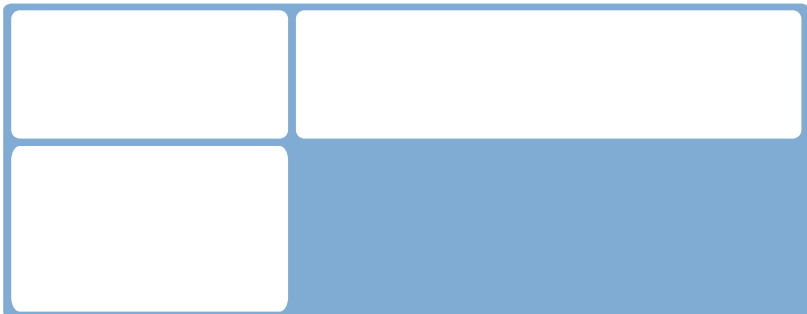# NI 9401

8 DIO, 5 V/TTL, Bidirectional, 100 ns

- DSUB connectivity
- CompactDAQ counter compatibility
- 60 VDC, CAT I, channel-to-earth isolation

The NI 9401 is a bidirectional digital module for any NI CompactDAQ or CompactRIO chassis. The eight DIO channels are grouped in two ports that you can configure independently for input or output. You can use the NI 9401 to implement custom digital systems such as counters/timers, digital communication protocols, pulse generation, and beyond.

C SERIES DIGITAL INPUT/OUTPUT MODULE COMPARISON						
Product Name	Signal Levels	Channels	Update Rate	Direction	Connectivity	Isolation Continuous
NI 9381	LVTTL	4	1 µs	Bidirectional	DSUB	None
NI 9401	5 V/TTL	8	100 ns	Bidirectional	DSUB	60 VDC Ch-Earth
NI 9402	LVTTL	4	55 ns	Bidirectional	BNC	None
NI 9403	5 V/TTL	32	7 µs	Bidirectional	DSUB	60 VDC Ch-Earth

NI C Series Overview

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.

www.valuetronics.com

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

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

www.valuetronics.com

NI LabVIEW Real-Time Module
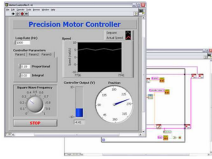
- Design deterministic real-time applications with LabVIEW graphical programming
- Download to dedicated NI or third-party hardware for reliable execution and a wide selection of I/O
- Take advantage of built-in PID control, signal processing, and analysis functions
- Automatically take advantage of 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

Input/Output Circuitry

The eight DIO channels are internally referenced to COM, so you can use any of the nine COM lines as a reference for the external signal.

Figure 1. NI 9401 Input/Output Circuitry

Input/output type	TTL, single-ended
Digital logic levels	
Input	
Voltage	5.25 V maximum
High, V_{IH}	2 V minimum
Low, V_{IL}	0.8 V maximum
Output High, V_{OH} (5.25 V maximum)	
Sourcing 100 µA	4.7 V minimum
Sourcing 2 mA	4.3 V minimum
Output Low, V_{OL}	
Sinking 100 µA	0.1 V maximum
Sinking 2 mA	0.4 V maximum
Maximum signal switching frequency, per channel	
Input	
8 input channels	9 MHz
4 input channels	16 MHz
2 input channels	30 MHz
Output[1]	
8 output channels	5 MHz
4 output channels	10 MHz
2 output channels	20 MHz
I/O propagation delay	100 ns maximum
I/O pulse width distortion	10 ns
Input current (0 V ≤ V_{IN} ≤ 4.5 V)	±250 µA
Input capacitance	30 pF
Input rise/fall time	500 ns maximum
Overvoltage protection, channel-to-COM[2]	±30 V maximum on one channel at a time
MTBF	1,244,763 hours at 25 °C; Bellcore Issue 2, Method 1, Case 3, Limited Part Stress Method

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[1] By number of output channels with an output load of 1 mA, 50 pF
[2] Continued use at this level will degrade the life of the module.

Power Requirements

Power consumption from chassis	
Active mode	580 mW maximum
Sleep mode	1 mW maximum
Thermal dissipation (at 70 °C)	
Active mode	580 mW maximum
Sleep mode	1 mW maximum

Physical Characteristics

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

Tip

⚠ Caution

Note

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