USER'S MANUAL

MCA-E3133A

PC Card: CBI-3133A

Ver. 1.0

Interface®

www.interface.co.jp

Notes to Users

The specifications of the product are under continuous improvement and while every effort is made to keep this manual up-to-date, we reserve the right to update the contents of this user's manual without prior notice. Therefore, you should thoroughly read this user's manual even if you have often purchased this product before.

Using this product requires technical knowledge of hardware and software.

Use this product only under the specified conditions such as power supply, voltage, temperature, and humidity range. Interface Corporation's products are not designed with components intended to ensure a level of reliability suitable for use under conditions that might cause serious injury or death.

Please consult our Technical Support Center if you intend to use our products for special purpose, such as use for moving vehicles, medical treatment, aerospace engineering, controlling nuclear power, submerged translators and so on. This product is made under strict quality management, however, when using this product for the purposes that may result in any damages, lost profits, or any other incidental or consequential damages resulting from breakdown of this product, the user is required to take adequate and appropriate measures, such as installing safety devices to avoid possible serious accidents.

Conventions Used in This Manual

⚠	This icon denotes a warning, which advises you of precautions to take to avoid injury, data loss, or system crash.
❗	This icon denotes a note, caution, or warning.

Indemnification

Interface Corporation makes no warranties regarding damages resulting from installation or use of this product, whether hardware or software, and assume that such risk reverts to the user.

Interface Corporation shall not be liable for any incidental or consequential damages, including damages or other costs resulting from defects which might be contained in the product, product supply delay or product failure, even if advised of the possibility thereof. Customer's right to recover damages caused by fault or negligence on the part of Interface Corporation shall be limited to the amount paid by the customer for that product.

This product including its software may be used only in Japan. Interface Corporation can not be responsible for the use of this product outside Japan. Interface Corporation does not provide technical support service outside Japan.

Warranty

Interface Corporation products are warranted for a period of either one year or two years from the date of shipment, as evidenced by receipts or other documentation. This warranty does not apply to the software products and expendable supplies such as batteries.

Note: You can determine the warranty period at our Web site by the serial number of your product. Those without Internet access should contact the Sales Information Center.

During the warranty period Interface Corporation will, as a general rule, replace or recondition the defective product without charge, in which case the user will be required to pay the shipping costs, except as set forth below.

The Warranty provided herein does not cover expendable supplies such as batteries and damages, defects, malfunctions, or failures caused by impact during transportation while under owner's responsibility; owner's failure to follow the instructions and the precautions contained in this manual; modification and/or repair of the product by other than Interface Corporation, trouble caused by use with peripherals not specified by Interface Corporation, power failure or surges, fire, earthquake, tidal wave and/or flood.

This warranty applies only when the product is used in Japan.

Interface Corporation warrants its repairs for six months, and will again repair the same defective part without additional charge provide the product is economically repairable. In that case, the user should attach a copy of the most recent repair report to the repair request form. If no repair report is attached, it will be considered as a new repair request.

Before You Export Interface Products

The foreign exchange and foreign trade law of Japan controls the export of this product, due to its possible use as a STRATEGIC MATERIAL. Therefore, before you export this product, you must secure an export permit from the Ministry of Economy, Trade and Industry of Japan.

Revision History

Version	Date	Comments
1.0	September 2003	English version of user's manual MCA-E3133A published.

Due to constant product improvements, the information in this user's manual is subject to change without prior notice.

-Contents-

Chapter 1   Introduction

1.1 Summary

The CBI-3133A is a multifunction 12-bit analog input/output card for CardBus-based computers. It provides 16 single-ended analog input or 8 differential input channels. This card provides high-speed AD conversion for software timing, external trigger, programmable timer, and so on. The conversion time per channel is 10 μs for a fixed single channel sampling and automatic sequential channel addressing. For software channel addressing, it is 20 μs per channel. At FIFO sampling setting, the CBI-3133A also provides a wide variety of trigger modes[*]: analog trigger, external trigger (sampling-start), post-trigger, and pre-trigger. This card controls 8 channels (max.) for external equipment by using digital input/output functions. The following table shows input ranges for each card.

Model	Input Range
CBI-3133A CBI-3134A	±1 V, ±2.5 V
CBI-3133B CBI-3134B	±5 V, ±10 V

The CBI-3133B and CBI-3134B allow to input the wide range because the voltage is divided by resistances for each channel inside the card. However, channel-to-channel error or reduction of input impedance will occur.

Notes:
- This board multiplexes input channels and routes the selected channel to the AD converter. Therefore, this board cannot sample multiple channels simultaneously. The input range cannot be independently set for each channel.
- Automatic sequential channel addressing: This mode automatically addresses sequential channels by hardware while AD conversion including sample and hold.
  Software channel addressing: This mode explicitly addresses a sampling channel and starts AD conversion on the channel after the settling time of channel scan.

1.1.1 Features

1. High-speed AD conversion
   The CBI-3133A provides high-speed AD conversion.

2. Software programmable input configuration
   The CBI-3133A provides software programmable input configurations: single-ended or differential.

3. Complete software-controlled adjustment and calibration
   The AD converter is fully adjusted and calibrated by software.

4. Analog trigger
   The CBI-3133A can output a one-shot pulse as a sampling-start, sampling-stop, or analog trigger output when triggers are detected at each falling edge or rising edge, depending on the setting. The hysteresis range isprogrammable for each trigger level by software.

5. On-board FIFO buffer memory
   The CBI-3133A has 2048-depth FIFO buffer memory. When using this function, the maximum sampling rate is 100 kHz.

6. Automatic sequential channel addressing
    This mode addresses sequential channels by hardware control. The CBI-3133A allows you to acquire data at very high-speed without intervention in channel scanning.

7. Software programmable external signal input
    The CBI-3133A can receive external signals; interrupt, sampling-start, or sampling pacer clock, depending on the software setting.

8. Trigger delay[*]
    The CBI-3133A can sample the specified number of data after a stop trigger occurs, so you can observe the waveform before and after the trigger.

9. Pre-trigger[*]
    The CBI-3133A can acquire data before trigger occurs.

10. General purpose digital input/output
    The CBI-3133A has 8 general purpose digital inputs and outputs for each. These inputs and outputs can be used as control signals for an external equipment.

11. Built-in precision sampling pacer
    The CBI-3133A has an on-card programmable sampling pacer clock. Using this feature, this card can generate an accurate sampling pacer clock.

12. Full-scale range detection[*]
    This feature detects that a digital code of AD conversion reached at the positive full-scale range or negative full-scale range.

13. Cable
    The JKC-0125 cable is included with the CBI-3133A. You can modify the one side as desired.

Note: [*] Please use the AdCommonGetPciDeviceInfo function to confirm revision ID of this product. Refer to Help for more details.

1.2 Optional Products

1.2.1 Accessories

Part Number	Description
TAC-3100 Cable: CAB-2901 Terminal block: TRM-3100	The TAC-3100 is composed of a cable and terminal block. The CAB-2901 straight cable converts a PC Card 68-pin male connector to 68-pin half-pitch female connector. The cable length is 1.5 m. The TRM-3100 terminal block has 68 screw terminals for easy connection of field signals. It has a 68-pin half-pitch male connector. It also includes hardware for mounting on a standard DIN rail.
BPC-0501 (Japanese)	This software provides VI (diagram) for Interface analog input card on LabVIEW 5.1(5.1.1) and 6I of National Instruments Corporation.
GPC-3100 (Japanese)	Analog input/output driver software for Windows XP/2000/NT/Me/98.
GPF-3100 (English)	Analog input/output driver software for Windows XP/2000/NT/Me/98.
GPG-3100 (Japanese)	Analog input/output driver software for Linux and RTLinux
GPH-3100 (English)	Analog input/output driver software for Linux and RTLinux

Refer to our Web site for the latest information and prices of optional products.

Note: You can download them from our Web site for free, but CD-ROM is charged a fee.

Connection Diagram

Interface Corporation
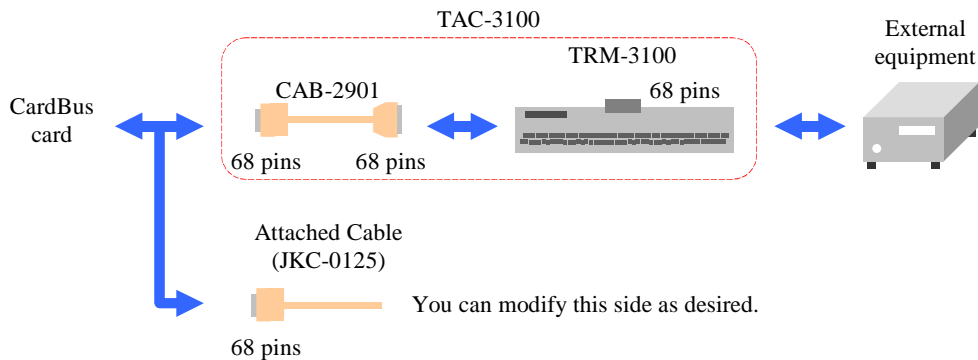
Chapter 2   Specifications

2.1 Hardware Specifications

Analog Section

Parameter	Specification
Number of channels	Single-ended input: 16 Differential input: 8
Input mode	Multiplexing
Input range	Bipolar: ±1 V, ±2.5 V
Input impedance	10 MΩ (±5%)
Input protection voltage	±15 V (power on) ±10 V (power off)
Resolution	12 bits
AD converter	ADS7835EB (Texas Instruments Incorporated) or equivalent
Relative accuracy	±1 LSB (max.) (25 ℃) ±1 V, ±2.5 V
Conversion time	10 μs (when single channel fixed.) 10 μs (when channel scanned, automatic sequential channel addressing[1]) 20 μs (when channel scanned, software channel addressing[1])
Analog trigger[2]	Trigger level: 2 levels Trigger pulse output (TTL)[6]: 1 channel
FIFO sample buffer	2048 samples per card

Basic Specifications

Parameter	Specification
Isolation	No-isolation
External control input	AD sampling trigger input (TTL)[3]: 1 channel (74VHCT240A or equivalent) External interrupt input (TTL)[3]: 1 channel (74VHCT240A or equivalent) External sampling pacer clock input (TTL)[3]: 1 channel (74VHCT240A or equivalent)
Digital I/O	CMOS gated high-voltage input[4] (with 4.7 kΩ pull-up resistor and protection diode, able to connect to TTL level output)[4]: 8 channels (74HC14 or equivalent) TTL open-collector output[5]: 8 channels (74HC14 or equivalent) 40 mA per channel
Timer	Clock: 8 MHz Output: timer interrupt and sampling pacer
Interrupt sources	12 sources (analog trigger[2], end of AD conversion, end of sampling, external interrupt, external trigger, full-scale range[2], overflow, sampling clock error[2], sampling counter, sampling interrupt counter, start of sampling, and timer)
Number of I/O ports	64 ports (The base address is assigned by the Plug and Play system.)
External reference voltage output	+5 V (±0.1%), -5 V (±0.1%)
Power consumption	+3.3 Vdc: 150 mA (typ.)
Bus requirements	PC Card Standards-Based CardBus
Card size	PCMCIA/JEITA Type II
Environmental conditions	Operating temperature: 0 ℃ to 50 ℃ Relative humidity: 20% to 90% (non-condensing)
I/O connector	CN1: VHDCI 68-pin female SCSI connector

Notes:

[*1] Mode Definition

Automatic sequential channel addressing: This mode automatically addresses sequential channels by hardware while AD conversion including sample and hold.

Software channel addressing: This mode explicitly addresses a sampling channel and starts AD conversion on the channel after the settling time of channel scan.

[*2] Please use the AdCommonGetPciDeviceInfo function to confirm revision ID of this product. Refer to Help for more details.

[*3] TTL level input

Parameter	Specification
Maximum voltage rating	+5 Vdc
Input voltage range	0 Vdc to +5 Vdc
Input impedance	4.7 kΩ pull-up resistor
Low-level input current	I_{IL} = -1.0 mA (max.)
High-level input current	I_{IH} = 10 µA (max.)
Low-level input voltage	V_{IL} = 0.8 V (max.)
High-level input voltage	V_{IH} = 2.0 V (min.)

[*4] CMOS gated high-voltage input

| Parameter	Specification
Maximum voltage rating	+30 Vdc
Input voltage range	0 Vdc to +24 Vdc
Input impedance	4.7 kΩ pull-up resistor
Low-level input current	I_{IL} = -1.0 mA (max.)
High-level input current	I_{IH} = 10 mA (max.)
Low-level input voltage	V_{IL} = 0.7 V (max.)
High-level input voltage	V_{IH} = 3.1 V (min.)

[*5] TTL open-collector output

Parameter	Specification
Maximum voltage rating	+30 Vdc
Output voltage range	+5 Vdc to +24 Vdc
Output impedance	4.7 kΩ pull-up resistor
Low-level output current	I_{OL} = 40 mA (max.)
High-level output current	I_{OH} = 10 µA (max.)
Low-level output voltage	V_{OL} = 0.2 V (max.) (I_{OL} = 10 mA)

[*6] TLL level output

Parameter	Specification
Maximum voltage rating	+5 Vdc
Output voltage range	0 Vdc to +5 Vdc
Low-level output current	I_{OL} = 25 mA (max.)
High-level output current	I_{OH} = -25 mA (max.)
Low-level output voltage	V_{OL} = 0.4 V (max.) (I_{OL} = 8 mA)
High-level output voltage	V_{OH} = 3.8 V (max.) (I_{OH} = -8 mA)

• For an unused analog input channel, connect to ground. If you do not connect it to ground, the conversion value of unused analog input channel is uncertain.

2.2 Circuit Diagram
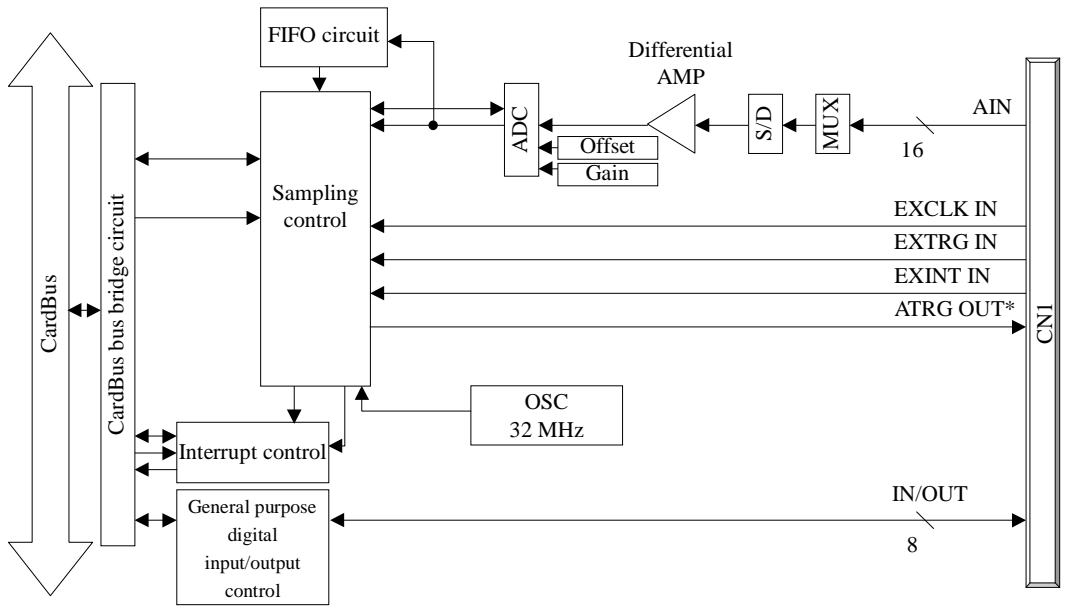
Note: * Please use the AdCommonGetPciDeviceInfo function to confirm revision ID of this product. Refer to Help for more details.

Chapter 3　Signal Definitions

3.1 Cable Connector Pin Assignments

Reserved	1	35	Reserved
Reserved	2	36	Reserved
ACOM1	3	37	ACOM9
AIN1	4	38	AIN9
ACOM2	5	39	ACOM10
AIN2	6	40	AIN10
ACOM3	7	41	ACOM11
AIN3	8	42	AIN11
ACOM4	9	43	ACOM12
AIN4	10	44	AIN12
ACOM5	11	45	ACOM13
AIN5	12	46	AIN13
ACOM6	13	47	ACOM14
AIN6	14	48	AIN14
ACOM7	15	49	ACOM15
AIN7	16	50	AIN15
ACOM8	17	51	ACOM16
AIN8	18	52	AIN16
Reserved	19	53	Reserved
Reserved	20	54	Reserved
Reserved	21	55	Reserved
Reserved	22	56	Reserved
Reserved	23	57	Reserved
Reserved	24	58	Reserved
Reserved	25	59	EXTRG IN
Reserved	26	60	EXCLK IN
IN/OUT1	27	61	Reserved
IN/OUT2	28	62	EXINT IN
IN/OUT3	29	63	Reserved
IN/OUT4	30	64	Reserved
IN/OUT5	31	65	ATRG OUT*
IN/OUT6	32	66	Reserved
IN/OUT7	33	67	DCOM
IN/OUT8	34	68	DCOM

Reserved: Pin for reserved. Do not connect to an external equipment.

Notes:
- * Please use the AdCommonGetPciDeviceInfo function to confirm revision ID of this product. Refer to Help for more details.
- For prevention of incorrect insertion, card frame and contraction tube of attached cable is the same color. Check they are same color when you connect the cable with the card.

3.2 Signals

Single-Ended Analog Input Channels

Signal	Pin Number	Channel	Direction	Description
AIN1	4	1	Input (positive)	Analog input
AIN2	6	2		
AIN3	8	3		
AIN4	10	4		
AIN5	12	5		
AIN6	14	6		
AIN7	16	7		
AIN8	18	8		
AIN9	38	9		
AIN10	40	10		
AIN11	42	11		
AIN12	44	12		
AIN13	46	13		
AIN14	48	14		
AIN15	50	15		
AIN16	52	16		
ACOM1	3	1	—	Analog common ground
ACOM2	5	2		
ACOM3	7	3		
ACOM4	9	4		
ACOM5	11	5		
ACOM6	13	6		
ACOM7	15	7		
ACOM8	17	8		
ACOM9	37	9		
ACOM10	39	10		
ACOM11	41	11		
ACOM12	43	12		
ACOM13	45	13		
ACOM14	47	14		
ACOM15	49	15		
ACOM16	51	16		

Differential Analog Input Channels

Signal	Pin Number	Channel	Direction	Description
AIN9	38	1	Input (positive)	Analog input
AIN10	40	2		
AIN11	42	3		
AIN12	44	4		
AIN13	46	5		
AIN14	48	6		
AIN15	50	7		
AIN16	52	8		
AIN1	4	1	Input (negative)	Analog input
AIN2	6	2		
AIN3	8	3		
AIN4	10	4		
AIN5	12	5		
AIN6	14	6		
AIN7	16	7		
AIN8	18	8		
ACOM1	3	1	—	Analog common ground
ACOM2	5	2		
ACOM3	7	3		
ACOM4	9	4		
ACOM5	11	5		
ACOM6	13	6		
ACOM7	15	7		
ACOM8	17	8		

Digital I/O

Signal	Pin Number	Direction	Description
EXINT IN	62	Input	External interrupt input
EXTRG IN	59		External trigger input • One-shot sampling (driver software programmable)
EXCLK IN	60		External sampling pacer clock input
ATRG OUT[*]	65	Output	Trigger pulse output • Pulse polarity: software programmable • Pulse width: 1 μs
IN/OUT1 through IN/OUT8	27 through 34	Input/output	General purpose digital input/output
DCOM	67, 68	—	Digital common ground for EXINT IN, EXTRG IN, EXCLK IN, and IN/OUT1 through IN/OUT8

Note: [*] Please use the AdCommonGetPciDeviceInfo function to confirm revision ID of this product. Refer to Help for more details.

3.3 Attached Cable

The JKC-0125 cable is included with the CBI-3133A. This cable has a single 68-pin half-pitch female on A side. You can modify the B side as desired. The cable length is 1.5 m.

3.3.1 Dimensions of the Connector

A side

Cable: AWG30 (7/0.1) or equivalent

B side

Some 6 mm in diameter

34　68

1　35

Contraction tube

1.5 m
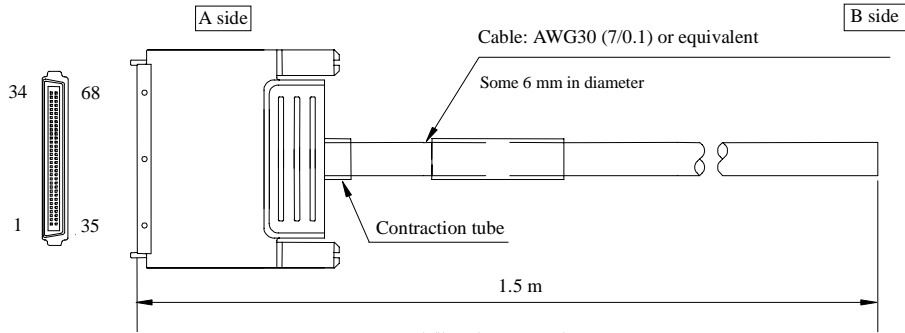
3.3.2 Wire Connection

CN1	Color of Wire Cover	Dot Mark . Color		CN1	Color of Wire Cover	Dot Mark . Color
1	orange	▬ red		35	gray	▬ ▬ ▬ ▬ ▬ (*1) red
2	orange	▬ black		36	gray	▬ ▬ ▬ ▬ ▬ (*1) black
3	gray	▬ red		37	orange	▬▬ red
4	gray	▬ black		38	orange	▬▬ black
5	white	▬ red		39	gray	▬▬ red
6	white	▬ black		40	gray	▬▬ black
7	yellow	▬ red		41	white	▬▬ red
8	yellow	▬ black		42	white	▬▬ black
9	pink	▬ red		43	yellow	▬▬ red
10	pink	▬ black		44	yellow	▬▬ black
11	orange	▬ ▬ red		45	pink	▬▬ red
12	orange	▬ ▬ black		46	pink	▬▬ black
13	gray	▬ ▬ red		47	orange	▬▬ ▬▬ red
14	gray	▬ ▬ black		48	orange	▬▬ ▬▬ black
15	white	▬ ▬ red		49	gray	▬▬ ▬▬ red
16	white	▬ ▬ black		50	gray	▬▬ ▬▬ black
17	yellow	▬ ▬ red		51	white	▬▬ ▬▬ red
18	yellow	▬ ▬ black		52	white	▬▬ ▬▬ black
19	pink	▬ ▬ red		53	yellow	▬▬ ▬▬ red
20	pink	▬ ▬ black		54	yellow	▬▬ ▬▬ black
21	orange	▬ ▬ ▬ red		55	white	▬ ▬ ▬ ▬ ▬ (*1) red
22	orange	▬ ▬ ▬ black		56	white	▬ ▬ ▬ ▬ ▬ (*1) black
23	gray	▬ ▬ ▬ red		57	yellow	▬ ▬ ▬ ▬ ▬ (*1) red
24	gray	▬ ▬ ▬ black		58	yellow	▬ ▬ ▬ ▬ ▬ (*1) black
25	white	▬ ▬ ▬ red		59	gray	▬ ▬ ▬ ▬ red
26	white	▬ ▬ ▬ black		60	gray	▬ ▬ ▬ ▬ black
27	yellow	▬ ▬ ▬ red		61	white	▬ ▬ ▬ ▬ red
28	yellow	▬ ▬ ▬ black		62	white	▬ ▬ ▬ ▬ black
29	pink	▬ ▬ ▬ red		63	yellow	▬ ▬ ▬ ▬ red
30	pink	▬ ▬ ▬ black		64	yellow	▬ ▬ ▬ ▬ black
31	orange	▬ ▬ ▬ ▬ red		65	pink	▬ ▬ ▬ ▬ red
32	orange	▬ ▬ ▬ ▬ black		66	pink	▬ ▬ ▬ ▬ black
33	orange	▬ ▬ ▬ ▬ ▬ ▬ (*1) red		67	pink	▬ ▬ ▬ ▬ ▬ (*1) red
34	orange	▬ ▬ ▬ ▬ ▬ ▬ (*1) black		68	pink	▬ ▬ ▬ ▬ ▬ (*1) black

Note: *1 These dot marks are printed in straight succession.

Chapter 4   External Connections

Keep these important points in mind when connecting the card with external equipment.
FAILURE TO OBSERVE THESE IMPORTANT SAFETY PRECAUTIONS MIGHT RESULT IN EXCESSIVE VOLTAGE IN THE CARDBUS CARD CIRCUITS, CAUSING AN ELECTRICAL FIRE, WITH POSSIBLE OPEN FLAME AND SMOKE.

☐ Do not apply voltage with surges greater than the input protection voltage to any analog input channels.
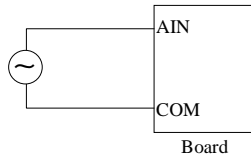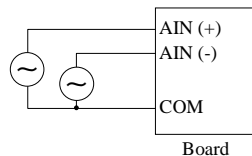
Single-Ended Input Configurations   Differential Input Configurations

Input protection voltage: Input protection voltage:

±15 V (power on)   ±15 V (power on)

±10 V (power off)   ±10 V (power off)

☐ Do not apply voltage of less than 0 V or greater than +5 V to EXCLK IN, EXINT IN, and EXTRG IN.

☐ Do not apply voltage of greater than +30 V to IN/OUT1 through IN/OUT8.

☐ Do not attach or remove external connectors when the computer or any external equipment is powered.

☐ We recommend that the cable length of the connecting digital signals (ATRG OUT*, EXCLK IN, EXINT IN, EXTRG IN, and IN/OUT1 through IN/OUT8) is less than or equal to 1.5 m.

☐ Connecting mechanical switches such as a relay to digital input pins may result in unexpected operations by contact bounces.

☐ To achieve precise data acquisition, we recommend you to use shielded cables, with lengths as short as possible to eliminate interference caused by noise. Moreover, move noise sources away.

☐ Keep the signal cable away from other equipment as far as possible to avoid electromagnetic interference.

Note: * Please use the AdCommonGetPciDeviceInfo function to confirm revision ID of this product. Refer to Help for more details.

4.1 Equivalent Circuits

● Analog Input Channels and Grounds for Single-Ended Input Configurations
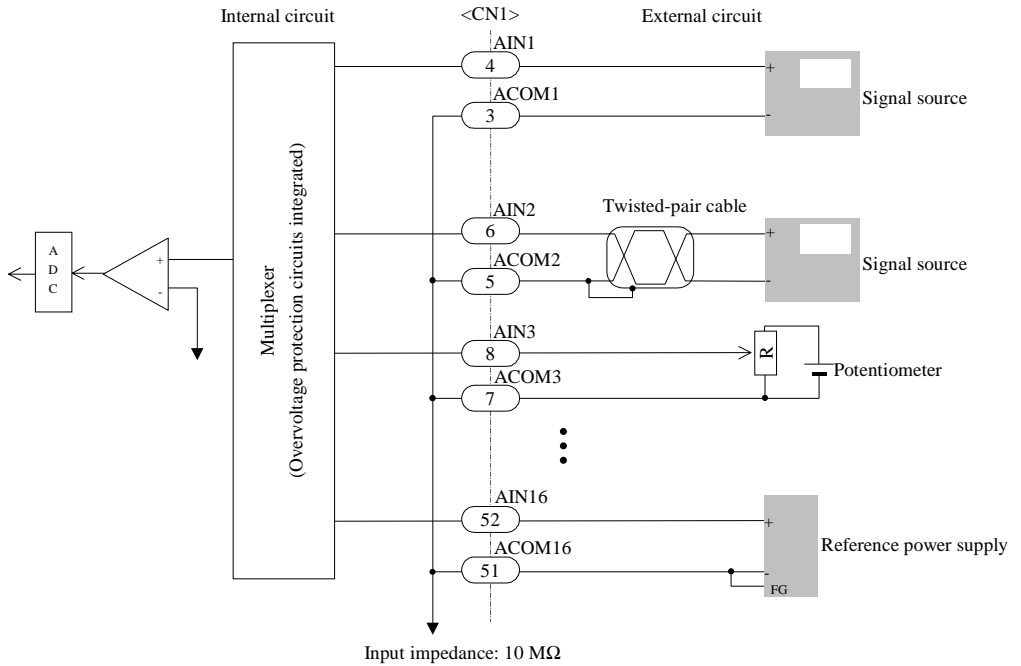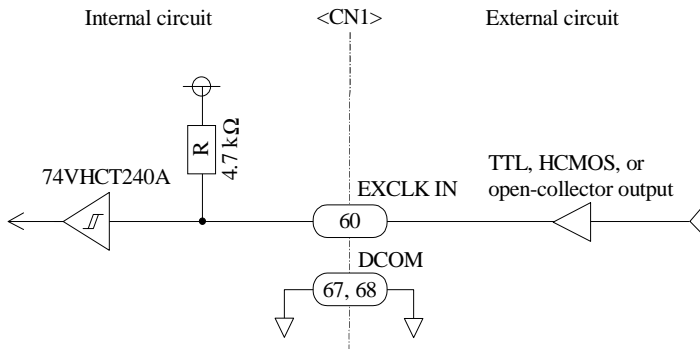

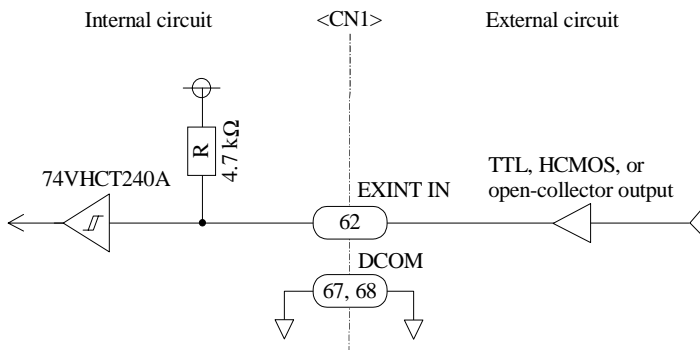● Analog Input Channels and Grounds for Differential Input Configurations
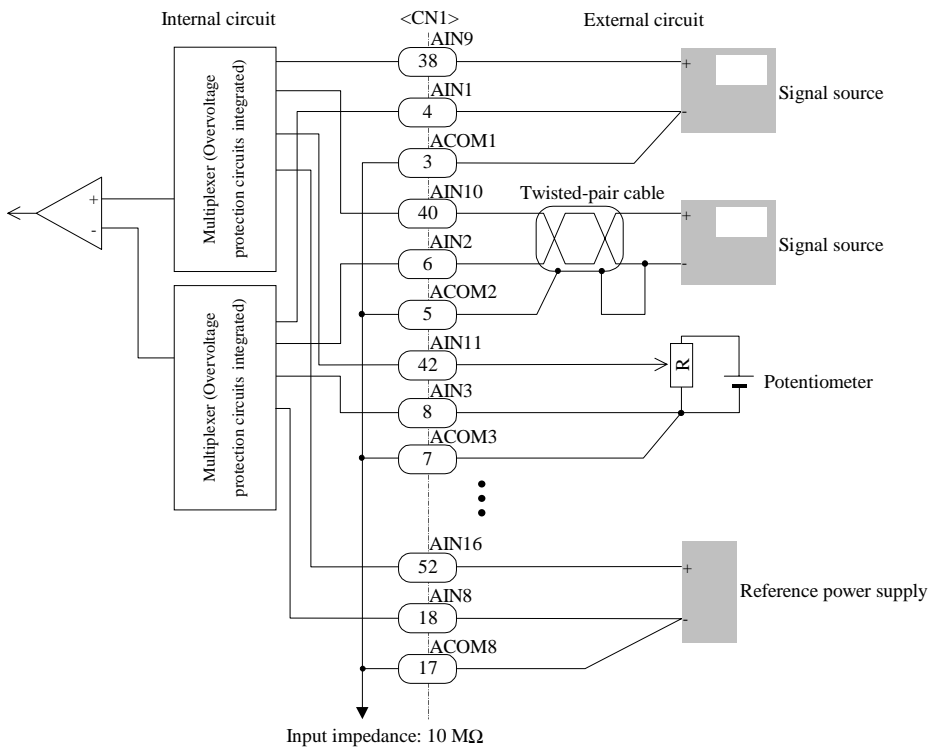
● EXCLK IN

External sampling pacer clock is detected at each falling edge or rising edge depending on the setting. The minimum pulse width is 100 ns. The maximum input frequency is 1 MHz. The input circuit is composed of an input buffer and pull-up resistor of 4.7 kΩ.
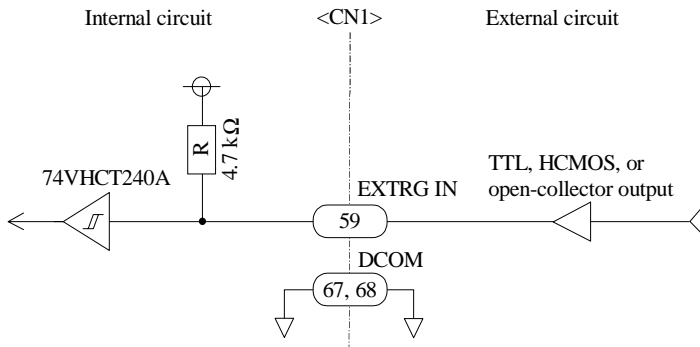
Internal circuit   <CN1>   External circuit

74VHCT240A   R 4.7 kΩ

EXCLK IN   TTL, HCMOS, or
open-collector output

60

DCOM

67, 68

● EXINT IN

Interrupts occur at each falling edge or rising edge depending on the setting. The minimum pulse width is 100 ns. The input circuit is composed of an input buffer and pull-up resistor of 4.7 kΩ.

Internal circuit   <CN1>   External circuit

74VHCT240A   R 4.7 kΩ

EXINT IN   TTL, HCMOS, or
open-collector output

62

DCOM

67, 68

● EXTRG IN

Triggers are detected at each falling edge or rising edge depending on the setting. The minimum pulse width is 100 ns. The input circuit is composed of an input buffer and pull-up resistor of 4.7 kΩ.

Internal circuit   <CN1>   External circuit

74VHCT240A   R 4.7 kΩ

EXTRG IN   TTL, HCMOS, or
open-collector output

59

DCOM

67, 68

● ATRG OUT[*]

A one-shot negative or positive pulse depending on the setting is output when a trigger is detected. The pulse width is 1 µs. The output circuit is composed of an output buffer.
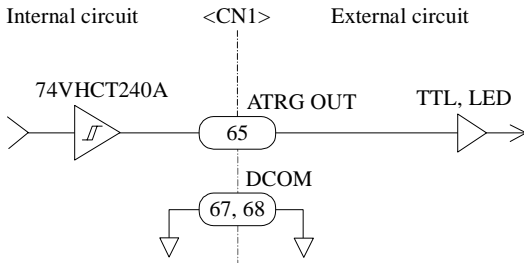
Internal circuit   <CN1>   External circuit

74VHCT240A   ATRG OUT   TTL, LED

65

DCOM

67, 68

Note: [*] Please use the AdCommonGetPciDeviceInfo function to confirm revision ID of this product. Refer to Help for more details.

● IN/OUT1 through IN/OUT8

The digital input/output circuit has 8 inputs/outputs, numbered from IN/OUT1 through IN/OUT8. Each pin can be configured as an input pin or an output pin. The maximum output current per channel is +40 mA.

Internal circuit   <CN1>   External circuit

+5 Vdc to +24 Vdc

74VHC14   R 4.7 kΩ

IN/OUT1   LED

27

TD62597AFN

74VHC14   R 4.7 kΩ

IN/OUT8

34   Switch

TD62597AFN

DCOM

67,68
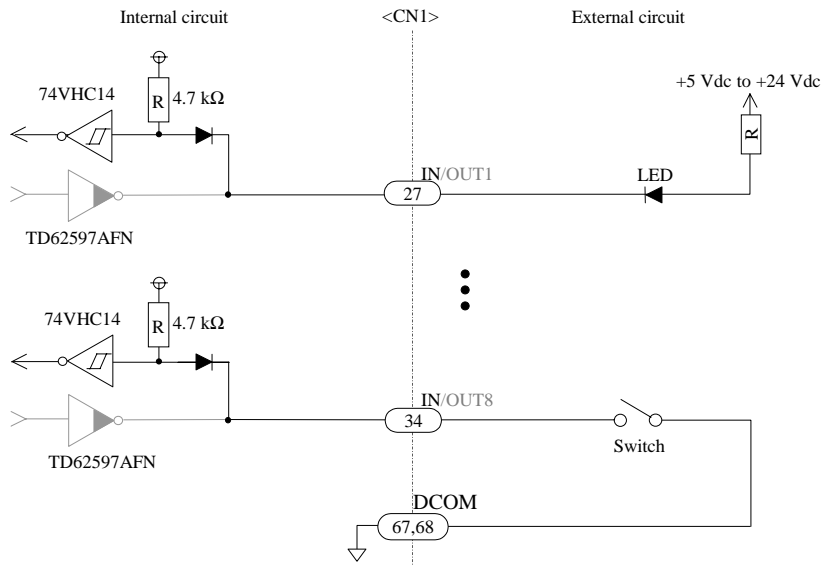
Input logic

Input Data	IN*xx*	External Circuit
0	High	Open (*S*: off, TTL input: High)
1	Low	Closed (*S*: on, TTL input: Low)

Output logic

Output Data	OUT*xx*	External Circuit
0	High	Open (LED: off, TTL input: High)
1	Low	Closed (LED: on, TTL input: Low)

4.2 Wiring Caution

1. You must keep the signal cable as far away from inductive noise sources as possible. The noises degrade accuracy of measurements. You should employ proper methods to protect signals from EMI/RFI.

2. We recommend using a twisted-pair cable to reduce inductively coupled noise.

Twisted-pair cable
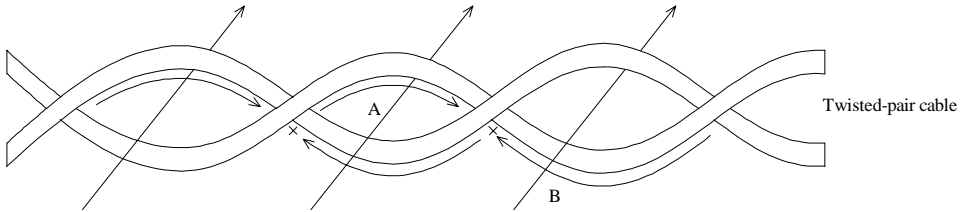
3. We recommend using a shielded cable to reduce capacitively coupled noise.

4. Grounding
   When connecting a computer with an external signal source, leakage current may cause an electric shock.
   Ground them properly or connect both frame grounds with a thick wire and ground one of them.
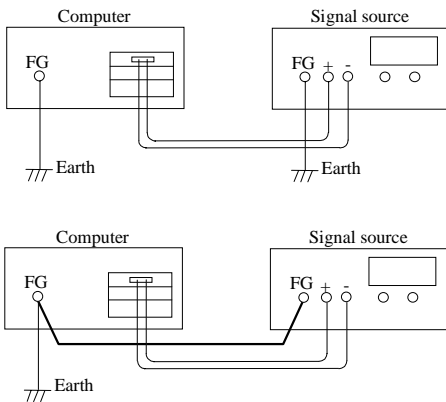
5.　Considering output impedance

Use signal sources whose output impedance as low as possible. If the output impedance is high, the loss of accuracy is related to the input impedance of the AD board. The input impedance of this board is 10 MΩ (±5%).

You can estimate errors arising out of signal source's output impedance as follows.

A signal source V_O with the output impedance R_S is connected to this board (input impedance R_{in}), the actual input voltage V_{in} is obtained by the following equation:

$$V_{in} = V_O \ \frac{R_{in}}{R_S + R_{in}}$$
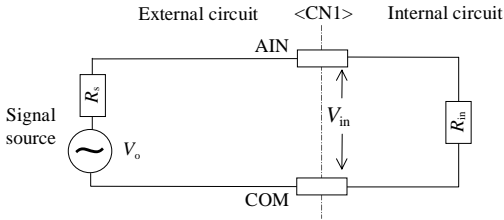
Example: You connect a signal source that has 100 kΩ of output impedance. When the signal source
outputs a 10 V signal, the equation becomes

$$V_{in} = 1 \text{ V} \times \frac{40 \text{ k}\Omega}{400\Omega + 40 \text{ k}\Omega} = 0.99009 \text{ V}.$$

Then, solving for V_{in} yields a value of 0.99009 V. Therefore, the error is approximately 10 mV.

The following table shows recommendations for output impedance of signal sources to achieve accuracy of less than 0.5 LSB in error.

Board	Resolution	Output Impedance	Accuracy
CBI-3133A CBI-3134A	12 bits	1.2 kΩ	0.012%
CBI-3133B CBI-3134B	12 bits	4.8 Ω	0.012%

Chapter 5　Installation

BE SURE TO ELIMINATE STATIC ELECTRICITY OF YOUR BODY BEFORE YOU INSTALL OR REMOVE THIS PRODUCT.

5.1 Card Installation

When you install this product in your system, read the manual of your system which refers to the PC card slot.

1. Make sure that the system is turned off and the power cable is unplugged.
   (This card corresponds to Hot Swap. You can insert this card when the system turns on.)

2. Insert the card into the PC card slot in your system.
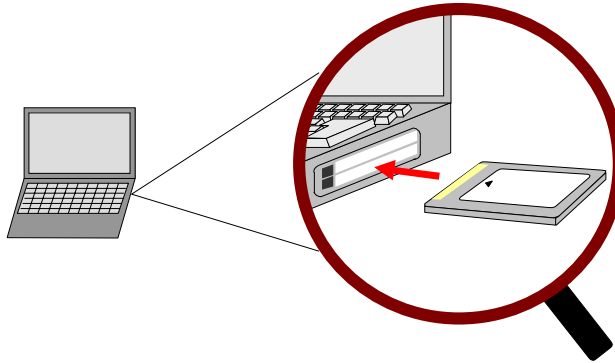
3. Plug in the power cord, and turn on the system.

Be careful of the insert direction when you insert this product into your system to avoid system damage.

The mounting with the computer may be restricted by the connector form of the attached cable. As shown in the following figure, the attached cable may interfere with the card cable connector for the adjacent slot or computer.
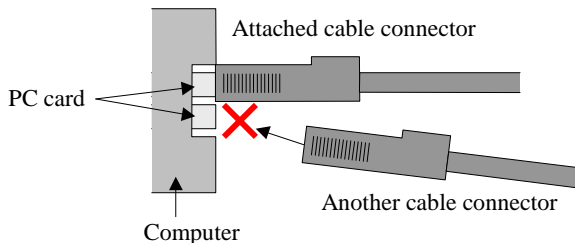
5.2 Driver Software Installation

Refer to our Web site for the Help of each optional software when you install and use it.

5.3 Card Uninstallation

The method of removing PC card from your system differs depending on each system. Please read the manual of your system.

Do not remove this product when accessing to the external equipment. Your system may not operate correctly.

Chapter 6   Notes for Users

For your safety, follow all warnings and instructions described in this manual.

6.1 Cautions, Periodic, Inspections, and Storage

Failure to follow this warning may result in electric shock, burns, serious injury, and in some cases, even cause death.

⚠ Warning!

● Keep this product away from flammable gases.

Use this product only under the conditions as shown below.

Environmental Specifications

Parameter	Specification
Temperature Range	0 °C to 50 °C
Relative Humidity Range	20% to 90% (non-condensing)
Dust	Typical office environment
Corrosive Gas	None
Noise	Far from power source and its wiring
Voltage Requirements	CardBus specification (+3.3 Vdc (±5%))

The following inspections should be carried out on this card periodically.

Periodic Inspections

Item	Checkpoint
Cable Connections	Be sure that all connectors and cables are installed correctly.
Connector Contacts	Check for dirt or corrosion.

TO AVOID DAMAGE TO THE BOARD AND POSSIBLE INJURY, TAKE APPROPRIATE PRECAUTIONS AS DESCRIBED BELOW WHEN HANDLING IT.

Caution!

☐ This board should be stored exactly the same way as when it was received. Proceed as follows:

1. Put the board back in its electro-conductive bag.

2. Wrap the board with the original packing material.

3. Avoid excessive humidity.

4. Do not expose the board to the direct rays of the sun.

5. Store the board at room temperature.

☐ Do not modify the card. Interface Corporation assumes no liability for any malfunctions resulting from users' unauthorized modification of the card.

☐ Take measures to avoid and minimize shock, vibration, magnetic fields, and static electricity in the storage or operating environment of this card.

☐ Make sure that the card is disconnected from the cable before inserting or removing any cards.

☐ Please keep the attached cable in a horizontal position for approximately 10 cm from the card connection part as below, and fix it not to move, even if stress starts.
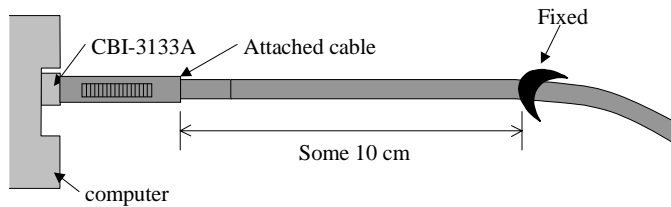
Chapter 7　Troubleshooting

7.1 Checkpoints

Problem	Solution
We cannot transfer the data correctly.	Double-check all cable connections.
	Setup your equipment to meet the timing characteristics of this board, such as data setup time, input/output response time.
	If the power requirements exceed the system power budget, the circuit on the card or connected external circuits cannot be driven properly. Prepare an external power supply for your Cardbus card.
The AD conversion value is unstable. Accuracy is bad.	If there is a noise source around the system, the conversion value becomes unstable. Please keep this board away from the noise source as far as possible. We recommend you to use the noise cutting transformer and the noise filter for the power supply line and use the shielded cable for the connection with an external signal.

Interface Corporation

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For Assistance:

Please visit our Web site (www.interface.co.jp) or send a fax (0120-621553(in Japan)) or e-mail (support@interface.co.jp) to the Technical Support Center.
We recommend you to ask questions from our Web site to shorten the answering time.

If the problem is urgent, please consult the Sales Information Center.
When you contact us, we need the information on the **Technical Support Form** provided with this manual plus the information listed below so we can answer your questions as quickly as possible.

Computer Environment	Computer brand and model, specific operating system, software configuration, other interface boards installed if any.
Description of The Problem	Situations where the product was used.

Technical support is available during business hours.
We provide a product rental service so you can evaluate our product prior to purchase.

Inquiries	Refer to	Phone	FAX
Product Rental Service	Technical Support Center	082-262-1630 (in Japan)	082-262-1552 (in Japan)
Distributors, Shipping Date, Prices, Others	Sales Information Center	0120-447213 (in Japan)	0120-458257 (in Japan)
		E-mail : sales@interface.co.jp	

Repair and Maintenance

The company will, at its option, replace its product, which the company, upon inspection, shall determine to be defective in material and/or workmanship. If the product is obviously damaged or defective, please return it using procedures outlined below.
1. Fill out the **Repair Request Form**. Describe hardware configurations of the board and malfunction in detail.
2. Fax the **Repair Request Form** to the Technical Support Center.
3. We will send you a repair quotation by return fax.
4. Carefully repack the damaged product, enclosing the **Repair Request Form**, and forward it (shipping prepaid) to the repair group, at our Oita Plant (address shown below).

When the damage or defect is not obvious, please contact the Sales Information Center or our Technical Support Center.
Be aware that depending on the extent and type of damage, the unit may not be economically repairable. If so, we will notify you immediately.

Receiver's Address	Repair Group, Oita Plant, Interface Corporation 1428, Shimobaru, Aki-machi, Higashikunisaki-gun, Oita, 873-0231 Japan
Contact Information	Technical Support Center Phone: 082-262-1630 (Available during business hours) FAX: 082-262-1552

Visit our Web site (www.interface.co.jp) for:

Technical Support	Frequently asked questions, related technical terminology
Product Information	The latest information about our products; specifications, product selection guides, etc
Useful Information	Discount information, rental information, distributors
Downloads Service	Drivers, technical documents such as I/O port maps, sample programs, and user's manual data.

The design and contents of the web site are under constant review. Therefore, there might be some changes in its design and contents.