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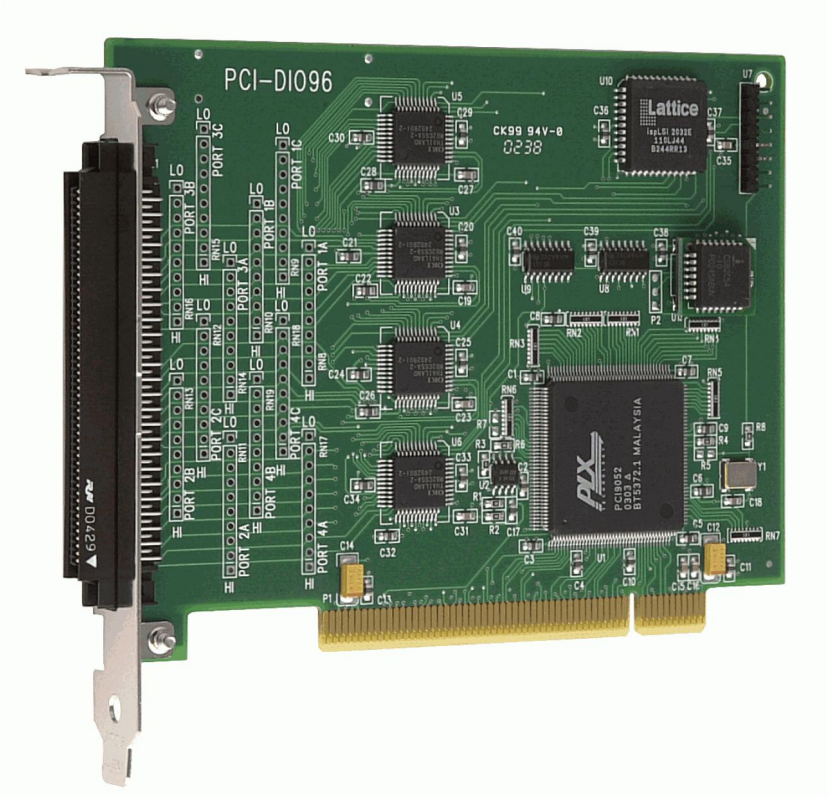
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PCI-DIO96

96-bit Digital I/O Board

User's Guide



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PCI-DIO96

Digital I/O Board

User's Guide



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About this User's Guide

What you will learn from this user's guide

This user's guide explains how to install, configure, and use the PCI-DIO96 so that you get the most out of its digital I/O features.

This user's guide also refers you to related documents available on our web site, and to technical support resources.

Conventions in this user's guide

For more information on …

Text presented in a box signifies additional information and helpful hints related to the subject matter you are reading.

Caution! Shaded caution statements present information to help you avoid injuring yourself and others, damaging your hardware, or losing your data.

<#:#> Angle brackets that enclose numbers separated by a colon signify a range of numbers, such as those assigned to registers, bit settings, etc.

bold text **Bold** text is used for the names of objects on the screen, such as buttons, text boxes, and check boxes. For example:
1. Insert the disk or CD and click the **OK** button.

italic text *Italic* text is used for the names of manuals and help topic titles, and to emphasize a word or phrase. For example:
The *Insta*Cal installation procedure is explained in the *Quick Start Guide*.
Never touch the exposed pins or circuit connections on the board.

Where to find more information

For additional information relevant to the operation of your hardware, refer to the *Documents* subdirectory where you installed the MCC DAQ software (C:\Program Files\Measurement Computing\DAQ by default), or search for your device on our website at www.mccdaq.com.

If you need to program at the register level in your application, refer to the *Register Map for the PCI-DIO96*. This document is available at www.mccdaq.com/registermaps/RegMapPCI-DIO96.pdf.

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Introducing the PCI-DIO96 board

Overview: PCI-DIO96 features

This manual provides installation and programming information for the PCI-DIO96 digital I/O board.

The PCI-DIO96 is a 96-bit line digital I/O board. The board provides the 96 bits in 24-bit groups based on the 82C55 specification. Each 24-bit group is divided into three eight-bit ports.

The ports are labeled on the board as PORT #A, PORT #B, and PORT #C, where # is from 1 to 4. PORT #C can be further split into two four-bit nibbles — PORT #C-HI and PORT #C -LO.

Each of these ports may be individually programmed as input or output.

Software features

For information on the features of *Insta*Cal and the other software included with your PCI-DIO96, refer to the *Quick Start Guide* that shipped with your device. The *Quick Start Guide* is also available in PDF at www.mccdaq.com/PDFmanuals/DAQ-Software-Quick-Start.pdf.

Check www.mccdaq.com/download.htm for the latest software version.

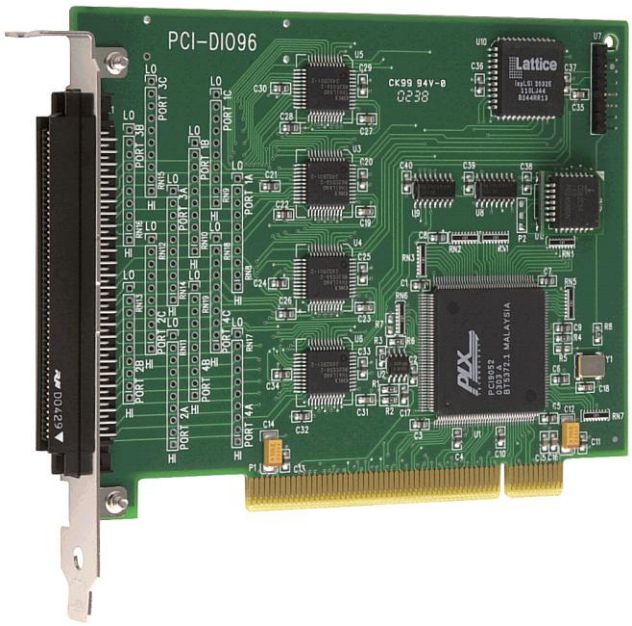
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Installing the PCI-DIO96

What comes with your PCI-DIO96 shipment?

Hardware

- PCI-DIO96

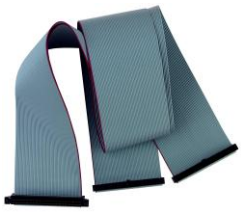


Additional documentation

In addition to this hardware user's guide, you should also receive the *Quick Start Guide* (available in PDF at www.mccdaq.com/PDFmanuals/DAQ-Software-Quick-Start.pdf). This booklet supplies a brief description of the software you received with your PCI-DIO96 and information regarding installation of that software. Please read this booklet completely before installing any software or hardware.

Optional components

- Cables



C100FF-x

- Signal termination and conditioning accessories

  MCC provides signal termination and signal conditioning products for use with the PCI-DIO96. Refer to Field wiring, signal termination and conditioning on page 13 for a list of compatible accessory products.

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Unpacking the PCI-DIO96

As with any electronic device, you should take care while handling to avoid damage from static electricity. Before removing the PCI-DIO96 from its packaging, ground yourself using a wrist strap or by simply touching the computer chassis or other grounded object to eliminate any stored static charge.

If any components are missing or damaged, notify Measurement Computing Corporation immediately by phone, fax, or e-mail:

- Phone: 508-946-5100 and follow the instructions for reaching Tech Support.
- Fax: 508-946-9500 to the attention of Tech Support
- Email: techsupport@mccdaq.com

Installing the software

Refer to the *Quick Start Guide* for instructions on installing the software on the *Measurement Computing Data Acquisition Software CD*. This booklet is available in PDF at www.mccdaq.com/PDFmanuals/DAQ-Software-Quick-Start.pdf.

Installing the PCI-DIO96

The PCI-DIO96 board is completely plug-and-play, with no switches or jumpers to set. Configuration is controlled by your system's BIOS. To install your board, follow the steps below.

Install the MCC DAQ software before you install your board

The driver needed to run your board is installed with the MCC DAQ software. Therefore, you need to install the MCC DAQ software before you install your board. Refer to the *Quick Start Guide* for instructions on installing the software.

1. Turn your computer off, open it up, and insert your board into an available PCI slot.
2. Close your computer and turn it on.

   If you are using an operating system with support for plug-and-play (such as Windows 2000 or Windows XP), a dialog box opens as the system loads, indicating that new hardware has been detected. The information file for this board should have already been loaded onto your PC when you installed the *Measurement Computing Data Acquisition Software* CD supplied with your board, and should be detected automatically by Windows. If you have not installed this software, cancel the dialog and install it now
3. To test your installation and configure your board, run the *Insta*Cal utility installed in the previous section. Refer to the *Quick Start Guide* that came with your board for information on how to initially set up and load *Insta*Cal.

Configuring the PCI-DIO96

All hardware configuration options on the PCI-DIO96 are software controlled. You can select some of the configuration options using *Insta*Cal, such as digital channel configuration (input or output). Once selected, any program that uses the Universal Library will initialize the hardware according to these selections.

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Connecting the board for I/O operations

Connectors, cables – main I/O connector

The table below lists the board connectors, applicable cable and compatible accessory products for the PCI-DIO96.

Board connectors, cables, and accessory equipment

Connector type	100 pin high-density Robinson-Nugent.
Compatibility	▪ Pinout identical to PCI-DIO96H ▪ Compatible with CIO-DIO96H using the C100FF-x cable
Compatible cables	C100FF-x
Compatible accessory products	SCB50 CIO-MINI50 CIO-TERM100 CIO-SPADE50 CIO-ERB24 CIO-ERB48 SSR-RACK24 SSR-RACK48

The PCI-DIO96 board has a 100-pin, high-density Robinson-Nugent male connector. Connector pinouts are listed on page 11.

You can use the optional C100FF-*x* cable to split the 100 I/O lines into two, 50-pin cables. Board connector pins 1 to 50 are mapped directly to pins 1 to 50 on the C100FF-x cable's first 50-pin connector. Board connector pins 51 to 100 are mapped directly to pins 1 to 50 on the C100FF-*x* cable's second 50-pin connector (pin 51 is mapped to pin 1, and pin 100 is mapped to pin 50.) A sample C100FF-*x* cable configuration is shown in Figure 2 on page 12.

Information on signal connections

General information regarding signal connection and configuration is available in the *Guide to Signal Connections*. This document is available on our web site at www.mccdaq.com/signals/signals.pdf.

Caution! When connecting a cable to the board's I/O connector, make sure that the arrow indicating pin 1 on the board connector lines up with the arrow indicating pin 1 on the cable connector. Incorrectly connected cables can damage the board and the I/O controller.

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Pin out – main I/O connector

Main connector pin out

Signal name	Pin		Pin	Signal name
GND	100	••	50	GND
+5V	99	••	49	+5V
THIRDPORTC Bit 0	98	••	48	FIRSTPORTC Bit 0
THIRDPORTC Bit 1	97	••	47	FIRSTPORTC Bit 1
THIRDPORTC Bit 2	96	••	46	FIRSTPORTC Bit 2
THIRDPORTC Bit 3	95	••	45	FIRSTPORTC Bit 3
THIRDPORTC Bit 4	94	••	44	FIRSTPORTC Bit 4
THIRDPORTC Bit 5	93	••	43	FIRSTPORTC Bit 5
THIRDPORTC Bit 6	92	••	42	FIRSTPORTC Bit 6
THIRDPORTC Bit 7	91	••	41	FIRSTPORTC Bit 7
THIRDPORTB Bit 0	90	••	40	FIRSTPORTB Bit 0
THIRDPORTB Bit 1	89	••	39	FIRSTPORTB Bit 1
THIRDPORTB Bit 2	88	••	38	FIRSTPORTB Bit 2
THIRDPORTB Bit 3	87	••	37	FIRSTPORTB Bit 3
THIRDPORTB Bit 4	86	••	36	FIRSTPORTB Bit 4
THIRDPORTB Bit 5	85	••	35	FIRSTPORTB Bit 5
THIRDPORTB Bit 6	84	••	34	FIRSTPORTB Bit 6
THIRDPORTB Bit 7	83	••	33	FIRSTPORTB Bit 7
THIRDPORTA Bit 0	82	••	32	FIRSTPORTA Bit 0
THIRDPORTA Bit 1	81	••	31	FIRSTPORTA Bit 1
THIRDPORTA Bit 2	80	••	30	FIRSTPORTA Bit 2
THIRDPORTA Bit 3	79	••	29	FIRSTPORTA Bit 3
THIRDPORTA Bit 4	78	••	28	FIRSTPORTA Bit 4
THIRDPORTA Bit 5	77	••	27	FIRSTPORTA Bit 5
THIRDPORTA Bit 6	76	••	26	FIRSTPORTA Bit 6
THIRDPORTA Bit 7	75	••	25	FIRSTPORTA Bit 7
FOURTHPORTC Bit 0	74	••	24	SECONDPORTC Bit 0
FOURTHPORTC Bit 1	73	••	23	SECONDPORTC Bit 1
FOURTHPORTC Bit 2	72	••	22	SECONDPORTC Bit 2
FOURTHPORTC Bit 3	71	••	21	SECONDPORTC Bit 3
FOURTHPORTC Bit 4	70	••	20	SECONDPORTC Bit 4
FOURTHPORTC Bit 5	69	••	19	SECONDPORTC Bit 5
FOURTHPORTC Bit 6	68	••	18	SECONDPORTC Bit 6
FOURTHPORTC Bit 7	67	••	17	SECONDPORTC Bit 7
FOURTHPORTB Bit 0	66	••	16	SECONDPORTB Bit 0
FOURTHPORTB Bit 1	65	••	15	SECONDPORTB Bit 1
FOURTHPORTB Bit 2	64	••	14	SECONDPORTB Bit 2
FOURTHPORTB Bit 3	63	••	13	SECONDPORTB Bit 3
FOURTHPORTB Bit 4	62	••	12	SECONDPORTB Bit 4
FOURTHPORTB Bit 5	61	••	11	SECONDPORTB Bit 5
FOURTHPORTB Bit 6	60	••	10	SECONDPORTB Bit 6
FOURTHPORTB Bit 7	59	••	9	SECONDPORTB Bit 7
FOURTHPORTA Bit 0	58	••	8	SECONDPORTA Bit 0
FOURTHPORTA Bit 1	57	••	7	SECONDPORTA Bit 1
FOURTHPORTA Bit 2	56	••	6	SECONDPORTA Bit 2
FOURTHPORTA Bit 3	55	••	5	SECONDPORTA Bit 3
FOURTHPORTA Bit 4	54	••	4	SECONDPORTA Bit 4
FOURTHPORTA Bit 5	53	••	3	SECONDPORTA Bit 5
FOURTHPORTA Bit 6	52	••	2	SECONDPORTA Bit 6
FOURTHPORTA Bit 7	51	••	1	SECONDPORTA Bit 7

PCI slot ↓

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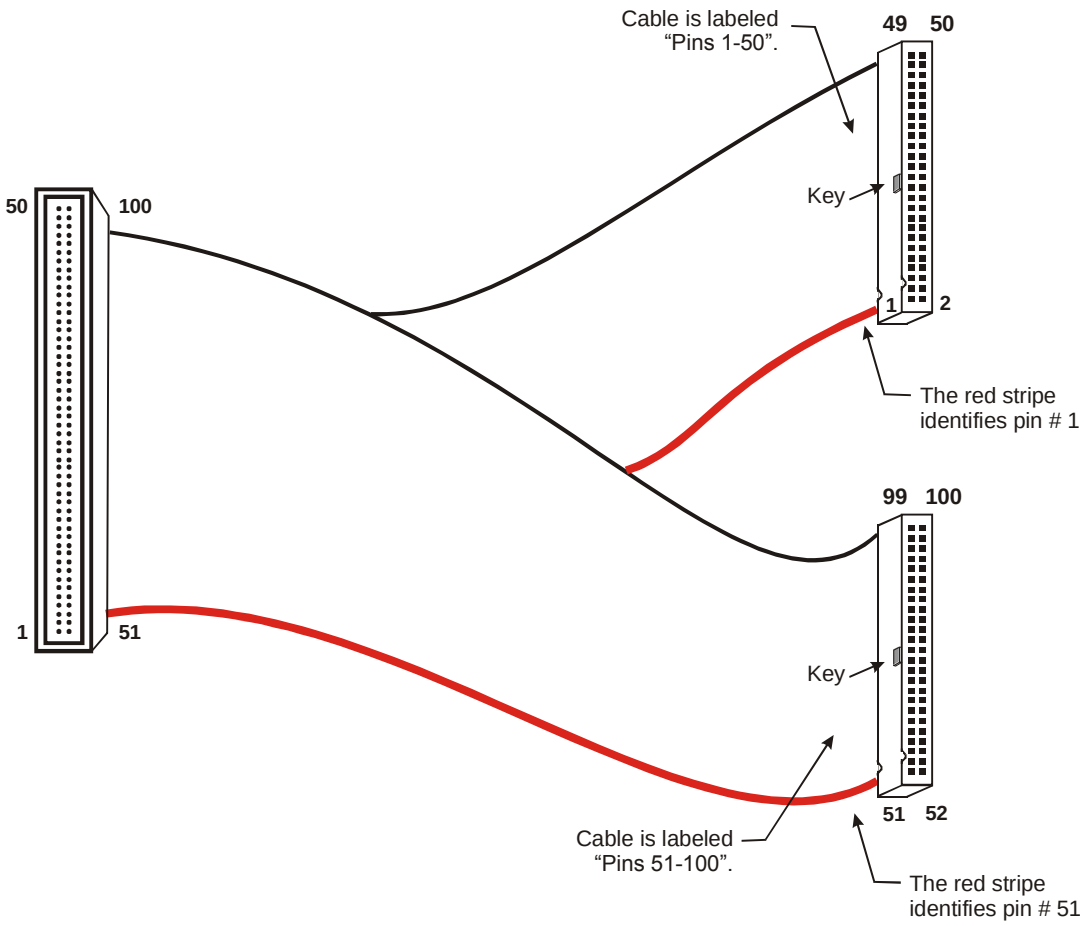


Figure 1. C100FF-x cable

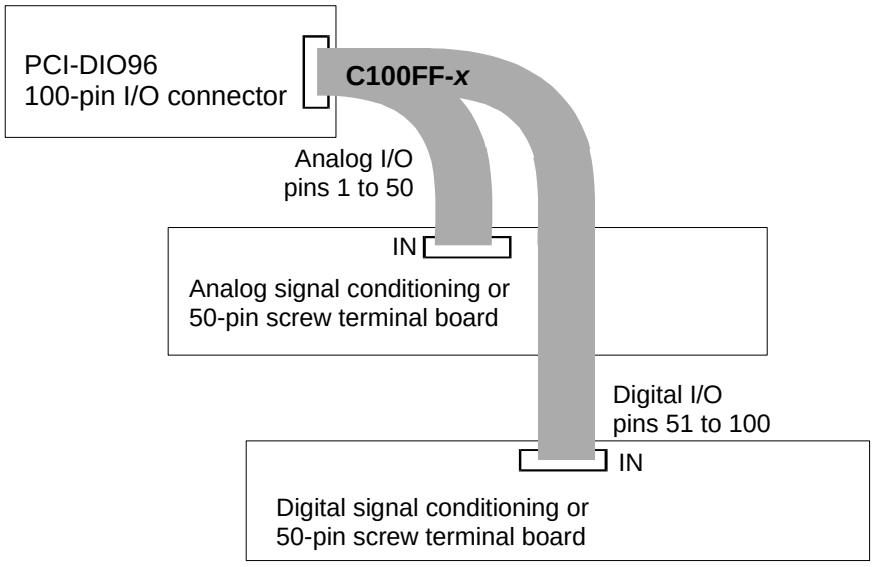


Figure 2. C100FF-x cable configuration

Details on these cables are available on our web site at www.mccdaq.com/products/accessories.aspx.

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Field wiring and signal termination accessories

You can use the following screw terminal boards to terminate field signals and route them into the PCI-DIO96 using the C100FF-x cable.

- SCB-50 – 50 conductor, shielded signal connection/screw terminal box provides two independent 50-pin connections.
- CIO-MINI50 – 50-pin screw terminal board.
- CIO-TERM100 – 100-pin screw terminal board (daisy-chained 50-pin IDC connectors).
- CIO-SPADE50 — 16" X 4" termination panel which mates with both 37-pin and 50-pin connectors.

Details on these products are available on our web site at www.mccdaq.com/products/screw_terminal_bnc.aspx.

- CIO-ERB24 – 24 Form C relays, 6 Amp relay accessory board for digital signal conditioning.
- CIO-ERB48 – 48 Form C relays, 6 Amp, relay, 50-pin accessory board for digital signal conditioning.
- SSR-RACK24 – 24-channel, solid-state relay mounting rack for digital signal conditioning.
- SSR-RACK48 – 48-channel, solid-state relay mounting rack with quad-format modules.

Details on these products are available on our web site at www.mccdaq.com/products/signal_conditioning.aspx.

For additional information about digital interfacing…

Detailed information regarding digital interfacing is contained in MCC's *Guide to Signal Connections*. This document is available on our web site at www.mccdaq.com/signals/signals.pdf.

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Functional Details

PCI-DIO96 block diagram

PCI-DIO96 functions are illustrated in the block diagram shown here.

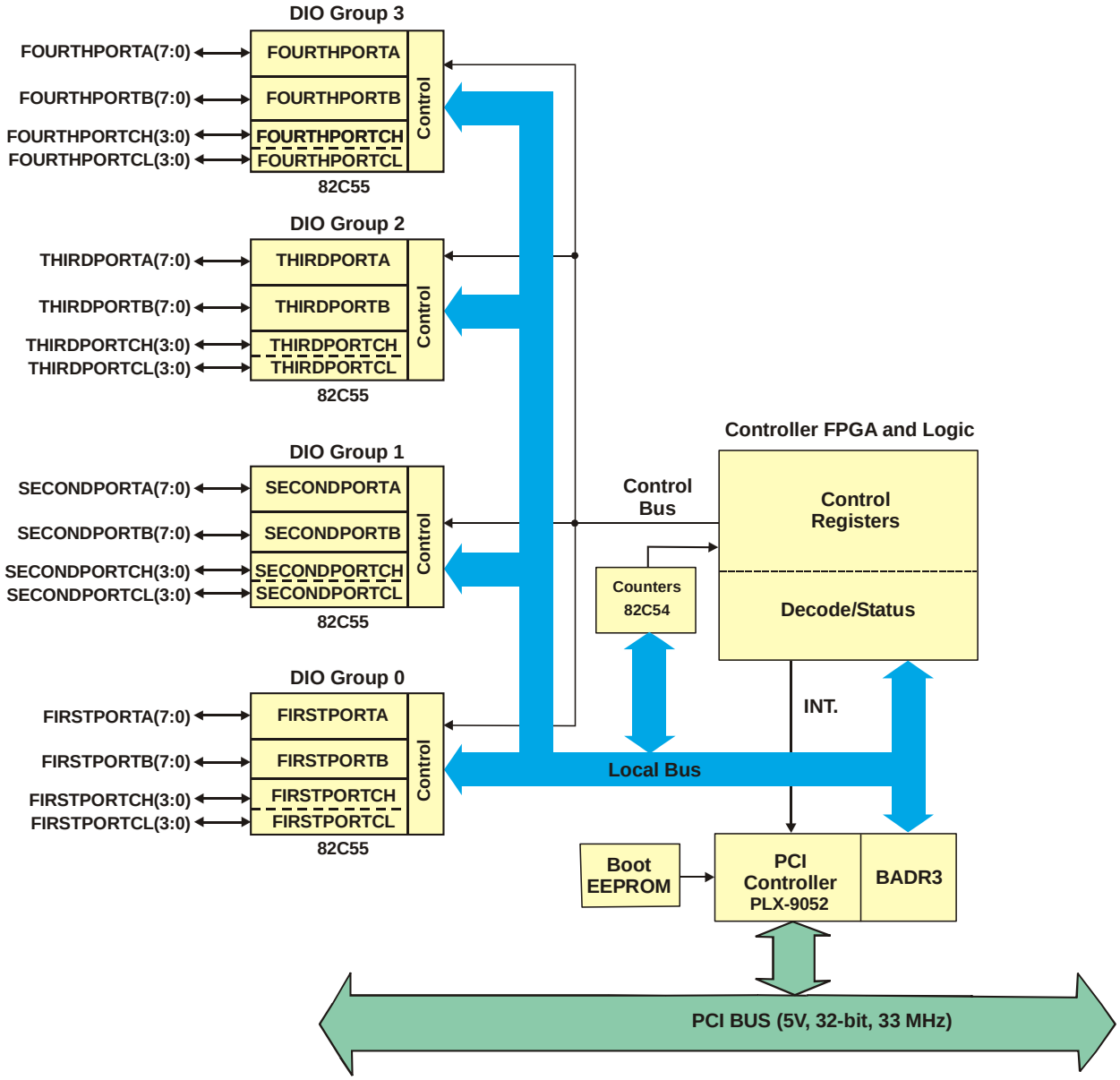


Figure 3. PCI-DIO96 functional block diagram

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Signal level control

All the digital inputs on the PCI-DIO96 are 8255 CMOS TTL. The PCI-DIO96 output signals are 8255 CMOS.

Note

The 82C55 digital I/O chip initializes all ports as inputs on power- up and reset. A TTL input is a high impedance input. If you connect another TTL input device to the 82C55 it could be turned ON or OFF every time the 82C55 is reset. Remember, the 82C55 is reset to the INPUT mode.

On power up and reset, all I/O bits are set to input mode. If you are using the board to control items that must be OFF on reset, install pull-down resistors. The PCI-DIO96 has open locations where you can install Single Inline Packages (SIP) resistor networks in either pull-up or pull-down configurations (refer to Figure 4).

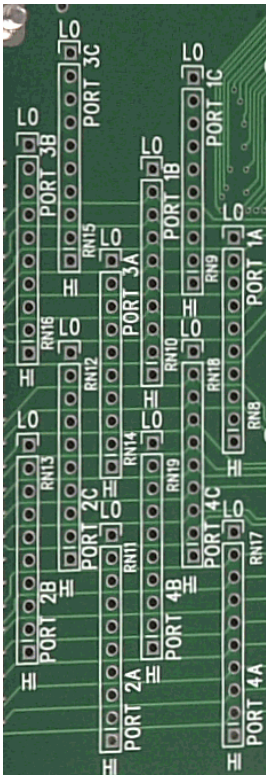


Figure 4. Open locations for SIP packs

You can install pull-up and pull-down resistor SIP packs at PORT #A, PORT #B, and PORT #C. These ports are adjacent to the I/O connector. When installed, the SIP establishes either a high or low logic level at each of the eight I/O lines on the port.

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To safeguard against unwanted signal levels, the devices being controlled by PCI-DIO96 series boards should be tied low or high as required by a 2.2K Ω resistor. In a 2.2K eight-resistor SIP pack, one side of all of the resistors is connected to a single common point and brought out to a pin. The common line, usually marked with a dot or line, is at one end of the SIP. The remaining resistor ends are brought out to the other eight pins (refer to Figure 5).

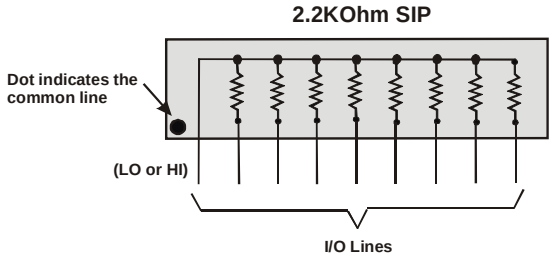


Figure 5. Eight-resistor SIP schematic

Figure 6 shows a schematic of an SIP installed in both the pull-up and pull-down positions. Each port provides 10 holes in a line. The end labeled **HI** connects to +5V. The end marked **LO** connects to GND. The eight holes in the middle (n0 –n7) connect to the eight lines of the Port, A, B or C.

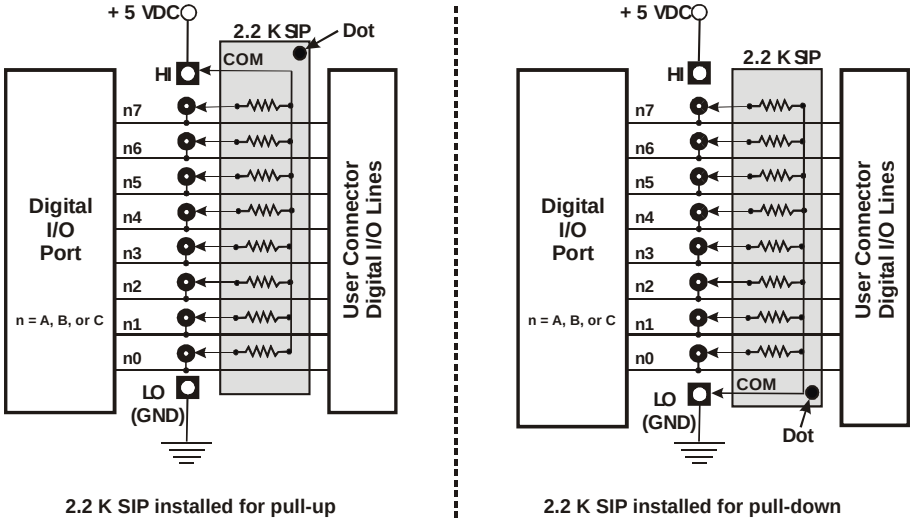


Figure 6. Pull-up and pull-down resistor SIPs schematic

To pull-up lines, orient the SIP with the common pin (dot) toward the **HI** end; to pull-down, install the resistor with the common pin in the **LO** hole.

When installing pull-up and pull-down resistor SIP packs, we recommend using 2.2K, eight-resistor Single Inline Packages (MCC part number SP-K2.29C). Use a different value only if necessary.

Information on signal connections

General information regarding signal connection and configuration is available in the *Guide to Signal Connections*. This document is available on our web site at www.mccdaq.com/signals/signals.pdf.

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CIO-ERB24 and SSR-RACK24 daisy chain configuration

Many relay and solid-state relay (SSR) racks provide only 24-bits of digital I/O. You can configure the CIO-ERB24 relay output board and SSR-RACK24 I/O module rack in a daisy chain configuration to use all of the digital I/O bits provided by the PCI-DIO96 board. An example of the daisy chain configuration scheme is shown below.

The PCI-DIO96 board provides digital I/O in a group of 96 bits. Each of the C100FF-x cable's 50-pin connectors provides 48-bits. To use all of the board's 96 digital I/O bits to control relays and/or SSRs, configure the daisy chain as shown in Figure 7.

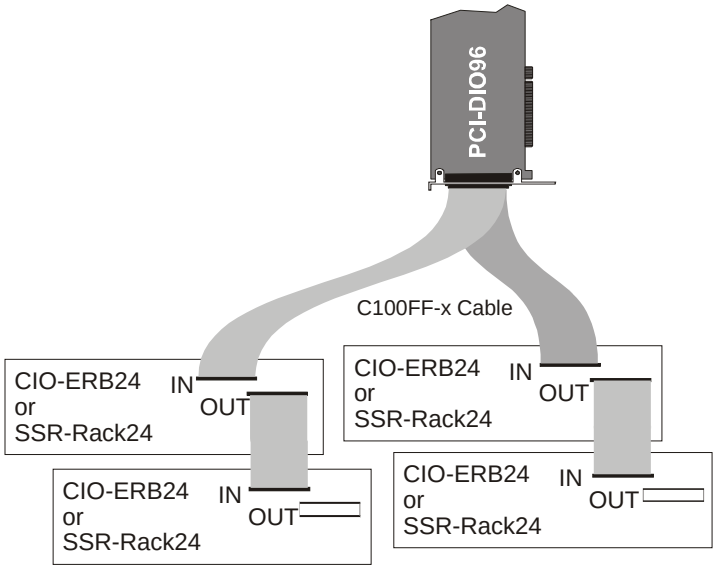


Figure 7. PCI-DIO96H to C100FF-x to relay rack daisy chain cabling

The PCI-DIO96 board's 24 digital I/O bits on pins 1-24 (base address +0 through +3) control the first relay board on the chain. The 24 DIO bits on pins 25-50 control the second relay/SSR board on the daisy chain and so on, for up to 100 pins.

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Specifications

Typical for 25 °C unless otherwise specified.

Specifications in *italic text* are guaranteed by design.

Power consumption

Table 1. Power consumption specifications

+5V quiescent	150 mA max

Digital input/output

Table 2. Digital input/output specifications

Digital type	Four 82C55
Number of I/O	96
Configuration per 82C55	▪ 2 banks of 8 and 2 banks of 4 or ▪ 3 banks of 8 or ▪ 2 banks of 8 with handshake
Output high	*3.0 volts min @ -2.5 mA*
Output low	*0.4 volts max @ 2.5 mA*
Input high	*2.0 volts min, 5.5 volts absolute max*
Input low	*0.8 volts max, -0.5 volts absolute min*
Power-up / reset state	Input mode (high impedance)
Pull-up/pull-down resistors	User installed. Dual footprint allows pull-up or pull-down configuration

Counters

Table 3. Counters specifications

Counter type	82C54	
Configuration	3 counters, 16 bits each	
Counter 1	Source:	2 MHz (xtal /8)
	Gate:	Tied to +5V
	Output:	Selectable Interrupt source
Counter 2	Source:	Counter 1 OUT
	Gate:	Tied to +5V
	Output:	Selectable interrupt source
Counter 3 - Not used	Source	
	Gate	
	Output	

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Interrupts

The interrupt control registers allow the four 82C55 devices and the 8254 counter timer to be used as interrupt sources.

Table 4. Interrupt specifications

Interrupt	INTA# - mapped to IRQn via PCI BIOS at boot-time
PCI Interrupt enable	Programmable through PLX9052 INTCSR register (INTCSR 4Ch)
Interrupt polarity	High or low level. Programmable through PLX9052
	Rising or falling edge. Programmable through PLX9052
Interrupt sources	82C55 in Mode 1 or Mode 2 interrupt configuration: ▪ First Port C0 ▪ First Port C3 ▪ Second Port C0 ▪ Second Port C3 ▪ Third Port C0 ▪ Third Port C3 ▪ Fourth Port C0 ▪ Fourth Port C3 Note: Any interrupt source above may be individually enabled. 82C54 Counter ▪ Counter 1 OUT ▪ Counter 2 OUT Note: Counter 1 and 2 interrupts are exclusive. Only one counter may be enabled as an interrupt source at one time.

Crystal oscillator

Table 5. Crystal oscillator specifications

Oscillator type	AT-cut crystal
Frequency	16 MHz
Frequency stability	±100 ppm

Environmental

Table 6. Environmental specifications

Operating temperature range	0 to 70 °C
Storage temperature range	-40 to 70 °C
Humidity	0 to 95% non-condensing

Mechanical

Table 7. Mechanical specifications

Card dimensions	PCI short card: 136.0 mm (L) x 100.6 mm (W) x11.00 mm (H)

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Main connector and pin out

Table 8. Board connectors, cables, and accessory equipment

Connector type	100 pin high-density Robinson-Nugent.
Compatibility	▪ Pinout identical to PCI-DIO96H. ▪ Compatible with CIO-DIO96H using C100FF-x.
Compatible cables	C100FF-x
Compatible accessory products	SCB50 CIO-MINI50 CIO-TERM100 CIO-SPADE50 CIO-ERB24 CIO-ERB48 SSR-RACK24 SSR-RACK48

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Table 9. Main connector pin out

Signal name	Pin		Pin	Signal name
GND	100	••	50	GND
+5V	99	••	49	+5V
THIRDPORTC Bit 0	98	••	48	FIRSTPORTC Bit 0
THIRDPORTC Bit 1	97	••	47	FIRSTPORTC Bit 1
THIRDPORTC Bit 2	96	••	46	FIRSTPORTC Bit 2
THIRDPORTC Bit 3	95	••	45	FIRSTPORTC Bit 3
THIRDPORTC Bit 4	94	••	44	FIRSTPORTC Bit 4
THIRDPORTC Bit 5	93	••	43	FIRSTPORTC Bit 5
THIRDPORTC Bit 6	92	••	42	FIRSTPORTC Bit 6
THIRDPORTC Bit 7	91	••	41	FIRSTPORTC Bit 7
THIRDPORTB Bit 0	90	••	40	FIRSTPORTB Bit 0
THIRDPORTB Bit 1	89	••	39	FIRSTPORTB Bit 1
THIRDPORTB Bit 2	88	••	38	FIRSTPORTB Bit 2
THIRDPORTB Bit 3	87	••	37	FIRSTPORTB Bit 3
THIRDPORTB Bit 4	86	••	36	FIRSTPORTB Bit 4
THIRDPORTB Bit 5	85	••	35	FIRSTPORTB Bit 5
THIRDPORTB Bit 6	84	••	34	FIRSTPORTB Bit 6
THIRDPORTB Bit 7	83	••	33	FIRSTPORTB Bit 7
THIRDPORTA Bit 0	82	••	32	FIRSTPORTA Bit 0
THIRDPORTA Bit 1	81	••	31	FIRSTPORTA Bit 1
THIRDPORTA Bit 2	80	••	30	FIRSTPORTA Bit 2
THIRDPORTA Bit 3	79	••	29	FIRSTPORTA Bit 3
THIRDPORTA Bit 4	78	••	28	FIRSTPORTA Bit 4
THIRDPORTA Bit 5	77	••	27	FIRSTPORTA Bit 5
THIRDPORTA Bit 6	76	••	26	FIRSTPORTA Bit 6
THIRDPORTA Bit 7	75	••	25	FIRSTPORTA Bit 7
FOURTHPORTC Bit 0	74	••	24	SECONDPORTC Bit 0
FOURTHPORTC Bit 1	73	••	23	SECONDPORTC Bit 1
FOURTHPORTC Bit 2	72	••	22	SECONDPORTC Bit 2
FOURTHPORTC Bit 3	71	••	21	SECONDPORTC Bit 3
FOURTHPORTC Bit 4	70	••	20	SECONDPORTC Bit 4
FOURTHPORTC Bit 5	69	••	19	SECONDPORTC Bit 5
FOURTHPORTC Bit 6	68	••	18	SECONDPORTC Bit 6
FOURTHPORTC Bit 7	67	••	17	SECONDPORTC Bit 7
FOURTHPORTB Bit 0	66	••	16	SECONDPORTB Bit 0
FOURTHPORTB Bit 1	65	••	15	SECONDPORTB Bit 1
FOURTHPORTB Bit 2	64	••	14	SECONDPORTB Bit 2
FOURTHPORTB Bit 3	63	••	13	SECONDPORTB Bit 3
FOURTHPORTB Bit 4	62	••	12	SECONDPORTB Bit 4
FOURTHPORTB Bit 5	61	••	11	SECONDPORTB Bit 5
FOURTHPORTB Bit 6	60	••	10	SECONDPORTB Bit 6
FOURTHPORTB Bit 7	59	••	9	SECONDPORTB Bit 7
FOURTHPORTA Bit 0	58	••	8	SECONDPORTA Bit 0
FOURTHPORTA Bit 1	57	••	7	SECONDPORTA Bit 1
FOURTHPORTA Bit 2	56	••	6	SECONDPORTA Bit 2
FOURTHPORTA Bit 3	55	••	5	SECONDPORTA Bit 3
FOURTHPORTA Bit 4	54	••	4	SECONDPORTA Bit 4
FOURTHPORTA Bit 5	53	••	3	SECONDPORTA Bit 5
FOURTHPORTA Bit 6	52	••	2	SECONDPORTA Bit 6
FOURTHPORTA Bit 7	51	••	1	SECONDPORTA Bit 7

PCI slot ↓

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CE Declaration of Conformity

Manufacturer: Measurement Computing Corporation
Address: 10 Commerce Way
Suite 1008
Norton, MA 02766
USA

Category: Electrical equipment for measurement, control and laboratory use.

Measurement Computing Corporation declares under sole responsibility that the product

PCI-DIO96

to which this declaration relates is in conformity with the relevant provisions of the following standards or other documents:

EC EMC Directive 2004/108/EC: General Requirements, EN 61326-1:2006 (IEC 61326-1:2005).

Emissions:

- EN 55011 (2007) / CISPR 11(2003): Radiated emissions: Group 1, Class A
- EN 55011 (2007) / CISPR 11(2003): Conducted emissions: Group 1, Class A

Immunity: EN 61326-1:2006, Table 3.

- IEC 61000-4-2 (2001): Electrostatic Discharge immunity.
- IEC 61000-4-3 (2002): Radiated Electromagnetic Field immunity.
- IEC 61000-4-4 (2004): Electric Fast Transient Burst Immunity.
- IEC 61000-4-5 (2001): Surge Immunity.
- IEC 61000-4-6 (2003): Radio Frequency Common Mode Immunity.
- IEC 61000-4-11 (2004): Voltage Interrupts.

To maintain compliance to the standards of this declaration, the following conditions must be met.

- The host computer, peripheral equipment, power sources, and expansion hardware must be CE compliant.
- All I/O cables must be shielded, with the shields connected to ground.
- I/O cables must be less than 3 meters (9.75 feet) in length.
- The host computer must be properly grounded.
- Equipment must be operated in a controlled electromagnetic environment as defined by Standards EN 61326-1:2006, or IEC 61326-1:2005.

Declaration of Conformity based on tests conducted by Chomerics Test Services, Woburn, MA 01801, USA in September, 2001. Test records are outlined in Chomerics Test Report #EMI3053.01. Further testing was conducted by Chomerics Test Services, Woburn, MA. 01801, USA in January, 2009. Test records are outlined in Chomerics Test report #EMI5243.09.

We hereby declare that the equipment specified conforms to the above Directives and Standards.



Carl Haapaoja, Director of Quality Assurance

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