NI Analog Video Generator

Video Generation of NTSC, PAL, and SECAM Video

- Adjustment for more than 40 video parameters
- Comprehensive library of signal bitmaps and ITS lines
- Output sampling at 100 MS/s with 16-bit resolution
- Easy setup with custom step types with NI TestStand

Overview

The NI Video Measurement Suite (NI VMS) is a versatile set of video analysis and generation test solutions for validation and production test. As part of this suite, the NI Analog Video Generator combines an NI 5421 16-bit, 100 MS/s signal generator with NI VMS Generator software to deliver a comprehensive test solution that generates all of the common composite video formats including M-NTSC (NTSC), B/G/D/H/I-PAL (Standard-PAL or simply PAL), and L/K-SECAM (SECAM). The software handles the generation of the video signals so you can adjust more than 40 video parameters and download waveforms to the onboard memory of an NI 5421 signal generator. The high accuracy of NI 5421 devices, with specifications such as -68 dBc THD at 5 MHz and spurious-free dynamic range (SFDR) of -71 dB at 1 MHz and -64 dB at 10 MHz, ensures high-quality video test signals for video test of analog composite video (CVBS or color, video, blanking, and sync) devices. The NI Analog Video Generator offers easy-to-use graphical user interfaces, the ability to adjust to more than 40 parameters for video generation, video generation optimized for automated test, high resolution of 16 bits, 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.

Requirements and Compatibility

OS Information
- Windows 7
- Windows XP

Driver Information
- NI-DAQmx
- NI-FGEN

Software Compatibility
- NI TestStand Development System

Application and Technology

Video Generation Using Smart Algorithms

You can define your own signal parameters with the NI Video Measurement Suite (NI VMS) Generator user interface. You can also set the attributes to change dynamic conditions by

- Inserting filters on all video components (affects the bandwidth of components)
- Adding white noise or distortion to your signal (for example, you can simulate bad signal transmission conditions by adding white noise or distortion to your signal)

Along with flexibility, the NI Analog Video Generator offers ease of use. You can still generate standard signals using a few operations, which improves productivity considerably. The tool supports the M-NTSC, NTSC-4.43, B/G/D/H/I-PAL, M-PAL, N/PAL, Nc-PAL, and B/D/G/K/K1/L-SECAM standards.

Bitmap Images and Insertion of Test Signals

The NI Analog Video Generator offers several ways to create and generate standardized as well as custom, arbitrary analog composite video signals. The solution is ideal for the production testing of TVs, video recorders, set-top boxes, and broadcast equipment. Signal generation is based on two essential modes of generation:
Bitmap-based generation

- Insertion of test signals

Bitmap images are grouped into two sets of resolution for each of the color coding systems. For NTSC and M/PAL, the bitmaps used are 640x480 pixels and 1044x480 in higher resolution. For all other PAL and SECAM variants, the bitmaps come in 768x576 pixels and 1040x576 pixels. These pixel resolutions are for the active video image. The NI Analog Video Generator comes with a large number of bitmaps for each resolution, and you can use bitmaps from other sources that meet the correct resolution formats as well.

You can also generate images using insertion test lines (ITLs). Commonly used in video testing, this feature is a powerful way to generate custom test images, such as an NTC-7 composite test signal, multiburst, modulated ramp, and color bars. An editor for test signal insertion is available through the "Insert Test Lines" interface. A signal viewer further helps identify the signals. In addition, you can take advantage of the full power of the function library to create final test images using a combination of bitmaps and inserted signals.

Integrated NI TestStand Step Types

The simplest way to generate an NTSC, PAL, or SECAM video signal is to use the custom step type that executes directly in NI TestStand. The NI VMS Generator step type for composite video generation provides an interactive interface to configure and program an NI 5421 to generate composite video signals. With the step type, you can generate standard test patterns or create custom test patterns based on an RGB bitmap image combined with inserted test signals from a large library of video test lines. The NI Analog Video Generator includes several bitmap images for each resolution that you can use to configure the video signal you generate, or you can use bitmap patterns from other sources, provided that they fit the bitmap size format you are using. You can also combine these bitmap patterns with ITLs to create the final video test signal.

The NI Analog Video Generator includes interactive graphical interfaces to adjust more than 40 video parameters, display the generated video pattern, create signals with bitmaps and insertion test lines (ITLs), and view individual ITLs.

The step type for NI TestStand improves productivity, ease of use, and debugging significantly by offering extensive code reuse. It also reduces application software maintenance. Using the NI TestStand step types is the preferable and cost-optimal approach for composite video generation in application test development because it allows many instantiations of the generator in a single test application.

Filter Characteristics

Filter functions play an important role in video signal generation and transmission. A high-performance video generator needs several essential filter functions to offer quality signal generation. The video bandwidth in transmission systems for the luminance information is 4.2 MHz for M-NTSC; 4.2 to 6.0 MHz for the PAL standard, depending on the specific PAL variant; and 5.0 or 6.0 MHz for SECAM, depending on the specific SECAM variant. For color transmission information, the color difference signals U and V are normally bandwidth-limited to 1.3 MHz in both NTSC and PAL. SECAM uses FM modulation to transmit the Pb and Pr color difference information with each component having its own subcarrier. The Pb and Pr color difference signals are lowpass filtered to 1.3 MHz as well. The NI Analog Video Generator offers several ways to filter different video components while computing a video signal. Depending on the video formats (PAL, NTSC, or SECAM), shifting filter combinations are required. You can use the following three options to filter:

- One or more of the predefined finite impulse response (FIR) filters
- One or more of the predefined infinite impulse response (IIR) filters

All predefined filters are designed to avoid group delay across the entire frequency range. In other words, there is no phase error and no delay between any parts of the different signal components whether or not they are filtered.

Visit ni.com/vms to configure your video test solution.
Ordering Information

For a complete list of accessories, visit the product page on ni.com.

<table>
<thead>
<tr>
<th>Products</th>
<th>Part Number</th>
<th>Recommended Accessories</th>
<th>Part Number</th>
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</thead>
<tbody>
<tr>
<td>NI Analog Video Generator</td>
<td></td>
<td>No accessories required.</td>
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<tr>
<td>NI Analog Video Generator, PXI-5421 (16 bit, 100 MS/s, 8MB/ch)</td>
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<td>780431-02</td>
<td>No accessories required.</td>
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Support and 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

NI measurement hardware is calibrated to ensure measurement accuracy and verify that the device meets its published specifications. To ensure the ongoing accuracy of your measurement hardware, NI offers basic or detailed recalibration service that provides ongoing ISO 9001 audit compliance and confidence in your measurements. To learn more about NI calibration services or to locate a qualified service center near you, contact your local sales office or visit ni.com/calibration.

Technical Support

Get answers to your technical questions using the following National Instruments resources.

- **Support** - Visit ni.com/support to access the NI KnowledgeBase, example programs, and tutorials or to contact our applications engineers who are located in NI sales offices around the world and speak the local language.
- **Discussion Forums** - Visit forums.ni.com for a diverse set of discussion boards on topics you care about.
- **Online Community** - Visit community.ni.com to find, contribute, or collaborate on customer-contributed technical content with users like you.

Repair

While you may never need your hardware repaired, NI understands that unexpected events may lead to necessary repairs. NI offers repair services performed by highly trained technicians who quickly return your device with the guarantee that it will perform to factory specifications. For more information, visit ni.com/repair.

Training and Certifications

The NI training and certification program delivers the fastest, most certain route to increased proficiency and productivity using NI software and hardware. Training builds the skills to more efficiently develop robust, maintainable applications, while certification validates your knowledge and ability.

- **Classroom training in cities worldwide** - the most comprehensive hands-on training taught by engineers.
- **On-site training at your facility** - an excellent option to train multiple employees at the same time.
- **Online instructor-led training** - lower-cost, remote training if classroom or on-site courses are not possible.
- **Course kits** - lowest-cost, self-paced training that you can use as reference guides.
- **Training memberships** and training credits - to buy now and schedule training later.

Visit ni.com/training for more information.

Extended Warranty

NI offers options for extending the standard product warranty to meet the life-cycle requirements of your project. In addition, because NI understands that your requirements may change, the extended warranty is flexible in length and easily renewed. For more information, visit ni.com/warranty.

OEM

NI offers design-in consulting and product integration assistance if you need NI products for OEM applications. For information about special pricing and services for OEM customers, visit ni.com/oem.

Alliance