

[Ordering Information](#) | [Detailed Specifications](#) | [Pinouts/Front Panel Connections](#)

For user manuals and dimensional drawings, visit the product page resources tab on ni.com.

Last Revised: 2014-09-24 23:07:52.0

NI 9234

±5 V, IEPE and AC/DC Analog Input, 51.2 kS/s/ch, 4 Ch Module



- 51.2 kS/s per channel maximum sampling rate; ±5 V input
- 24-bit resolution; 102 dB dynamic range; anti-aliasing filters
- Software-selectable AC/DC coupling; AC-coupled (0.5 Hz)
- Software-selectable IEPE signal conditioning (0 mA or 2 mA)
- Transducer Electronic Data Sheet smart sensor compatibility
- -40 °C to 70 °C operating, 5 g vibration, 50 g shock

Overview

The NI 9234 is a 4-channel C Series dynamic signal acquisition module for making high-accuracy audio frequency measurements from integrated electronic piezoelectric (IEPE) and non-IEPE sensors with NI CompactDAQ or CompactRIO systems. The NI 9234 delivers 102 dB of dynamic range and incorporates software-selectable AC/DC coupling and IEPE signal conditioning for accelerometers and microphones. The four input channels simultaneously digitize signals at rates up to 51.2 kHz per channel with built-in anti-aliasing filters that automatically adjust to your sampling rate.

Recommended Software

NI sound and vibration analysis software, including the NI Sound and Vibration Measurement Suite and the NI Sound and Vibration Toolkit, provides signal processing functionality for performing audio measurements, fractional-octave analysis, frequency analysis, transient analysis, and order tracking. NI analysis software features NI Sound and Vibration Assistant interactive software for quickly acquiring, analyzing, and logging acoustic, noise, and vibration data. With a configuration-based, flexible measurement library and open-analysis capability, the Sound and Vibration Assistant is designed for quick data capture through a unique software-based measurement approach to create customized applications.

Recommended Accessories

None

Box Contents

- 1 NI 9234 C Series module
- 1 NI 9234 Operating Instructions and Specifications manual

[Back to Top](#)

Comparison Tables

Product Name	Signal Ranges	Channels	Sample Rate	Simultaneous	Resolution	Excitation	Isolation	Connectivity
NI 9232	±30 V	3 differential	102.4 kS/s/ch	Yes	24-Bit	4 mA	60 VDC Ch-Earth	Screw Terminal
NI 9234	±5 V	4 differential	51.2 kS/s/ch	Yes	24-Bit	2 mA	None	BNC

[Back to Top](#)

Application and Technology

NI C Series Overview



NI C Series modules are designed to provide high-accuracy measurements to meet the demands of advanced DAQ and control applications. Each module contains measurement-specific signal conditioning to connect to an array of sensors and signals, bank and channel-to-channel isolation options, and support for wide temperature ranges to meet a variety of application and environmental needs all in a single rugged package. You can choose from more than 100 C Series modules for measurement, control, and communication to connect your applications to any sensor on any bus.

Most C Series I/O modules work with both the NI CompactDAQ and CompactRIO platforms. The modules are identical, and you can move them from one platform to the other with no modification.

NI CompactRIO Platform



Powered by the NI LabVIEW reconfigurable I/O (RIO) architecture, NI CompactRIO combines an open embedded architecture with small size, extreme ruggedness, and hot-swappable industrial I/O modules. Each system contains an FPGA for custom timing, triggering, and processing with a wide array of modular I/O to meet any embedded application requirement.

[Configure Your Complete NI CompactRIO System](#)

NI CompactDAQ Platform



NI CompactDAQ is a portable, rugged data acquisition platform that integrates connectivity and signal conditioning into modular I/O to directly interface with any sensor or signal. Using NI CompactDAQ with LabVIEW, you can easily customize how you acquire, analyze, present, and manage your measurement data. From research to development to validation, NI provides programmable software, high-accuracy measurements, and local technical support to help ensure you meet your exact measurement application requirements.

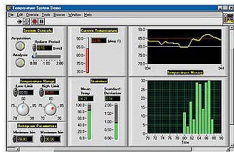
[Configure Your Complete NI CompactDAQ System](#)

[Back to Top](#)

Ordering Information

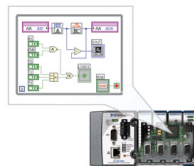
Software Recommendations

LabVIEW Professional Development System for Windows



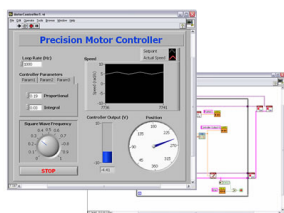
- Advanced software tools for large project development
- Automatic code generation using DAQ Assistant and Instrument I/O Assistant
- Tight integration with a wide range of hardware
- Advanced measurement analysis and digital signal processing
- Open connectivity with DLLs, ActiveX, and .NET objects
- Capability to build DLLs, executables, and MSI installers

NI LabVIEW FPGA Module



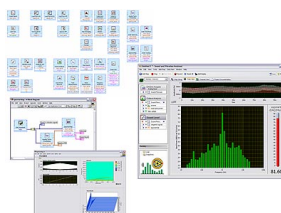
- Design FPGA applications for NI reconfigurable I/O (RIO) hardware targets
- Program with the same graphical environment used for desktop and real-time applications
- Execute control algorithms with loop rates up to 300 MHz
- Implement custom timing and triggering logic, digital protocols, and DSP algorithms
- Incorporate existing HDL code and third-party IP including Xilinx CORE Generator functions
- Included in the LabVIEW Embedded Control and Monitoring Suite

NI LabVIEW Real-Time Module



- Design deterministic real-time applications with LabVIEW graphical programming
- Download to dedicated NI or third-party hardware for reliable execution and a wide selection of I/O
- Take advantage of built-in PID control, signal processing, and analysis functions
- Automatically take advantage of multicore CPUs or set processor affinity manually
- Includes real-time OS, development and debugging support, and board support
- Purchase individually or as part of a LabVIEW suite

NI Sound and Vibration Measurement Suite



- Minimize development time with ready-to-run application examples
- Get started quickly with application example projects
- Build custom DAQ systems faster than ever with DAQ configuration XControl
- Avoid the expense of verification with NI ANSI- and IEC-compliant octave and sound-quality analysis
- Decrease test time with parallel processing

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

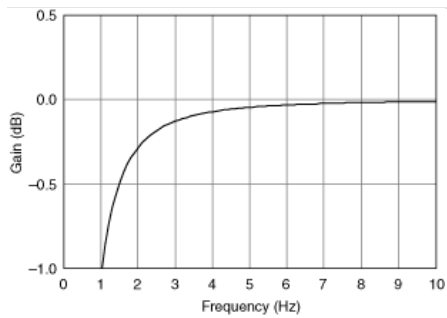
Our Professional Services Team is comprised of NI applications engineers, NI Consulting Services, and a worldwide National Instruments Alliance Partner program of more than 700 independent consultants and integrators. Services range from start-up assistance to turnkey system integration. Visit ni.com/alliance.

[Back to Top](#)

Detailed Specifications

The following specifications are typical for the range -40 to 70 °C unless otherwise noted.

Input Characteristics	
Number of channels	4 analog input channels
ADC resolution	24 bits
Type of ADC	Delta-Sigma (with analog prefiltering)
Sampling mode	Simultaneous
Type of TEDS supported	IEEE 1451.4 TEDS Class I
Internal master timebase (f_M)	
Frequency	13.1072 MHz
Accuracy	±50 ppm max
Data rate range (f_s) using internal master timebase	
Minimum	1.652 kS/s
Maximum	51.2 kS/s
Data rate range (f_s) using external master timebase	
Minimum	0.391 kS/s
Maximum	52.734 kS/s
Data rates ¹ (f_s)	$\frac{f_M \times 256}{n}, n = 1, 2, \dots, 31$
Input coupling	AC/DC (software-selectable)
AC cutoff frequency	
-3 dB	0.5 Hz
-0.1 dB	4.6 Hz max
AC cutoff frequency response	



Input range	±5 V
AC voltage full-scale range	
Minimum	±5 V _{pk}
Typical	±5.1 V _{pk}
Maximum	±5.2 V _{pk}
Common-mode voltage range (AI– to earth ground)	±2 V max
IEPE excitation current (software-selectable on/off)	
Minimum	2.0 mA
Typical	2.1 mA
Power-on glitch	90 μA for 10 μs
IEPE compliance voltage	19 V max
If you are using an IEPE sensor, use the following equation to make sure your configuration meets the IEPE compliance voltage range.	
$(V_{common-mode} + V_{bias} \pm V_{full-scale})$ must be 0 to 19, where $V_{common-mode}$ is the common-mode voltage applied to the NI 9234, V_{bias} is the bias voltage of the IEPE sensor, and $V_{full-scale}$ is the full-scale voltage of the IEPE sensor.	
Overvoltage protection (with respect to chassis ground)	
For a signal source connected to AI+ and AI–	±30 V
For a low-impedance source connected to AI+ and AI–	–6 to 30 V
Input delay	$38.4/f_s + 3.2 \mu s$

Accuracy ²		
Measurement Conditions	Percent of Reading (Gain Error)	Percent of Range ³ (Offset Error)
Calibrated max (–40 to 70 °C)	0.34%, ±0.03 dB	±0.14%, 7.1 mV
Calibrated typ (25 °C ±5 °C)	0.05%, ±0.005 dB	±0.006%, 0.3 mV
Uncalibrated max (–40 to 70 °C)	1.9%, ±0.16 dB	±0.27%, 13.9 mV
Uncalibrated typ (25 °C ±5 °C)	0.48%, ±0.04 dB	±0.04%, 2.3 mV

Gain drift	
Typical	0.14 mdB/°C (16 ppm/°C)
Maximum	0.45 mdB/°C (52 ppm/°C)
Offset drift	
Typical	19.2 μV/°C
Maximum	118 μV/°C
Channel-to-channel matching	
Gain	
Typical	0.01 dB
Maximum	0.04 dB
Phase (f_{in} in kHz)	$f_{in} \cdot 0.045^\circ + 0.04 \text{ max}$
Passband	
Frequency	$0.45 \cdot f_s$


Flatness ($f_s = 51.2$ kS/s)	± 40 dB (pk-to-pk max)
Phase nonlinearity ($f_s = 51.2$ kS/s)	$\pm 0.45^\circ$ max
Stopband	
Frequency	$0.55 \cdot f_s$
Rejection	100 dB
Alias-free bandwidth	$0.45 \cdot f_s$
Oversample rate	$64 \cdot f_s$
Crosstalk (1 kHz)	-110 dB
CMRR ($f_{in} \leq 1$ kHz)	
Minimum	40 dB
Typical	47 dB
SFDR ($f_{in} = 1$ kHz, -60 dBFS)	120 dB

Idle channel noise and noise density			
Idle Channel	51.2 kS/s	25.6 kS/s	2.048 kS/s
Noise	97 dBFS	99 dBFS	103 dBFS
	$50 \mu V_{rms}$	$40 \mu V_{rms}$	$25 \mu V_{rms}$
Noise density	310 nV/ \sqrt{Hz}	350 nV/ \sqrt{Hz}	780 nV/ \sqrt{Hz}

Input impedance	
Differential	305 k Ω
AI- (shield) to chassis ground	50 Ω

Total harmonic distortion (THD)		
Input Amplitude	1 kHz	8 kHz
-1 dBFS	-95 dB	-87 dB
-20 dBFS	-95 dB	-80 dB

Intermodulation distortion (-1 dBFS)	
DIN 250 Hz/8 kHz, 4:1 amplitude ratio	-80 dB
CCIF 11 kHz/12 kHz, 1:1 amplitude ratio	-93 dB
MTBF	390,362 hours at 25 °C; Bellcore Issue 2, Method 1, Case 3, Limited Part Stress Method

 **Note** Contact NI for Bellcore MTBF specifications at other temperatures or for MIL-HDBK-217F specifications.

Power Requirements

Power consumption from chassis	
Active mode	900 mW max
Sleep mode	25 μ W max
Thermal dissipation (at 70 °C)	
Active mode	930 mW max
Sleep mode	25 μ W max

Physical Characteristics

Weight	173 g (6.1 oz)
--------	----------------

Safety

If you need to clean the module, wipe it with a dry towel.

Safety Voltages

Connect only voltages that are within the following limits.

Channel-to-earth ground	±30 V max, Measurement Category I
-------------------------	-----------------------------------

Isolation

Channel-to-channel	None
--------------------	------

Channel-to-earth ground	None
-------------------------	------

Measurement Category I is for measurements performed on circuits not directly connected to the electrical distribution system referred to as MAINS ⁴ voltage. This category is for measurements of voltages from specially protected secondary circuits. Such voltage measurements include signal levels, special equipment, limited-energy parts of equipment, circuits powered by regulated low-voltage sources, and electronics.



Caution Do *not* connect the NI 9234 to signals or use for measurements within Measurement Categories II, III, or IV.

Hazardous Locations

U.S. (UL)	Class I, Division 2, Groups A, B, C, D, T4; Class I, Zone 2, AEx nA IIC T4
-----------	--

Canada (C-UL)	Class I, Division 2, Groups A, B, C, D, T4; Class I, Zone 2, Ex nA IIC T4
---------------	---

Europe (DEMKO)	Ex nA IIC T4
----------------	--------------

Safety Standards

This product is designed to meet the requirements of the following standards of safety for electrical equipment for measurement, control, and laboratory use:

- IEC 61010-1, EN 61010-1
- UL 61010-1, CSA 61010-1



Note For UL and other safety certifications, refer to the product label or the *Online Product Certification* section.

Electromagnetic Compatibility

This product meets the requirements of the following EMC standards for electrical equipment for measurement, control, and laboratory use:

- EN 61326 (IEC 61326): Class A emissions; Basic immunity
- EN 55011 (CISPR 11): Group 1, Class A emissions
- AS/NZS CISPR 11: Group 1, Class A emissions
- FCC 47 CFR Part 15B: Class A emissions
- ICES-001: Class A emissions



Note For the standards applied to assess the EMC of this product, refer to the *Online Product Certification* section.



Note For EMC compliance, operate this device with shielded cables.

CE Compliance

This product meets the essential requirements of applicable European Directives, as amended for CE marking, as follows:

- 2006/95/EC; Low-Voltage Directive (safety)
- 2004/108/EC; Electromagnetic Compatibility Directive (EMC)



Note For the standards applied to assess the EMC of this product, refer to the *Online Product Certification* section.

Online Product Certification

Refer to the product Declaration of Conformity (DoC) for additional regulatory compliance information. To obtain product certifications and the DoC for this product, visit ni.com/certification, search by module number or product line, and click the appropriate link in the Certification column.

Shock and Vibration

To meet these specifications, you must panel mount the system.

Operating vibration

Random (IEC 60068-2-64)	5 g _{rms} , 10 to 500 Hz
-------------------------	-----------------------------------

Sinusoidal (IEC 60068-2-6)	5 g, 10 to 500 Hz
----------------------------	-------------------

Operating shock (IEC 60068-2-27)	30 g, 11 ms half sine, 50 g, 3 ms half sine, 18 shocks at 6 orientations
----------------------------------	--

Environmental

National Instruments C Series modules are intended for indoor use only but may be used outdoors if installed in a suitable enclosure. Refer to the manual for the chassis you are using for more information about meeting these specifications.

Operating temperature (IEC 60068-2-1, IEC 60068-2-2)	−40 to 70 °C
--	--------------

Storage temperature (IEC 60068-2-1, IEC 60068-2-2)	−40 to 85 °C
--	--------------

Ingress protection	IP 40
--------------------	-------

Operating humidity (IEC 60068-2-56)	10 to 90% RH, noncondensing
-------------------------------------	-----------------------------

Storage humidity (IEC 60068-2-56)	5 to 95% RH, noncondensing
-----------------------------------	----------------------------

Maximum altitude	2,000 m
Pollution Degree (IEC 60664)	2

Environmental Management

National Instruments is committed to designing and manufacturing products in an environmentally responsible manner. NI recognizes that eliminating certain hazardous substances from our products is beneficial not only to the environment but also to NI customers.

For additional environmental information, refer to the *NI and the Environment* Web page at ni.com/environment. This page contains the environmental regulations and directives with which NI complies, as well as other environmental information not included in this document.

Waste Electrical and Electronic Equipment (WEEE)



EU Customers At the end of their life cycle, all products *must* be sent to a WEEE recycling center. For more information about WEEE recycling centers and National Instruments WEEE initiatives, visit ni.com/environment/weee.htm.

电子信息产品污染控制管理办法（中国 RoHS）



中国客户 National Instruments 符合中国电子信息产品中限制使用某些有害物质指令 (RoHS)。关于 National Instruments 中国 RoHS 合规性信息，请登录 ni.com/environment/rohs_china。(For Information about China RoHS compliance, go to ni.com/environment/rohs_china.)

Calibration

You can obtain the calibration certificate for this device at ni.com/calibration.

Calibration interval	1 year
----------------------	--------

¹ The data rate must remain within the appropriate data range. Refer to the *Understanding NI 9234 Data Rates* section of *NI 9234 Operating Instructions and Specifications* for more information.

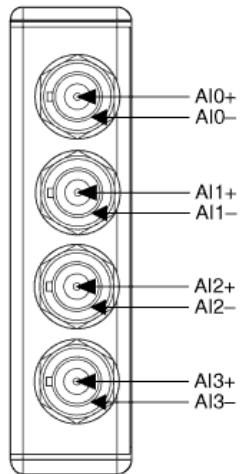
² Refer to the *NI 9234 Circuitry* section of the *NI 9234 Operating Instructions and Specifications* for information regarding grounded signal sources and measurement accuracy.

³ Range = 5.1 V_{pk}

⁴ MAINS is defined as the (hazardous live) electrical supply system to which equipment is designed to be connected for the purpose of powering the equipment. Suitably rated measuring circuits may be connected to the MAINS for measuring purposes.

[Back to Top](#)

Pinouts/Front Panel Connections



[Back to Top](#)

©2014 National Instruments. All rights reserved. CompactRIO, FieldPoint, LabVIEW, National Instruments, NI, ni.com, and NI CompactDAQ 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.

[My Profile](#) | [RSS](#) | [Privacy](#) | [Legal](#) | [Contact NI](#) © 2014 National Instruments Corporation. All rights reserved.