

ARTISAN®
TECHNOLOGY GROUP

Your **definitive** source for quality pre-owned equipment.

Artisan Technology Group
(217) 352-9330 | sales@artisantg.com | artisantg.com

Full-service, independent repair center
with experienced engineers and technicians on staff.

We buy your excess, underutilized, and idle equipment
along with credit for buybacks and trade-ins.

Custom engineering
so your equipment works exactly as you specify.

- Critical and expedited services
- In stock / Ready-to-ship
- Leasing / Rentals / Demos
- ITAR-certified secure asset solutions

Expert team | Trust guarantee | 100% satisfaction

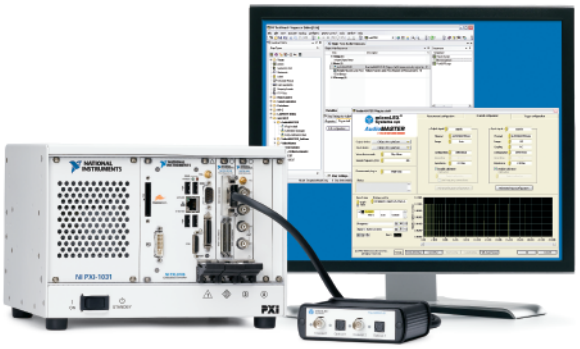
All trademarks, brand names, and brands appearing herein are the property of their respective owners.

Visit our website - *Click HERE*

Analog and Digital Audio Analyzer

NI AudioMASTER for Analog and Digital Audio *NEW!*

- Comprehensive set of audio measurements using single and multiple tones, amplitude and frequency sweeps, and step response analysis
- Advanced limit testing capabilities using window, tunnel, or point limits
- Analog audio generation and analysis at up to 204.8 kS/s with 24 bits of resolution
- Digital audio analysis for S/PDIF interfaces with sample rates from 22 to 192 kHz
- Interactive step types directly integrated into NI TestStand



Overview

NI AudioMASTER is a set of versatile audio test solutions based on NI TestStand for analog and digital audio validation and production test. NI AudioMASTER for Analog Audio combines a high-performance NI 4461 dynamic signal acquisition (DSA) device, featuring 24-bit resolution, a 204.8 kS/s sample rate, two inputs, and two outputs, or an NI 4462 DSA device, featuring 24-bit resolution, a 204.8 kS/s sample rate, and four inputs, with NI AudioMASTER software for the acquisition, analysis, and generation (NI 4461 only) of analog audio. NI AudioMASTER for Digital Audio combines an NI 7813R reconfigurable I/O device and NI CB-2180 digital audio accessory with NI AudioMASTER software for the acquisition and analysis of S/PDIF audio with coaxial or optical connections. These combinations deliver a comprehensive automated test solution with the performance otherwise found in only high-end audio analyzers.

NI AudioMASTER offers easy-to-use graphical user interfaces with a comprehensive set of audio measurement results using single tone, multitone, amplitude sweep, frequency sweep, and step response analysis optimized for automated test. It is directly integrated into NI TestStand test management software, which simplifies the development of automated audio tests and measurements by providing an interactive, configuration-based setup for audio measurements, limit evaluation, and system calibration.

NI AudioMASTER for Analog Audio

NI AudioMASTER for Analog Audio includes the following components:

- NI PXI-4461 or PCI-4461 DSA device with 24-bit resolution, 204.8 kS/s sample rate, two inputs, and two outputs or NI PXI-4462 or PCI-4462 DSA device with 24-bit resolution, 204.8 kS/s sample rate, and four inputs
- NI AudioMASTER software DVD
- Required license for analog audio measurements

Analog Audio Performance

The analog input channels of NI 446x devices have 24-bit resolution analog-to-digital converters (ADCs) that are simultaneously sampled at software-programmable rates at up to 204.8 kS/s. The analog inputs offer a programmable gain amplifier stage with gain selections from -20 to +30 dB in 10 dB steps that accept differential or single-ended signal connections. The input channels also provide software-selectable AC/DC coupling and Integrated Electronic Piezoelectric (IEPE) conditioning of 0, 4, or 10 mA for sensors such as IEPE microphones. NI 446x device inputs deliver high dynamic range of 118 dB, amplitude flatness of ±0.006 dB (20 Hz to 20 kHz), and low distortion of -107 dB of THD+N (20 Hz to 20 kHz).

NI 4461 devices also feature two analog output channels with 24-bit resolution digital-to-analog converters (DACs) that are simultaneously updated at software-programmable rates at up to 204.8 kS/s. The analog outputs offer a programmable attenuation of 0, 20, or 40 dB (±10, 1, or 0.1 V_{pk}) with differential or pseudodifferential output configurations. A common application of the analog output is to stimulate a device under test while measuring the response with the analog inputs. You can simultaneously acquire data on the input channels while updating the output channels. The inputs and outputs of an NI 4461 are also sampled coherently, making NI 4461 devices ideal for stimulus-response audio tests. NI 4461 outputs deliver high dynamic range of 113 dB, amplitude flatness of ±0.008 dB (20 Hz to 20 kHz), and low distortion of -97 dB of THD+N (20 Hz to 20 kHz).

NATIONAL INSTRUMENTS™

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Acoustical and Electroacoustical Tests

In combination with NI 446x devices, you can use NI AudioMASTER software in NI TestStand to perform acoustical and electroacoustical tests in a wide range of applications including loudspeakers, headsets, microphones, media players, and televisions. Designed for coherent and noncoherent test environments, NI AudioMASTER can be used to set up coherent tests where the signal generation (output to the device under test, or DUT) is synchronized with the signal acquisition (output from the DUT), and the frequencies and timing functions are related in an exact integer ratio. For noncoherent test setups, NI AudioMASTER can apply various windowing functions to minimize the challenges that arise in noncoherent test environments. Typical noncoherent cases include the output testing of a CD, DVD, MP3, or media player, where the audio output is independent (free-running) with respect to the acquisition instrumentation. Included with NI AudioMASTER, you also receive the calibration manager to calibrate against system-level nonlinearities that occur when using anechoic test chambers, artificial mouths, microphones, and other test system interfaces.

Calibration Tool and Manager

Several acoustical test components such as anechoic test chambers and rooms are inherently nonlinear. In addition, acoustical features can change as a result of different environmental parameters such as the surrounding air pressure. NI AudioMASTER offers an advanced, easy-to-use tool suite to calibrate acoustical characteristics. You can use the calibration tool to calibrate anechoic test chambers, anechoic rooms, artificial mouths, microphone test stands, and other test system interfaces and devices. You can implement the calibration procedure after you define the input and output calibration parameters in a calibration window. With the calibration manager, you can enforce specific calibration intervals. If expired, a calibration action can automatically be initiated, or the user can be prompted to take the appropriate action.

NI AudioMASTER for Digital Audio

NI AudioMASTER for Digital Audio includes the following components:

- NI PXI-7813R or PCI-7813R R Series reconfigurable I/O device
- NI AudioMASTER software DVD
- Required license for digital audio measurements
- CB-2180 digital audio accessory (add-on)

Digital Audio Testing

Using the PCI-7813R or PXI-7813R R Series device and the CB-2180 digital audio accessory in combination with NI AudioMASTER software in NI TestStand, you can perform digital audio test on S/PDIF-enabled devices featuring coaxial or optical interfaces. Such devices can include set-top boxes, DVD players, and home theater systems.

The CB-2180 provides two input channels. Each channel has a software-selectable BNC for coaxial or TOSLINK for optical connection. Each channel also has an LED interface that visually indicates when the input is locked to the received S/PDIF signal. You can connect up to four CB-2180 digital audio accessories to a single NI 7813R device providing a total of eight S/PDIF inputs, which greatly simplifies the test fixture required for multidevice testing.

Using the complete NI AudioMASTER for Digital Audio solution (NI 7813R, CB-2180, and NI AudioMASTER software), you can acquire and analyze S/PDIF signals encoded in linear PCM or AC-3 formats. In linear PCM mode, NI AudioMASTER supports two-channel formats with 8, 16, 20, or 24 bits per sample and sampling frequencies ranging from 22 to 192 kHz. In AC-3 mode, NI AudioMASTER supports up to six-channel configurations, also referred to as 5.1, where there are five full bandwidth channels representing right front, center, left front, right rear, and left rear plus one lower bandwidth subwoofer channel, known as the low-frequency effect (LFE) channel.

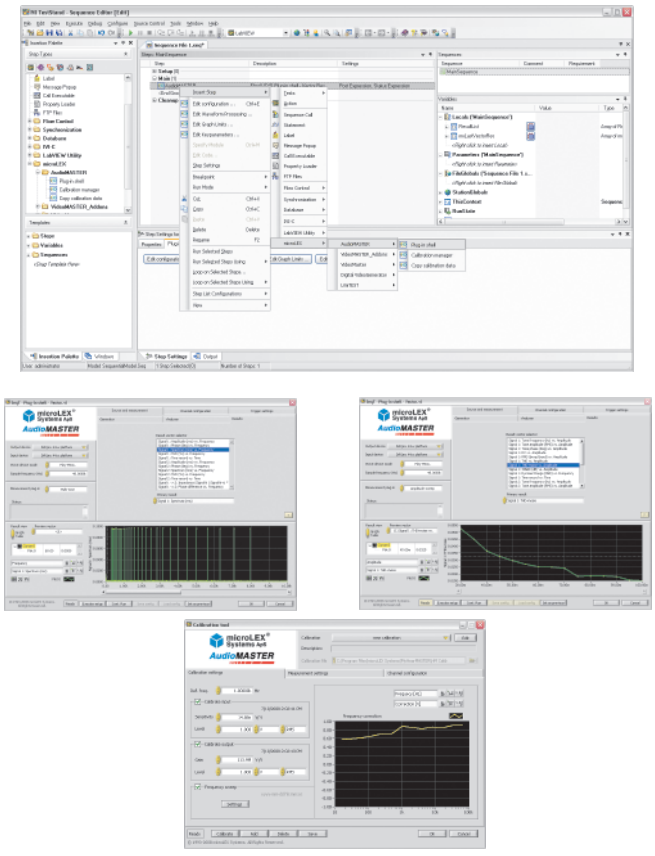


Figure 1. With NI AudioMASTER, you can perform a comprehensive set of audio measurements and system calibration using the interactive step types for NI TestStand.

Fast Automated Test Development

You can develop test programs quickly with a configuration-based programming approach, for which you control the hardware and software by setting a few parameters using the NI AudioMASTER step type interfaces for NI TestStand. When you have configured your tests and various measurements using interactive step types in NI TestStand, you can run the program to obtain the test results, compare these results to defined limits, generate a report, and store the measurement results to a database. You can also view live measurement results, including frequency response and distortion curves, during development and debugging by pressing an execute button in the NI AudioMASTER step type interfaces. For limit testing, the software incorporates graph limits to enable vector-based limits using window limits, tunnel limits, or point limits that can be static or floating. NI AudioMASTER has several built-in checks that protect against incorrect measurement setups and inconsistent measurement results.

NI AudioMASTER is a highly efficient solution that combines hardware and software so that users from novice to experienced test engineers can develop and perform optimized measurements and tests on a wide variety of audio products including set-top boxes, media players, headphones, microphones, and loudspeakers. It improves user productivity in test application development as well as test execution time in validation and production testing. The result is shorter development times for test applications and optimized test times for automated tests.

Customized Audio Measurements

You also can combine NI AudioMASTER with NI sound and vibration software to develop your own customized audio measurements. Using NI AudioMASTER, you can quickly set up your test system to generate the required stimulus signal to the DUT and/or acquire the response using the interactive configuration-based interface in NI TestStand. The software can then apply your system calibration parameters to the acquired waveform before passing it to your custom audio measurements written in LabVIEW or other application development environments using local variables in NI TestStand. NI sound and vibration software includes numerous algorithms and functions for audio measurements and is shipped with several examples so you can quickly build customized audio measurements that you can use with NI AudioMASTER.

Visit **ni.com/audiomaster** to configure your NI AudioMASTER solution.

Ordering Information

NI AudioMASTER for Analog Audio

Includes NI AudioMASTER software, a license for analog audio measurements, and one of the following hardware options.

NI AudioMASTER with NI PXI-4461 (2 inputs, 2 outputs)....780478-01
NI AudioMASTER with NI PXI-4462 (4 inputs) 780479-01
NI AudioMASTER with NI PCI-4461 (2 inputs, 2 outputs)....780480-01
NI AudioMASTER with NI PCI-4462 (4 inputs) 780481-01

NI AudioMASTER for Digital Audio

Includes NI AudioMASTER software, a license for digital audio measurements, and one of the following hardware options. At least one NI CB-2180 digital audio accessory is required to acquire S/PDIF signals.

NI AudioMASTER with NI PXI-7813R 781006-01
NI AudioMASTER with NI PCI-7813R 781007-01

Digital Audio Accessory

Includes one NI CB-2180 digital audio accessory and 0.5 m NI SHC68-C69-S cable to connect to an NI 7813R device. At least one NI CB-2180 digital audio accessory is required to acquire S/PDIF signals.

NI CB-2180 digital audio accessory
(2 inputs, each with BNC and optical connections) 781008-01

NI TestStand Compatibility

NI AudioMASTER Version 6.0
- NI TestStand 3.5 or 4.0.1

BUY NOW!

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

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Specifications

Analog Input (AI) – NI 4461 and NI 4462

Number of simultaneously sampled input channels	
NI 4461	2
NI 4462	4
A/D converter (ADC) resolution	24 bits, delta-sigma ADC
Sample rates (f_S),	1 to 204.8 kS/s in 181.9 µS/s increments
Input range[1]	-20 to 30 dB in 10 dB steps, ±0.316 V_{pk} to ±42.4 V_{pk}
Input configuration[1]	Differential or pseudodifferential
Input coupling[1]	AC or DC
IEPE current	0, 4, or 10 mA
Maximum bandwidth	>90 kHz
Amplitude accuracy (1 kHz)	±0.03 dB
Amplitude flatness (rel to 1 kHz)	±0.003 dB (20 Hz to 20 kHz)
Idle channel noise (20 kHz bandwidth)	1.3 µV
Total harmonic distortion + noise (THD + N)	-108 dB (20 Hz to 20 kHz)

Analog Output (AO) – NI 4461 Only

Number of simultaneously updated output channels	2
D/A converter (DAC) resolution	24 bits, delta-sigma ADC
Sample rates (f_S)	1 kS/s to 204.8 kS/s in 181.9 µS/s increments
Output attenuation[1]	0, 20, 40 dB; ± 10 V_{pk}, ±1 V_{pk}, ±0.1 V_{pk}
Output configuration[1]	Differential or pseudodifferential
Maximum bandwidth	>90 kHz
Amplitude accuracy (1 kHz)	±0.04 dB
Amplitude flatness (rel to 1 KHz)	±0.008 dB (20 Hz to 20 kHz)
Idle channel noise (30 kHz bandwidth)	5 µV
Total harmonic distortion + noise (THD + N)	<-97 dB (20 Hz to 20 kHz)

Digital Input – NI 7813R with NI CB-2180 Digital Audio Accessory

Number of input channels	
NI CB-2180	2

Note: *Each input channel provides a BNC for coaxial and TOSLINK for optical connection. You can connect up to four CB-2180 accessories to a single NI 7813R R Series device.*

Connection type[1]	S/PDIF: BNC or TOSLINK AES-3id: BNC
Input impedance	75 Ω (BNC)
Supported Encoded Formats	
Linear PCM	
Number of encoded channels	2 (L, R stereo)
Sample rates (Hz)	22.05, 24, 32, 44.1, 48, 88.2, 96, 176.4, and 192 k
Supported bit depth	8, 16, 20, 24 bits
AC-3	
Number of encoded channels	5.1 (right front, center, left front, right rear, left rear, LFE)
Sample rates (Hz)	32, 44.1, 48 k
Supported bit depth	16 bits

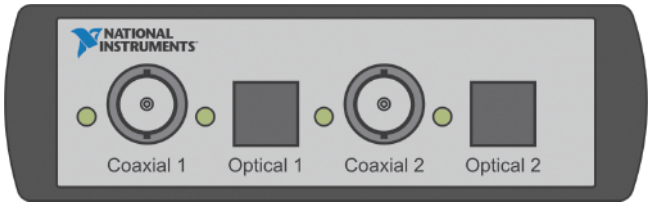


Figure 2. The NI CB-2180 digital audio accessory provides two digital audio input channels. Each channel has a software-selectable BNC for coaxial or TOSLINK for optical connection.

[1] *Software-selectable on each channel independently.*

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Measurements Included with NI AudioMASTER

Measurement	Description	Measurement Results
Amplitude sweep	Generate and analyze a sequence of pure tones with increasing or decreasing amplitude at a user-specified frequency.	• Tone frequency • Tone amplitude (RMS) • Tone phase • DC • RMS • THD • THD+noise • SINAD • Dynamic range (SNR) • Time record • Signal N/Signal N+1 • Phase Signal N–Signal N+1 difference Measurements made versus output amplitude parameters as defined in the measurement setup
Coherent sweep	Generate and analyze a sequence of coherent sine tones. The frequency range is specified by the start and end frequencies and the steps can be configured as linear or logarithmic steps.	• Tone frequency • Tone amplitude (RMS) • Tone phase • DC • Broadband RMS • THD • THD+noise • Time record • Amplitude of Signal N/Signal N+1 • Phase Signal N–Signal N+1 Measurements made versus frequency parameters as defined in the measurement setup
Dual tone	Generate and analyze a sequence of coherent dual tones. The frequency range of the primary tone is specified by the start and end frequencies and the steps can be configured as linear or logarithmic steps. The frequency for the secondary tone can be set as fixed or at a frequency offset from the primary tone.	• Primary tone amplitude (RMS) • Dual tone amplitude (RMS) • Intermodulation distortion (IMD) • Time record Measurements made versus frequency parameters as defined in the measurement setup
Multiple pure tones	Generate and analyze a sequence of pure sine tones of equal length with linear or logarithmic spacing. The generator envelopes each tone so that the amplitude rises from zero to full amplitude and tapers from full amplitude to zero.	• Tone frequency • Tone amplitude (RMS) • Tone phase • DC • RMS (broadband) • THD • THD+noise • Time record • Amplitude ratio (Signal N/Signal N+1) • Phase difference Measurements made versus frequency parameters as defined in the measurement setup

BUY ONLINE at **ni.com** or **CALL 800 813 3693 (U.S.)**

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Analog and Digital Audio Analyzer

Measurement	Description	Measurement Results
Multitone	Generate and analyze a coherent multitone burst (multiple tones simultaneously). The frequency of tones is specified by the start and end frequencies and can be configured as linear or logarithmic steps or the user can define frequency, amplitude, and phase independently through a table.	• Amplitude (RMS) • Phase • Spectrum • THD • Time record • Impedance (Signal N/Signal N+1) * R • Phase difference between Signal N and Signal N+1 Measurements made versus frequency parameters as defined in the measurement setup

Step response	Generate and analyze a pure tone signal that changes instantly from a low level to a higher level and back. Typically used to measure the attack and release time of devices with automatic gain control (AGC).	• Step time (s) versus step
		  • Attack time (user-defined settling criteria)
		  • Release time (user-defined settling criteria)
		• Envelope
		• DC
		• Time record
		
		Measurements made versus time as defined in the measurement setup

Bluetooth headset	Generate and analyze a multitone signal specifically designed for testing narrowband headsets, such as Bluetooth headsets.	• Samples versus time • RMS values versus index • Averaged power spectrum versus frequency • Amplitude versus frequency • Gain response, dB versus frequency • Sensitivity, dB versus frequency • Loudness ratings versus index • Clearance of primary result versus index • Offset for clearance versus index
Waveform analyzer	Acquire signals for general analysis. You can generate a uniform white noise or arbitrary signal. Analysis functions include fast Fourier transform (FFT) and fractional octave band analysis.	• Amplitude versus frequency • Phase versus frequency • Octave versus frequency • Time record versus time • Signal 1/Signal 2 versus frequency • Phase difference

Table 1. Various Measurements Supported by NI AudioMASTER

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

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**.

NATIONAL INSTRUMENTS™
Certified Alliance Partner

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

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**.

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**.

NATIONAL INSTRUMENTS™

ni.com • 800 813 3693
National Instruments • info@ni.com

©2009 National Instruments. All rights reserved. CompactRIO, FieldPoint, LabVIEW, National Instruments, National Instruments Alliance Partner, NI, ni.com, and NI TestStand are trademarks of National Instruments. Other product and company names listed are trademarks or trade names of their respective companies. A National Instruments Alliance Partner is a business entity independent from National Instruments and has no agency, partnership, or joint-venture relationship with National Instruments. 2009-10883-101-D

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Artisan Technology Group is an independent supplier of quality pre-owned equipment

Gold-standard solutions

Extend the life of your critical industrial, commercial, and military systems with our superior service and support.

We buy equipment

Planning to upgrade your current equipment? Have surplus equipment taking up shelf space? We'll give it a new home.

Learn more!

Visit us at **artisantg.com** for more info on price quotes, drivers, technical specifications, manuals, and documentation.

Artisan Scientific Corporation dba Artisan Technology Group is not an affiliate, representative, or authorized distributor for any manufacturer listed herein.

We're here to make your life easier. How can we help you today?

(217) 352-9330 | sales@artisantg.com | artisantg.com

ARTISAN® TECHNOLOGY GROUP