DAQ-1278

User manual

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This symbol has been attached to the equipment or, if this has not been possible, on the packaging, instruction literature and/or the guarantee sheet. By using this symbol, it states that the device has been marketed after August 13th 2005, and implies that you must separate all of its components when possible, and dispose of them in accordance with local waste disposal legislations.

- Because of the substances present in the equipment, improper use or disposal of the refuse can cause damage to human health and to the environment.
- With reference to WEEE, it is compulsory not dispose of the equipment with normal urban refuse, arrangements should be instigated for separate collection and disposal.
- Contact your local waste collection body for more detailed recycling information.
- In case of illicit disposal, sanctions will be levied on transgressors.

RoHS

This device, including all it components, subassemblies and the consumable materials that are an integral part of the product, has been manufactured in compliance with the European directive 2002/95/EC known as the RoHS directive (Restrictions on the use of certain Hazardous Substances). This directive targets the reduction of certain hazardous substances previously used in electrical and electronic equipment (EEE).

Introduction

Manual Conventions

The following conventions are used throughout this manual.

The "Mode" of the register:

Symbol / Text	Definition
RW	Readable and Writable register
RO	Read only register
W	Meaning of the register when written
R	Meaning of the register when read

Hexadecimal numbering:

Hexadecimal numbers are indicated with an "h" suffix (for example: 11Ch)

Symbols and Text used in Pin-out tables:

Symbol / Text	Definition
◄	Input
►	Output
◄►	Bi-Directional
—	Passive
Module specific	Dependent on module installed
NC	Not Connected
Reserved	Use reserved to Eurotech, must remain unconnected
#	Active low signal
◆	Pass-thru signal: not used by the board described in this manual

Warnings and Important Notices:

Within this manual you will find the following tables, please ensure that you read and understand these as they are intended to highlight potential risks or precautions that should be taken.

Warnings:
Information to alert you to potential hazards:
Potential personal injury or damage to a system, device or program.

Information:
Indicates important features or instructions that should be observed

Technical Assistance

If you have any technical questions or if you cannot isolate a problem with your device, please e-mail the Eurotech Technical Support Team: techsupp@eurotech.it.

RMA Requests

Before returning any Eurotech product, for any reason, you must e-mail the Eurotech Technical Support Team on the above email address, giving the following information; you will then be sent an RMA number (Returned Material Authorization) for the return of the material:

- Model number (see Figure 1)
- Serial number (see Figure 1)
- Detailed fault description
- Company Details
- Contact details

Transportation

When transporting any module or system, for any reason, it should be packed using anti-static material and placed in a sturdy box with enough packing material to adequately cushion it.

Warning:
Any product returned to Eurotech that is damaged due to inappropriate packaging will not be covered by the warranty!

Board labelling

On the external side of the ISA Bus connector, you will find several labels displaying the following:
- Batch Number
- Serial Number
- Model Number
- Hardware Revision

Note:
The actual location of these labels may vary depending on the product purchased.
For example: If no ISA bus is present, the PCI bus may be used instead.
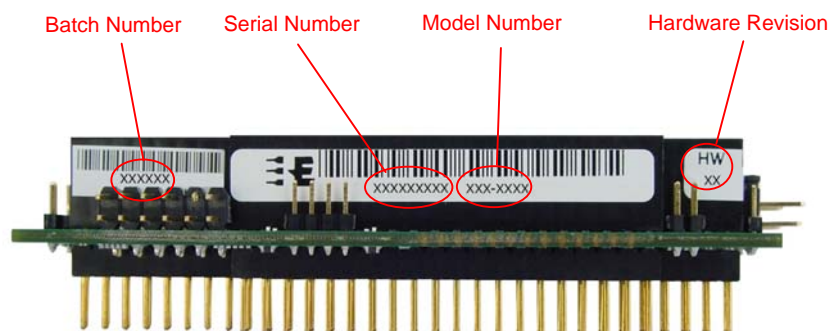However, the labelling formats will remain the same.

Figure 1.   Board label locations

Table of Contents

Chapter 1   Product Overview

The DAQ-1278 PC/104 module combines: 48-isolated digital I/O grouped as 24 inputs and 24 outputs, three Intel 8254 compatible timer/counters and two high current N-channel MOSFET control outputs. This board is designed to operate over a wide temperature range, such as those commonly encountered in automotive, military, industrial and mobile applications. The extensive use of SMD technology and a jumperless design increases system reliability. The use of modern FPGA technology allows for high functionality integration as well as flexible customization to meet the requirements of custom applications. Board configuration and settings are stored in an EEPROM and can be freely configured by software

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In the following paragraphs you will find a brief description of the characteristics of the DAQ-1278 board.

DAQ-1278 Block diagram

The following figure shows the functional block diagram of the DAQ-1278.
For clarity we have omitted the power supplies.
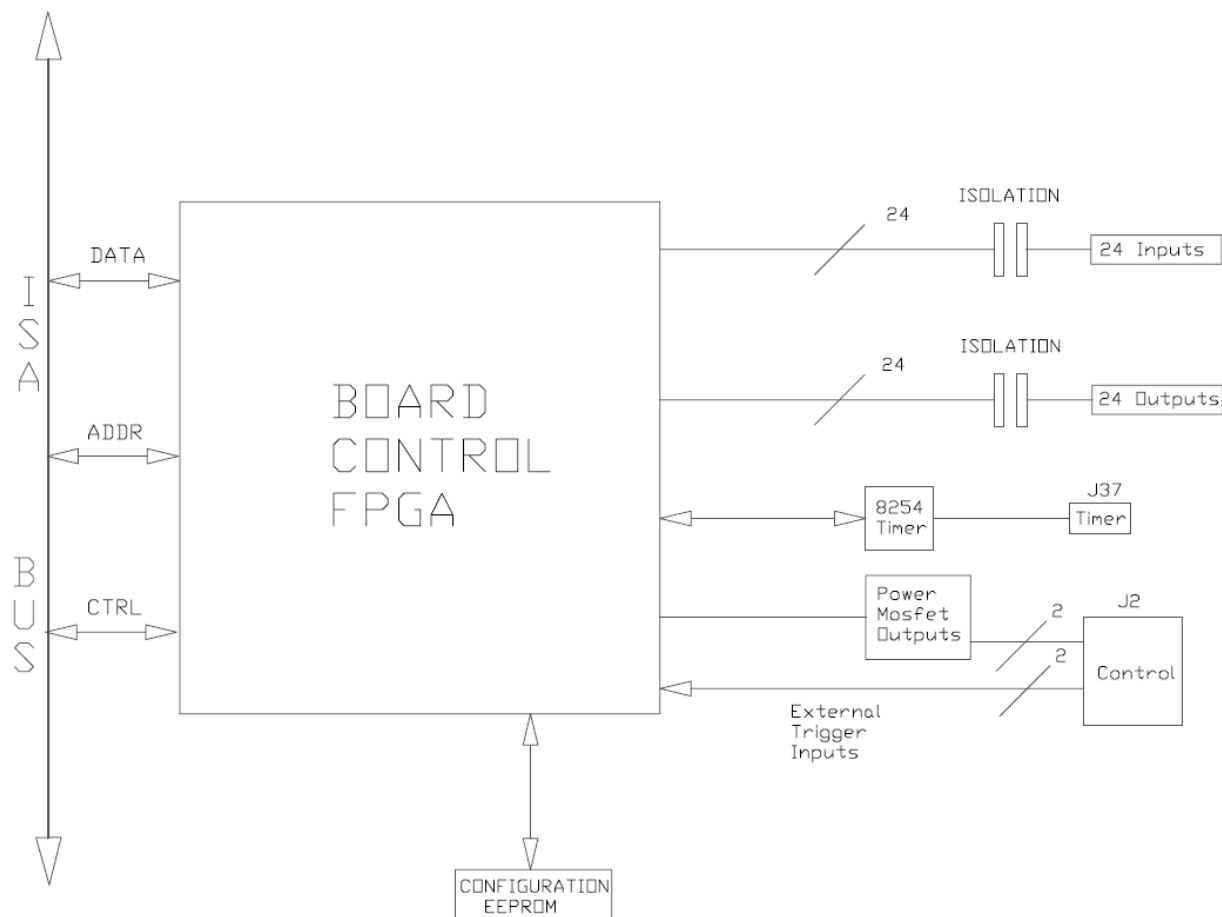
Product Description

DAQ-1278 Galvanically isolated digital I/O board

- PC/104 Form Factor: 90 x 96 mm (3.6" x 3.8"), height: 15 mm (0.6")
- Low power consumption, fully 3.3V design
- 24 open collector isolated outputs
- 24 opto-isolated digital inputs
- Three 8254 compatible 16-bit timer counters
- Two MOSFET outputs - up to 2A drive / channel
- Software configurable FlexiSet™ - jumperless board setup and configuration
- High reliability, wide operating temperature range -40 to +85˚C
- +5V only operation
- AT-bus connector, XT and AT interrupt support - 8-bit data bus

Isolated digital inputs

- 24 opto-isolated inputs
- All inputs independent
- Reverse voltage protection
- +12V nominal input range - factory configured
- +10V nominal switching level for logical "1"
- Toshiba TLP281 opto-couplers
- Maximum input switching voltage range up to 28Vdc
- Input configurable as external trigger interrupt

Isolated digital outputs

- 24 opto-isolated outputs
- Toshiba TLP281 opto-couplers
- Open collector configuration - common emitter connection
- Each channel can switch different voltage levels with a 4.7 kOhm pull up
- 0 to +30V DC switching

Power outputs

- 2 MOSFET outputs
- Current sinking configuration
- Up to 2A switching current

Timer counters

- 8 MHz oscillator can be used for clock
- Three 8254 compatible timer/counters
- Counter connection freely configurable with FlexiSet™
- Counters signal interconnection freely software configurable - no fixed jumpers
- Call Eurotech for details on available options

Bus Interface

- PC/104 16-bit bus connector
- 8-bit data bus, XT and AT interrupts supported
- Software configurable interrupt and base address selection

FlexiSet™ Configuration

- No jumpers needed for serial port base addresses or interrupts
- Software configurable board configuration stored in EEPROM
- Board serial number and board type identification
- Base address and interrupt channel stored in memory
- Advanced setup program for board parameter configuration
- Support for user data storage in non volatile EEPROM

Electrical and Environmental Specifications

Operating Characteristics

Electrical Operating Characteristics

Power supply	• +5V dc +/- 5%
Power consumption	• 1.8W typical

Operating Temperature Range

For correct operation of the module, the ambient air temperature must remain within the following range:

Standard	• Minimum +0 °C
	• Maximum +60 °C
Extended (optional)	• Minimum -40 °C
	• Maximum +85 °C

Absolute Maximum Ratings

Supply Voltage:	0.00 to 5.40V
Storage Temperature Range:	-40°C to +85°C
Non-Condensing Relative Humidity:	<95% at 40°C

Warning:
Stressing the device beyond the "Absolute Maximum Ratings" may cause permanent damage. These are stress ratings only. Operation beyond the "Operating Conditions" is not recommended. Extended exposure beyond the "Operating Conditions" may affect device reliability

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Chapter 2   Connector Description

Connector Layout

Connectors are shown as **J** followed by its designated number and a red pad indicates pin 1.
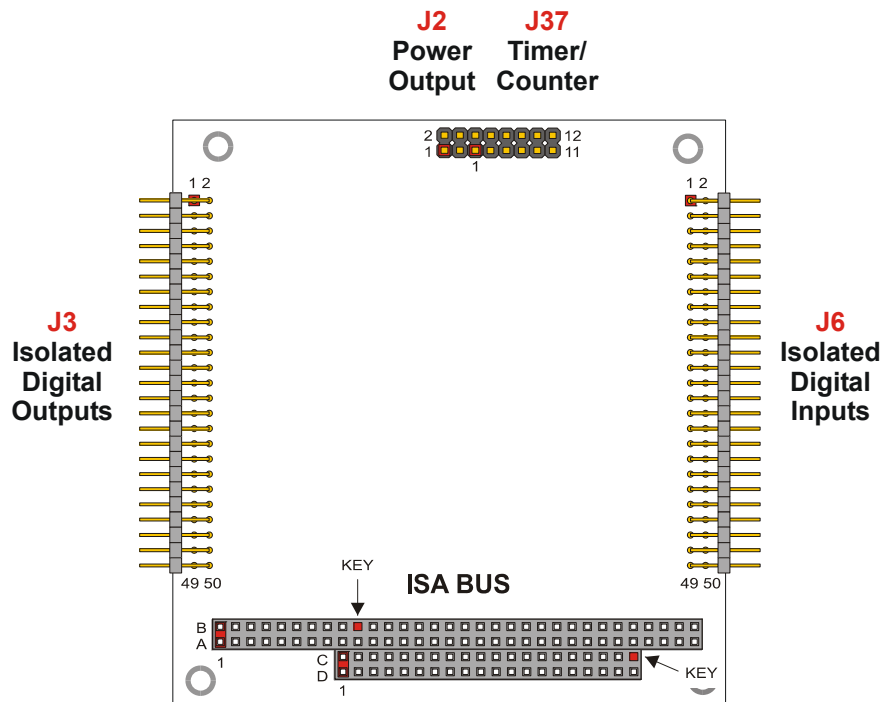
Figure 2.   Connector layout

Connector	Function
ISA BUS	ISA BUS (PC/XT)
J2	Power Output Connector
J3	Isolated Digital Output Connector
J6	Isolated Digital Input Connector
J37	Timer/Counter Connector

Table 1.   Connector Functions

How to connect the DAQ-1278 with other PC/104 & PC/104-Plus devices: the stack assembly

The ISA and PCI bus connectors of the module are designed to allow it to be connected with other PC/104 and/or PC/104-Plus devices, we recommend users to follow this procedure to ensure that stacked modules are not damaged.

> **Warning:**
> Appropriate ESD (Electro Static Discharge) precautions should be used for the following procedure.

1. Turn off the power to the PC/104 (or PC/104-Plus) system or stack.
2. Select and install standoffs as required to correctly position the module on the PC/104 stack.
3. Remove the module from its anti-static bag.
4. Check that keying pins in the bus connector are correctly positioned.
5. Check the stacking order; make sure an XT bus card will not be placed between two AT bus cards or it will interrupt the AT bus signals.
6. Hold the module by its edges and orient it so that the bus connector pins line up with the matching connector on the stack.
7. Press the module evenly onto the PC/104 stack.

Figure 3 shows a typical module stack with two PC/104 modules, one PC/104 16-BIT module, and one PC/104 8-BIT module.
The maximum number of modules is four in addition to the Host Board.
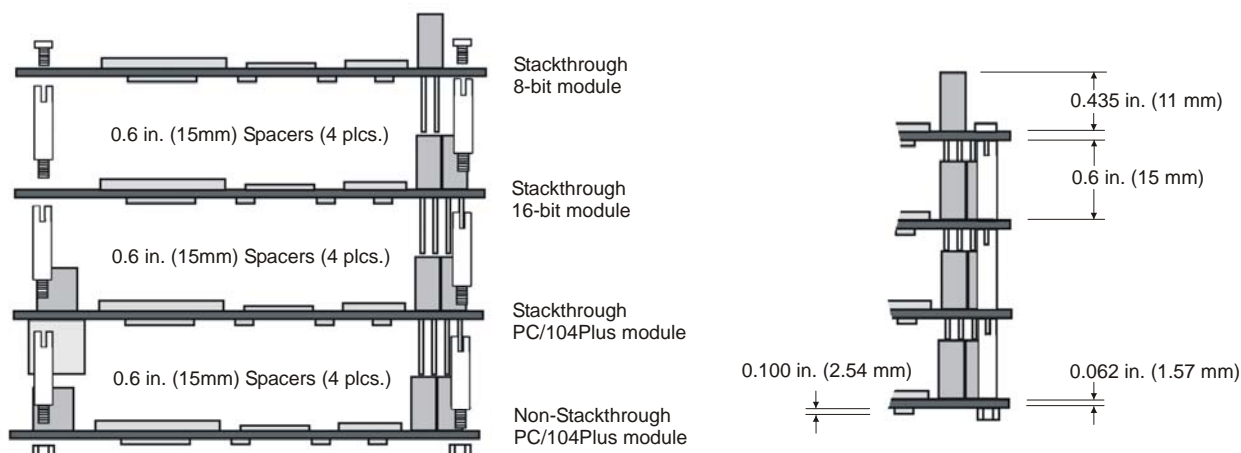
Figure 3.   The Module Stack

> **Warning:**
> Do not force the module onto the stack! Wiggling the module or applying too much pressure may damage it. If the module does not readily press into place, remove it, check for bent pins or out-of-place keying pins, and try again.

J1 and J2: the ISA Bus

Connectors J1 and J2 carry the signals for the ISA Bus.
These signals match the definitions of the IEEE P996 standard.
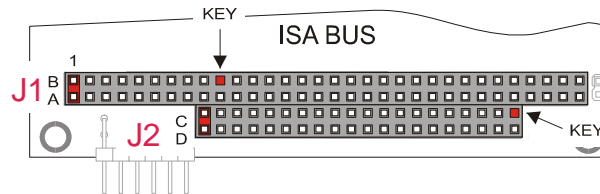
Figure 4.   ISA BUS layout

According to the PC/104 specification, some of the female connector holes are blocked, these are the KEY pins, also the relative pins are removed from the male bus connector, this is done to protect the boards from damage caused by incorrect connection.
For further info about ISA bus please refer to Eurotech website in the Industry Standards section.

Pin #	Use	Signal	Pin #	Use	Signal
1	ISA Bus	IOCHK#	33	ISA Bus	A14
2	ISA Bus	Ground	34	ISA Bus	DACK1#
3	ISA Bus	D7	35	ISA Bus	A13
4	ISA Bus	RSTDRV	36	ISA Bus	DRQ1
5	ISA Bus	D6	37	ISA Bus	A12
6	ISA Bus	+5 Volts	38	ISA Bus	REFRESH#
7	ISA Bus	D5	39	ISA Bus	A11
8	ISA Bus	IRQ 9	40	ISA Bus	ISACLK
9	ISA Bus	D4	41	ISA Bus	A10
10	ISA Bus	-5 Volts	42	ISA Bus	IRQ 7
11	ISA Bus	D3	43	ISA Bus	A9
12	ISA Bus	DRQ2	44	ISA Bus	IRQ 6
13	ISA Bus	D2	45	ISA Bus	A8
14	ISA Bus	-12 Volts	46	ISA Bus	IRQ 5
15	ISA Bus	D1	47	ISA Bus	A7
16	ISA Bus	ZEROWS#	48	ISA Bus	IRQ 4
17	ISA Bus	D0	49	ISA Bus	A6
18	ISA Bus	+12 Volts	50	ISA Bus	IRQ 3
19	ISA Bus	IOCHRDY	51	ISA Bus	A5
20	Not Connected	Key	52	ISA Bus	DACK2#
21	ISA Bus	AEN	53	ISA Bus	A4
22	ISA Bus	SMEMW#	54	ISA Bus	TC
23	ISA Bus	A19	55	ISA Bus	A3
24	ISA Bus	SMEMR#	56	ISA Bus	BALE
25	ISA Bus	A18	57	ISA Bus	A2
26	ISA Bus	IOW#	58	ISA Bus	+5 Volts –1
27	ISA Bus	A17	59	ISA Bus	A1
28	ISA Bus	IOR#	60	ISA Bus	OSC
29	ISA Bus	A16	61	ISA Bus	A0
30	ISA Bus	DACK3#	62	ISA Bus	Ground 1
31	ISA Bus	A15	63	ISA Bus	Ground 3
32	ISA Bus	DRQ3	64	ISA Bus	Ground 2

Table 2.   J1 pinout

Pin #	Use	Signal	Pin #	Use	Signal
1	ISA Bus	Ground 0	21	ISA Bus	MEMW#
2	ISA Bus	Ground 1	22	ISA Bus	DACK5#
3	ISA Bus	SBHE#	23	ISA Bus	SD8
4	ISA Bus	ISA_MEMCS16#	24	ISA Bus	DRQ5
5	ISA Bus	LA23	25	ISA Bus	SD9
6	ISA Bus	IOC16#	26	ISA Bus	DACK6#
7	ISA Bus	LA22	27	ISA Bus	SD10
8	ISA Bus	IRQ10	28	ISA Bus	DRQ6
9	ISA Bus	LA21	29	ISA Bus	SD11
10	ISA Bus	IRQ11	30	ISA Bus	DACK7#
11	ISA Bus	LA20	31	ISA Bus	SD12
12	ISA Bus	IRQ12	32	ISA Bus	DRQ7
13	ISA Bus	LS19	33	ISA Bus	SD13
14	ISA Bus	IRQ15	34	ISA Bus	+5 Volts
15	ISA Bus	LA18	35	ISA Bus	SD14
16	ISA Bus	IRQ14	36	ISA Bus	MASTER#
17	ISA Bus	LA17	37	ISA Bus	SD15
18	ISA Bus	DACK0#	38	ISA Bus	Ground 2
19	ISA Bus	MEMR#	39	ISA Bus	Not Connected
20	ISA Bus	DRQ0	40	ISA Bus	Ground 3

Table 3.   J2 pinout

Note:
For further information regarding the ISA and PCI bus, please visit the Eurotech website (http://www.eurotech.it/), referring to the section titled "Industry Standards."

J2 Power Output Connector

J2 is located immediately next to J37 (timer/counter connector) on the topside of the board. J2 is a 4pin double row (2x2pin with 2.54mm pitch) connector and allows for the connection of between 0V and +30V switching power outputs capable of sinking 2A and two external trigger/interrupt inputs. The power outputs are ideal for driving relays, power switches, solenoids or software controlled stepper motors, and can also be used for controlling the power to the isolated output stage of the DAQ-1278.
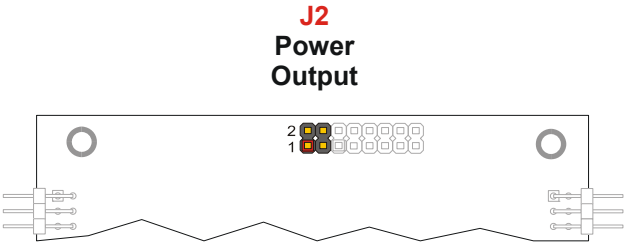
Figure 5.   J2 Power Output Connector

Connector J2 also offers two TTL/CMOS level external trigger inputs.

The power output port of the DAQ-1278 offers the following functions:
- 2 channel high current switching outputs, 0 to +30.0V output level.
- Up to 2A drive current
- N-Channel MOSFET stage configured as current sinks
- Two external interrupt/trigger inputs TTL/CMOS

Warning:
The switching currents are not limited above 2A. Make sure you check the signal wiring carefully. Exceeding the 2A switching current for long periods of time in high ambient temperatures may cause permanent damage to the DAQ-1278 board.

Connector pin out for J2

Pin #	Signal - Function	Pin #	Signal - Function
1	EXT-INT-B	2	EXT-INT-A
3	Power Switch Ch#2	4	Power Switch Ch#1

Table 4.   J2 - Digital Power Control Port Connector

J3 Isolated Digital Output connector

J3 is located on the left hand side of the board and is a 50-pin double row (25 x 2 pin with 2.54mm pitch) connector and allows the connection of between +3.3V and +30V switching output signals to the DAQ-1278 board. All the isolated digital outputs share a common emitter or "ground". Each of the output channels is connected in an open collector configuration with a 4.7 kOhm pull-up resistor to a selected output voltage (V+). The absolute maximum bias voltage (V+) is +30V DC, exceeding this voltage may cause permanent damage to the board. Note that the switching level of the output is defined by V+ voltage of the output.
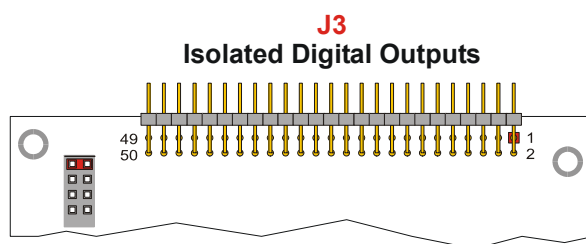
Figure 6.   J3 Isolated Digital Output Connector

Digital output channel connection circuitry

Figure 7.   Output connection for each output channel

This isolated digital output connector implements the following functions:
- Universal isolated digital output
- 24 channel programmable digital outputs, +3.3 to +30.0V output levels
- Independent 4.7 kOhm pull-up to selected voltage (V+) on each channel
- Common emitter configuration for all channels

Warning:
The signal outputs are not voltage protected above +30V. Make sure you check the signal wiring carefully so as not to connect the output connector to the input connector that is also 50-pins. Applying incorrect or negative voltages to these output pins may cause permanent damage to the DAQ-1278 module.

Connector pinout

Pin #	Signal - Function	Pin #	Signal - Function
1	V+ Channel 24	2	Output Channel 24
3	V+ Channel 23	4	Output Channel 23
5	V+ Channel 22	6	Output Channel 22
7	V+ Channel 21	8	Output Channel 21
9	V+ Channel 20	10	Output Channel 20
11	V+ Channel 19	12	Output Channel 19
13	V+ Channel 18	14	Output Channel 18
15	V+ Channel 17	16	Output Channel 17
17	V+ Channel 16	18	Output Channel 16
19	V+ Channel 15	20	Output Channel 15
21	V+ Channel 14	22	Output Channel 14
23	V+ Channel 13	24	Output Channel 13
25	V+ Channel 12	26	Output Channel 12
27	V+ Channel 11	28	Output Channel 11
29	V+ Channel 10	30	Output Channel 10
31	V+ Channel 9	32	Output Channel 9
33	V+ Channel 8	34	Output Channel 8
35	V+ Channel 7	36	Output Channel 7
37	V+ Channel 6	38	Output Channel 6
39	V+ Channel 5	40	Output Channel 5
41	V+ Channel 4	42	Output Channel 4
43	V+ Channel 3	44	Output Channel 3
45	V+ Channel 2	46	Output Channel 2
47	V+ Channel 1	48	Output Channel 1
49	Isolated ground	50	Isolated ground

Table 5.   J3 - Digital Output Connector

The digital output signals can be configured to switch a different voltage level for each independent channel. This allows for maximum flexibility in wiring and system interconnections.

J6 Isolated Digital Input connector

J6 is located on the right hand side of the board and is a 50-pin double row (25x2pin with 2.54mm pitch) connector that allows for the connection of between +12V and +30V switching input signals to the DAQ-1278 board. Each of the output channels is independently connected with a series resistor that configures the nominal switching trigger voltage to be +10V. The absolute maximum input voltage is 30Vdc, exceeding this voltage may cause permanent damage to the board.
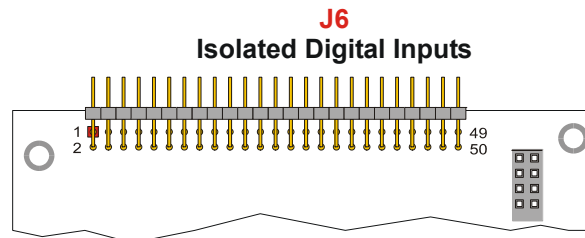
Figure 8.   J6 Isolated Digital Input Connector

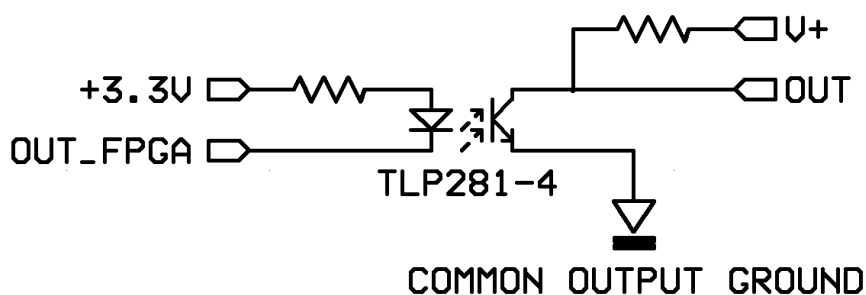## *Digital input channel connection circuitry*
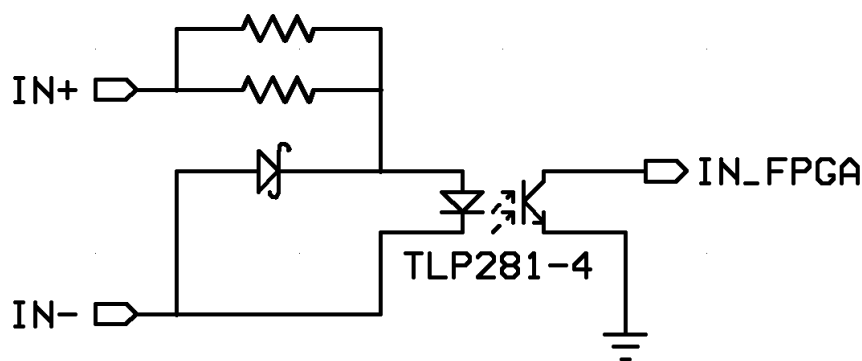
Figure 9.   Input connection, identical for each channel

This isolated digital input connector implements the following functions:
- Universal isolated digital input
- 24 channel programmable digital inputs, +12 to +30V input levels
- Independent series resistor set up to +10V nominal switching level on each channel
- Reverse voltage protection on all input channels

Warning:
The signal inputs are not voltage protected above +30V. Make sure you check the signal wiring carefully not to connect the output connector to the input connector that is also 50-pins.

Connector pinout

Pin	Signal - Function	Pin	Signal - Function
1	In+ Ch#24	2	In- Ch#24
3	In+ Ch#23	4	In- Ch#23
5	In+ Ch#22	6	In- Ch#22
7	In+ Ch#21	8	In- Ch#21
9	In+ Ch#20	10	In- Ch#20
11	In+ Ch#19	12	In- Ch#19
13	In+ Ch#18	14	In- Ch#18
15	In+ Ch#17	16	In- Ch#17
17	In+ Ch#16	18	In- Ch#16
19	In+ Ch#15	20	In- Ch#15
21	In+ Ch#14	22	In- Ch#14
23	In+ Ch#13	24	In- Ch#13
25	In+ Ch#12	26	In- Ch#12
27	In+ Ch#11	28	In- Ch#11
29	In+ Ch#10	30	In- Ch#10
31	In+ Ch#9	32	In- Ch#9
33	In+ Ch#8	34	In- Ch#8
35	In+ Ch#7	36	In- Ch#7
37	In+ Ch#6	38	In- Ch#6
39	In+ Ch#5	40	In- Ch#5
41	In+ Ch#4	42	In- Ch#4
43	In+ Ch#3	44	In- Ch#3
45	In+ Ch#2	46	In- Ch#2
47	In+ Ch#1	48	In- Ch#1
49	No Connection	50	No Connection

Table 6.   J6 - Digital Input Connector

The digital input signals do not share a common ground. This allows for maximum flexibility in wiring and system interconnection. The grounds may be connected together if so required.

J37 Timer/Counter Connector

J37 is located immediately next to the J2 connector (power control) on the topside of the board. J37 is a 12-pin double row (6x2pin with 2.54mm pitch) connector and allows the connection of counter, gate and timer outputs to the onboard 8254 timer counter. The interconnection of the timer signals can be reconfigured using the FlexiSet™ board configuration utility "FX.EXE".

J37
Timer/Counter
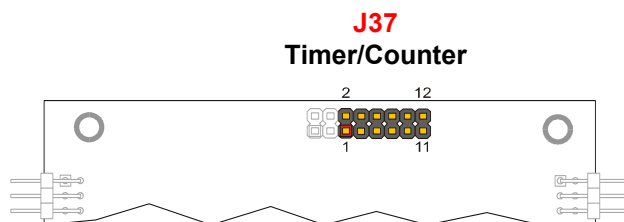
Figure 10.   J37 Timer/Counter Connector

Timer/counter interface port of the DAQ-1278 offers the following functions:
- Three 16-bit counter/timer inputs
- Three external gate inputs
- Three counter/timer outputs

Timer and clock configurations can be set as follows:

Name	Possible Configurations
Clock 0	• Onboard 8MHz oscillator • External clock input (Pin#1)
Clock 1	• Onboard 8MHz oscillator • External clock input (Pin#1) • Timer #0 output
Clock 2	• Onboard 8MHz oscillator • External clock input (Pin#5) • Timer #1 output
Gate 1	• External gate timer #1 (Pin#6) • Timer#1 output

Connector pinout

Pin #	Signal - Function	Pin #	Signal - Function
1	CLOCK timer #0	2	GATE timer #0
3	OUT timer #0	4	GND
5	CLOCK timer #1	6	GATE timer #1
7	OUT timer #1	8	GND
9	CLOCK timer #2	10	GATE timer #2
11	OUT timer #0	12	GND

Table 7.   J2 - Digital Power Control Port Connector

Warning:
All timer signals have a weak pull-up to +3.3V and will be in a logical one if left floating.

Chapter 3   Board Set-up and Configuration

The FlexiSet™ program ("FX.exe")

The configuration of the board is done using the FlexiSet™ configuration utility ("FX.EXE").

With this software you can to configure all the parameters of the board including:
- Base address of the DAQ-1278
- Timer/counter clock and gate connections
- Interrupt source selection

These settings are stored on the board in a non-volatile EEPROM. During each start-up of the system your DAQ-1278 board is configured automatically once power is applied.

I/O map of the DAQ-1278 board

ADDRESS	FUNCTION	NOTE
BASE	Address register	Address of internal data register
BASE+1	Data register	Data of register pointed by address
BASE+2	Timer #0 data	8254 internal register
BASE+3	Timer #1 data	8254 internal register
BASE+4	Timer #2 data	8254 internal register
BASE+5	Timer control	8254 internal register

Register description, indirect addressing mode through BASE and BASE+1 registers

ADDRESS (BASE)	FUNCTION	NOTE
0x00	Inputs 0-7	Read only
0x01	Outputs 0-7	Read/Write
0x02	Inputs 8-15	Read only
0x03	Outputs 8-15	Read/Write
0x04	Inputs 16-23	Read only
0x05	Outputs 16-23	Read/Write
0x06	Power outputs	Read/Write bits 0 and 1
0x07	IRQ enable/mode register	Write only
0x08	IRQ compare mode register	Write only
0x09	IRQ enable/compare register Ch. 0-7	Write only
0x0A	IRQ enable/compare register Ch. 8-15	Write only
0x0B	IRQ enable/compare register Ch. 16-23	Write only
0x0C	IRQ edge trigger mode LSB Ch. 0-7	Write only
0x0D	IRQ edge trigger mode LSB Ch. 8-15	Write only
0x0E	IRQ edge trigger mode LSB Ch. 16-23	Write only
0x0F	Global IRQ status register	Read only
0x10	IRQ status register Ch. 0-7	Read only
0x11	IRQ status register Ch. 8-15	Read only
0x12	IRQ status register Ch. 16-23	Read only

Address 0X00, 0x02 and 0x04 Input registers

Address	Command	Description	Channel
0x00	READ	Reads the data of the 8 digital inputs	00 to 07
0x00	WRITE	Not Defined	
0x02	READ	Reads the data of the 8 digital inputs	08 to 15
0x02	WRITE	Not Defined	
0x04	READ	Reads the data of the 8 digital inputs	16 to 23
0x04	WRITE	Not Defined	

Address 0X01, 0x03 and 0x05 Output registers

Address	Command	Description	Channel
0x01	READ	Reads back the data of the 8 digital outputs	00 to 07
0x01	WRITE	Writes the data of the 8 digital outputs	00 to 07
0x03	READ	Reads back the data of the 8 digital outputs	08 to 15
0x03	WRITE	Writes the data of the 8 digital outputs	08 to 15
0x05	READ	Reads back the data of the 8 digital outputs	16 to 23
0x05	WRITE	Writes the data of the 8 digital outputs	16 to 23

Address 0X06 Power Output register

Address 0x06 Power output port

Command	Function	Values
WRITE	Writes the data of the MOSFET power switch outputs	Bit 0 = CH1 Bit 1 = CH2
READ	Read back data from the MOSFET power switch outputs	Bit 0 = CH1 Bit 1 = CH2

Address 0X07 IRQ enable/mode register

Address 0x07, Interrupt enable / mode register, one for each 8-bit byte
- WRITE -   Writes data
- READ   -   Not defined

Register	Bit	Byte	Channel	Comment
Enable	00	0	00 to 07	0=Interrupt Disabled 1=Interrupt Enabled
Enable	01	1	08 to 15	0=Interrupt Disabled 1=Interrupt Enabled
Enable	02	2	16 to 23	0=Interrupt Disabled 1=Interrupt Enabled
Enable	03		External Interrupt	0=Interrupt Disabled 1=Interrupt Enabled
Mode	04	0	00 to 07	0=Edge triggered 1=Level/compare triggered
Mode	05	1	08 to 15	0=Edge triggered 1=Level/compare triggered
Mode	06	2	16 to 23	0=Edge triggered 1=Level/compare triggered
Mode	07		External Interrupt	0=Edge triggered 1=Level/compare triggered

Address 0X08 IRQ compare mode register – equal or not equal to enable/compare

Address 0x08, Interrupt compare mode register
- WRITE - Writes data
- READ - Not defined

Bit	Byte	Channels	Comment
00	0	00 to 07	0 = Input equals enable/compare 1 = Inputs not equal
01	1	08 to 15	0 = Input equals enable/compare 1 = Inputs not equal
02	2	16 to 23	0 = Input equals enable/compare 1 = Inputs not equal

Address 0X09 IRQ enable/compare register Byte 0

Address 0x09, Interrupt enable/compare register Channels 0 to 7
- WRITE - Writes data
- READ - Not defined

Mode	Bit	Byte	Channels	Comment
Level trigger (compare) mode	00 - 07	0	00 to 07	Comparison value
Edge trigger mode MSB bit	00 - 07	0	00 to 07	Trigger mode selection MSB

Edge trigger mode selection bits (for Channels 0 to 7 for example):

MSB (Address 0x09)	LSB (Address register 0x0C)	Comments
0	0	Disable interrupt on the selected bit
0	1	Positive edge trigger
1	0	Negative edge trigger
1	1	Both edges

Address 0X0A IRQ enable/compare register Byte 1

Address 0x0A, Interrupt enable/compare register Channels 8 to 15
- WRITE - Writes data
- READ - Not defined

Mode	Bit	Byte	Channels	Comment
Level trigger (compare) mode	00 – 07	1	08 to 15	Comparison value
Edge trigger mode MSB bit	00 – 07	1	08 to 15	Trigger mode selection MSB

Edge trigger mode selection bits (for Channels 8 to 15 for example):

MSB (Address 0x0A)	LSB (Address register 0x0D)	Comments
0	0	Disable interrupt on the selected bit
0	1	Positive edge trigger
1	0	Negative edge trigger
1	1	Both edges

Address 0X0B IRQ enable/compare register Byte 2

Address 0x0B Interrupt enable/compare register Channels 16 – 23
- WRITE -   Writes data
- READ   -   Not defined

Mode	Bit	Byte	Channels	Comment
Level trigger (compare) mode	00 - 07	2	16 to 23	Comparison value
Edge trigger mode MSB bit	00 - 07	2	16 to 23	Trigger mode selection MSB

Edge-trigger mode selection bits (for Channels 16-23 for example):

MSB (Address 0x0B)	LSB (Address register 0x0E)	Comments
0	0	Disable interrupt on the selected bit
0	1	Positive edge trigger
1	0	Negative edge trigger
1	1	Both edges

Address 0X0C IRQ edge trigger mode LSB Byte 0

Address 0x0C Edge trigger mode LSB register Channels 0 – 7
- WRITE -   Writes data
- READ   -   Not defined

Mode	Bit	Byte	Channels	Comment
Edge trigger mode LSB bit	00 to 07	0	00 to 07	Trigger mode selection LSB

Address 0X0D IRQ edge trigger mode LSB Byte 1

Address 0x0D Edge trigger mode LSB register Channels 8 - 15
- WRITE -   Writes data
- READ   -   Not defined

Mode	Bit	Byte	Channels	Comment
Edge trigger mode LSB bit	00 to 07	1	08 to 15	Trigger mode selection LSB

Address 0X0E IRQ edge trigger mode LSB Byte 2

Address 0x0E Edge trigger mode LSB register Channels 16 – 23
- WRITE -   Writes data
- READ   -   Not defined

Mode	Bit	Byte	Channels	Comment
Edge trigger mode LSB bit	00 - 07	2	16 to 23	Trigger mode selection LSB

Address 0X0F Global IRQ status register – for all input ports

Address 0x0F Global Interrupt Status Register
- WRITE -   Not defined
- READ   -   Reads data

Bit	Byte	Channels	Comment
00	0	00 to 07	0 = No interrupt 1 = Interrupt occurred
01	1	08 to 15	0 = No interrupt 1 = Interrupt occurred
02	2	16 to 23	0 = No interrupt 1 = Interrupt occurred
03		External Interrupt	0 = No interrupt 1 = Interrupt occurred

Address 0X10 IRQ Status Register Byte 0

Address 0x10, Interrupt Status Register Channels 0 to 7
- WRITE -   Not defined
- READ   -   Reads data

Mode	Bit	Byte	Channels	Comment
Level (compare) mode	00 - 07	0	00 to 07	All bits are "1" if compare interrupt has occurred
Edge trigger mode	00 - 07	0	00 to 07	All bits indicate interrupt on each bit

Address 0X11 IRQ Status Register Byte 1

Address 0x10 Interrupt Status Register Channels 8 – 15
- WRITE -   Not defined
- READ   -   Reads data

Mode	Bit	Byte	Channels	Comment
Level (compare) mode	00 - 07	1	08 to 15	All bits are "1" if compare interrupt has occurred
Edge trigger mode	00 - 07	1	08 to 15	All bits indicate interrupt on each bit

Address 0X12 IRQ Status Register Byte 2

Address 0x12 Interrupt Status Register Channels 16-23
- WRITE -   Not defined
- READ   -   Reads data

Mode	Bit	Byte	Channels	Comment
Level (compare) mode	00 to 07	2	16 to 23	All bits are "1" if compare interrupt has occurred
Edge trigger mode	00 to 07	2	16 to 23	All bits indicate interrupt on each bit

BIOS configuration for Eurotech CPU modules that include an ISA/PCI bridge

Further the I/O addresses listed in the previous pages, the DAQ-1278 also needs to use address 0x279, this allows it to be recognized by the FX software.

For this reason, when using the DAQ-1278 with Eurotech CPU modules that include an ISA/PCI bridge, users should enter the CPU BIOS go to the "ISA Bus" menu and configure it as follows:

Main		ISA Bus			
	I/O space 1: Enabled	**Addr:** 00200h	**Bytes:** 32		
	I/O space 2: Enabled	**Addr:** 00279h	**Bytes:** 1		
	I/O space 3: Enabled	**Addr:** 00300h	**Bytes:** 32		
	I/O space 4: Disabled	**Addr:** 00000h	**Bytes:** 1		
	I/O space 5: Disabled	**Addr:** 00000h	**Bytes:** 1		
	I/O space 6: Disabled	**Addr:** 00000h	**Bytes:** 1		
ISA Bus	**Memory at 0D0000h .. 0D7FFFh :** PCI bus				
	Memory at 0D8000h .. 0DFFFFh : PCI bus				
	Memory at 0E0000h .. 0E3FFFh : PCI bus				
	Memory at 0E4000h .. 0E7FFFh : PCI bus				

Note:
The above image shows the BIOS configuration when a system is only using the DAQ-1278 module. It may be necessary to include other IO Spaces depending on other modules that will be installed.

Chapter 4   Troubleshooting

The following table lists some of the common problems that you may encounter while using your DAQ-1278 module, and suggests possible solutions.

If you are having problems with your DAQ-1278 module, please review this table *before* contacting technical support.

Problem	Solution
Board does not work	In some cases, if the +5V power supply rises slowly the FPGA will not initialize properly. The status LED on the board will be lit if the FPGA is correctly booted. If the LED is not illuminated you must recycle power.
No input change on bits	Check the triggering voltage levels. The DAQ-1278 is factory configured for +12V signal levels, i.e. +10V and over will be interpreted as a logical one, all voltages below will be read as logical zero.
Some bits are one and some zero when all inputs are connected to a voltage.	Close to the triggering level around 10V some opto-couplers may switch and others may not. The trigger current of opto-couplers may vary part-by-part. Solution: use a higher voltage for a logical one.

Table 8.   Common problems and solutions

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Appendix

A.1. Mechanical Dimensions
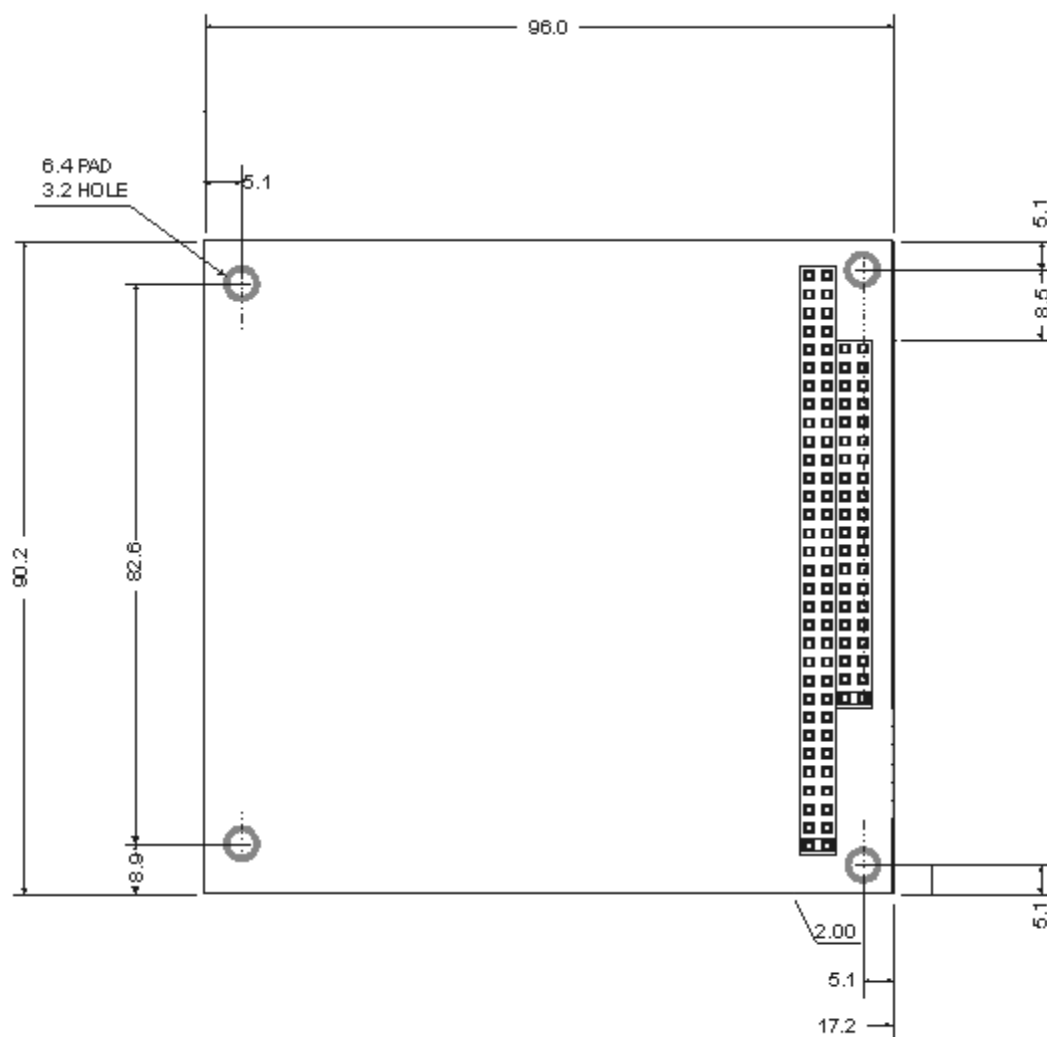
Dimensions are in millimetres

Figure 11.   DAQ-1278 Board dimensions

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i **Note:**
For further information about the mechanical dimensions of ISA and PCI buses please refer to the PC/104 consortium site (www.pc104.org)

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A.2. Manual Revision History

REVISION	DESCRIPTION	DATE
1.0	First Release	2nd February 2007
2.0	Layout updated Chapter 3 updated	22nd January 2008