Appendix for PC/104-*plus* modules

1   Introduction

1.1   Introduction of PC/104-plus

PC/104-*plus* is a special bus architecture designed for embedded systems. A third connector opposite the PC/104 connectors supports the PCI bus. Basically the electrical specifications of the PC/104-*plus* bus are compliant with the PCI signals, except 64-bit extensions, JTAG, PRSNT or CLKRUN signals. The mechanical specifications are changed to "module stack"; please refer to the figure shown below. According to the specifications of PC/104-*plus*, PC/104-*plus* modules are installed and configured by switching CLK, IDSEL, INT, REQ and GNT signals through multiplexers to the appropriate connections.
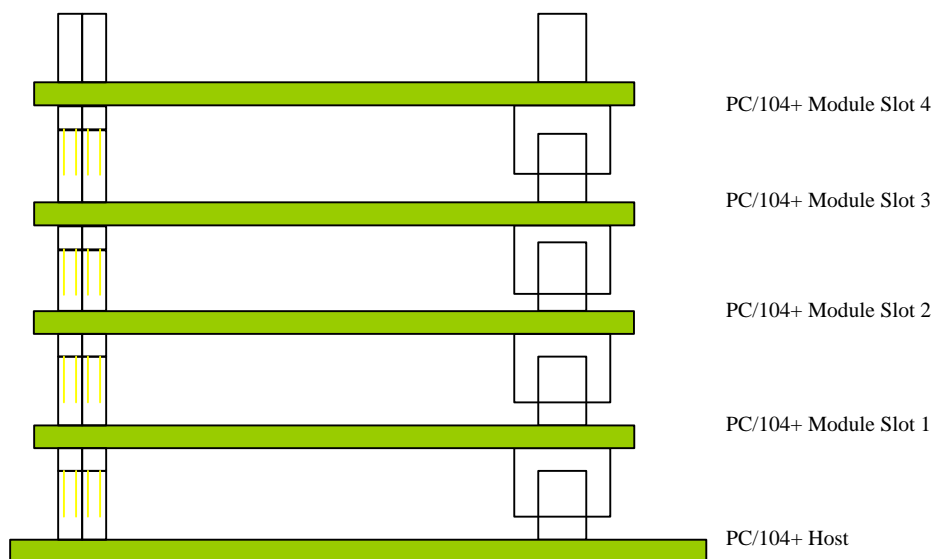

PC/104+ Module Slot 4

PC/104+ Module Slot 3

PC/104+ Module Slot 2

PC/104+ Module Slot 1

PC/104+ Host

Figure 1: PC/104-plus module stack

Rotary switch on PCM-9112+ is used for these signals switching, please refer to section 2.4 for details in this appendix.

1.2   Specifications for PCM-9112+

The specifications of the PCM-9112+ are the same as that of the PCI-9112 except for the Digital Input and Digital Output functions have been removed from the PCM-9112+. To compensate for the removal of the DI/DO functions, the AD FIFO has been enlarged to 512 words allowing it to handle a wider range of applications. Please refer to section 1.3 of the PCI-9112 manual for further details.

1.3   Supported Software

The supported software is the same as that of the PCI-9112 without the DI/DO functions. Please refer to section 1.4 of the PCI-9112 manual for further details.

2   Installation procedures for PC/104-*plus* DAQ modules:

2.1   what you have

In addition to this appendix, the package includes the following items:

◆ PCM-9112+ DAQ modules

◆ Manual & Software Utility CD-ROM

If any of these items is missing or damaged, contact the dealer from whom you purchased the product. Save the shipping materials and carton in case you want to ship or store the product in the future.

2.2   unpacking

The card contains electro-static sensitive components that can be easily be damaged by static electricity.

Therefore, the card should be handled on a grounded anti-static mat. The operator should be wearing an anti-static wristband, grounded at the same point as the anti-static mat.
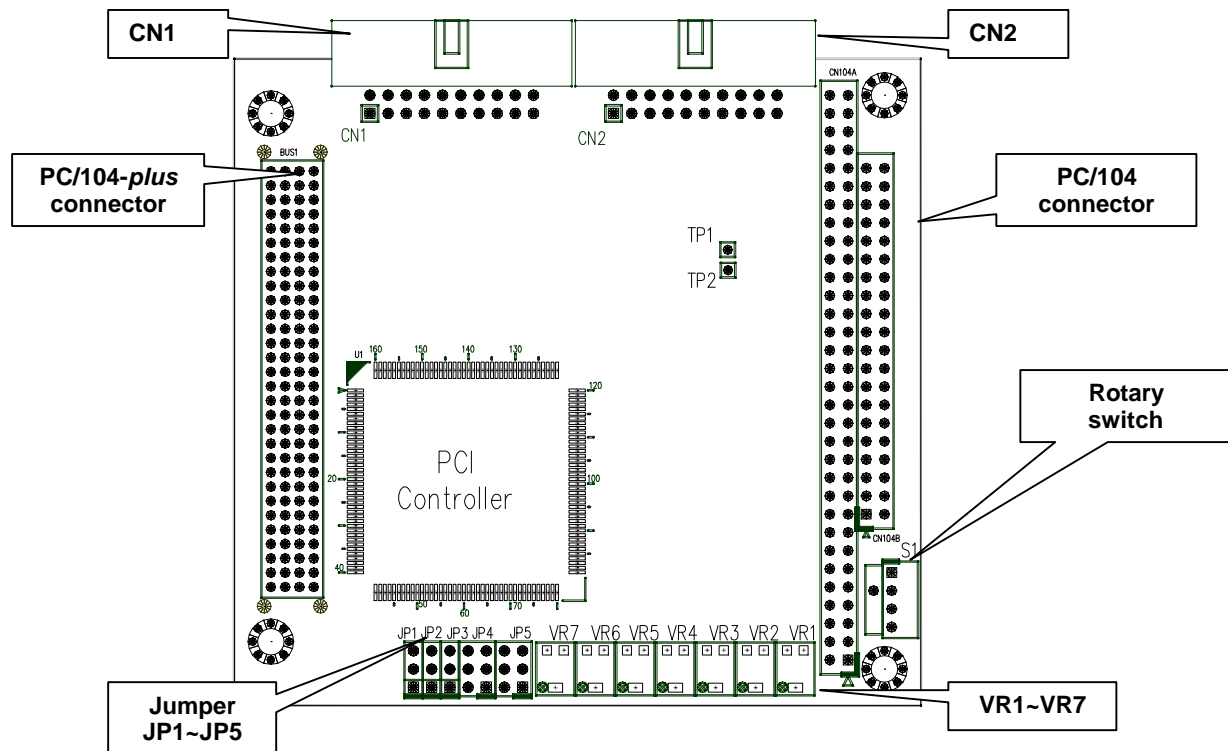
2.3   layout of modules

Figure 2: PCM-9112+ DAQ module layout

2.4 PC/104-*plus* configuration

A rotary switch on the PCM-9112+ is used for switching the appropriate CLK, IDSEL, INT, REQ and GNT signals from the PCI bus. If the PCM-9112+ card is inserted in a position nearest to the PC/104-*plus* motherboard, the switch must be set to 0 or 4. For signal stability, the rotary switch should be set to the appropriate position with respect to the module slot. The module stack order was shown in Figure 1. According to PC/104-*plus* specification, module slots 3 and 4 share REQ2/GNT2, hence they cannot both have bus-mastering devices. In another word, module 3 and 4 cannot be stacked with 2 PCM-9112+ modules.

Rotary Switch Position	Module Slot	CLK	IDSEL	INT	REQ	GNT
0 or 4	1	CLK0	IDSEL0	INTA	REQ0*	GNT0*
1 or 5	2	CLK1	IDSEL1	INTB	REQ1*	GNT1*
2 or 6	3	CLK2	IDSEL2	INTC	REQ2*	GNT2*
3 or 7	4	CLK3	IDSEL3	INTD	REQ2*	GNT2*

* Only for Bus Master card

Table 1: Rotary switch setting

2.5 Jumpers Setting

On the PCM-9112+ DAQ module, there are 5 jumpers that need to be adjusted depending on application requirements. The following table describes the attributes of these jumpers.

Configuration	Attributes	Jumpers
Analog Inputs	Single-ended or Differential Analog Input	JP1 and JP4
Clock Source	Internal Clock or External Clock	JP2
D/A Reference Voltage	-10V or -5V	JP3
D/A Reference Source	Internal Reference or External Reference	JP5

Table 2: Jumpers setting

2.5.1 Analog input mode configuration

The analog input channels on the PCM-9112+ DAQ module can be configured as 16 single-ended or 8 differential inputs. Jumpers JP1 and JP4 control the analog input configuration. The setting of JP1 and JP4 are specified below:
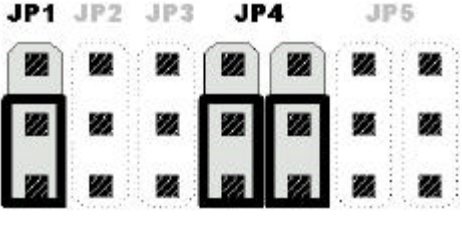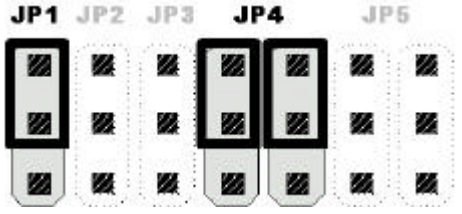
	Analog Input Setting
Single-ended input (Default)	
Differential input	

Table 3: Analog input mode configurations

2.5.2 Clock Source Setting

The programmable 8254-interval timer is used in the PCM-9112+. It provides 3 independent 16-bit programmable down counters. Input of counter 2 is connected to an accurate 2MHz oscillator used as the internal pacer.   Input of counter 1 is cascaded from the output of counter 2.   Channel 0 is free for user applications. There are two selections for the clock source of channel 0: the internal 2MHz clock or an external clock signal. The setting for clock signal is shown in the following table.
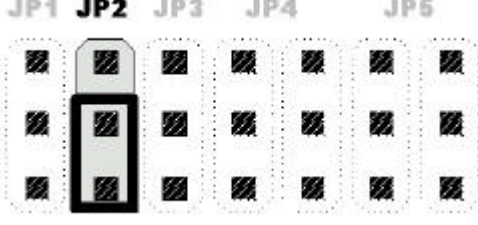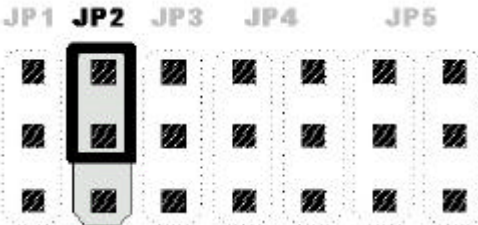
	Clock source setting
Internal Clock Source: 2MHz (default)	
External Clock Source	

Table 4: Clock source setting

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2.5.3 D/A Reference Voltage External/Internal Setting

The D/A converter's reference voltage source can be supplied either by internal or external sources. For external reference voltage, pin 3 (ExtRef1) and 4 (ExtRef2) of connector CN2 are used. Reference voltage source for D/A of channel 1 and 2 are selected by JP4. Possible settings are shown below:

	D/A Reference Voltage Setting
D/A CH1 is external D/A CH2 is external	
D/A CH1 is external D/A CH2 is internal	
D/A CH1 is internal D/A CH2 is external	
D/A CH1 is internal D/A CH2 is internal	

Table 5: D/A reference voltage setting

2.5.4 Internal Reference Voltage Setting

The internal reference voltage can be set to either –5V or –10V by JP3. Possible configurations are illustrated in the table below. Note that the internal reference voltage is used only when JP5 is set to internal reference only. If –10V internal reference voltage is selected, the D/A output range is 0V~10V. On the other hand, if the –5V is selected, the D/A output range is 0V~5V.

	Internal Reference Voltage Setting
-5V internal reference voltage	JP1 JP2 **JP3** JP4 JP5
-10V internal reference voltage	JP1 JP2 **JP3** JP4 JP5

Table 6: Internal reference voltage setting

2.6 Connector Pin Assignment

The PCM-9112+ DAQ module has two 20-pin connectors. CN1 is for analog input and CN2 for analog output, timer/counter's signals.
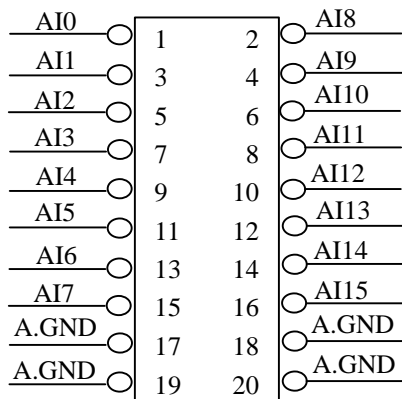
AI0	1	2	AI8
AI1	3	4	AI9
AI2	5	6	AI10
AI3	7	8	AI11
AI4	9	10	AI12
AI5	11	12	AI13
AI6	13	14	AI14
AI7	15	16	AI15
A.GND	17	18	A.GND
A.GND	19	20	A.GND

Figure 3: CN1 pin assignment for single-ended connection

AIH0	1	2	AIL0
AIH1	3	4	AIL1
AIH2	5	6	AIL2
AIH3	7	8	AIL3
AIH4	9	10	AIL4
AIH5	11	12	AIL5
AIH6	13	14	AIL6
AIH7	15	16	AIL7
A.GND	17	18	A.GND
A.GND	19	20	A.GND
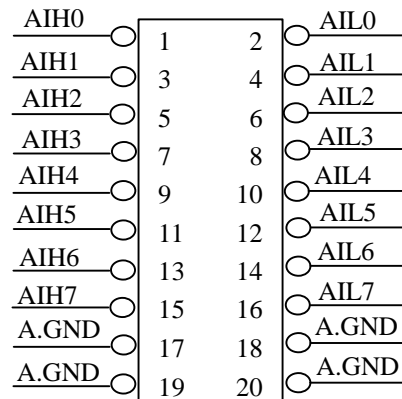
Figure 4: CN1 pin assignment for differential connection

V.REF	1	2	AO1
ExtRef2	3	4	ExtRef1
+12V	5	6	AO2
A.GND	7	8	GATE0
D.GND	9	10	GATE
COUT0	11	12	COUT1
ExtTrg	13	14	N/C
N/C	15	16	ExTCLK
+5V	17	18	N/C
N/C	19	20	N/C
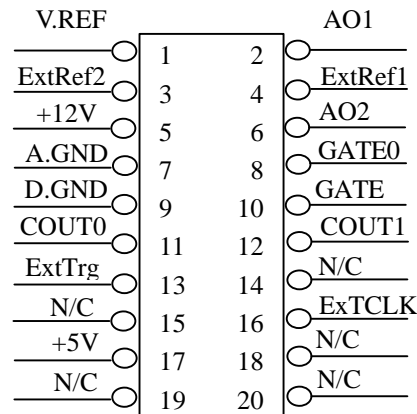
Figure 5: CN2 pin assignment

Legend:

AIn	:	Analog input channel n (single-ended)
AIHn	:	Analog high input channel n (differential)
AILn	:	Analog low input channel n (differential)
ExtRef n	:	External reference voltage for D/A channel n
AOn	:	Analog output channel n
ExtCLK	:	External clock input
ExtTrig	:	External trigger signal
GATE	:	Gate input for 8254
COUT n	:	Signal output of counter n
V.REF	:	Voltage reference
A.GND	:	Analog ground
D.GND	:	Digital ground

2.7 Daughter Boards and Accessories

The PCM-9112+ DAQ module has several available accessories allowing for easy signal wiring for measurements and control. Functionality and connections of the available accessories are describe in the in the following sections.

2.7.1 Connect with ACLD-9137

Equipped with a 37-pin D-sub connector, the ACLD-9137 provides a simple way for connection. Intuitively layout and reliable screw clamp terminal allows for easy wiring. In conjunction with the ACL-10337 (two 20-pin headers to DB-37 cable), users can set up the connection immediately.
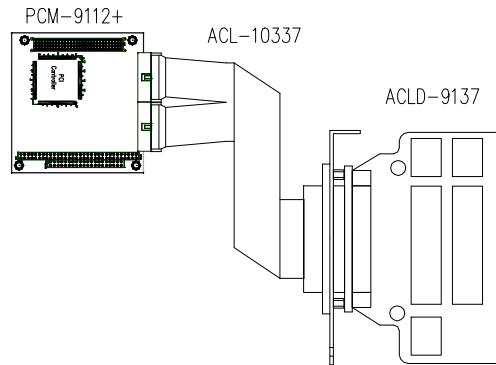
Figure 6: Connect with ACLD-9137

2.7.2 Connect with DIN-37D

The DIN-37D is a termination board with a DIN socket. When users need to mount the termination board onto the DIN rail, it provides a convenient interface for installation. To achieve this connection, use the following cables ACL-10337 and ACL-10137.
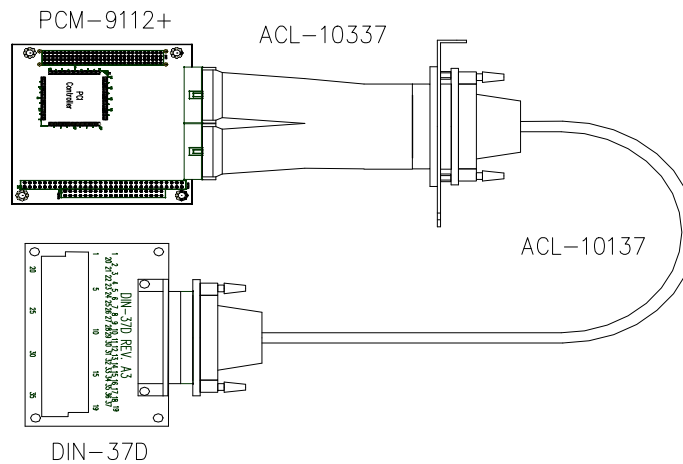
Figure 7: Connect with DIN-37D

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2.7.3   Connect with ACLD-8125

The ACLD-8125 has a 37-pin D-sub connector, which can connect to the PCM-9112+ through a ACL-10337 and ACL-10137 cable. The most outstanding feature of this daughter board is the CJC (cold junction compensation) circuit. You can directly connect a thermocouple onto the ACLD-8125 board. The CJC is only suitable for high gain analog input mode.
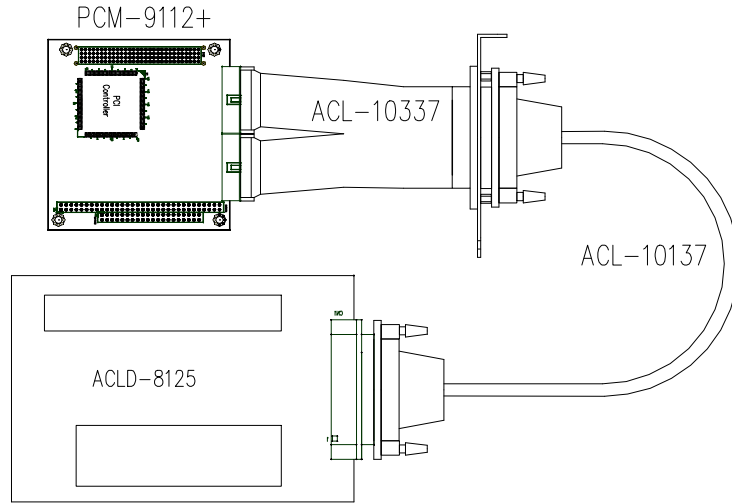
Figure 8: Connect with ACLD-8125

2.7.4   Connect with DIN-20P

The DIN-20P has a 20-pin ribbon connector with a DIN socket. This board is connected to the PCM-9112+ via a 20-pin ribbon cable.
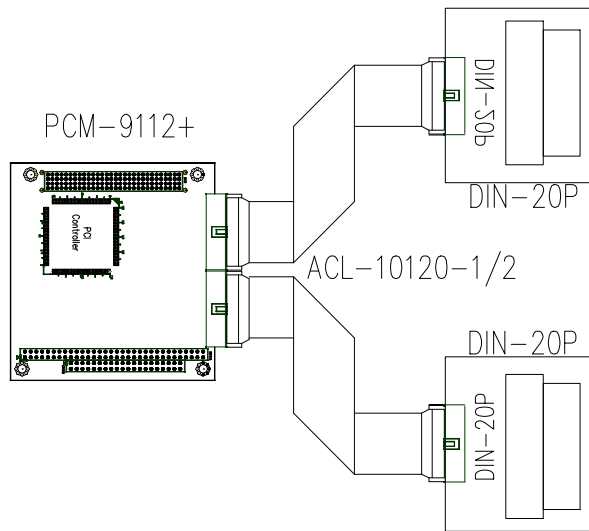
Figure 9: Connect with two DIN-20P termination boards