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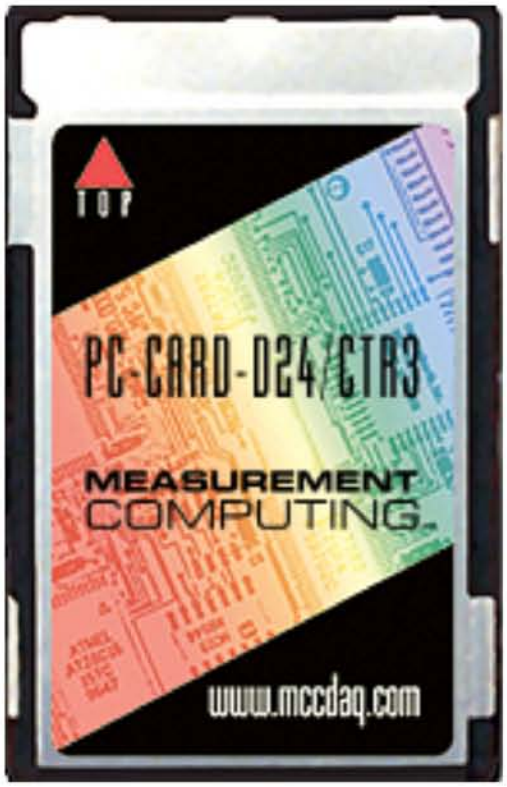
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Find the *Measurement Computing PC-Card-D24/CTR3* at our website: *Click HERE*

PC-CARD-D24/CTR3

24 Digital I/O, Three 16-bit Down Counters

User's Guide



MEASUREMENT COMPUTING

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PC-CARD-D24/CTR3

Digital I/O and Counter 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 PC-CARD-D24/CTR3 so that you get the most out of its digital I/O and counter 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

The following conventions are used in this manual to convey special information:

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

The following electronic documents provide information relevant to the operation of the PC-CARD-D24/CTR3.

- MCC's *Specifications: PC-CARD-D24/CTR3* (the PDF version of the *Specifications* chapter in this guide) is available on our web site at www.mccdaq.com/pdfs/PC-CARD-D24_CTR3.pdf.
- MCC's *Quick Start Guide* is available on our web site at www.mccdaq.com/PDFmanuals/DAQ-Software-Quick-Start.pdf.
- MCC's *Guide to Signal Connections* is available on our web site at www.mccdaq.com/signals/signals.pdf.
- MCC's *Universal Library User's Guide* is available on our web site at www.mccdaq.com/PDFmanuals/sm-ul-user-guide.pdf.
- MCC's *Universal Library Function Reference* is available on our web site at www.mccdaq.com/PDFmanuals/sm-ul-functions.pdf.
- MCC's *Universal Library for LabVIEW™ User's Guide* is available on our web site at www.mccdaq.com/PDFmanuals/SM-UL-LabVIEW.pdf.

PC-CARD-D24/CTR3 User's Guide (this document) is also available on our web site at www.mccdaq.com/PDFmanuals/PC-CARD-D24_CTR3.pdf.

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Introducing the PC-CARD-D24/CTR3

Overview: PC-CARD-D24/CTR3 features

The PC-CARD-D24/CTR3 is a data acquisition and control board for IBM PC compatible computers with PCMCIA/PC-CARD type slots. The primary functional elements consist of the following:

- An 82C55 chip using TTL logic for 24 bi-directional digital I/O channels.
- An 82C54 counter/timer chip that has three, 16-bit down-counters.

  Under software control, the counters can be clocked internally from a 10 or 1 MHz crystal oscillator, clocked externally, or chained to yield a 32- or 48-bit counter. Each counter can be gated (disabled) with an external gate signal

The 24 digital I/O channels are divided into three ports — A, B, and C. Each port has eight I/O channels. At power-on or reset, the digital lines are set as inputs. The board provides three independently programmable and functioning 16-bit down-counters. You can access the clock input, gate, and output for each counter.

PC-CARD-D24/CTR3 block diagram

PC-CARD-D24/CTR3 functions are illustrated in the block diagram shown here.

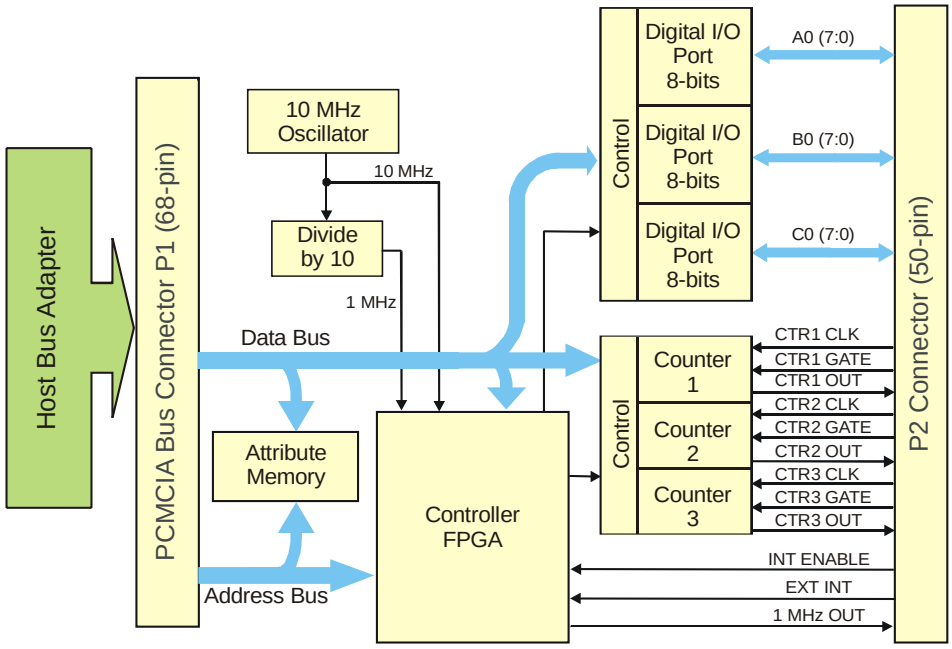


Figure 1. PC-CARD-D24/CTR3 functional block diagram

Software features

For information on the features of *Insta*Cal and the other software included with your PC-CARD-D24/CTR3, 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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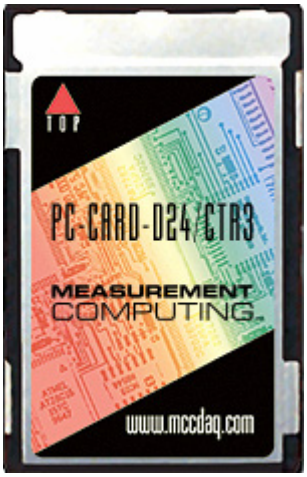
Installing the PC-CARD-D24/CTR3

What comes with your PC-CARD-D24/CTR3 shipment?

The following items are shipped with the PC-CARD-D24/CTR3.

Hardware

- PC-CARD-D24/CTR3



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 PC-CARD-D24/CTR3 and information regarding installation of that software. Please read this booklet completely before installing any software or hardware.

Optional components

- Cables



CPCC-50F-39



CPCC-50M-4



C50FF-x

- Signal termination and conditioning accessories

  MCC provides signal conditioning and termination products for use with the PC-CARD-D24/CTR3. Refer to Field wiring and signal termination on page 11 for a complete list of compatible accessory products.

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Unpacking the PC-CARD-D24/CTR3

As with any electronic device, you should take care while handling to avoid damage from static electricity. Before removing the PC-CARD-D24/CTR3 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 PC-CARD-D24/CTR3

The PC-CARD-D24/CTR3 board is completely plug-and-play. There are no switches or jumpers to set. 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.

To install your PC-Card, do the following:

- Insert the card into a free PC Card/PCMCIA type II or III slot. The key helps to insure that the cable is inserted in the correct orientation.

  You do not have to turn the computer off. The system is designed for power-on installation. You should hear an insertion beep when you insert the card.

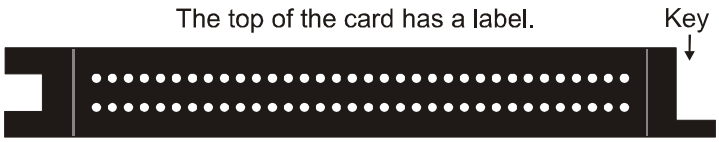


Figure 2. End view of the 50-pin PC-CARD connector showing proper orientation

Windows automatically detects, recognizes, and configures the PC-CARD. You should hear an insertion beep when you insert the card into the slot. To verify that the card is recognized, go to Control Panel\System\Device Manager and the card should now appear under "DAS Component."

If your PCMCIA card is not detected

If the card is not detected by Windows, and you are not prompted for a driver after inserting the card, check that your computer's 32-bit PCMCIA drivers are installed and enabled. Do the following:

1. From your desktop, right-click on My Computer and select **Properties**. The **System Properties** dialog opens.
2. Select the **Hardware** tab and click on the **Device Manager** button.

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3. Verify that "PCMCIA adapters" is listed in the Device Manager. If you don't find this entry, or if the properties for the adapter indicate "this device is not working," you need to install or update your PCMCIA adapter drivers.
   - If the PCMCIA adapter is not listed, use the **Add New Hardware Wizard** to install PCMCIA support.
   - If the PCMCIA adapter is listed but not working, use the **Update Driver** option to install the appropriate drivers.

After performing the update procedure, reboot your PC and insert your card again.

Connecting the board for I/O operations

Connectors, cables – main I/O connector

The table below lists the board connector, applicable cables, and compatible accessory products.

Board connector, cables, and accessory equipment

Connector type	50-pin connector
Compatible cables	▪ CPCC-50F-39: 50-pin Micro connector to 50-pin female IDC, one-meter cable (39 inches).
	▪ CPCC-50M-4: 50-pin Micro connector to 50-pin male IDC, 4 inch adapter cable. and ▪ C50FF-x: 50-pin IDC female to female cable. x = length in feet.
Compatible accessory products	CIO-MINI50 CIO-SPADE50 CIO-TERM100 SCB-50 SSR-RACK24 CIO-ERB24 CIO-SERB24

Pin out – main I/O connector

Figure 3 shows a PC-CARD-D24/CTR3 case looking into the male mini-connector. The connector is mechanically keyed to insure that the cable is inserted correctly.

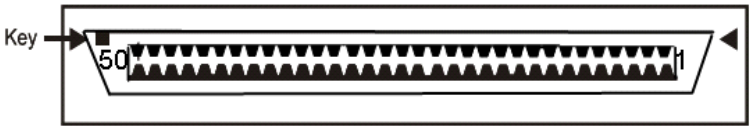


Figure 3. 50-pin I/O mini-connector

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Cabling

Measurement Computing offers two cables for connecting the PC-CARD-D24/CTR3 to a screw-type terminal board or other signal conditioning interface board:

- The CPCC-50F-39 cable: 39 inches (990 mm) long; and compatible with standard 50-pin screw terminal products.
- The CPCC-50M-4 cable: four-inch long adapter cable; required when using a C50FF-x series cable.

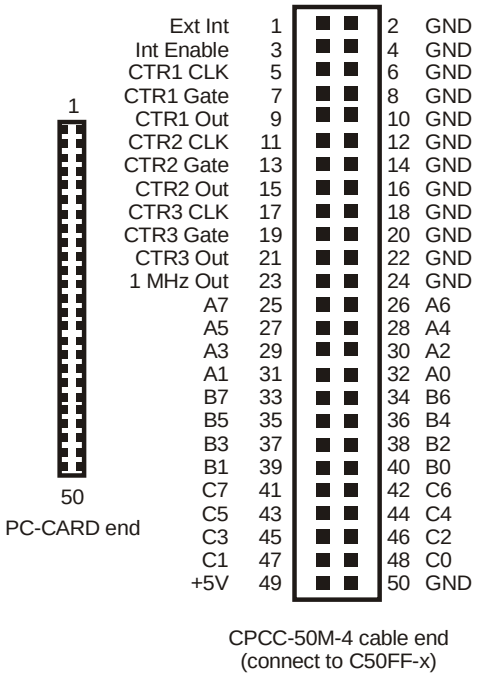


Figure 4. Cable map — PC-CARD to CPCC-50M-4

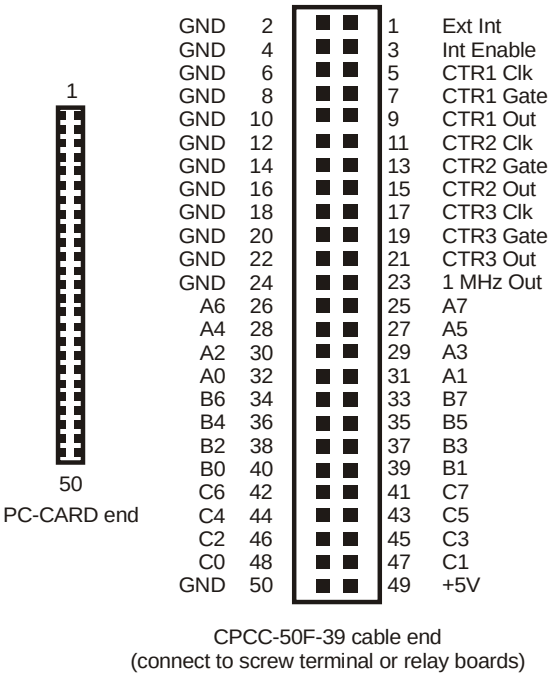


Figure 5. Cable map — PC-CARD to CPCC-50F-39

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Figure 6 shows a map of the two methods of cabling the PC-CARD-D24/CTR3 to various screw terminal or signal conditioning boards.

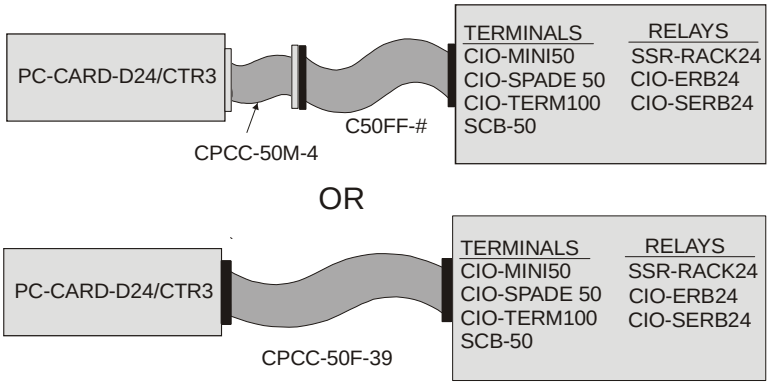


Figure 6. Connecting to screw terminal or relay boards

CPCC-50F-39

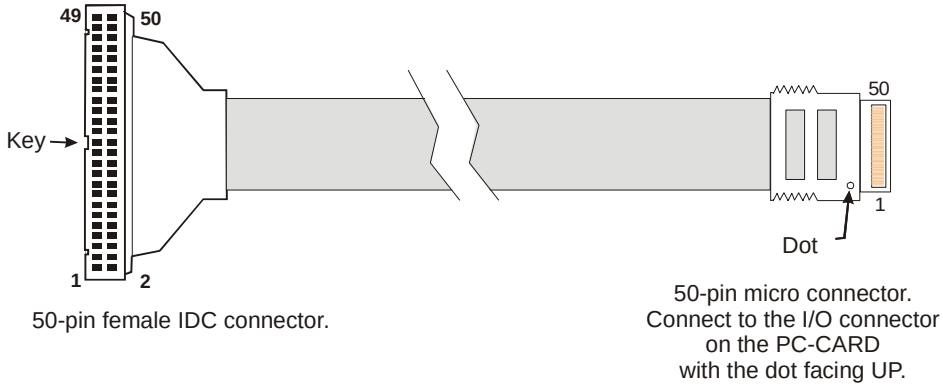


Figure 7. CPCC-50F-39 cable connections

Details on the CPCC-50F-39 cable are available on our web site at www.mccdaq.com/cbicatalog/cbiproduct.asp?dept_id=105&pf_id=1379.

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CPCC-50M-4

If your application requires a cable that is longer than one meter in length, use the CPCC-50M-4 four-inch cable, and connect to a C50FF-*x* cable.

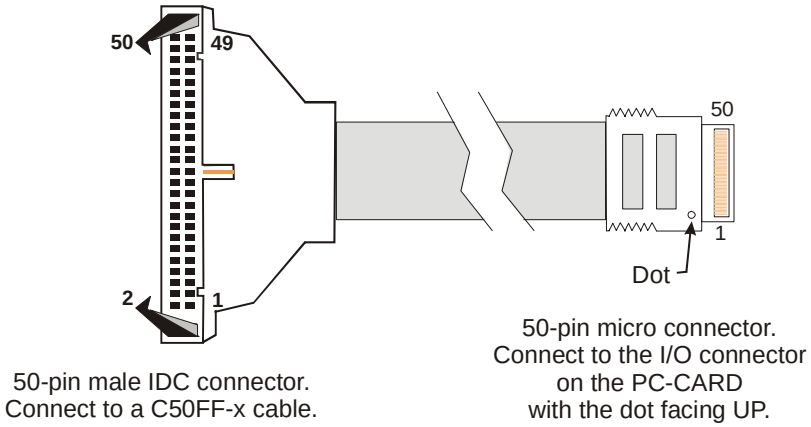


Figure 8. CPCC-50M-4 cable connections

Details on the CPCC-50M-4 cable are available on our web site at www.mccdaq.com/cbicatalog/cbiproduct.asp?dept_id=96&pf_id=1380.

C50FF-x

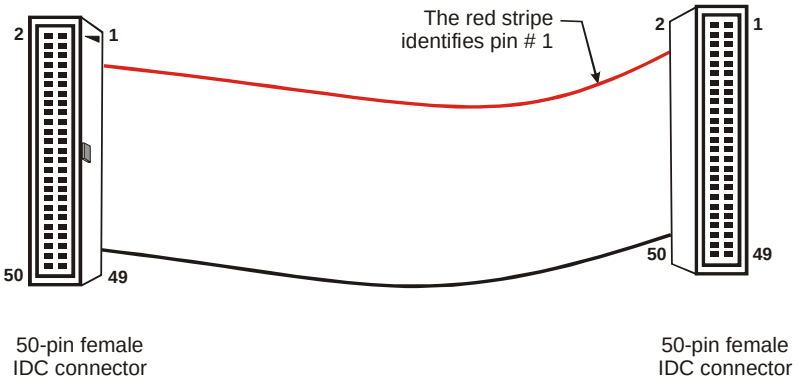


Figure 9. C50FF-*x* cable

Details on the C50FF-x cable are available on our web site at www.mccdaq.com/cbicatalog/cbiproduct.asp?dept_id=104&pf_id=136.

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Field wiring and signal termination

You can use the following cabling, screw termination, and signal conditioning products with the CPCC-50F-39 cable, or with the CPCC-50M-4 and C50FF-x cables:

- CIO-MINI50 – 50-pin screw terminal board. Details on this product are available on our web site at www.mccdaq.com/cbicatalog/cbiproduct.asp?dept_id=102&pf_id=258.
- CIO-TERM100 – 100-pin screw terminal board (Two 50-pin IDC connectors). Details on this product are available on our web site at www.mccdaq.com/cbicatalog/cbiproduct.asp?dept_id=102&pf_id=281.
- CIO-SPADE50 — 16" X 4" termination panel which mates with both 37-pin and 50-pin connectors. Details on this product are available on our web site at www.mccdaq.com/pdfs/screw.pdf.
- SCB-50 – 50 conductor, shielded signal connection/screw terminal box provides two independent 50-pin connections. Details on this product are available on our web site at www.mccdaq.com/cbicatalog/cbiproduct.asp?dept_id=196&pf_id=1168.
- SSR-RACK24 – 24-channel, solid-state relay mounting rack for digital signal conditioning. Details on this product are available on our web site at www.mccdaq.com/cbicatalog/cbiproduct.asp?dept_id=122&pf_id=1193.
- CIO-ERB24 – 24 Form C relays, 6 Amp relay accessory board for digital signal conditioning. Details on this product are available on our web site at www.mccdaq.com/cbicatalog/cbiproduct.asp?dept_id=123&pf_id=241.
- CIO-SERB24 – 24 Form C relays, 10 Amp, fault detecting relay accessory board with socketed and field-replaceable relays. Details on this product are available on our web site at www.mccdaq.com/cbicatalog/cbiproduct.asp?dept_id=123&pf_id=678.

Information on signal connections

General information regarding signal connection and configuration is available in the *Guide to Signal Connections* (available at www.mccdaq.com/signals/signals.pdf).

Calibrating the PC-CARD-D24/CTR3

No calibration is required. There are no socketed or user-serviceable parts in the PC-CARD-D24/CTR3. The case cannot be opened. Opening the case will void your warranty. If your PC-CARD-D24/CTR3 requires service, contact the factory for an RMA# and return it

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Programming and Developing Applications

After following the installation instructions in Chapter 2, your board should now be installed and ready for use. In general there may be no correspondence among registers for different boards. Software written at the register-level for other models does not function correctly with your board.

Programming languages

Measurement Computing's Universal Library provides access to board functions from a variety of Windows programming languages. If you are planning to write programs, or would like to run the example programs for Visual Basic® or any other language, please refer to the *Universal Library User's Guide* (available on our web site at www.mccdaq.com/PDFmanuals/sm-ul-user-guide.pdf).

Packaged applications programs

Many packaged application programs now have drivers for your board. If the package you own does not have drivers for the board, please fax or e-mail the package name and the revision number from the install disks. We will research the package for you and advise how to obtain drivers.

Some application drivers are included with the Universal Library package, but not with the application package. If you have purchased an application package directly from the software vendor, you may need to purchase our Universal Library and drivers. Please contact us 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

Counter operational modes

The 82C54 counter can be programmed to operate in one of six modes as follows:

- Mode 0: Interrupt on Terminal Count. Typically used for event counting.
- Mode 1: Hardware Re-triggerable One-Shot.
- Mode 2: Rate Generator (divide by N-counter used for real-time clock interrupt).
- Mode 3: Square-Wave mode. Typically used for baud rate generation.
- Mode 4: Software-triggered counting mode.
- Mode 5: Hardware-Triggered Strobe - Re-triggerable.

To program the 82C54 counter, refer to the 82C54 data sheet at www.mccdaq.com/PDFmanuals/82C54.pdf.

Register-level programming

You should use the Universal Library or one of the packaged application programs mentioned above to control your board. Only experienced programmers should try register-level programming.

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Specifications

Typical for 25 °C unless otherwise specified.

Specifications in *italic text* are guaranteed by design.

Digital input/output

Table 1. Digital I/O specifications

Digital type	*82C55*
Configuration	*2 banks of 8, 2 banks of 4, programmable by bank as input or output*
Number of channels	*24 I/O*
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)*
Interrupts	Programmable levels 2-15
Interrupt enable	Programmable
Interrupt sources	Programmable: ▪ External (Ext Int) ▪ Internal (counter 1 output, counter 2 output, counter 3 output, 82C55 port C bit C0 or bit C3)

Counter

Table 2. Counter specifications

Counter type	*82C54*	
Configuration	3 down counters per 82C54, 16 bits each	
Counter 1 - Independent user counter	Source:	Programmable internal 10 MHz or external (CTR1 CLK)
	Gate:	External (CTR1 Gate), pulled high (enabled) by 10 k resistor
	Output:	Available at user connector (CTR1 Out), may also be programmed to connect to counter 2 clock.
Counter 2 - Independent user counter	Source:	Programmable internal 10 MHz , external (CTR2 CLK) or CTR1 Out
	Gate:	External (CTR2 Gate), pulled high (enabled) by 10 k resistor
	Output:	Available at user connector (CTR2 Out), may be programmed to connect to counter 3 clock
Counter 3 - Independent user counter	Source:	Programmable internal 1 MHz , external (CTR3 CLK) or CTR2 Out
	Gate:	External (CTR3 Gate), pulled high (enabled) by 10k resistor
	Output:	Available at user connector (CTR3 Out)
Clock input frequency	*10 MHz max*	
High pulse width (clock input)	*30 ns min*	
Low pulse width (clock input)	*50 ns min*	
Gate width high	*50 ns min*	
Gate width low	*50 ns min*	
Input low voltage	*0.8 V max*	
Input high voltage	*2.0 V min*	
Output low voltage	*0.4 V max*	
Output high voltage	*3.0 V min*	

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Crystal oscillator	Frequency:	10 MHz
	Frequency accuracy:	50 ppm
	Miscellaneous:	Available (divided by 10) at user connector (1 MHz Out)

Power consumption

Table 3. Power consumption specifications

+5V operating	45 mA typical, 65 mA max

Miscellaneous

Table 4. Miscellaneous specifications

+5 Volts DC	Available at I/O connector (+5V Power)
	Protected by resettable fuse: ▪ Hold current: 350 mA ▪ Trip current: 700 mA ▪ *Trip and recovery time: 100 mS*

Environmental

Table 5. Environmental specifications

Operating temperature range	*0 to 70 °C*
Storage temperature range	*-40 to 100 °C*
Humidity	*0 to 95% non-condensing*

Connector and pin out

Table 6. Connector specifications

Connector type	50-pin connector
Compatible cables	CPCC-50F-39: 50-pin Micro connector to 50-pin female IDC, one-meter cable (39 inches).
	▪ CPCC-50M-4: 50-pin Micro connector to 50-pin male IDC, 4 inch adapter cable. and ▪ C50FF-x: 50-pin IDC female to female cable. x = length in feet.
Compatible accessory products	CIO-MINI50 CI-SPADE50 CIO-TERM100 SCB-50 SSR-RACK24 CIO-ERB24 CIO-SERB24

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Table 7. Connector pin out

Pin	Signal Name	Pin	Signal Name
1	Ext Int	26	A6
2	GND	27	A5
3	Int Enable	28	A4
4	GND	29	A3
5	CTR1 CLK	30	A2
6	GND	31	A1
7	CTR1 Gate	32	A0
8	GND	33	B7
9	CTR1 Out	34	B6
10	GND	35	B5
11	CTR2 CLK	36	B4
12	GND	37	B3
13	CTR2 Gate	38	B2
14	GND	39	B1
15	CTR2 Out	40	B0
16	GND	41	C7
17	CTR3 CLK	42	C6
18	GND	43	C5
19	CTR3 Gate	44	C4
20	GND	45	C3
21	CTR3 Out	46	C2
22	GND	47	C1
23	1 MHz Out	48	C0
24	GND	49	+5V
25	A7	50	GND

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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

PC-CARD-D24/CTR3

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

EU EMC Directive 89/336/EEC: Electromagnetic Compatibility, EN 61326 (1997) Amendment 1 (1998)

Emissions: Group 1, Class A

- EN 55011 (1990)/CISPR 11: Radiated and Conducted emissions.

Immunity: EN61326, Annex A

- IEC 1000-4-2 (1995): Electrostatic Discharge immunity, Criteria C.
- IEC 1000-4-3 (1995): Radiated Electromagnetic Field immunity Criteria C.
- IEC 1000-4-4 (1995): Electric Fast Transient Burst immunity Criteria C.
- IEC 1000-4-5 (1995): Surge immunity Criteria A.
- IEC 1000-4-6 (1996): Radio Frequency Common Mode immunity Criteria C.
- IEC 1000-4-11 (1994): Voltage Dip and Interrupt immunity Criteria A.

Tests to IEC 1000-4-8 were not required. The PC cards do not contain components that would be susceptible to magnetic fields.

Declaration of Conformity based on tests conducted by Chomerics Test Services, Woburn, MA 01801, USA in July, 2004. Test records are outlined in Chomerics Test Report #EMI3930.04.

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



Carl Haapaoja, Director of Quality Assurance

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