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Find the *National Instruments NI 9436* at our website: ***Click HERE***

DATASHEET

NI 9436

8 DI, ±100 VDC to ±250 VDC/100 VAC to 250 VAC, Sinking/Sourcing, 20 ms



- Screw-terminal connectivity
- 250 Vrms, CAT II, channel-to-channel isolation
- 250 Vrms, CAT II, channel-to-earth isolation
- Protective backshell

The NI 9436 is an 8-channel, 20 ms sinking/sourcing digital input C Series module for any CompactDAQ or CompactRIO chassis. Each channel accepts signals from ±100 VDC to ±250 VDC and 100 VAC to 250 VAC. The NI 9436 works with industrial logic levels and signals to directly connect to a wide array of high voltage industrial switches, transducers, and devices.

Kit Contents

- NI 9436
- NI 9939 Strain Relief and Operator Protection
- NI 9436 Getting Started Guide

NI C Series Overview



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NI provides more than 100 C Series modules for measurement, control, and communication applications. C Series modules can connect to any sensor or bus and allow for high-accuracy measurements that meet the demands of advanced data acquisition and control applications.

- Measurement-specific signal conditioning that connects to an array of sensors and signals
- Isolation options such as bank-to-bank, channel-to-channel, and channel-to-earth ground
- -40 °C to 70 °C temperature range to meet a variety of application and environmental needs
- Hot-swappable

The majority of C Series modules are supported in both CompactRIO and CompactDAQ platforms and you can move modules from one platform to the other with no modification.

CompactRIO



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

CompactDAQ

CompactDAQ is a portable, rugged data acquisition platform that integrates connectivity, data acquisition, and signal conditioning into modular I/O for directly interfacing to any sensor or signal. Using CompactDAQ with LabVIEW, you can easily customize how you acquire, analyze, visualize, and manage your measurement data.



Software

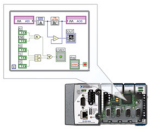
LabVIEW Professional Development System for Windows



- Use advanced software tools for large project development
- Generate code automatically using DAQ Assistant and Instrument I/O Assistant
- Use advanced measurement analysis and digital signal processing
- Take advantage of open connectivity with DLLs, ActiveX, and .NET objects
- Build DLLs, executables, and MSI installers

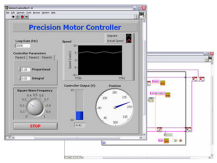
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NI LabVIEW FPGA Module



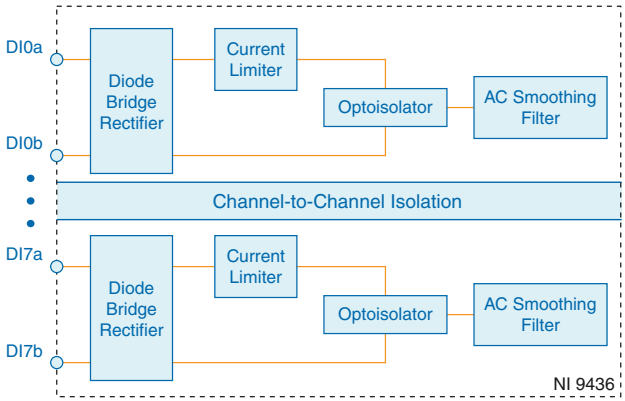
- Design FPGA applications for NI RIO hardware
- Program with the same graphical environment used for desktop and real-time applications
- Execute control algorithms with loop rates up to 300 MHz
- Implement custom timing and triggering logic, digital protocols, and DSP algorithms
- Incorporate existing HDL code and third-party IP including Xilinx IP generator functions
- Purchase as part of 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
- Take advantage of real-time OS, development and debugging support, and board support
- Purchase individually or as part of a LabVIEW suite

NI 9436 Circuitry



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- The input signal on each digital input channel is first fully rectified by a diode bridge before passing through the current limiter and optoisolator. The output of each optoisolator is then passed through a smoothing filter.
- The current limiter has a foldback response, where current will decrease with increasing input voltage. This ensures a low power dissipation at high voltage while maintaining high current at low voltage.
- The optoisolator on each digital input channel provides isolation between the high voltage input circuitry and the low voltage digital circuitry.
- The AC smoothing filter ensures a constant ON state for AC input signals.
- Each input channel on the NI 9436 is individually isolated from one another and from other non-isolated system components and earth ground.

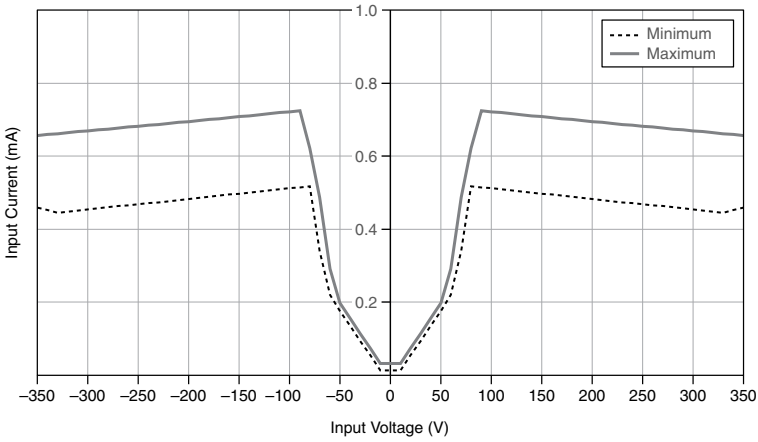
Digital Logic Levels

The NI 9436 measures whether the difference between the DIa and DIb pins is greater than or less than the digital logic levels. If the difference between the pins is within the input high range, the channel registers a HIGH. If the difference between the pins is within the input low range, the channel registers a LOW.

Input Current Limit

Each input on the NI 9436 has a current limiter with foldback response that varies with the input voltage. At lower input voltages, the input current level is higher and decreases with increasing input voltages. This is to maintain low power at high input voltages. The following figure shows the maximum and minimum input current per channel over the full temperature range that the NI 9436 present to a connected load in mA.

Figure 1. Input Current Per Channel



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Turn-Off Time

The NI 9436 turn-off time is the amount of time it takes for the current of the digital input to discharge any capacitance on the input line to a voltage below the turn-off threshold level when no signal is present or the sourcing-output device is open. When opening the sourcing-output device, the turn-off time is the time it takes for the NI 9436 to read the incoming voltage as OFF.

Note The NI 9436 turn-off time is the amount of time it takes for the DC input voltage to cross the DC turn-off threshold plus the input delay time of the NI 9436. The turn-off time with DC input voltage represents the maximum NI 9436 turn-off time .

The NI 9436 provides sinking digital inputs that discharge capacitance that might be present on the input line. If there are transients that could charge this capacitance to the value of the supply voltage, the turn-off time is the amount of time it takes to remove this charge to a level below the threshold voltage. When you debounce your readings from the NI 9436 in your software application with a debounce time that is at least as long as this turn-off time, the NI 9436 is immune to these capacitively-coupled transients.

Use the following equation to determine the correct maximum turn-off time over the full temperature range based on the supply voltage and the amount of capacitance in your system.

$$\mathrm{T} = 0.02 - \frac{\mathrm{C} \times (\mathrm{V} - 55)}{(290 \times V) - 540000}$$

where

T is the maximum turn-off time (s)

V is the system supply DC/peak voltage (VDC/Vpeak)

C is the capacitance in your system (nF)

Use the following equation to determine the maximum capacitance that your system can tolerate based on the supply voltage and desired turn-off time.

$$C = \left(\frac{(0.02 - T) \times [(290 \times V) - 540000]}{V - 55}\right)$$

where

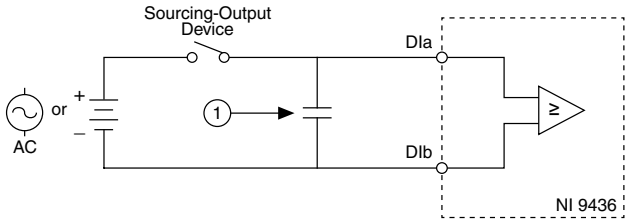
C is the maximum capacitance (nF)

T is the desired turn-off time (s)

V is the system supply DC/peak voltage (VDC/Vpeak)

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Figure 2. Capacitance Discharge



1. Capacitance from parts such as cables and sensors.

NI 9436 Specifications

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

Caution Do not operate the NI 9436 in a manner not specified in this document. Product misuse can result in a hazard. You can compromise the safety protection built into the product if the product is damaged in any way. If the product is damaged, return it to NI for repair.

Input Characteristics

Number of channels	8 digital input channels
Input type	Sinking/Sourcing
Digital logic levels	
OFF state	
Input voltage	≤55 VDC
Input voltage	≤40 VAC
Input current	≤200 µA DC/ACpeak
ON state	
Input voltage	≥74 VDC
Input voltage	≥68 VAC
Input current	≥500 µA DC
Input current	≥800 µA ACpeak
Input frequency	50 Hz/60 Hz/400 Hz

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I/O protection	
Input voltage (DIa-DIb)	250 VAC, ±250 VDC maximum
Input delay time[1]	20 ms maximum

Power Requirements

Power consumption from chassis	
Active mode	26.3 mW maximum
Sleep mode	26.3 µW maximum
Thermal dissipation (at 70 °C)	
Active mode	1.5 W maximum
Sleep mode	1.5 W maximum

Physical Characteristics

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

Tip For two-dimensional drawings and three-dimensional models of the C Series module and connectors, visit *ni.com/dimensions* and search by module number.

Screw-terminal wiring	
Gauge	0.05 mm^2 to 1.5 mm^2 (30 AWG to 14 AWG) copper conductor wire
Wire strip length	6 mm (0.24 in.) of insulation stripped from the end
Temperature rating	90 °C minimum
Torque for screw terminals	0.22 N · m to 0.25 N · m (1.95 lb · in. to 2.21 lb · in.)
Wires per screw terminal	One wire per screw terminal; two wires per screw terminal using a 2-wire ferrule
Ferrules	0.25 mm^2 to 1.5 mm^2
Connector securement	
Securement type	Screw flanges provided
Torque for screw flanges	0.2 N · m (1.80 lb · in.)
Weight	150 g (5.3 oz)

[1] The input delay time is the minimum amount of time that the voltage across a channel must remain at the ON or OFF level to change the channel from ON to OFF or from OFF to ON.

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Safety Voltages

Connect only voltages that are within the following limits:

DIa-to-DIb	250 Vrms maximum, Measurement Category II
Isolation	
Channel-to-channel	
Continuous	250 Vrms, Measurement Category II
Withstand	1,500 Vrms, verified by a 5 s dielectric withstand test
Channel-to-earth ground	
Continuous	250 Vrms, Measurement Category II
Withstand	3,000 Vrms, verified by a 5 s dielectric withstand test

Measurement Category II is for measurements performed on circuits directly connected to the electrical distribution system. This category refers to local-level electrical distribution, such as that provided by a standard wall outlet, for example, 115 V for U.S. or 230 V for Europe.

Caution Do not connect the NI 9436 to signals or use for measurements within Measurement Categories III or IV.

Safety

This product is designed to meet the requirements of the following electrical equipment safety standards 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 61326-1 (IEC 61326-1): Class A emissions; Industrial 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 In the United States (per FCC 47 CFR), Class A equipment is intended for use in commercial, light-industrial, and heavy-industrial locations. In Europe,

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Canada, Australia and New Zealand (per CISPR 11) Class A equipment is intended for use only in heavy-industrial locations.

Note Group 1 equipment (per CISPR 11) is any industrial, scientific, or medical equipment that does not intentionally generate radio frequency energy for the treatment of material or inspection/analysis purposes.

Note For EMC declarations and certifications, and additional information, refer to the *Online Product Certification* section.

CE Compliance CE

This product meets the essential requirements of applicable European Directives, as follows:

- 2014/35/EU; Low-Voltage Directive (safety)
- 2014/30/EU; Electromagnetic Compatibility Directive (EMC)
- 2011/65/EU; Restriction of Hazardous Substances (RoHS)

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

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 °C to 70 °C
Storage temperature (IEC 60068-2-1, IEC 60068-2-2)	-40 °C to 85 °C
Ingress protection (with power plug attached)	IP 40

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Operating humidity (IEC 60068-2-78)	10% RH to 90% RH, noncondensing
Storage humidity (IEC 60068-2-78)	5% RH to 95% RH, noncondensing
Pollution Degree	2
Maximum altitude	5,000 m

Indoor use only.

Environmental Management

NI is committed to designing and manufacturing products in an environmentally responsible manner. NI recognizes that eliminating certain hazardous substances from our products is beneficial to the environment and to NI customers.

For additional environmental information, refer to the *Minimize Our Environmental Impact* 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 the product life cycle, all NI products must be disposed of according to local laws and regulations. For more information about how to recycle NI products in your region, visit *ni.com/environment/weee*.

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`.)

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