

Video Signal Analyzer for Composite, S-Video, and Component Video

NI VideoMASTER Analog Video Analyzer **NEW!**

- Analysis of composite, S-video, and component video (including HDTV and VGA)
- Support for NTSC and PAL signals
- Complete set of more than 200 video measurements
- Acquisition sampling up to 100 MS/s with 14 bits (NI 5122) or 200 MS/s with 12 bits (NI 5124)
- Ready-to-run configurable step types for NI TestStand
- Camera-specific measurement add-on available

Operating Systems

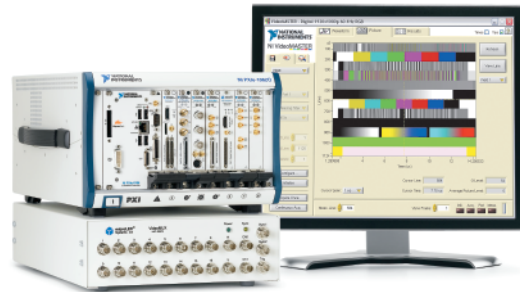
- Windows XP/2000

Recommended Software

- NI TestStand
- NI LabVIEW

Included Software

- VideoMASTER Analysis Software
- 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 video standards and formats for both analog and digital video. VideoMASTER Analog Video Analyzer combines a high-performance NI 5122 14-bit, 100 MS/s digitizer or NI 5124 12-bit, 200 MS/s digitizer with VideoMASTER Analysis Software to deliver a comprehensive automated test solution with the performance otherwise found in only costly, high-end video analyzers.

VideoMASTER offers easy-to-use graphical user interfaces, more than 200 video measurements optimized for automated test, high resolution with 14 bits versus the 8 to 9 bits of typical video analyzers, 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 video test.

Scale from Composite to Component HDTV

The various NI VideoMASTER modules scale from composite video (CVBS) to S-video to a comprehensive offering for component video including HDTV and VGA (analog RGB), S-video, and CVBS. Unlike with most video analyzers, you can later upgrade a VideoMASTER solution configured for composite and S-video measurements to support component HDTV. The system scales as your requirements change.

The VideoMASTER complete video test solution includes the PCI, PXI, or PXI Express hardware necessary to capture the video signal you want to test, a video switch multiplexer, (S-Video and Composite (HDTV) Video Add-On only), and the software required to perform more than 200 video measurements. There is also a special option for composite analog camera testing.

VideoMASTER Analog Video Analyzer Components

- An NI 5122 14-bit, 100 MS/s digitizer or an NI 5124 12-bit, 200 MS/s digitizer to capture the desired CVBS, S-video, or CAV video signals
- Two 75 Ω terminators
- NI VideoMASTER Analysis Software DVD
- Required license for composite video measurements

VideoMASTER Software Add-Ons

- S-Video Add-On for additional S-video measurements
- S-Video Composite Component (HDTV) Video Add-On for additional component and S-video measurements; includes the VideoMUX video switch multiplexer required for component and HDTV video measurements
- Camera Test Add-On for specific camera test 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 Digital Video Analyzer data sheet for more information on digital video solutions.

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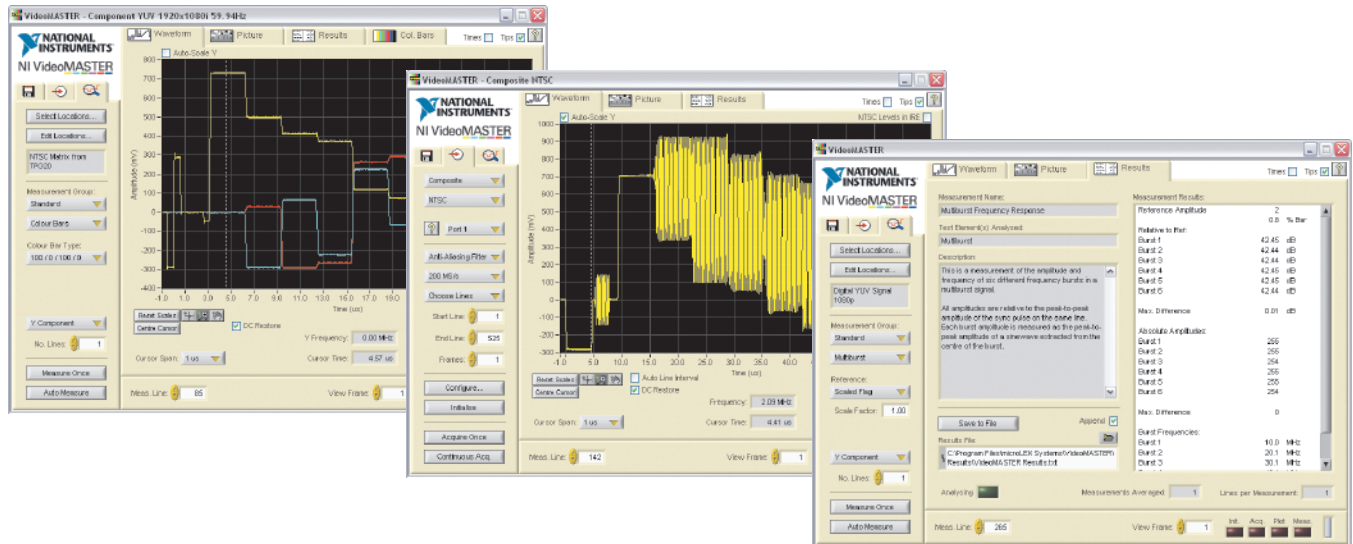


Figure 1. NI VideoMASTER includes interactive graphical interfaces to display the acquired video signal, video image, vectorscope, and complete measurement results.

Easy-to-Use UI and API

VideoMASTER Analysis 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 test application development or debugging, you can manually change limits or load them 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 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.

Composite and S-Video Measurements

Composite video, also referred to as CVBS (color, video, blanking, and sync), differs around the world due to the combination of various color encoding and transmission standards. VideoMASTER software can analyze the following television systems (and, hence, video signal formats):

- PAL-B/D/G/H/I
- PAL-M
- PAL-N
- NTSC-M
- NTSC-4.43
- Combination PAL-N

These television systems use the standard definition aspect ratio of 4:3, a scanning sequence from left to right and from top to bottom, and an interlace ratio of 2:1, resulting in a picture (frame) frequency of half the field frequency.

In addition, you can use this software to acquire and analyze S-video signals (also called S-VHS or Y/C), which have separate luminance and chrominance channels.

Table 1 shows the composite and S-video measurements that VideoMASTER Analog Video Analyzer supports. The license for composite video analysis is included with the VideoMASTER solution. To analyze S-video signals, you need the NI S-Video Add-On.

Video Signal Analyzer for Composite, S-Video, and Component Video

Amplitude and Timing	
2-channel timing ¹	Interchannel delay Burst phase difference
Average picture level ^{1,2}	APL (% of bar and in millivolts)
Bar line time ³	Bar amplitude (ref. BP) Bar amplitude (ref. b1) Bar amplitude error Sync amplitude Sync amplitude error Sync to bar top Sync/bar ratio Bar rise time Bar width
Color bars ³	White bar rise time White peak to peak Luminance ampl. (6 colors and white, black) Chrominance ampl. (6 colors) Chrominance phase (6 colors) White bar start Blue bar end
Edge finder	Number of edges found Low level High level Amplitude min, max, and mean center Min, max, and mean width Min, max, and mean rise time Min, max, and mean fall time
Horizontal timing ^{1,3}	Sync amplitude Sync fall time Sync rise time Sync width Burst amplitude Burst amplitude error Burst amplitude difference Burst quadrature error Burst width (s) Burst width (cycles) Burst delay (s) Burst delay (cycles) Burst frequency SCH phase DC offset Breezeway Blanking start Blanking width
Insertion gain ³	Peak-to-peak amplitude Peak amplitude Insertion gain (%) Insertion gain (dB)
Jitter error ^{1,2,3}	Jitter error (min, max, and pk-pk)
Level meter ^{1,3}	Luma amplitude Chroma amplitude Chroma phase Frequency Location (time)
Line frequency ^{1,3}	Line frequency Line frequency error Line period Field frequency Field period
Subcarrier frequency ³	Subcarrier frequency Subcarrier frequency error
Vertical blanking ^{1,3}	Eq. pulse width Eq. pulse fall time Eq. pulse rise time Broad pulse width Broad pulse fall time Broad pulse rise time Serration width

Noise	
Noise spectrum ^{1,2,3}	Noise level (dB _{rms}) Noise level (mV _{rms}) Peak noise level Peak noise frequency
– Unweighted (567)	–
– Unweighted (569)	–
– Unified weighted (567)	–
– Unified weighted (569)	–
Chrominance AM/PM ³	AM noise PM noise
Linear Distortion	
Chrominance to luminance	Chroma gain inequality Chroma delay inequality Pulse width
Hum ^{1,2,3}	Blanking variation
Line-time distortion	Line-time distortion (567) Line-time distortion (pk-pk) Bar tilt (569) Base line distortion (569)
Field-time distortion ^{1,2,3}	Line-time distortion (567) Line-time distortion (pk-pk)
Group delay	Reference frequency Gain at 7 frequencies Group delay at 7 frequencies
K-factor ³	K-2T K-PB PB ratio PB ratio error Pulse width (HAD)
Sweep ³	Amplitude Frequencies Max amplitude difference
Linear Distortion	
Differential gain and differential phase	Differential gain (min, max, pk-pk) Packet gains Differential phase (min, max, pk-pk) Packet phases
Chrominance nonlinearity	Packet nonlinear gains Packet nonlinear phases Chroma luma intermodulation
Luminance nonlinearity ³	Luminance nonlinearity Relative step height Largest step
Signal information	Sample Interval Format

¹Does not require a test pattern in the active line interval

²Field-based measurements

³Applies to S-video signals as well as composite video signals

Table 1. Composite and S-Video Measurements Supported by VideoMASTER Analog Video Analyzer with the S-Video Add-On

VideoMASTER measurements for composite and S-video are designed to meet the specifications as defined by the following recommendations:

- ITU-R BT.1700 (2005), Television Systems (formerly ITUR BT.470-6 (1998) and CCIR Rep. 624)
- ITU-R BT.1439 (2000), Measurement Methods Applicable in the Analogue Television Studio and the Overall Analogue Television System
- ITU-T J.61 (1990), Transmission Performance of Television Circuits Designed for Use in International Connections (formerly CCIR Rec. 567)

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- ITU-T J.64 (1986), Definitions of Parameters for Simplified Automatic Measurement of Television Insertion Test Signals (formerly CCIR Rec. 569)
- ITU-T J.63 (1990), Insertion of Test Signals in the Field-Blanking Interval of Monochrome and Color Television Signals (formerly CCIR Rec. 473)
- ANSI/SMPTE 170M-1999, Television Composite Analog Video Signal NTSC for Studio Applications

Component Video Measurements

Component video – CAV, including analog RGB (red, green, blue) and YUV (luminance and two color differences) – is available in a wide variety of formats, largely depending on the broadcast system and equipment bandwidth. VideoMASTER software can analyze the following component video signal formats:

HDTV

- 1280x720p, 23.98 Hz
- 1280x720p, 24 Hz
- 1280x720p, 50 Hz
- 1280x720p, 59.94 Hz
- 1280x720p, 60 Hz
- STANAG 3350 A
- STANAG 3350 B
- STANAG 3350 C
- 1920x1035i, 60 Hz
- 1920x1152i, 50 Hz
- 1920x1080p, 23.98 Hz
- 1920x1080p, 24 Hz
- 1920x1080p, 30 Hz
- 1920x1080p, 50 Hz
- 1920x1080p, 59.94 Hz
- 1920x1080p, 60 Hz
- 1920x1080psf, 23.98 Hz
- 1920x1080psf, 24 Hz
- 1920x1080i, 50 Hz
- 1920x1080i, 59.94 Hz
- 1920x1080i, 60 Hz

SDTV

- 720x480i, 59.94 Hz
- 720x480i, 60 Hz
- 720x576i, 50 Hz

EDTV

- 720x480p, 59.94 Hz
- 720x480p, 60 Hz
- 720x576p, 50 Hz

For additional formats contact NI.

These television systems use the high-definition aspect ratio of 16:9 (SDTV formats are also available in 4:3), a scanning sequence from left to right and from top to bottom, and a variety of scanning modes including progressive (p), segmented frame (psf), and interlaced (i). At least one component channel (G/Y) carries the sync information, which is bilevel for SDTV formats and trilevel for HDTV formats.

Table 2 shows the component video measurements VideoMASTER supports with the NI S-Video and Composite (HDTV) Video Add-On. This add-on also includes the composite and S-video measurements listed in Table 1.

Amplitude and Timing	
Channel delay	Delays between the 3 channels
Color bars	Bar amplitudes and errors
Edge finder	Number found Low and high levels Amplitude and center Rise and fall times
Group delay and frequency response (SinX)/X	Group delay Gain
Horizontal timing ^{1,3} (bilevel)	Amplitude (burst and sync) Pulse width (burst and sync) Rise and fall times Back porch DC offset Start/end of active video Active line interval
Horizontal timing ^{1,3} (trilevel)	Negative, positive amplitudes Amplitude diff. and pk-pk Negative, positive pulse widths Negative, positive pulse fall times Rise time Back porch DC offset Start/end of active video Active line interval Blanking width
Jitter ^{1,2,3}	Jitter error (min.) Jitter error (max.) Jitter error (p-p)
K-factor	Pulse/bar ratio and error K-pulse bar K 2T Pulse width (HAD)
Level meter ¹ (single point/two point diff.)	Amplitude level frequency
Line frequency ^{1,3}	Line frequency and errors Line interval Field frequency Field interval
Noise	
Noise spectrum	Luminance noise Peak noise level and frequency
Linear Distortion	
Hum (blanking variation)	Pk-pk variation in back porch
Multiburst	Flag (sync) 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, overshoot, settling time
Nonlinear Distortion	
Nonlinearity	Nonlinearity Step nonlinearity errors
Vertical Blanking	
Equalizing pulse	Width, rise, and fall time
Broad pulse	Width, rise, and fall time
Serration	Width, start, and end times
Signal Information	Sample Interval Format

¹Does not require a test pattern in the active line interval

²Field-based measurement

³Requires a sync signal in the channel

Table 2. Component Video Measurements Supported by VideoMASTER Analog Video Analyzer with the S-Video, and Composite (HDTV) Video Add-On

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VideoMASTER measurements for component video are designed to meet the specifications as defined by the following recommendations¹:

- ANSI/SMPTE 293M-1996, Television 720 x 483 Active Line at 59.94 Hz Progressive Scan Production Digital Representation
 - ITU-R BT.1358 (1998), Studio Parameters of 625 and 525 Line Progressive Scan Television Systems
 - IEC/CEA 770.2-C (2001), Standard Definition TV Analog Component Video Interface
 - SMPTE 274M-1998, Television 1920 x 1080 Scanning and Analog and Parallel Digital Interfaces for Multiple Picture Rates
 - SMPTE 296M-2001, Television 1280 x 720 Progressive Image Sample Structure Analog and Digital Representation and Analog Interface
 - ITU-R BT.709-4 (2000), Parameter Values for the HDTV Standards for Production and International Program Exchange
- Visit ni.com/videomaster to configure your NI VideoMASTER solution.

¹ For additional formats contact NI.

Ordering Information

NI VideoMASTER Analog Video Analyzer

Includes NI VideoMASTER Analysis Software, license for composite video analysis, and one of the following hardware options.

NI VideoMASTER with NI PXIe-5122	
64 MB/channel.....	781231-01
NI VideoMASTER with NI PXI-5122	
32 MB/channel.....	780426-01
256 MB/channel.....	780426-02
NI VideoMASTER with NI PXI-5124	
32 MB/channel.....	780427-01
256 MB/channel.....	780427-02
NI VideoMASTER with NI PCI-5122	
32 MB/channel.....	780428-01
256 MB/channel.....	780428-02
NI VideoMASTER with NI PCI-5124	
32 MB/channel.....	780429-01
256 MB/channel.....	780429-02
NI VideoMASTER for offline analysis	780475-01
<i>Software only with no support for hardware.</i>	
NI VideoMASTER 3.0 upgrade.....	850484B-03

VideoMASTER Analog Video Analyzer Add-Ons

License for composite video analysis included with digitizer hardware.

S-Video Add-On	780472-01
S-Video and Composite (HDTV) Video Add-On	780436-01
<i>Includes VideoMUX hardware.</i>	
Camera Test Add-On	780437-01

Accessories

NI VideoMUX rack-mount kit	780473-01
Active differential probe for video signals	780476-01

NI LabVIEW and NI TestStand Compatibility

NI VideoMASTER 3.0

- LabVIEW 8.2, 8.2.1, 8.5, 8.5.1, 8.6, 8.6.1, 9.0, 9.01, LabVIEW 2009
- NI TestStand 4.0, 4.01, 4.1, 4.2

Related VideoMASTER Solutions

- NI VideoMASTER Analog Video Generator
- NI VideoMASTER Digital Video Analyzer
- NI VideoMASTER Digital Video Generator

BUY NOW!

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

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Hardware Services

System Assurance Programs

NI system assurance programs are designed to make it even easier for you to own an NI system. These programs include configuration and deployment services for your NI PXI, CompactRIO, or Compact FieldPoint system. The NI Basic System Assurance Program provides a simple integration test and ensures that your system is delivered completely assembled in one box. When you configure your system with the NI Standard System Assurance Program, you can select from available NI system driver sets and application development environments to create customized, reorderable software configurations. Your system arrives fully assembled and tested in one box with your software preinstalled. When you order your system with the standard program, you also receive system-specific documentation including a bill of materials, an integration test report, a recommended maintenance plan, and frequently asked question documents. Finally, the standard program reduces the total cost of owning an NI system by providing three years of warranty coverage and calibration service. Use the online product advisors at ni.com/advisor to find a system assurance program to meet your needs.

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.

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