

Digital Video Signal Analyzer for DVI and HDMI Devices

NI VideoMASTER for Digital Video Analysis **NEW!**

- Analysis of DVI and HDMI (with disabled HDCP encryption) with 24-bit/pixel color depth digital video
- Support for formats from 480i to 1080p at 24 to 60 Hz (or fps)
- Complete set of more than 40 digital video measurements
- Acquisition with NI PXI-6542 at 100 MS/s, 32 bits; VideoSPX-I DVI/HDMI interface
- Ready-to-run configurable step types for NI TestStand

Operating Systems

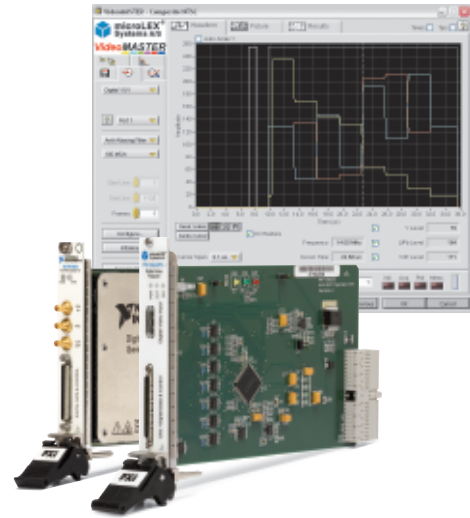
- Windows XP/2000

Recommended Software

- NI TestStand
- NI LabVIEW

Included Software

- VideoMASTER – Analog and Digital Analyzer
- VideoMASTER Analog Analyzer license
- Required NI drivers



Overview

NI VideoMASTER, a versatile video analysis and generation test suite for validation and production test, works with a wide variety of standards and formats for analog and digital video. VideoMASTER for Digital Video Analysis combines an NI PXI-6542 high-speed digital waveform analyzer/generator with a PXI VideoSPX-I DVI/HDMI input deserializer module and VideoMASTER – Digital Analyzer software to deliver a comprehensive automated test solution for digital video devices.

VideoMASTER offers easy-to-use graphical user interfaces, more than 40 digital video measurements optimized for automated test, and seamless integration into NI TestStand test management software for automated validation and production environments. High test throughput, coverage for design and production requirements, and a relatively low cost ensure a reduced overall ownership cost for high-performance digital video test.

Integrated Solution for Digital Video Analysis

VideoMASTER for Digital Video Analysis is a solution for functional test of digital video such as DVI (Digital Visual Interface) and HDMI (High-Definition Multimedia Interface) where you can disable the HDCP (High-bandwidth Digital Content Protection). VideoMASTER for Digital Video Analysis is an extension of the VideoMASTER for Analog Video Analysis to analyze composite video (CVBS or color, video, blanking, and sync), S-video, and component video (CAV). These solutions are well-suited to analyze video characteristics such as color bar measurements to verify the hue and color saturation accuracy, multiburst and sweep measurements to test the frequency response, K-factor measurements to test uniformity of frequency response, horizontal timing for general timing analysis, and a variety of linear and nonlinear distortions.

You can use VideoMASTER for Digital Video Analysis to analyze digital video signals including serial and parallel data streams such as ITU-R BT.601 for serial and ITU-R BT.656 for parallel video signals. It supports the RGB 4:4:4, YCbCr 4:4:4, and YCbCr 4:2:2 pixel encoding formats.

VideoMASTER works with an extensive set of video formats and timings including:

- 480i and 480p 24/25/29.97/30/50/59.92/60 fps
- 576i and 576p systems 24/25/29.97/30/50/59.92/60 fps
- 720p systems 24/25/29.97/30/50/59.92/60 fps
- 1080i systems 24/25/29.97/30/50/59.92/60 fps
- 1080p 24/25/29.97/30 fps

The VideoMASTER for Digital Video Analysis supports a color depth of 24 bits – in other words, 3x8 bit pixels, which resembles the ITU-R BT.601-5 and the 8-bit coding system of the ITU-R BT.709-5.

Fast Signal Acquisition and High Throughput

During initialization, VideoMASTER automatically determines the digital video signal format (resolution and timing) and pixel encoding of the source signal and acquires the signal accordingly. Once it acquires the video signal, you can use a video image frame to perform measurements defined by the user with the advanced signal processing algorithms included in the software. To ensure optimal execution speed for digital video testing, the system acquires one frame of video and takes several measurements on the acquired frame defined by the user. Measurement time thus becomes a function of computation time and not the acquisition time. The result is a system that benefits from the latest multicore processors to reduce total test time. The total test time for a

Digital Video Signal Analyzer for DVI and HDMI Devices

video test, digital or analog, thus consists of the acquisition time for one frame and the time to perform the requested measurements. The latter improves over time as the host processor increases in performance.

Hardware Architecture

VideoMASTER uses a dedicated PXI VideoSPX-I deserializer to convert the DVI or HDMI digital serial stream to a parallel stream (during acquisition). The VideoSPX-I is a PXI module that facilitates a complete PXI implementation of the VideoMASTER for Digital Video Analysis solution. The interaction between this module and the PXI-6542 is transparent to the user and handled by the VideoMASTER – Analog and Digital Analyzer software.

VideoMASTER for Digital Video Analysis Components

- PXI-6542 32-bit, 100 MS/s high-speed digital analyzer/generator with 8 MB of onboard memory

- VideoSPX-I DVI/HDMI deserializer
- NI SHC68-C68-D4 cable (1 m) to connect the PXI-6542 to the VideoSPX-I
- NI VideoMASTER – Analog and Digital Analyzer software DVD
- Required license for digital video measurements

Unified Solution for Analog and Digital Video

You can use VideoMASTER for both digital and analog baseband video analysis with a common software interface. Configure a system to conduct analog video analysis and/or digital video analysis on various configurations ranging from analog composite video to a complete system including component video, S-video, and composite analog video combined with digital analysis for DVI, HDMI, or parallel ITU-R BT.656. Refer to the NI VideoMASTER for Analog Video Analysis data sheet for more information on analog video solutions.

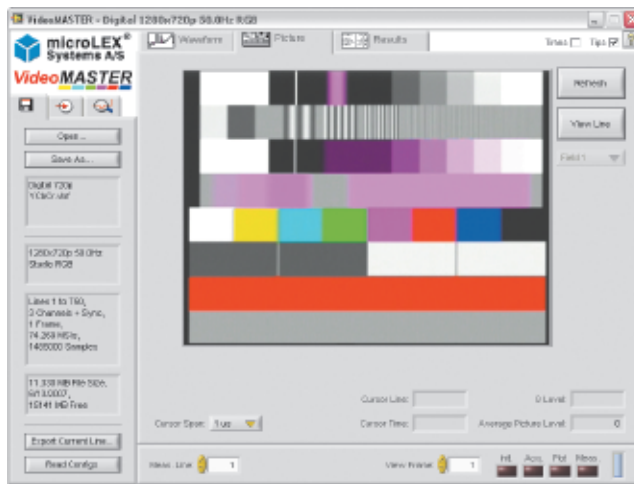
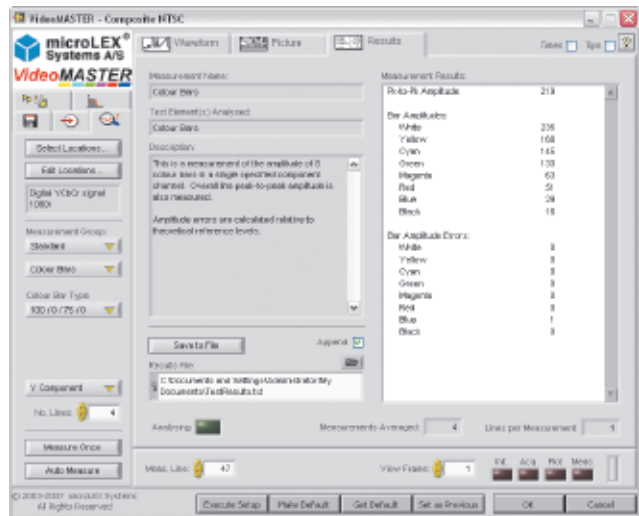
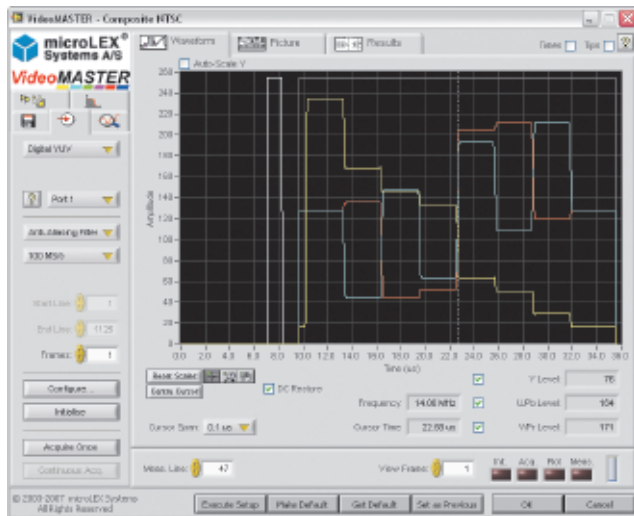


Figure 1. NI VideoMASTER includes interactive graphical interfaces to display the acquired video signal, video image, and complete measurement results.

Digital Video Signal Analyzer for DVI and HDMI Devices

Amplitude and Timing	
Channel delay	Delays between the 3 channels
Color bars	Bar amplitudes and errors
Edge finder	Number of edges found Low and high levels Amplitude and center Bar width Rise and fall times
Group delay and frequency response (SinX)/X	Group delay Gain
Horizontal timing	Sync width, start and end Sync polarity: H and V Active video: start and end Active line interval Total line interval
K-factor	K 2T K-pulse bar Pulse/bar ratio and error Pulse amplitude Pulse width (HAD)
Level meter (single point/two point diff.)	Amplitude levels: Y, U, V Frequency Location/time
Line frequency	Line frequency Line period Frame frequency Sample frequency
Noise	
Noise spectrum	Noise level, dB _{rms} and mV _{rms} Peak noise level and frequency Noise band start and stop
Linear Distortion	
Multiburst	Flag amplitude Packet amplitudes Packet frequencies Amplitude difference
Sweep	Amplitudes Frequencies Amplitude difference
Short-time distortion	Bar amplitude and width Rise time, preshoot, overshoot, settling time Fall time, preshoot, undershoot, settling time
Nonlinear Distortion	
Nonlinearity	Nonlinearity Step nonlinearity errors

Table 1. Digital Video Measurements Supported by VideoMASTER for Digital Video Analysis

Easy-to-Use User Interfaces and API

VideoMASTER – Analog and Digital Analyzer software is shipped with several easy-to-use graphical user interfaces for quick and easy configuration and measurement. The interfaces include the following:

- Interactive Video Analyzer Instrument Panel for easy debugging and nonautomated applications
- Measurement Locations Editor for standard or custom video signal measurement locations
- Custom step types for NI TestStand for efficient application development for validation and product test setups

Use the custom step types for NI TestStand to quickly develop test sequences for new applications, including configuring typical video parameters for test. Then easily manage pass-fail tests using the Limit Editor built into the VideoMASTER custom step types. Measurement results are automatically transferred to the Limit Editor for immediate display to check if the various measurement limits are exceeded. During the test application development or debugging, limits can be changed manually or loaded from a file. Once set, the limits are saved with the test applications and subsequently loaded dynamically through NI TestStand, allowing the use of company-wide defined limit parameters that can be shared between groups. Limits can also be saved to file for use in other test applications, reducing test development time and removing potential sources of error. VideoMASTER also includes an application programming interface (API) that features several high-level LabVIEW VIs. You can easily integrate these VIs to develop customized video analysis applications.

See the compatible versions of LabVIEW and NI TestStand in the “Ordering Information” section.

Visit ni.com/videomaster to configure your VideoMASTER solution.

Ordering Information

NI VideoMASTER for Digital Video Analysis

Includes VideoMASTER – Analog and Digital Analyzer software, license for digital video analysis, PXI-6542 with 8 MB of memory, VideoSPX-I, and SHC68-C68-D4 cable.

NI VideoMASTER with NI PXI-6542 Digital Video Analyzer,

DVI or HDMI with HDCP disabled780432-01
 NI VideoMASTER for offline analysis780475-01
Software only with no support for hardware.

NI LabVIEW and NI TestStand Compatibility

VideoMASTER – Analog and Digital Analyzer Version 2.1.1.5

- LabVIEW 8.2 or 8.2.1
 - NI TestStand 3.5 or 4.0.1 (not compatible with NI TestStand 4.0)
- VideoMASTER - Analog and Digital Analyzer Version 2.2
- LabVIEW 8.2 or 8.2.1
 - NI TestStand 3.5 or 4.0.1 (not compatible with NI TestStand 4.0)

Related VideoMASTER Solutions

- NI VideoMASTER for Composite Video Generation
- NI VideoMASTER for Analog Video Analysis
- NI VideoMASTER for Digital Video Generation

BUY NOW!

For complete product specifications, pricing, and accessory information, call 800 813 3693 (U.S.) or go to ni.com/videomaster.

NI Services and Support



NI has the services and support to meet your needs around the globe and through the application life cycle – from planning and development through deployment and ongoing maintenance. We offer services and service levels to meet customer requirements in research, design, validation, and manufacturing. Visit ni.com/services.

Training and Certification

NI training is the fastest, most certain route to productivity with our products. NI training can shorten your learning curve, save development time, and reduce maintenance costs over the application life cycle. We schedule instructor-led courses in cities worldwide, or we can hold a course at your facility. We also offer a professional certification program that identifies individuals who have high levels of skill and knowledge on using NI products. Visit ni.com/training.

Professional Services

Our NI Professional Services team is composed of NI applications and systems engineers and a worldwide National Instruments Alliance Partner program of more than 600 independent consultants and

integrators. Services range from start-up assistance to turnkey system integration. Visit ni.com/alliance.



OEM Support

We offer design-in consulting and product integration assistance if you want to use our products for OEM applications. For information about special pricing and services for OEM customers, visit ni.com/oem.

Local Sales and Technical Support

In offices worldwide, our staff is local to the country, giving you access to engineers who speak your language. NI delivers industry-leading technical support through online knowledge bases, our applications engineers, and access to 14,000 measurement and automation professionals within NI Developer Exchange forums. Find immediate answers to your questions at ni.com/support.

We also offer service programs that provide automatic upgrades to your application development environment and higher levels of technical support. Visit ni.com/ssp.

Hardware Services

NI Factory Installation Services

NI Factory Installation Services (FIS) is the fastest and easiest way to use your PXI or PXI/SCXI combination systems right out of the box. Trained NI technicians install the software and hardware and configure the system to your specifications. NI extends the standard warranty by one year on hardware components (controllers, chassis, modules) purchased with FIS. To use FIS, simply configure your system online with ni.com/pxiadvisor.

Calibration Services

NI recognizes the need to maintain properly calibrated devices for high-accuracy measurements. We provide manual calibration procedures, services to recalibrate your products, and automated calibration software specifically designed for use by metrology laboratories. Visit ni.com/calibration.

Repair and Extended Warranty

NI provides complete repair services for our products. Express repair and advance replacement services are also available. We offer extended warranties to help you meet project life-cycle requirements. Visit ni.com/services.



ni.com • 800 813 3693

National Instruments • info@ni.com

