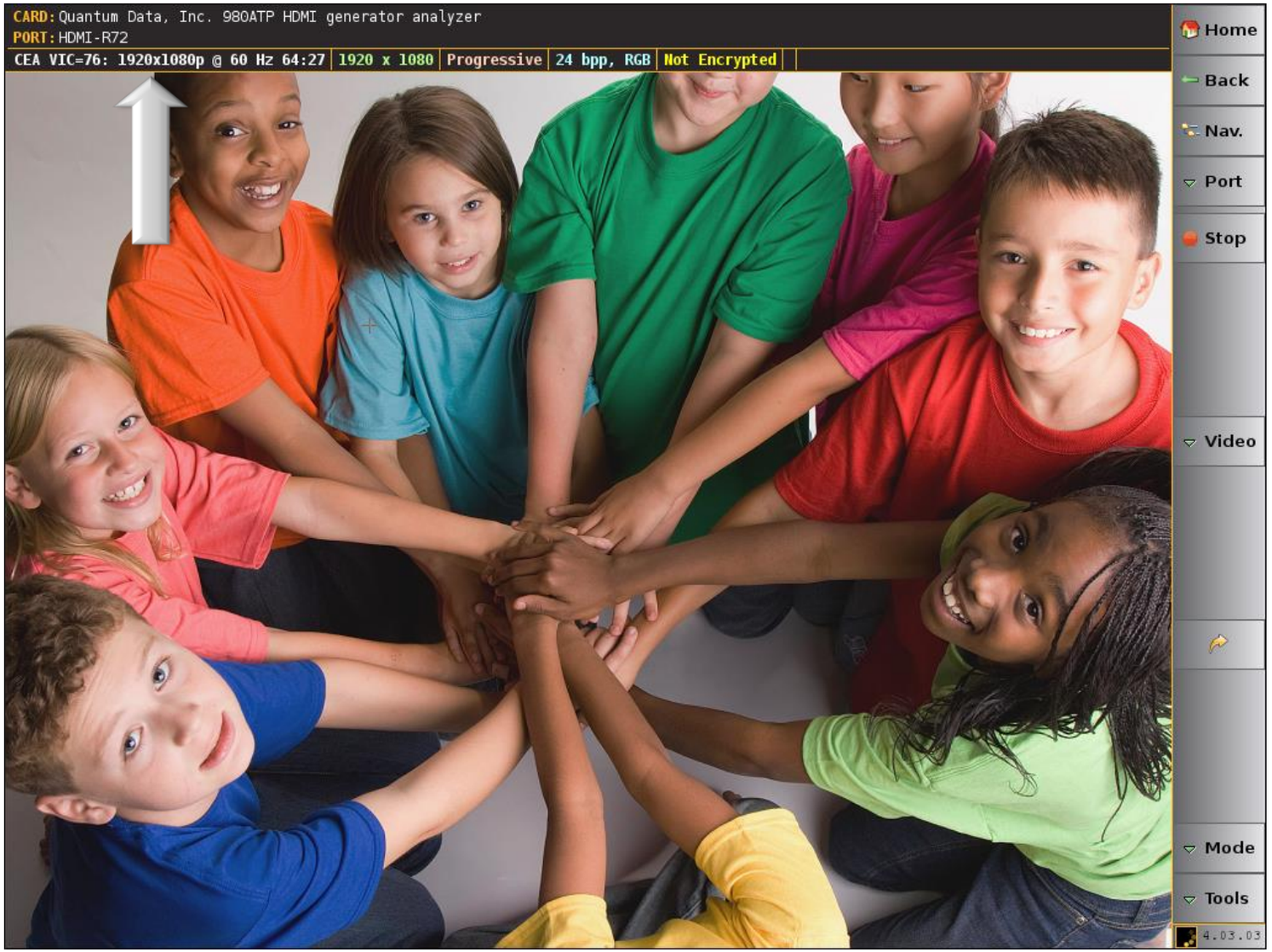
980 HDMI Video Generator Module
Basic Analyzer for Source Testing

Quantum Data Inc. 2111 Big Timber Road Elgin, IL 60123-1100 USA Phone: (847) 888-0450 www.quantumdata.com

980 HDMI Video Generator Module – Basic Analysis

- Optional feature for basic verification of HDMI source devices.
- Verify incoming video image.
- Check basic video parameters.
- Select EDIDs for emulation.

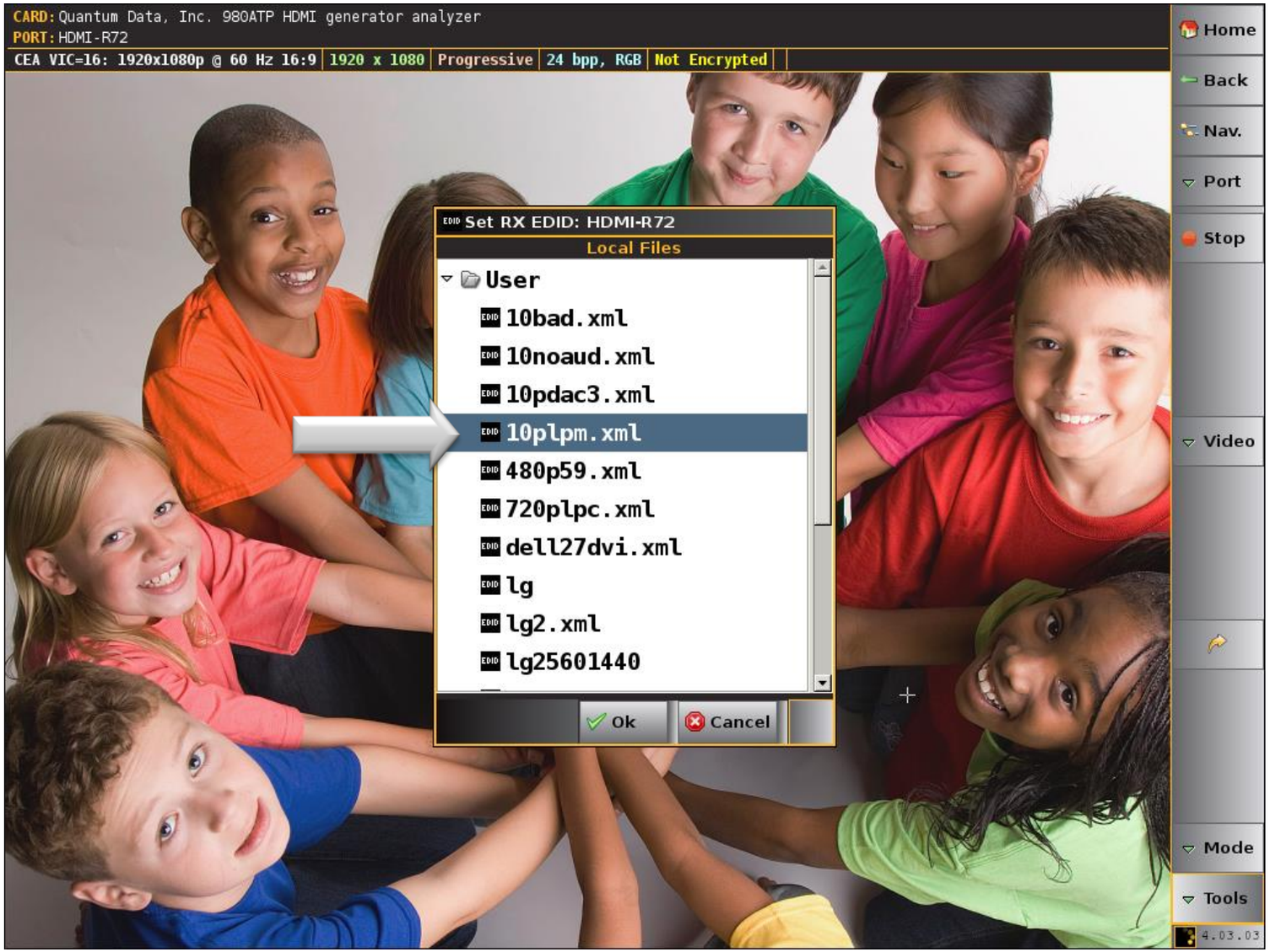
980 HDMI Video Generator Module – Analyzer



Confidence Testing of HDMI source devices:

- Main window shows incoming video.
- Dashboard shows important attributes of incoming HDMI video.

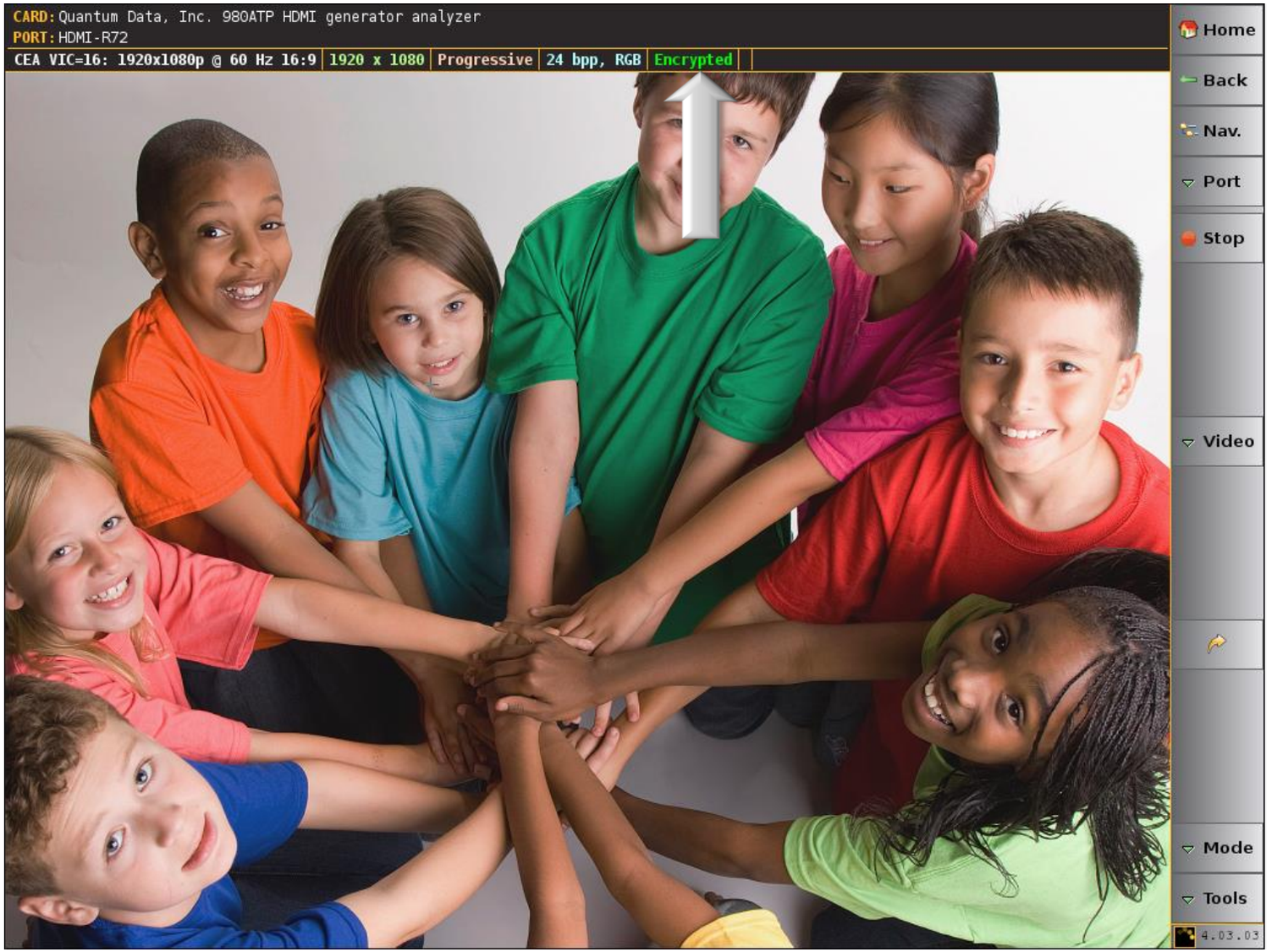
980 HDMI Video Generator Module – Analyzer



Confidence Testing of HDMI source devices:

- Set EDID on Rx port to emulate any EDID.

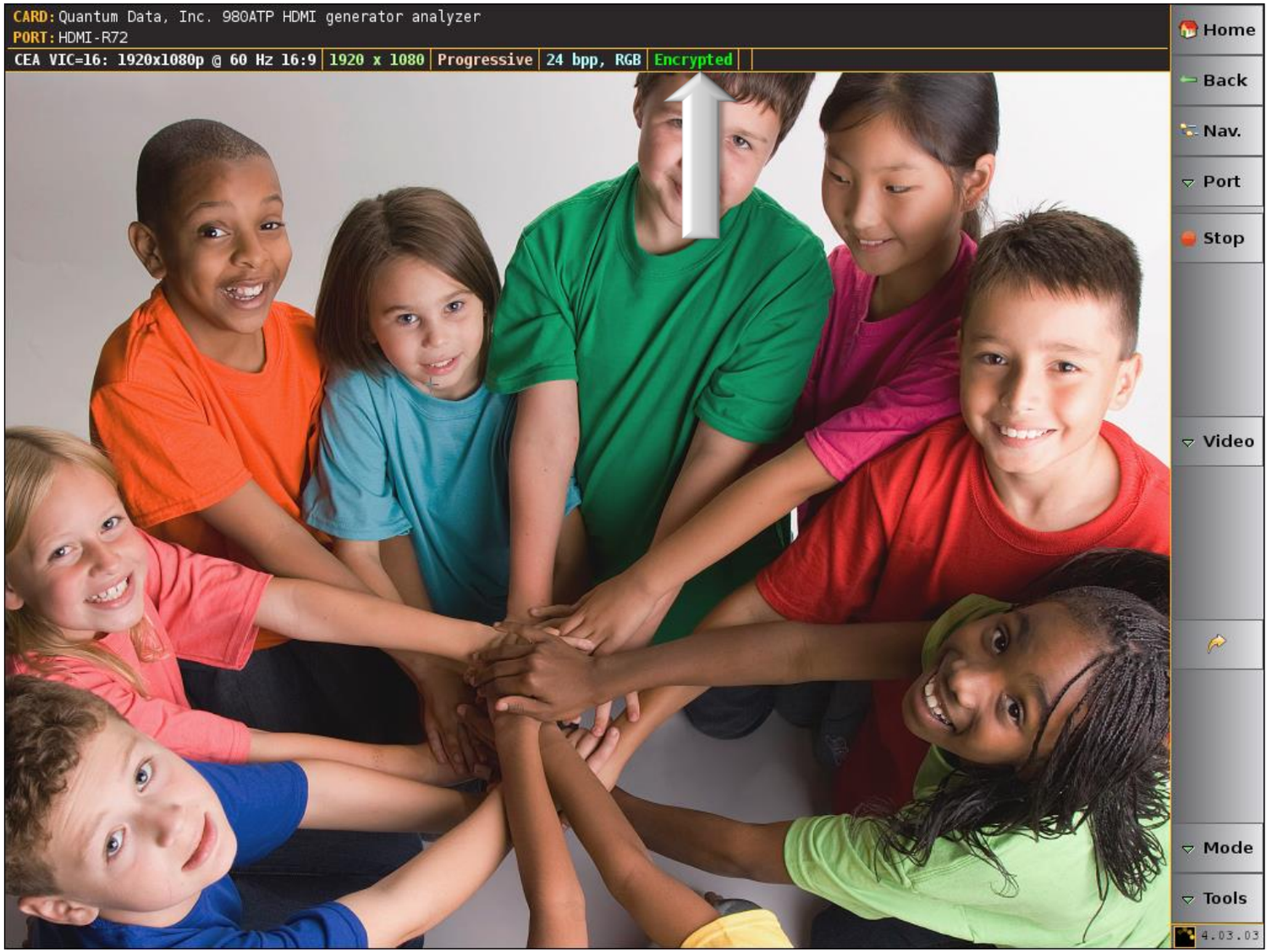
980 HDMI Video Generator Module – Analyzer



Confidence Testing of HDMI source devices:

- Example showing Encrypted content.

980 HDMI Video Generator Module – Analyzer



Confidence Testing of HDMI source devices:

- Example showing Encrypted content.

Quantum Data 980 Video Test Generation Module

… 980 now supports video pattern testing of HDMI HDTVs and displays.